UNITED STATES OF AMERICA

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CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD

PUBLIC MEETING

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TUESDAY, SEPTEMBER 17, 2003

The meeting came to order in the Cafritz Auditorium, 800 21st Street, NW, Washington, DC at 9:30 a.m., Carolyn Merritt, Chair, presiding.

Present:

Carolyn Merritt	Chair
John Bresland	Member
Gerald Poje, Ph.D.	Member
Irv Rosenthal, Ph.D.	Member
Andrea K. Taylor, Dr. P.H., MSPH	Member

Johnnie Banks	Chemical Incident Investigator
Angela Blair	Chemical Incident Investigator
John Vorderbrueggen	Chemical Incident Investigator
Ray Porfiri, Esq.	Deputy General Counsel

I-N-D-E-X

P-R-O-C-E-E-D-I-N-G-S

9:30 a.m.

CHAIRPERSON MERRITT: Good morning. I'm Carolyn Merritt. I'm the CEO and Chairman of the Chemical Safety Board. I'm very glad to see you all here this morning, and I welcome you to this public meeting of the Board.

To begin, I'd like to start with a safety announcement. The two exits behind you if you turn left or right both lead to an emergency exit, and the one behind us also is an emergency exit that leads to the outdoors in the event of an emergency. Also, I'd like to ask you, if you would, to please turn your cell phones off or on to vibrate so that we can proceed without having to be disturbed by your important business.

But I'd like to again welcome you all, and I'm pleased that you're here today. Today, this proceeding is being videotaped, and the video will be put up on our web site, www.csb.gov, later this week for access to the general public and to those who are interested in our proceedings today.

In this meeting, we'll hear from two CSB investigative teams who have completed investigations on different incidents. The first report will detail the events of a particularly tragic flammable vapor cloud explosion and fire that occurred on January 13, 2003 in Rosharon, Texas in Brezoria County. The event resulted in fatalities of three individuals and burns to -- injuries to four others. On that morning, Francisco Perez, 22, and Merchario Martinez, 32, left for work as employees of BLSR Operating, an oil and gas field waste disposal operation. Fifty-two-year-old Barry Rayburne, an employee of T&L Environmental Services, also left home expecting a routine day of waste hauling, but this day was going to be anything but routine. By that evening all of their families and the futures of their families would have been changed forever. Mr. Perez and Mr. Martinez would be dead, and Mr. Rayburne would be fighting for his life in a Galveston burn unit. That's a fight that he would lose 42 days later. Four others would be burned severely. All of their futures would be changed in ways that we can't even begin to imagine.

The BLSR investigation revealed that there were some dangerous gaps in safety practices of some oil and gas well producers, contracts, waste haulers and disposers. In 1984, OSHA promulgated rules that required all employers to create or obtain chemical and physical hazard information on materials produced or hauled, handled, in their operations and to give the information to their employees, to their customers and contractors. Those people are to be informed of the risk posed by these materials. Employers are also required to provide for their employers protection while handling these materials. Trucking operators also need this information to comply with Department of Transportation requirements and to alert their truck drivers of hazards associated with the materials being hauled.

This hazard information gives everyone receiving the hazardous material as well as others, such as emergency response agencies and organizations, needed information so that they can properly protect and train their employees and know what safety regulations apply. This way they can take precautions

necessary to safely handle the material and to protect their employees. If these requirements had been followed, the explosion and fire at BLSR might not have occurred. The victims would still be with their families, and January 13 would indeed have been just another work day.

The task of the CSB is to investigate these incidents in a scientific and objective way to find out what happened and to determine how to prevent them from happening again. It's not our intent to apportion blame or liability to anyone. There are thousands of oil and gas field workers, truckers and waste haulers in Texas and in other parts of the country, such as Pennsylvania, Louisiana, Kentucky, California, Ohio, Illinois and Indiana. No one should be faced with these same hazards just because they've not been aware of the dangers that they're being exposed to.

We also seek partners in the oil and gas industry and in those regulators who have authority in the oil and gas industry to take a lead in getting this information out. And gas and well owners,

operators, contractors and service businesses throughout the country might be handling similar materials without knowing about the flammability hazards or the regulations concerning the management and transport of these oil and gas waste materials. Today we'll hear about the consequences of those hazards and make recommendations to responsible authorities and industry operators on how to prevent this tragedy from happening again.

The incident information is also being distributed to the press that services the Spanish-speaking population of the Houston area. Many oil and gas workers are fluent only in English -- I'm sorry, only in Spanish. This population is at particular risk if they are not given information in a language that they can understand. In order to reach this population, we'll be providing an incident digest and other materials in Spanish as well as -- but we are not the first line of information. That must come from their employers.

The second report to the Board will be a case study from the Chemical Safety Board staff who

investigated what might seem to be a minor incident in Ohio. Fortunately, this was a near miss, and it involved no fatalities. Our concern, however, as a Board, is that incidents involving highly toxic hydrogen sulfide gas are all too common and attention is not being paid to the known hazard of hydrogen sulfide gas generation in many manufacturing facilities or treatment facilities where chemicals are used. This report documents the mixing of sulfide and acidic materials in an open top waste treatment vessel that subsequently generated toxic hydrogen sulfide gas when these chemicals reacted. One worker was rendered unconscious but fortunately recovered. Here again failure to recognize the hazards of inadvertent hydrogen sulfide gas generation, failure to maintain hydrogen sulfide warning alarms and failure to properly train employees of the hazards of hydrogen sulfide nearly took another life. All of these are preventable.

Learning from these two incidents and changing how business is managed to take these potentially hazardous situations serious is key to

preventing them from occurring somewhere else. Small, medium and large operations must take seriously its safety responsibilities and protect their workers from serious consequences that can result from exposure to physical and toxic gas hazards on the job.

The CSB is a scientific and independent agency. It's not our task to place blame on individuals in our investigations but to identify the holes and gaps in regulations, operations and management systems that allow these events to happen. Our mission is to promote prevention of similar incidents, but we can't do it unless business owners and operators change their view of safety and their duty under the law to protect their employees and the public from chemical hazards.

Now to the business of the meeting. The agenda we'll follow today will first be to have the BLSR investigation review presented by the staff. At that time, we'll open the proceedings for questions to the staff from the Board members. Then the staff will present their proposed recommendations. At that time, we'll open this meeting to public comment on the BLSR

investigation. If you wish to participate, please register with Mrs. Spiers at the front door. Your comments must be germane to this investigation and limited to three minutes. The public may not directly question the staff or the Board, but I encourage the public to make statements concerning this event if they wish.

We'll then take a short break and when we reconvene the Board may deliberate for further clarification with the staff with any questions that they might have about the report or the recommendations. Following deliberation we'll determine if we are prepared to vote on acceptance of this report and the recommendations. The Board may modify or add to the recommendations at this time.

Following the vote on BLSR, the meeting will proceed to the case study on environmental enterprises incident. There will be questions for staff and discussion by the Board. The public will again be invited to comment, and again I would ask you to register with Mrs. Spiers at the front table if you wish to comment on the EEI case study, keeping your

comments germane to this incident and limited to three minutes. The Board will then vote on accepting the staff report.

Now, are there any questions by the Board members or any other opening statements? Then if not, I would like to introduce the Board -- I forgot to do that. On my left here -- on my left -- on my right is Dr. Irv Rosenthal, Dr. Andrea K. Taylor, Mr. John Bresland. To my left is Ray Porfiri. He is representing our Office of General Counsel this morning. And Board Member Dr. Gerry Poje. Also, I'd like to introduce Charles Jeffers, he's our Chief Operating Officer. And with that, I'd like to introduce our investigator who is John Vorderbrueggen. John is a registered professional engineer with more than 30 years of experience in private industry. He was the lead investigator for the BLSR investigation, along with Mike Morris and who else was -- you want to name those others who were involved with this?

MR. VORDERBRUEGGEN: Mike and I did the field investigation. And then on the team was Bill Hoyle and Giby Joseph and Ray Porfiri.

CHAIRPERSON MERRITT: Okay. Thank you. Then you may proceed.

MR. VORDERBRUEGGEN: Thank you, Madam Chair, members of the Board, staff and ladies and gentlemen. Today, I'm going to present the findings of our investigation of the BLSR Operating, Limited incident that occurred last January 13 in Rosharon, Texas. I want to talk about key issues, the incident description, the incident analysis that we conducted, I'll identify the root and contributing causes that were determined, and then we'll present the recommendations to the Board for consideration for a vote. As mentioned, there's the staff that participated in the investigation.

First a little lesson on well operations to orient everybody to the operations that occurred. The well head, which is the gas if it's a gas-generating well, produces gas, water, there's salt, cyanide and other mineral debris that comes up with the gas stream. The gas stream itself is separated out through the separation system and ends up in the gas pipeline distribution system. In addition to the

natural gas that comes out, we have a material which is a liquid hydrocarbon, highly enriched liquid hydrocarbon, which is called condensate, and that is transferred into storage tanks on site, everything above the dotted line is at the well site. The water is also generated, salt water comes out of the well in significant amounts, and that all has to be handled and transported. The condensate is field tested by the oil hauler and if it passes the field test, it is then transported to a refinery or other facility that uses that condensate and processes it.

BS&W, or basic sediment and water, settles to the bottom of the condensate tank, and that has to be removed periodically and hauled and disposed of at a waste disposal facility. So a waster hauler is brought in to perform that function and then haul it to the waste disposal facility for injection into the ground.

And then finally we have the tank full of water. It's primarily salt water, and that water is removed by the same waste hauler and transported to typically the same waste facility, or at least in the

case of this incident, the waster facility accepted both materials and then disposed of.

Now what happened on January 13? The oil hauler had rejected the condensate load because the depth of BS&W exceeded the threshold value, which is about ten inches deep in that tank. So the waste transporter, T&L Environmental Services, was contacted to come to the well site, drain the tank, drain the BS&W out of the tank and then haul it to BLSR Operating. When they were off-loading at BLSR they generated copious amounts of flammable vapor, it found an ignition source and ignited, and we heard what the end results were. This view was taken about an hour after the event while the Fire Department was still there, and there was significant damage in addition to the tragic deaths that we had.

As Chairman Merritt said, there were two BLSR employees that were fatally burned at the scene of the incident and three seriously burned. Two drivers were seriously burned, and one of those two drivers, Barry Rayburne, died 46 days later. The other individuals that were burned are continuing

their recovery process.

The key issues that we found in our investigation was recognition of the flammability hazard of oil field waste liquids, in particular basic sediment and water, or commonly referred to as BS&W, which is the material that settles to the bottom of the condensate tank. The second key issue was safe handling practices associated with disposal of these highly flammable liquids.

Let me briefly summarize the three companies that were involved in this incident. Noble Energy is a global exploration and production, E&P, operation. They're an independent oil producer, and they've been in business since 1932. In 2002, they generated 327 million cubic feet of gas per day, on average, and 18,000 barrels of oil per day. The Texas Railroad Commission regulates the gas and oil well production, waste removal and all activities associated with exploration and production activities, and they provide permits to the various entities, including Noble Energy.

This happens to be one of the tank

batteries at one of the two well sites that was involved in the incident. The tank on the left is the water tank. They're 20 feet tall, 12 feet in diameter. The two tanks on the right contain the condensate. And the BS&W is only in the bottom of these two tanks, and, again, the threshold is only about ten inches before the oil hauler will not accept the load and the BS&W then has to be removed and disposed of.

T&L Environmental Services provides that service to the oil industry, and they did at the day of this event at the two well sites that were involved. They are a vacuum truck exploration and production waste liquid removal and hauling business. They, as well, are permitted by the Railroad Commission. They had about 15 employees in their operation, and their vehicles were not designed or maintained to transport flammable liquids as regulated by U.S. Department of Transportation, and we'll get into that discussion and how that plays into this as we move forward.

This happens to be a photo of a truck

similar to the two trucks that were destroyed on the fire. It's a 50-barrel truck, which is about 2,100 gallons, and they drain out of the back of the truck. That large bumper protects the back drain and the like, and that also -- that bumper and the drain method plays into the vapor generation problem that occurred at BLSR. BLSR Operating, Limited is the waste disposal facility. They are permitted by the Railroad Commission to accept waste liquids that are generated at the oil production and drilling operations throughout the state, and they also bring in some other state waste materials. They have a salt water disposal station that takes the water that's in the big tanks, and they also have a mud disposal and washout pad that takes drilling mud and other high viscous material that can't flow effectively through the piping systems. They also skim oil off of the salt water disposal side and sell that to the industry similar to the condensate being sold by the oil producer or the gas producer.

They had 18 employees when the event occurred. Some of those employees were not English-

speaking, and they could only communicate to management through one of their cohorts that might be bilingual, because none of the BLSR management people were bilingual. And, again, Texas Railroad Commission permits the BLSR Operating, and they in fact have five EPA Class 2 injection wells. EPA and Class 2 wells are wells that can accept waste water and liquids from the oil field production and drilling operations.

This is an aerial view of BLSR. The salt water disposal is there on the left, the large tank is the primary holding -- temporary holding tank before they inject the salt water in the ground, and then on the right is the mud disposal washout pad. It's covered by a roof structure which is strictly a rain guard, and that's where the fire occurred. And size-wise it's about 150 feet between those two locations. The vehicles come down the road from the right on that dirt road and come into one of the two off-loading stations.

I'll describe a little bit more detail of what happened. The two T&L trucks arrived approximately the same time, within a couple minutes

of each other. They had come from two different well sites, both operated by Noble Energy, and they had both had BS&W in the trucks. One truck backed into position, as shown in the view here. The other truck was backed in, and they're about 24 feet apart, as you can see. The two drivers left their trucks with the engines running and proceeded to the office there where they wait for the trucks to be drained by BLSR employees and BLSR employees also do a washout of these trucks to clean out, and they just use this hose spray to clean the inside of the trucks as necessary. And liquid flows down a slight slope to the life pumps, and then it's transferred into holding tanks and then injected in the ground.

So the drivers move into the office, trucks are unloading for about five minutes, and suddenly both engines start to overrev and start backfiring and the drivers heard this as well as the other employees. There was thick black smoke coming out of the exhaust stacks, both of them were responding in similar manners, and the drivers and one BLSR employee actually left that office that they were

in and approached the trucks with the purpose of shutting the trucks off. The drivers thought they could shut the trucks off, and they actually went and opened the doors of the trucks. It was right about then that the fire ignited and engulfed the trucks and the personnel.

That's another view of the incident, about an hour when they were doing final mop-up, and you can see the one truck in the scene. They were cooling that truck off and, as you can see, everything is just destroyed. Another view of the trucks looking from the other direction.

Our incident analysis identified that E&P industry believes that basic sediment and water, BS&W, is not a significant flammable hazard. They recognize that it does have some flammability, but they don't recognize the extent of that flammability. And then, furthermore, that the industry doesn't recognize that what ends up in the truck itself can contain significant quantities of highly volatile and flammable condensate, which if the BS&W starts out not to be flammable, as mentioned earlier, it may not be

flammable depending on the well site, the driver may make it flammable in the process of unloading, and I'll explain that as we go through.

Just as a reference point, U.S. Department of Transportation defines the flammability limit as a liquid that has a flash point below 141 degrees fahrenheit. The flash point is the lowest temperature at which a liquid will continue to release vapors such that it could ignite. The OSHA flammability limit that applies to the hazard is a flash point of 100 degrees fahrenheit, below 100 degrees fahrenheit. And these exploration and production waste liquids are subject to both OSHA and DOT regulations. There are no exemptions from these regulations.

As far as the flammability of BS&W that we examined during our investigation, we looked at 12 of 13 samples out of six different well sites, including the two well sites that were involved in this incident, and found that in all 12 of those cases DOT flammability limit and OSHA flammability limits were -- the liquids were well within those limits. They were down around 30 degrees fahrenheit. Also, EPA

published a report in 2000 that identified 17 of 32 results that had been submitted to them by industry throughout the United States exhibited similar flammability characteristics, and they qualified as both DOT and OSHA flammable requiring special handling and precautions.

Now, the next issue is vacuum truck handling of the BS&W and mixing of BS&W when it's taken out of the tanks. There's three things that happen that could make the BS&W either more flammable or if it wasn't flammable to start with, they can make it flammable. The removal process affects what's going into the truck, the flow characteristics of the tank contents affects what ends up in the tank mixture, and, finally, measurement accuracy by the driver all plays into the situation.

This slide here shows an example of what happens when the driver is removing BS&W out of the bottom of this tank. The tank's 12 feet in diameter, about 20 feet tall. In this example, which is representative of what happened in one of the -- or at least the levels of what happened at one of the two

well sites is the well site reported that they had 13 inches of BS&W and it needed to be removed from the tank.

If you look at the lower right corner, if you drop below four inches, you are going to take condensate out of that tank when you're unloading and putting it in your vacuum truck. We don't know exactly how much the driver intended to take, so I'm going to make the assumption that he only was taking eight inches, which happens to only be 13.5 barrels, or 563 gallons. So let's see what happens as the condensate comes down.

It only took him about four minutes to get that tank drained, because he's pulling about 100 gallons a minute. And what's really happening is the BS&W doesn't stay level across there as the whole level of the contents comes down, and he thought he was going to be at five inches in our example, but in fact if he dropped to that level, he's probably pulling condensate unless he were going very, very sloe. So that's one factor that causes the mixture in the truck to possibly be more flammable than what the

pure BS&W was.

Just, again, to show you these tanks. We're talking a 20 foot tall tank, it's 12 feet in diameter. He's only taking 13 inches or it's only at about 13 inches, and in the situation, in the incident we're talking about, the waste material was drained from the drain connection that is connected to piping that goes around to the back of those tanks. Now, the product drain connection is 12 inches up -- the bottom of that product connection is 12 inches up, and that's where they pull the product from, that other connection port.

The next problem that we identified, issue we identified was that the measurement accuracy from the waste hauler compounds the issue. In fact, the waste hauler did not measure the tank contents level, so he wasn't necessarily sure how much liquid was in the tank. He clearly didn't measure the BS&W level in the tank. And the only thing he used to determine how much liquid he had pulled out of the tank was that site glass right there. And as you can see, that site glass is not very transparent and there are no

calibrated markings on that gage. The only thing he might have been able to guess at is that the tank's half full, it's a 50-barrel truck. Maybe he had a reasonable estimate of 25 barrels. But he was only taking about 13 barrels out of each of a couple tanks. So there's a real shortcoming in the protocols that the waste hauler uses.

Just briefly reviewing the records of one of the two well sites, at 8:30 in the morning, the oil hauler physically and accurately measured 13 inches of BS&W in one tank and 15 inches of BS&W in the other tank. If you subtract that four-inch tolerance band because of the drain position, there was only about 34 barrels available to be taken the morning of the incident at the CJ Waller Site, which is one of the two well sites. The waste hauler reported at 3:30 in the afternoon he actually had filled his truck from those two tanks, which means he had up to 16 barrels of highly flammable condensate mixed in with the BS&W. That's 32 percent of his load.

Now we have a highly flammable liquid that can generate lots of vapor. It gets delivered to

BLSR. The trucks back into position and BLSR employees open two drain valves on each of the two trucks. Those are -- one's a three-inch port, one's a four-inch port. There were no hoses used to control any splashing or any flow of the liquid. Literally, it pours out onto the ground. Some of it, of course, is splashing on that large bumper. Now we are generating copious amounts of flammable liquid. All it needs is an ignition source and we're in trouble. And that's exactly what happened.

We identified up to five possible ignition sources. We narrowed it down to the most probable, but that doesn't necessarily eliminate all of those. So I'm going to talk just about the credible and probable ignition source. The diesel engine. The nature of the beast is that, number one, it has a very high temperature surface, and the literature reports that at idle it's about 250 degrees fahrenheit, and under full load it can exceed 900 degrees fahrenheit. A hot surface contact by the vapor can ignite that vapor, so that is a credible ignition that existed at the facility from the two trucks.

The probable ignition source, we concluded, also involved the engines, and let me just show you on this last slide. Notice this elbow here and that rubber hose fitting. That's the discharge of the turbo charger, and that's part of the intake system on the truck. And that's what it looks like. This is a photo of a similar engine to that that was destroyed in the fire. This next slide shows the after on one of the two engines. What happened -- what we concluded happened was as the vapor was being sucked into the engine intake system, as evidenced by the backfiring and the black smoke, it ignited inside the intake system, and when it ignited it blew the elbow off the fitting there, and you can see where it fractured the flange surface on the elbow and it also tore that elbow. And notice there's no fire damage on this elbow. That means that that elbow was on the ground before the fire destroyed the trucks. It's clear evidence that we had a serious backfire in this engine.

Further evidence that this same engine overspeeded and backfired is when it was disassembled

the push tube, or push rod for those of you not familiar with diesel engines, was seriously bent, and valve stem damage was identified that show that the valve was stuck in the open position that provides an ignition from inside the cylinder back through the intake system, blowing off the elbow and igniting the flammable vapor.

So what were the root and contributing causes that resulted in this very tragic incident. Our investigation concluded two root causes. Noble Energy, which was the shipper/offerer of the waste material to be hauled, did not identify the true flammability hazard of the BS&W that was to be hauled away at their facility. Again, they knew that it had some flammability, but the had not clearly identified what level of hazard it posed to the workers. They didn't provide the OSHA material safety data sheet to the drivers, and the storage tanks were not marked with any labeling indicating what the flammability of that material might be. The second root cause was that BLSR, which again is the operating facility of the waste facility, did not identify and manage the

flammable liquid hazard that was being delivered to their facility. They did not know what the real hazard was, they did not obtain or request an MSDS or other document from the driver, and they did not test it to determine what it was in the absence of information that the driver could have or should have provided.

The next problem with BLSR in this root cause is that the vacuum trucks weren't grounded. Grounding is an important feature to minimize the potential for static discharge. And then, finally, the method of unloading this flammable liquid clearly promoted uncontrolled vapor generation. It happened to be a fairly calm day that afternoon, the winds were essentially calm, and, quite unfortunately, they were blowing from the back of the -- the slight movement was from the back of the truck to the front of the truck, so any vapor generated had a tendency to move to the ignition source that we identified.

We have a series of contributing causes that played into this unfortunate event. T&L, the trucking company that hauled the waste material, did

not obtain the material safety data sheet for the material that they were hauling. They did not obtain that from the shipper, Noble Energy. In fact, they incorrectly believed that it was not a DOT hazard class 3 flammable. As I mentioned early in the presentation, T&L did not have authority to haul a DOT class 3 flammable, and had they known they would not have, but they didn't think that this was in that category. And, also, T&L did not use any procedures to minimize removal of condensate when they were loading their truck. We had the measurement inaccuracies, the flow characteristics were not understood by the drivers.

T&L did not use industry guidelines for safely unloading flammable liquids. There is an American Petroleum Institute recommended practice, 2219, safe operation of vacuum trucks in petroleum service. They address minimizing flammable vapor generation, or it addresses, and it also addresses control of ignition sources such as make sure you ground the truck. The trucks were grounded when they loaded them; they weren't grounded when they unloaded

them. It also recommends that you shut off the engine if it's not required to be used. There are situations where the vacuum pump is required to be used; in fact, they use the vacuum pump to pull the liquid out of the tanks at the well site. So you can't always turn off the engine.

BLSR did not use industry guidelines to manage the receipt of potentially flammable waste liquids at their facility. There's another American Petroleum Institute recommended practice, G00004, guidelines for commercial exploration and production waste management facilities. BLSR actually relied on the drivers to select which unloading station would be used without considering that the pad was an open disposal area, and they did not consider the flammability hazard associated with that. Furthermore, BLSR did not provide adequate training on hazard awareness and safe work practices to their employees and the drivers that were waiting for their loads to be offloaded.

Next contributing cause, T&L and BLSR did not train employees on the cause and safe response to

diesel engine over-revving, and this is probably a fairly common misconception in industry. Number one, both engines responded to flammable vapor by over-revving, as reported by eyewitness and as evidenced by damage to the engines. The two drivers and one BLSR employee went to the trucks thinking they could stop the problem and in fact that action directly resulted in the death of one driver and serious burns to the other driver and to the BLSR employee.

Let me talk briefly about the regulatory agencies. Environmental Protection Agency has regulatory authority over exploration and production waste liquids. These waste liquids are exempt from Resource Conservation Act, Subtitle C, Hazardous Material Regulation. That regulation addresses the toxic hazard to workers and the exposure to the environment from these toxic hazards. E&P waste liquids are exempt, and there's significant studies conducted by EPA to defend that position.

The state agencies actually do the day-to-day regulation of these waste liquids as they're generated, transported and disposed in industry.

OSHA, Occupational Safety and Health Administration, there's two specific areas that are of importance in this incident. One is hazard identification, which is 29 CFR 1910.1200. It requires that the employer, and this could be Noble Energy, it could be T&L, it could be BLSR, provide adequate labeling, provide a material safety data sheet and provide adequate training to employees who are exposed to hazards in the workplace. And it also addresses and has specific regulations for proper design of a facility that deals with a flammable liquid based on that threshold temperature I mentioned earlier, and that's in 1910.106.

The United States Department of Transportation under their Hazardous materials and Oil Transportation, which is 49 CFR Subchapter A, identifies a requirement for the transporter, T&L in this case, to classify, or the shipper to classify the hazard, the shipping papers to be properly prepared, the container, i.e. the tank on the truck, to be properly designed if they're hauling a hazardous material and then to finally labeling on the truck that we call placards to identify to the emergency

responders what's in the truck should it be involved in an accident on the public highway.

And then the Texas Railroad Commission. I said earlier they regulate the oil exploration and production in the state of Texas under Admin Code Title 16, Part 1, Chapter 3. And they address exploration, they address production, transportation and waste injection. Their statutes cover environmental protection, safety, which really focuses on hydrogen sulfide safety-related issues, production records and resource conservation, and they do periodic permit holder audits, and they have audited BLSR on a number of occasions over the years.

With that, I will open it up to the Board for any questions or discussion before I move into the recommendations that the staff has made.

CHAIRPERSON MERRITT: Okay. If you would please raise your hand so I can recognize you. Dr. Poje?

MR. POJE: John, thank you for the presentation. I'm interested in going back to the range of activities that occurred on the site of the

incident for that particular day. Were there any other flammable materials that you could have considered as being contributory to this vapor cloud or was it only the two truckloads that had greater significance, presuming that this facility was taking shipments throughout the day?

MR. VORDERBRUEGGEN: We reviewed the operating records from BLSR, and the morning of the event or during the day of the event they had received, as I recall, about ten or 12 loads of waste liquids from various production facilities. That included drilling mud, it included salt water disposal, it included BS&W disposal, and I believe a couple of trucks actually came in just to be rinsed out.

MR. POJE: Just to clarify on that, is there any perception that you have about the flammability of salt water shipments and drilling mud shipments? You characterized bottom solids and waste as, at least from some analysis from CSB samplings and from EPA samplings, that it could be almost half of such load as having a high flammability quotient.

MR. VORDERBRUEGGEN: The salt water is going to have trace amounts of hydrocarbon in it because it's coming out of the well. Those trace amounts probably are not sufficient to create near the vapor cloud that we had, and there is -- in the salt water tank it is intended to just be the salt water and those trace amounts. The drilling mud, there's two basic forms: There's a water-based drilling mud and there's an oil-based drilling mud, and the oil-based drilling mud is a diesel fuel base mineral oil that is used as the liquid transport in this drilling mud. So certainly it does have a flammability characteristics that can start approaching the hazards that we had.

It had been not less than about two hours lag time from the last load of any material brought in to when the event occurred. We were unable to test any of the samples that preexisted, but based on the information that we obtained and the contents that we believe was in the truck based on the drivers' records and based on the test samples out of the very same tanks that these trucks had hauled from, the flammable

liquid clearly came -- the highly flammable liquid and all of the vapor generating capacity, if you will, came from the two well sites.

MR. POJE: Thank you.

CHAIRPERSON MERRITT: Dr. Taylor?

MS. TAYLOR: I had a question, John, regarding the measurement accuracy for the BS&W. You mentioned that the employee who was required to remove BS&W had not conducted the measurement. When is the measurement -- my questions are twofold. One is when are the measurements for the BS&W conducted again, and how do they actually do that to determine whether they're actually just pulling the sediment? Is there any way of actually --

MR. VORDERBRUEGGEN: The only accurate measurement of BS&W taken on these condensate storage tanks is conducted by the oil hauler, that is the company that is buying the condensate that's going to drain it --

MS. TAYLOR: And in this case, this was?

MR. VORDERBRUEGGEN: And this was another party that was not directly involved in the incident.

MS. TAYLOR: Okay.

MR. VORDERBRUEGGEN: They actually haul the good condensate to a refinery or other process facility, okay? The driver of that vehicle is required -- will actually go up on top of the tank, open the hatch and drop a measurement blind down into the tank, it touches the bottom. He records the total depth of liquid in the tank which is both condensate and BS&W, and he also puts a chemical on the line down low that changes color when it comes in contact with water. So when he dropped it down in, he can see and know exactly how deep the BS&W is. So now we have an accurate measurement of that. And he will reject the condensate load if that BS&W exceeds in this case about ten inches. I believe ten inches was the oil haulers accept-reject limit. Once he rejected that load, that's when the waste hauler was called to remove BS&W out of the bottom of the tank. So we do have an accurate record of BS&W that the oil hauler records and it's documented in paperwork that ultimately ends up in Noble Energy for their use later on.

The waste hauler doesn't use that information and doesn't measure the depth of liquid in the tank, either the BS&W, which is all he wants, or the total tank contents. In this particular incident, the waste hauler, the T&L truck driver, strictly relied on what he was told that he needed to take out X inches of BS&W and he drained that into this truck only using the site gauge on the truck to determine how much liquid he had actually pulled out of the tank.

MS. TAYLOR: And is it still color-coded then or no? I mean can you see --

MR. VORDERBRUEGGEN: No. It's strictly what liquid goes into the vacuum truck it starts going up on the site glass, and he's -- in this case, he was really guesstimating how much liquid really had come out of that vacuum truck, out of that first tank and ended up in his truck. And then he had to do the sam thing on the second tank and then, if you will, add that quantity to his truck so he's starting somewhere on that site glass with the second tank unload, and he raises it up. And, again, based on the drivers'

records, even though the tank records indicate that there wasn't enough BS&W to take out and avoid pulling down below the drain line, he actually filled his truck to 50 full barrels, which, again, was more than 30 percent of what was ultimately in the truck was condensate.

MS. TAYLOR: Follow-up to that would be then how often would a hauler be pulling that much condensate and whether there's a way of knowing that you're ever not pulling some condensate, and what amount of condensate is acceptable? I guess three different questions all in one, I'm sorry.

MR. VORDERBRUEGGEN: In beginning your question you said how does the hauler know how much condensate he's pulling. How much BS&W --

MS. TAYLOR: Right.

MR. VORDERBRUEGGEN: -- is what we're looking at. Again, we're talking the waste hauler trying to take the material off the bottom of the tank.

MS. TAYLOR: Right.

CHAIRPERSON MERRITT: Can you go back to

that diagram?

MR. VORDERBRUEGGEN: To that slide? Sure. Bear with me while I dig through my -- this is --

CHAIRPERSON MERRITT: The one before that.

MR. VORDERBRUEGGEN: Yes. I can do that.

CHAIRPERSON MERRITT: That one.

MR. VORDERBRUEGGEN: Okay. That's the physical condition of that tank, the actual depth of BS&W, 13 inches was the physical condition at 8:30 in the morning on one of the four tanks that was drawn from prior to the incident. The depth of condensate is not really important in this example, other than we know it was deep enough that they wanted to haul a load. Typically, they would let that fill up. The total height of the tank is 20 feet. They would call the oil hauler to come and get the condensate when it gets to be 15, 18 feet deep. They call the oil hauler, the condensate hauler, the purchaser of the condensate to come and take the load, but if the load exceeds ten inches here, if the BS&W, as measured by the condensate hauler exceeds ten inches, he won't accept it because he doesn't want to chance getting

any BS&W into his condensate load because his buyer will refuse to allow him to unload it.

MS. TAYLOR: Okay.

MR. VORDERBRUEGGEN: Okay?

MR. BRESLAND: Let me ask a follow-up question while --

CHAIRPERSON MERRITT: Mr. Bresland.

MR. BRESLAND: -- this drawing is still up here. Before we get to that, I had one other question. The flash points that you were talking about, the OSHA flash point and the DOT flash point and then the flash point of the material, which I believe you said was 30 degrees fahrenheit.

MR. VORDERBRUEGGEN: It was down around 30 degrees fahrenheit, as tested.

MR. BRESLAND: For comparison, what is the flash point of the more common substance that we use, gasoline?

MR. VORDERBRUEGGEN: Gasoline, it's down around minus 50, depending of course on the type of gas it is. Diesel fuel is 100, right at the threshold for the OSHA definition. Charcoal lighter fluid is

around 100 because it's essentially kerosene. So there's a couple examples.

MR. BRESLAND: So this material in terms of its flammability is somewhere between gasoline and diesel?

MR. VORDERBRUEGGEN: Yes.

MR. BRESLAND: And you said that they dumped -- when they went to the disposal they dumped approximately 2,000 gallons of material which included --

MR. VORDERBRUEGGEN: Of waste liquid.

MR. BRESLAND: Yes.

MR. VORDERBRUEGGEN: In each of two tanks. So about 4,000 gallons from the two trucks. Both of them were 50-barrel trucks -- about 4,000 gallons.

CHAIRPERSON MERRITT: Of what?

MR. VORDERBRUEGGEN: Of waste material, presumably all BS&W, but we have accurate records from the Waller site, which is the site that the driver that survived hauled from. It's those records that suggest that he had upwards of 32 percent of highly flammable condensate that he had actually put into

this truck.

MR. BRESLAND: So if your calculations and assumptions are correct, when this dumping took place or the discharge from the truck took place, they discharged perhaps as much as 1,000 gallons of flammable material?

MR. VORDERBRUEGGEN: Well, we know 16 barrels. Based on records we could argue 16 barrels at 42 gallons a barrel is 700 gallons if we only concluded that one truck had excess condensate, it was about 700 gallons of condensate in the total amount that was dumped.

MR. BRESLAND: Okay. Now, leaving that for a second and getting back to the drawing that you have up here, bearing in mind that this is not drawn to scale, obviously as you know because you drew it, and if it were drawn to scale, the tank itself would probably reach to about the top of this building, 20 feet.

MR. VORDERBRUEGGEN: Yes. It's a 20-foot tall tank. This is a standard tank throughout the industry. The tank's 20 feet tall which is about the

top of this roof here, 12 feet in diameter, flat bottom, no piping inside.

MR. BRESLAND: So you're talking about a very -- you know, several inches in the bottom of a 20-foot tank, which they're removing at, you said, 100 gallons per minute.

MR. VORDERBRUEGGEN: Yes.

MR. BRESLAND: So it would seem to me that in the overall operation of these systems in a general way, apart from this one, if you discharge or remove from the tank at a 100 gallons a minute, it would be, from my perception of having been around times like this in chemical plants, that it would not be uncommon to suck out condensate material.

MR. VORDERBRUEGGEN: Oh, absolutely. If you look at the second view here, again this is a cutaway, but I didn't even get into the discussion of the vortexing action that's occurring at the very close to the port. So it could be more severe than this rendition of what this fluid is probably doing in this event.

MS. TAYLOR: So that goes to my second

question. How -- what is this -- I don't want to say the safest amount of condensate can, say, a company -- are they not supposed to transport any condensate, because it seems like it would be highly unlikely that you would get just BS&W.

MR. VORDERBRUEGGEN: The goal, of course, is don't take the man's oil, and those are the quotes from every waste hauler we talked to. The last thing the waste hauler wants to do is get the condensate, because that condensate is very valuable. It's $25 a barrel or so. So the waste hauler did not intentionally try to take this condensate at all. The problem is that they don't recognize, they don't realize when they draw down, if they get very close to that nozzle, that's what's happening. And on top of that, if they don't accurately measure what they're taking, they could pull a lot more than should have. So they end up mixing the condensate in the truck. So, again, the issue becomes -- it's more complicated if the BS&W tests non-flammable -- you know, the pure BS&W hazard is very low, but what DOT's concerned about and what BLSR needs to be concerned about is

what's in the truck, and that's critical that the driver manage that to the best of his ability to prevent that hazard from increasing. Or if they did make the hazard go up, then handle it accordingly.

CHAIRPERSON MERRITT: Dr. Rosenthal?

MR. ROSENTHAL: You had two truck unloading.

MR. VORDERBRUEGGEN: Yes, sir.

MR. ROSENTHAL: And I gather why we looked at the Noble Energy tank in some detail was we're gathered from what I think I hear you say that in similar situation it must have occurred in this other source.

MR. VORDERBRUEGGEN: Yes. Both well sites or Noble Energy well site almost identical in their configuration.

MR. ROSENTHAL: Both were Noble Energy well sites.

MR. VORDERBRUEGGEN: Both were operated by Noble Energy.

MR. ROSENTHAL: Do you have any whether their -- what the situation is at companies other than

Noble? Is this an industry-wide phenomenon, do you think, or no information?

MR. VORDERBRUEGGEN: Based on the interviews we conducted, which obviously were very limited based on available time and resources, it's hard to argue that it's widespread, but, clearly, everybody we talked to the description that we're providing here on how it was handled by these parties goes well beyond these parties. The industry needs to think harder about what's happening when they drain these tanks, and the industry needs to think about identifying these hazards to the workers.

MR. ROSENTHAL: Now, if you wrote an MSCS on BS&W, which you carefully isolated, you might get one flammability value and it might be --

MR. VORDERBRUEGGEN: It could be very low.

MR. ROSENTHAL: Very low.

MR. VORDERBRUEGGEN: In other words, it could have a high flash point.

MR. ROSENTHAL: So really what you have to write a MSCS for is not BS&W, but what is in those tanks, what you take out, if you take it out in 55-

gallon drums or if you take it out in the truck. You could write one for BS&W and give it to someone and they would conclude there's no hazard.

MR. VORDERBRUEGGEN: The duty of the Noble Energys of the world, the producers of the world that owns or manages this tank, is to identify what is the real hazard of just the red BS&W in this view?

MR. ROSENTHAL: Yes. It's not just the BS&W.

MR. VORDERBRUEGGEN: But the --

MR. ROSENTHAL: But there is a product which is a drain product. And the reason I raise this is that if you just get an MSDS on BS&W, you may have no flammability hazard at all. What you're getting a flammability hazard on is the results of an operation in which Noble Energy is throwing away 30 gallons every time they do this, a product, and not only are they throwing it away, valuable product, they're paying to dispose of it.

MR. VORDERBRUEGGEN: That's right. And, again, what you're pointing to is the challenge that, okay, so Noble does an accurate test of BS&W and they

can represent that it's not flammable under the DOT reg. In other words, the flash point is way up there.

MR. ROSENTHAL: Right.

MR. VORDERBRUEGGEN: However, what does the driver -- since the driver has the responsibility to put the material in his truck, the trucking company has a duty and responsibility to understand if they have changed the hazard. If they have changed the hazard, regardless of what the MSDS says, they then have to treat it accordingly.

MR. ROSENTHAL: I'm not dealing with responsibility, I'm just dealing with the description to say the MSDS has got to be on the product as drained, that there's a waste product that's got to be characterized whichever way it has to be for the hazards that it has.

MR. VORDERBRUEGGEN: And that's the DOT regulatory status.

MR. ROSENTHAL: And we're dealing with a situation in which a very sloppy operation is throwing away valuable product and creating hazards. So it may be a fairly general thing.

The other thing, you come to the question that in this particular instance the evidence indicates that the ignition source was probably the diesel truck. Was this site, the unloading site, was it all wired to handle flammable atmospheres, codes on flammable atmospheres?

MR. VORDERBRUEGGEN: No, it wasn't.

MR. ROSENTHAL: Okay.

MR. VORDERBRUEGGEN: There were lighting systems, 110-bolt lighting systems on the overhead roof structure that were just what you'd find in your garage. They were not designed to be used in a flammable environment. They were not in use at the time of the event. The lights were turned off and the like, but they were not properly --

MR. ROSENTHAL: They had no precautions about carrying metal bars and things such as this.

MR. VORDERBRUEGGEN: No.

MR. ROSENTHAL: Was smoking in fact taking place or ever took place at that site?

MR. VORDERBRUEGGEN: There were "no smoking" signs posted. The management and the

employees reported to us that they avoided smoking in the area, because, again, they recognize there is some level of flammability.

MR. ROSENTHAL: Okay. So they did --

MR. VORDERBRUEGGEN: But they did have -- there were challenges to that -- in that little office, which is only ten, 15 feet away from where the unloading's going on, they were smoking. There was smoking going on in that office.

MR. ROSENTHAL: And last question: Are there any other instances in which this practice led to a fire?

MR. VORDERBRUEGGEN: Unloading of BS&W or waste liquid --

MR. ROSENTHAL: Or hauling it or spilling it or --

MR. VORDERBRUEGGEN: We did not find any evidence in industry that links -- a parallel. There was evidence in industry where diesel engines are involved in flammable liquid ignitions. Some of those included gasoline spills at a gas station, there was an incident that occurred late spring this year, a few

hours north of where this incident occurred where they were doing a pigging operation. Flammable vapors found a diesel engine and destroyed all the equipment and the like.

MR. ROSENTHAL: Thank you.

CHAIRPERSON MERRITT: If I might, I have a couple of questions. One of the things you raised in your root -- or in your causes is a failure to account for or take care of static electricity charges, but yet you don't mention that as or you don't contribute that as a cause of that incident. Why have you included as part of your root cause?

MR. VORDERBRUEGGEN: The statement discussing not providing static control supports the argument in the root cause that BLSR did not have management practices in place to avoid creating hazardous situations. So it's really a reinforcement of the root cause position statement of fact that they did not ground the trucks.

CHAIRPERSON MERRITT: There are more things that need to be controlled besides static electricity. There is smoking --

MR. VORDERBRUEGGEN: Yes, ma'am.

CHAIRPERSON MERRITT: -- and explosion proofing and things like that.

MR. VORDERBRUEGGEN: Yes.

CHAIRPERSON MERRITT: So that one statement doesn't -- does that mean that you feel that static electricity is an ignition source or was an ignition source?

MR. VORDERBRUEGGEN: Static electricity is a credible ignition source, but the preponderance of the evidence drives right to the diesel engines being the actual ignition source. But static is a credible ignition source.

CHAIRPERSON MERRITT: Okay. But there are others that could be as well.

MR. VORDERBRUEGGEN: Yes.

CHAIRPERSON MERRITT: So just controlling static isn't going to necessarily control all the other possible ignition sources.

MR. VORDERBRUEGGEN: Correct.

CHAIRPERSON MERRITT: Okay. Can you tell me who owned those tanks from which the BS&W was

withdrawn?

MR. VORDERBRUEGGEN: As far as the legal term, "ownership," I won't venture on that, but the operator who had responsibility for the two well sites, each of those had two tanks containing condensate, is Noble Energy. So they had responsibility as the operator and the permit holder through Texas Railroad Commission to operate the well sites and all equipment on those well sites. That was done normally through contractors on a routine day-to-day basis.

CHAIRPERSON MERRITT: Who owned the product?

MR. VORDERBRUEGGEN: Well, Noble Energy gets the money, I'm assuming. Noble Energy and their partners. There's two other parties that are part owners with Noble Energy, and Noble Energy has the responsibility, as I understand it through their contractual agreements with the other two partners, that they operate the well sites.

CHAIRPERSON MERRITT: One of the things I see, and like you, John, I mean I've been in industry

a long time, and if I have two dissimilar materials that I'm trying to separate and it's going to -- I'm going to lose money, I would certainly design a different tank. What is the -- what do you think the contributing factor of having a tank like this in an operation where you want to remove waste and separate it from valuable product? Is that not a -- would that not be a concern as well?

MR. VORDERBRUEGGEN: It's interesting in that there are some well sites that are generating condensate or crude oil, because crude oil -- a crude oil well operates in a similar mode where they put the crude oil in a storage tank and then the crud settles to the bottom. Some of those that the rate of generation of BS&W is very, very low and you could go months and months and months and never get near the nozzle, the product draw nozzle, which is only 12 inches up off the bottom of the tank. So you could go many, many months and not have a problem. Then other well sites, and possibly a new well site, that BS&W may be generating fairly rapidly which forces you to remove more frequently.

But as you can see in the description of the incident, we're talking fairly low volumes if ten inches is the limit. Ten inches is 16.7 barrels, to be exact. It would be nice and a simple thing that would reduce the probability of pulling condensate would be to raise that nozzle, make it 24 inches. You've got 18 more feet of storage capacity up there. So for a well that generates a lot of BS&W and requires a frequent drawdown, you could move that nozzle up.

CHAIRPERSON MERRITT: Okay. Tank configuration is definitely a contributing factor to the impossibility, as I'm hearing you, of actually drawing out clean BS&W.

MR. VORDERBRUEGGEN: That's true, and these tanks have been around forever, and that's part of the problem.

CHAIRPERSON MERRITT: The BS&W that is generated in gas fields would you characterize as different from that which might come from, say, heavy crude production?

MR. VORDERBRUEGGEN: I'd be stepping a

little bit out on a limb, but the condensate in a gas field I think is typically characteristically more flammable than crude oil. Not always but in general it's going to be, and since the BS&W is coming right from that material because it settles out of it, it's characteristic is probably going to tend to be more flammable in a condensate -- in a gas well than it will be in a crude well. But that's not a global think you could ever --

CHAIRPERSON MERRITT: So even if I drew the purest possible sample of BS&W, your tests indicate that it's highly flammable?

MR. VORDERBRUEGGEN: Given enough time it won't be, because the hydrocarbon will leave the BS&W over time. But time is of the essence, so they can't let it sit there indefinitely. But if you let is sit long enough, it will lose its flammability characteristic and become -- fall outside of the range of concern. But that's not a practical solution. Time delay is not a practical solution.

CHAIRPERSON MERRITT: I'm not trying to solve the problem, what I'm trying to do is figure out

what the BS&W in gas field generation is likely to be. Is there a solubility factor for the condensate in the BS&W or is it emulsified so that it's -- you know, I mean I've seen layers where you can't get a clean separation and therefore it's impossible to really separate these materials. So you're always going to have some condensate that's going to be mixed with the BS&W which will affect its flammability.

MR. VORDERBRUEGGEN: And that is true, and, again, it's dependent on the temperature. In the winter, it's going to be probably a little bit more hazardous in the BS&W than in the summer because the high temperature of the liquid contents promotes migration out of the BS&W, this hydrocarbon. So in the hot summer months, the BS&W may be less hazardous than in the dead of winter even in Texas.

CHAIRPERSON MERRITT: So the producer's responsibility is to characterize the material that they are producing to give information to their employees, to contractors and to people who would be hauling this material away. My question is would you -- can you generalize on a material safety data sheet

to indicate that it's probable that this material is flammable?

MR. VORDERBRUEGGEN: Typical MSDS sheet, material safety data sheet, will identify a range of flammability, i.e. a range of flash points. It could say anywhere from minus 20 to plus 200, and of course the two trigger points that we have to be concerned about is 100 and 141, depending on what -- whether we're talking OSHA or DOT. So it is common to have that range, and that may be the safe thing for the shipper/hauler, the operator of the well site to put a range in there, and that puts the truck driver, the hauler on notice that what he's putting in his truck may have a flammability category that requires special handling.

CHAIRPERSON MERRITT: Okay. Dr. Poje?

MR. POJE: No, that's fine.

CHAIRPERSON MERRITT: Okay. Dr. Rosenthal?

MR. ROSENTHAL: In your experience, John, in industry, I know in mine, is this an unusually difficult separation problem or is this something that

secondary -- draining into a secondary tank, allowing with greater height or any one of a number of things that have been done in industry to separate these materials cleanly?

MR. VORDERBRUEGGEN: Certainly, you could spend the money to have a much more effective separation process upstream, but that, again, isn't a practical answer to the oil and gas industry.

MR. ROSENTHAL: Okay.

MR. VORDERBRUEGGEN: The practical --

CHAIRPERSON MERRITT: It's not up to us to solve the problem.

MR. ROSENTHAL: Right. Okay.

CHAIRPERSON MERRITT: What it is it's up to us to determine what the root cause is and what the contributing causes are and make recommendations to try to prevent this from happening again. So that's where we need to try to go. Is there any other questions at this time? I'd like at this time then to open the floor -- thank you, John. Oh, I'm sorry, recommendations.

MR. VORDERBRUEGGEN: You want to go

through the recommendations?

CHAIRPERSON MERRITT: Yes. Thank you.

MR. VORDERBRUEGGEN: Okay. Get down here and find them. Okay. With that, let me go through the recommendations that we have that the staff is recommending for action by various parties involved in this incident or involved in the regulation of exploration and production waste materials. The first recommendation that we have identified is to Noble Energy. Provide documentation of the potential flammability hazard of exploration and production waste liquids, such as the use of a material safety data sheet, to all employees, contract personnel and haulers handling waste liquids generated at the well sites. Emphasize that mixing condensate with BS&W during the removal process can significantly increase that flammability hazard. The mixture in the transport container should be treated as a flammable liquid absent any positive identification to the contrary.

Second recommendation is to Noble Energy. Review and revise the Company gauging and waste

liquid removal protocols as necessary to minimize inadvertent removal and subsequent disposal of hydrocarbon product when removing basic sediment and water from product storage tanks. Again, we recognize the Noble doesn't physically do this activity at the well site. That's contracted out through various parties. However, Noble can establish some minimum practices and impose those, that's the right word, impose those on their contractors and expect the contractors to conform.

The next recommendation is to T&L Environmental Services. They are the waste hauler in this incident. Ensure that the written procedures for hazard identification require that all customers requesting loading and transportation of E&P waste, exploration and production waste liquids, provide that written notification such as using a material safety data sheet that lists the potential flammability hazard of the waste material that they're asked to haul.

Recommendation Number 2 to T&L Environmental Services, ensure that the written

procedures for safe operation of their vacuum trucks incorporate applicable good practices, including techniques to minimize the possibility of exposing the diesel engines to flammable vapor. Specifically, we recommend that they use API 2219, which is titled, "Safe Operation of Vacuum Trucks in the Petroleum Industry."

The third recommendation to T&L Environmental Services, develop written operating procedures that incorporate best practices for unloading storage tank waste liquids, such that the drivers accurately measure the quantity of liquid removed from that storage tank and minimize the removal of product such as flammable condensate.

Recommendation Number 4 to T&L Environmental Services, ensure that written emergency procedures address the safe response to abnormal diesel engine operation due to a flammable vapor atmosphere. Explain that the normal engine shutoff method will not function as long as that flammable vapor continues to enter the intake system.

The fifth recommendation to T&L

Environmental Services, conduct and document training for all personnel who handle the waste liquids at the facility with their trucks using languages or formats that are clearly understood by the affected personnel. The training must address the potential flammability hazard associated with exploration and production waste liquids, emphasizing how the withdraw procedure is likely to increase the flammability limit of the vacuum truck contents through unavoidable mixing of product in BS&W. Describe operating an emergency response to the diesel engine overspeed that is caused when flammable vapor is ingested.

First recommendation to BLSR Operating, the waste disposal facility operator. Develop a written waste acceptance plan, as recommended by American Petroleum Institute Order G00004, which is titled, "Guidelines for Commercial Exploration and Production Waste Management Facilities." Require that the shipper or carrier properly classify the flammability hazard of the exploration and production waste liquids. Require that the carrier provide information such as an MSDS that identifies the

flammability hazard of the material before accepting the load for disposal.

Second recommendation to BLSR Operating, develop and implement written procedures and provide training to the employees on the safe handling of all waste liquids delivered to the facility in accordance API Order G, four zeros and a 4, "The guidelines for Commercial Exploration and Production Waste Management Facilities," and the American Petroleum Institute recommended practice, 2219, "Safe Operation of Vacuum Trucks in Petroleum Service." BLSR does conduct activities related to the unloading of those trucks as well as disposal of the waste. Include requirements for proper grounding of the trucks and eliminating other sources of ignition, such as the electrical equipment in the area, control smoking in the unloading areas. And ensure that the material is presented in language or formats that are clearly understood by all affected personnel. BSLR has non-English speaking employees. They need to understand clearly what is being addressed.

Recommendation Number 3 to BLSR Operating,

develop written procedures for and provide training to employees on unloading all flammable or potentially flammable exploration and production waste liquids. Avoid unloading flammable liquids into an open work area such as the mud disposal and washout pad. Include alternative unloading methods, such as using a closed piping system and minimize vapor generation. Ensure that the material is presented in a language and format clearly understood by all personnel.

Fourth recommendation to BLSR, develop written emergency procedures and provide training to the employees on the response to abnormal diesel engine operation and emergency situations, including uncontrolled vapor releases that could result in a fire or explosion hazard. Again, ensure that the material is presented in languages and formats that's clearly understood by all personnel working at the facility in the area.

Next recommendation is to the U.S. Department of Transportation. Publish an information document on the exploration and production -- for exploration and production industry employers that

includes producers, shippers, offerors, motor carriers and disposal facility operators that are involved in the transportation of BS&W and other waste liquids on public highways. In that publication, emphasize the importance of and the responsibility for properly classifying and identifying flammable waste liquids. Reference the OSHA requirements for obtaining the material safety data sheet from the shipper and the required content of their DOT shipping papers. And include specific reference to this CSB investigation report and the American Petroleum Institute recommended practices that are cited in our report.

The next recommendation is to the United States Occupational Safety and Health Administration. Issue a safety and health information bulletin on the potential flammability hazards associated with bulk transportation of oil field exploration and production waste liquids. Summarize the OSHA requirements for proper hazard classification by the shipper and the use of material safety data sheets. Summarize the DOT requirements for hazard classification and the documentation for their flammable liquids. And

approve container design and periodic testing provided in the DOT regs.

Discuss safe handling to minimize the generation of the flammable vapor and to control ignition sources from vehicle-mounted equipment and facility equipment. And, finally, summarize the requirements for proper labeling of storage tanks at the well sites and the like to clearly identify the hazard of the contents to all employees and contractors working at the well site.

Next recommendation is to the Texas Railroad Commission, the regulators overseeing the activities. Require that all permitted drillers and producers identify and document through the use of an MSDS, for example, the potential flammability hazard of exploration and production waste liquids. It should be provided to the workers and contractors, again, in languages clearly understood by the recipients, and that's throughout the state.

Second recommendation to the Railroad Commission, Texas Railroad Commission, provide information such as a safety bulletin or other

technique to industry on the potential flammability hazard associated with basic sediment and water, BS&W, and other exploration and production waste liquids. Waste liquids can contain sufficient hydrocarbons to be classified as a flammable liquid, classified specifically meaning DOT or OSHA. The waste liquid removal method can result in removal of significant quantities of flammable hydrocarbon products such that the mixture in the transport container may require classification as a flammable liquid under DOT and/or OSHA regulations, independent of what it was in the storage tank.

Next recommendation is to American Petroleum Institute. We recommend that they revise API RP 2219, The Safe Operation of Vacuum Trucks in the Petroleum Service, and revise API Order G00004, Guidelines for commercial exploration and production waste management facilities, to discuss the hazards of unloading potentially flammable or flammable liquids into open unloading areas, such as a concrete pad. Recommend other alternatives for minimizing vapor generation, such as unloading flammable liquids into a

closed piping system.

Second recommendation to the American Petroleum Institute, communicate the findings and recommendations of this CSB report to your membership. Emphasize that basic sediment and water removed from crude oil and condensate storage tanks requires special handling and compliance with DOT and/or OSHA regulations if it contains sufficient hydrocarbons, either residual or mixed in during the removal process, such that it be classified a flammable liquid as defined in each regulation.

And the last recommendation that the staff proposes to the Board for consideration is to the National Tank Truck Carriers. This organization I haven't mentioned yet but they are an association of about 180 trucking companies throughout the United States. They are lobbyists for the trucking industry, and they also provide safety guidance and training programs and the like to the bulk trucking industry. We recommend that they communicate the findings and recommendations of this CSB report to their membership. Emphasize the emergency response to

diesel engine overspeed that is caused by exposure to flammable vapor atmospheres. And that concludes the recommendation portion of the presentation.

CHAIRPERSON MERRITT: Thank you, John. At this time, then, are there any questions from the Board concerning recommendations? I have one. On your -- oh, it's not on the recommendations, no. I think your recommendations are fine. At this time, thank you, John, very much. Oh, I'm sorry, Jerry, yes?

MR. POJE: Just give me some clarification, John, on the previous activities in the Department of Transportation and the Occupational Safety and Health Administrations with the development of information bulletins? Is this a task that they have done in the past and utilized to improve the safe operations?

MR. VORDERBRUEGGEN: Yes. Both agencies do have mechanisms in place to publish this type of information and emphasize key points related to previously unknown hazards or areas that need reemphasizing and the like. So they have protocols in

place to do this.

MR. POJE: There's important non-regulatory information outreach, if you will --

MR. VORDERBRUEGGEN: Yes.

MR. POJE: -- of such federal agencies. Thank you.

MR. BRESLAND: Just a clarification point, John. Noble Energy Recommendation Number 1 requires documentation of the potential flammability of the hazards of E&P waste liquids, which is a specific recommendation to one company, Noble Energy.

MR. VORDERBRUEGGEN: Yes.

MR. BRESLAND: Texas Railroad Commission Recommendation Number 1 is basically a similar recommendation but that would be to the totality of the industry --

MR. VORDERBRUEGGEN: To all permit holders --

MR. BRESLAND: -- in Texas.

MR. VORDERBRUEGGEN: -- in the state of Texas.

MR. BRESLAND: Okay.

CHAIRPERSON MERRITT: Thank you. At this time -- thank you, John.

MR. VORDERBRUEGGEN: Thank you.

CHAIRPERSON MERRITT: At this time, I would invite any members of the public who would like to speak on the BLSR incident to step forward. I have one name that has been registered. If you would like to speak, you may still do so by registering with Ms. Spiers. Bill Poillion? Poillion. Sorry, my French isn't very good. Would you please state your name and your affiliation?

MR. POILLION: Yes, ma'am. I am Bill Poillion, Senior Vice President, Production and Drilling for Noble Energy in Houston, Texas. Good morning, Madam Chairman and members of the Board. We heard today about a very tragic accident. Our company is committed to safety, and we have dedicated our people and resources to helping your Board investigate this accident fully. We support the Board's mission; however, information obtained from outside experts and an investigation conducted by others revealed that the Board's investigation missed important facts and drew

erroneous conclusions. The omission of these facts and erroneous conclusions seriously undermines the investigators' findings about the root cause of the accident.

In our view, the Chemical Safety Board incorrectly cited the failure to identify the flammability hazard of BS&W as a root cause of this accident. The real cause of this accident was that the truck engines were left running. Anyone who has ever been to a gas station knows you just don't do that. What makes it worse was that the trucks were not outfitted with a safety device commonly installed on diesel engines. This simple device prevents the engines from overracing when a fuel supply is present. It was a spark from an engine overracing and backfiring that caused this horrible accident. That spark was the root cause.

To prevent these types of accidents, truckers must be better equipped, drivers must be better trained, and disposal sites just be made safer. It was reasonable for us to expect safe practices to be followed. We contracted with an experienced,

permitted and independent trucking company and disposal site. Now we are requiring trucking companies and disposal sites to certify their practices to us.

Your report is not only incorrect about the root causes, it fails to acknowledge the significance of other potential causes. The source of the flammable vapors caused in this accident is not conclusive. Other fluids were delivered before the trucks arrived, samples taken from the pit area where the fire occurred indicate the presence of flammable materials that did not come from our well site.

A central focus of the report is a requirement placed on shippers of potentially flammable materials. Under federal law, there can be multiple shippers involved in transporting materials, each having independent responsibility. However, the Board's investigators simply identified a single shipper and ignored the substantial responsibility that other parties had in identifying, preparing and transporting the BS&W.

We will seriously consider the Board's

recommendations, but I want you to know that we have already acted to substantially lower the risk of this type of accident from occurring again. For example, we have implemented changes that will require fewer pick-ups to remove waste materials. Our hearts go out to the injured parties and their families. They are our neighbors, and we care about people in our community.

For more than 70 years, contractors have safely disposed of BS&W from thousands of our well sties, in Texas and across the U.S. Our company has been recognized for its record of workplace safety many times. Most recently, we were honored to be nominated by the Bureau of Land Management for its best practices award, and we received both the good corporate citizen award and the safety award for excellence from the Minerals Management Services.

In conclusion, we want to emphasize again our support for the Board's mission, and we pledge to you that we will continue our efforts to increase the safety of all oil field operations. Thank you.

CHAIRPERSON MERRITT: Thank you, Mr.

Poillion. Are there any other comments at this time? If not, then I'd like to take a short break. Let's try to reconvene in 15 minutes, please, in this room for discussion and vote.

(Whereupon, the foregoing matter went off the record at 11:04 a.m. and went back on the record at 11:16 a.m.)

CHAIRPERSON MERRITT: At this time, I would open the floor to the Board and I'd ask you to raise your hands so that I can recognize you. And, John, if you would be willing to answer any other questions that the Board might have. Yes, Dr. Taylor?

MS. TAYLOR: John, just a follow up in response to the public comment that we heard. How do you go about identifying what a root cause actually is, particularly in this investigation?

MR. VORDERBRUEGGEN: Okay. It's important to understand the definition of a root cause, of course. A root cause is a management deficiency that resulted or that allowed a causal factor to occur. Causal factors are those things such as diesel engine overspeeds, equipment malfunctions, human error.

Those types of things are what we define as causal factors. And, of course, the diesel engine overspeed is a very important causal factor. We concluded it was the probable ignition source. But a root cause is a management system deficiency that allowed the causal factor to occur. So that's really the difference in definition and why we identified those management systems as being root causes.

MS. TAYLOR: Okay.

MR. VORDERBRUEGGEN: Okay?

CHAIRPERSON MERRITT: Doctor, did you have --

MS. TAYLOR: I think I understand.

CHAIRPERSON MERRITT: Okay.

MS. TAYLOR: Okay. Thank you.

CHAIRPERSON MERRITT: Are there any other? John?

MR. BRESLAND: Just one question on the process that we use for coming to where we are today. Have the parties involved in this had an opportunity to review the report with you and have some comments, feedback on the report?

MR. VORDERBRUEGGEN: Yes. They -- all three companies, BLSR, T&L and Noble Energy, were provided with the body of the report and commented on the body of the report as well as we presented the recommendations to them in meetings with them, and we discussed our preliminary recommendations prior to today.

MR. BRESLAND: Thank you.

CHAIRPERSON MERRITT: One of the things that I feel came out very strongly in your report is the -- from your definition of a root cause is the strong cause of T&L not characterizing what was being hauled in their truck. It was decidedly the next link in the chain that allowed this to happen.

MR. VORDERBRUEGGEN: Yes.

CHAIRPERSON MERRITT: Because even if the MSDS for BS&W had been obtained from Noble, their -- the way that material is sucked into the truck they can't guarantee they're getting BS&W, and so there are materials in that truck that added to its flammability. And that might be true no matter what they were doing if they went to another location or

anything else, that it would be their responsibility to characterize what's in their truck for proper shipping papers and things like that; isn't that correct?

MR. VORDERBRUEGGEN: Yes. T&L Environmental Services does have the duty and responsibility under DOT regulations to know what is in their truck before they put it on a public highway.

CHAIRPERSON MERRITT: Okay.

MR. VORDERBRUEGGEN: And their process influences that.

CHAIRPERSON MERRITT: And we have that or you have suggested this or put this as a contributing cause, and what I would like to do is make this a root cause along with the BS&W as well as the Noble Energy root cause.

MR. VORDERBRUEGGEN: You mean BLSR.

CHAIRPERSON MERRITT: BLSR -- thank you -- root cause so that there are really three links in the chain as causes.

MR. VORDERBRUEGGEN: I have no problem with that at all.

MR. BRESLAND: Just for clarification, which slide number is that?

CHAIRPERSON MERRITT: I'm sorry, Slide 37

MR. BRESLAND: Okay.

CHAIRPERSON MERRITT: And how I would suggest that we change it would be that T&L did not obtain a BS&W material safety sheet or characterize the contents of what was being hauled. So that's how I would like to modify that. I don't have exactly the right words, but we can do that as amended.

MR. VORDERBRUEGGEN: Yes. We'll make those changes based on your recommendation, and we'll incorporate that into the final report prior to publishing it.

CHAIRPERSON MERRITT: Okay. All right. Thank you. I think that would mostly be like an editorial type of change if everyone has no objections to making that. And I bring this up now because if I call for the motion, then I would be asking that the motion also understandably includes that there be this modification made.

MR. POJE: I looked at this as well, and I

agree that there are three important parties that have had a role in this incident. And moving this to a root cause is very acceptable to me.

CHAIRPERSON MERRITT: All right. Then with that, I would like to ask if there is a call for the motion or should we proceed to a motion? Is there anyone who would like to make a motion concerning accepting the report?

MR. BRESLAND: Madam Chair, I'd like to make a motion that we approve the CSB staff investigative report, BLSR Report Number 2003-06-1-TX and the recommendations regarding that incident at BLSR Operating, Limited on January 13, 2003.

CHAIRPERSON MERRITT: Is there a second?

MR. POJE: I second it with the, again, repeat of the proviso --

CHAIRPERSON MERRITT: Right.

MR. POJE: -- that we're moving to the change to the root cause as opposed to contributing cause for T&L.

CHAIRPERSON MERRITT: Would you -- so when I read it back would you make sure that that's read

properly?

MR. PORFIRI: Yes.

CHAIRPERSON MERRITT: At this time, I open the floor for any discussion between Board members. If you would, raise your hand and I'll recognize you. Yes, Dr. Rosenthal?

MR. ROSENTHAL: Yes. There were interesting points raised by comment during the public hearing by Noble Energy, but I think that the body of the report addressed those concerns. No question that had the various parties taken certain actions we would not have had that incident, because you need three things: You need a fuel, you need a source of ignition, and you need oxygen. Well, oxygen we had because they were doing it in open pits. The fuel we had in that tank. The source of ignition, if it was not the truck, could easily have been one thing or another. There's a statement and that's why people act that way. If you have fuel and you have oxygen, the source of ignition will find you. So I appreciated the comments from Noble Energy, but I think that given the context of the discussions and

the body of the report, I'm comfortable with the Board's report and intend to -- I mean with the staff's report and intend to approve it.

CHAIRPERSON MERRITT: Any other questions or comments or discussion?

MR. POJE: I concur with those comments.

CHAIRPERSON MERRITT: Then at this time, I'd like to read the -- bring the question and we will ask then for a vote. The motion then would be to approve the CSB staff investigative report, BLSR Report Number 2003-06-1-TX, and the recommendations regarding an incident at BLSR Operating, Limited on January 13, 2003 with a change proposed by the Chair that T&L be changed from a contributing cause to a third root cause of this incident. If that is properly read, then I would like to ask, Dr. Taylor, how do you vote?

MS. TAYLOR: I approve.

CHAIRPERSON MERRITT: And, Dr. Rosenthal?

MR. ROSENTHAL: I approve.

CHAIRPERSON MERRITT: Dr. Poje?

MR. POJE: I approve.

CHAIRPERSON MERRITT: Mr. Bresland?

MR. BRESLAND: I approve.

CHAIRPERSON MERRITT: And I also approve. So the motion is then carried unanimously. Thank you, John and the investigative staff for your efforts in this and the production of the report and the good work that you did. Thank you, everybody.

At this time, I would like to introduce the second case that we are going to take. This is a case study, and the lead investigator on this was Angela Blair who graduated with a degree in chemical engineering from Auburn University, 1982. She's a registered professional engineer. And will you introduce Mr. Banks?

MS. BLAIR: Yes, Madam Chairman. I'll introduce him when it's his portion of the program.

Thank you, Madam Chair, Board members, Mr. Porfiri, Mr. Jeffers, ladies and gentlemen. This is a case study report of an investigation into an incident that involved an exposure to hydrogen sulfide gas which occurred at the facilities of Environmental Enterprises, Incorporated in Cincinnati, Ohio on the

afternoon of December 11, 2002.

This is a photograph of the waste water treatment process that is located within a building at the Environmental Enterprises facility on Spring Grove Avenue in Cincinnati. I will be explaining what you see in this photo when it comes up later in the presentation.

The bare facts of the incident are: On December 11, 2002, an employee of Environmental Enterprises was exposed to the toxic gas hydrogen sulfide, or H2S. This employee was rendered unconscious but after being rescued from the immediate area, he began breathing on his own and fully recovered. There were no other injuries.

Environmental Enterprises, Incorporated, or EEI, is a hazardous waste treatment storage and disposal facility. Individuals who are in the know in environmental regulations would call this a TSD facility. Environmental Enterprises takes household waste, light industrial and laboratory hazardous waste and collects those wastes. They also provide transportation, treatment and disposal of these

miscellaneous household wastes or hazardous wastes. Environmental Enterprises, Incorporated is known to many people in Cincinnati because they have participated with the City of Cincinnati on drives to collect household hazardous waste.

In addition to the waste treatment storage, transportation and disposal operations, Environmental Enterprises also performs on-site remediation of hazardous chemical spills and HAZMAT response to small scale hazardous chemical releases.

Now, some people may be wondering why would the Chemical Safety Board deploy investigators to such a seemingly minor incident. Well, it just so happened that the occurrence of this incident coincided with a study that the Chemical Safety Board had initiated that involved toxic gas releases around industrial waste treatment systems and industrial sewers. So we were -- you could say our radar was tuned to this kind of incident.

We had heard about it and believed that this incident would be an interesting case study for that toxic gas hazard review. So two CSB

investigators, myself and Johnny Banks, whom I'll introduce in a moment, arrived on the site on December 18 of 2002. In addition to the Chemical Safety Board investigators, there were also investigators on site for Region 5 for the Occupational Safety and Health Administration and for the Ohio Environmental Protection Agency. We were later to learn that investigators from the City of Cincinnati Office of Environmental Management as well as the Cincinnati Fire Department Office of Environmental Crimes were involved in investigating this incident.

Now, I'd like to give you just a little brief description on the fairly simple waste water treatment process at Environmental Enterprises, because this is integral into the events that set up the incident. At EEI, waste water is collected from various different off-site sources. That waste water is consolidated into a tank and then tested to determine what treatment protocol is necessary. Depending on the contaminants that are in the waste water, various chemicals are added to either neutralize the waste, that is to adjust the Ph toward

the neutral zone, which neutral is defined as a Ph of 7, to neutralize the waste and/or remove those contaminants.

After the chemical treatment, the solids that are already existing in the waste as well as solids formed by the reactions to remove contaminants settle to the bottom, and then further filtering takes the solids that are entrained in that waste water out of the material. After final testing, the treated waste is discharged into the Cincinnati Municipal Sewer System if all of the contaminants that are measured are within the acceptable limits for the City permit.

This is a very simplified diagram of the waste water treatment process at Environmental Enterprises. And I say very simplified diagram but this is pretty reflective of what's in the plant, and it's a very simple process. This is where the water-based waste, or aqueous or waste water, is consolidated from all of those different sources -- household hazardous waste, light industrial hazardous waste, laboratory waste. Rather than flush that

material down the sewer of the laboratory, we collect it; Environmental Enterprises would dispose of it.

So all those materials are collected and brought into a tank. This is where it's tested. What's in this stuff and how do we treat it to get it to where we can discharge it? It then goes into the treatment tank. This treatment tank is equipped with a vent -- is an enclosed vessel, has a vent scrubber that removes any toxic vapors that might be generated, and then the vapors are vented to the atmosphere.

After treatment, the waste water is filtered and then put into a filtrate tank where it's collected. Then it is sent into a clarifier. This is an open-top vessel with a conical bottom. The design of this vessel is intended to allow whatever remaining solids that might not have settled out before this to settle out. So this is a fairly large tank that just gives time for the solution to settle out where the solids are collected off the bottom. There is also at this point the opportunity to take this material back to the treatment tank if it requires retreatment.

Then the liquid part of this waste water,

the water itself is decanted or it's a way of pouring the liquid off the top and leaving the solid in the bottom, into the holding tank. At this point, it's tested again. If all of the contaminants are within the range specified in the City disposal permit, then it's passed through one more filter just for good measure and then discharged to the Cincinnati Municipal Sewer System. From that point, it gets treated along with all of the other materials that are going into the municipal sewer.

Here's that same photograph I showed you earlier of the waste treatment process. I know it's a little bit dim. This is not a real bright room this stuff is included in. But these two blue tanks that you see here are the treatment tanks. This is where the chemical addition is performed. And if you were -- if this photograph were a little better, you would be able to see the vents that are coming off the top, and then those go outside the room to a vent scrubber.

Back off in the corner over here is a dark green tank. That's our clarifier. It's going to play an important role in this incident. This white vessel

here is one of the two storage tanks. And that stuff on the floor is water.

There are regulations that apply to the operations at Environmental Enterprises, and I'm strictly speaking about the waste water treatment operations. I'm not going to address the other hazardous waste treatment disposal and recycling things that happen at that facility. The waste water treatment facility is covered under the U.S. Environmental Protection Agency's hazardous waste regulations, and there are a number of those and we chose not to list all of them here in this presentation. In addition to that, as I mentioned before, the City of Cincinnati operates a municipal sewer and that municipal sewer district grants a permit to Environmental Enterprises that specify what they can discharge into that sewer system and what the limits for contaminants are.

In addition to that, some OSHA regulations apply in addition to all of the general working condition regulations that OSHA has, in particular, hazard communication, which is also referred to as

HAZCOM. In the BLSR presentation, John mentioned the statutory citation of 29 CFR 1910.1200. That's the regulation that specifies that the information that employers have to provide to employees about the hazards of their workplace.

In addition to that, there are regulations on hazardous waste operations, which this clearly is, and emergency response. That would be emergency response to hazardous waste operations. That's also referred to quite often as HAZWOPER. We like our acronyms in the government.

At this point, I'm going to turn the podium over to Johnny Banks who will describe the incident in a little more detail and go into the causes and the findings. Mr. Banks attended the University of California at Berkeley. He comes to the Chemical Safety Board with 23 years of experience in petroleum refining with the Chevron Corporation. While at the Richmond Refinery for Chevron, Mr. Banks was quite involved in health and safety programs with the Pace International Union. He was also a key member of the multifunctional, multidisciplinary team

that implemented the Triangle of Prevention Safety Program that became very instrumental in helping the Richmond Refinery take great strides forward in their safety program. So he comes to the Chemical Safety Board with a great wealth of practical and hands-on experience. Mr. Banks?

MR. BANKS: Thank you, Angela. Madam Chair, members of the Board, Mr. Porfiri, ladies and gentlemen, the next portion of our presentation I'll provide an overview of the incident description, the causes and our findings over the course of our investigation of events at Environmental Enterprises.

At the outset of this incident, the waste water treatment operator was conducting normal operations. He was doing a typical batch treatment of waste water. After chemical treatment, filtering and settling, a sample was taken on the waste water and the results indicated high concentrations of mercury. The treatment operator, as a result of these findings, added sodium sulfide flake to the clarifier. His intention here was to react the mercury with the sodium sulfide flake to form a salt which would aid in

the settling process.

In this view, which is kind of dim, the clarifier is captured right here. It's a vessel that's approximately 15 to 20 feet tall, and you'll note that there is a deck area that runs adjacent to this tank. There's a stairway that provides access, and it is from this level that the waste water treatment operator would add the sodium sulfide flakes. And over the course of this treatment that created this event, there would be three 50-pound sacks of sodium sulfide flake that would be added. As Angela mentioned, you have the treatment tanks to the right there and storage tank there to the left.

After the operator added the sulfide, the waste water Ph was found to be too high. This was after sampling the waste water. The operator added highly acidic polyaluminum chloride to the solution in an attempt to lower the Ph and to form larger particles. This activity is called flocculating. This would cause the solids in the waste water to clump together and, again, aid in the settling process. Due to the excess sodium sulfide in the

clarifier, this reacted with the added acid and formed hydrogen sulfide gas, or H2S. It's important to note that the clarifier is an open-top vessel and as such H2S was released into the room.

Adjacent to this clarifier is the tool storage area that the waste water treatment operator used to store his tools. As the treatment was ongoing, a mechanic entered the room to retrieve a tool that the operator had borrowed. Through interviews, he stated that as he approached the clarifier, he began to have difficulty in breathing, felt a burning sensation in his lungs and attempted to evacuate the area. He progressed approximately 20 feet before collapsing in a walkway that provided access to a separate part of the building. Other employees entering the area to investigate the smell of H2S with an H2S detector saw the mechanic lying in the middle of the floor, put him to a safe area where he began to breathe again and regain consciousness.

In this view, we tried to capture the path of egress from the area and along this dotted line there, beneath the stairway is the path that the

mechanic took. The clarifier can be seen here. This is the stairway to that deck area where the sodium sulfide flake was added. And, again, we have the storage tank. There is a path that extends to another portion of the building that he was attempting to make it to and it is in that area that his fellow employees found him collapsed.

In looking at the incident cause of this event, it was caused by performing chemical treatment in the wrong vessel. The chemicals were added to the clarifier, which, as was pointed out by Ms. Blair earlier, is not designed for such treatment. This, however, was a routine practice. The proper location for chemical treatment would have been in the treatment tanks, which are equipped with vent scrubbers that are equipped to scrub the material before it's routed to the atmosphere.

In this view, taken from the tank area, you can see the open top to the clarifier. This would be where the addition of the sodium sulfide would have occurred. And as mentioned earlier, there were three 50-pound sacks of the material loaded there.

In using the diagram that Ms. Blair showed you earlier, the normal flow, process flow would have been from the feed tank, through the treatment tanks, to the filter, filtrate tank and so on. As was the case on this day, the chemicals were added here at the clarifier, which is not equipped with a scrubber. By rights, they should have been added here.

Our findings led us to the conclusion that there were breaches of several managed systems. These systems included procedures, training, hazard communication with the work force, sharing of previous incidents, mechanical integrity and management oversight. I'll go over each of these points and point out the features that make them important.

In the area of procedures, there were no specific procedures established for waste water treatment operations. These treatments were designed on a batch-by-batch basis and in some cases were determined by the sample results. On-site chemists were not consulted on treatment protocols on a regular basis.

In the area of training, operator training

was not -- the operator was not formally trained in waste water treatment operations and chemical hazards. In fact, the operator and management relied on his personal knowledge to conduct waste water treatment operations in a safe and efficient manner.

In the area of hazard communication, non-operating personnel were not trained on the hazards of H2S or the significance of certain orders. Consequently, they were not aware of the imminent danger that would be inherent in the characteristic rotten odor smell -- rotten egg smell associated with H2S. These odors were in fact considered a normal part of the waste water treatment operations. Finally, there were no warning signs of potentially hazardous conditions in the waste water treatment area.

In the area of previous incidents, a previous H2S release in 2001 resulted in an order from the Cincinnati Office of Environmental Management that Environmental Enterprises would install an H2S detector and dissolve sodium sulfide before addition to the treatment process. In fact, the operator was

not aware of this 2001 order from the OEM.

In the area of mechanical integrity, the H2S detector was not working at the time of this incident. There was no calibration and inspection program in place. The calibrations were done on a very casual, whenever needed basis with no record of when or by whom these calibrations were done. In this view, we have a shot of the H2S detector which if working properly would have sounded an audible alert and visual que that H2S is present in the area.

In the area of management oversight, management and chemists were not consulted on a regular basis on treatment protocol. Additionally, there was little direct management oversight on waste water treatment operations that we observed in our investigation.

That concludes my portion of the presentation, and I'll return the podium to Angela.

MS. BLAIR: Ladies and gentlemen, because this is a case study and not, as we would call, a full blown Chemical Safety Board investigation, we do not use the terms, "root and contributing causes." We are

simply here to identify factors that contributed to this event happening. And, likewise, we do not make recommendations in a case study. We merely point out preventive measures that if they had been in place might have prevented the incident from occurring. So I want you to keep that in mind as we go through the next few items.

Effective management systems are the key to preventing accidents, and that's true of any accident, of any kind, at any place. Management systems are the key. And when I say the word, "management systems," it tends to conjure up images of rows of thick manuals full of procedures and mounds of paperwork, lots of training and expensive hours by some high-faluting management system expert. That is not necessarily the case. In fact, in my experience over the years, I have seen that management systems can be tailored to fit the size and complexity of the organization. When you have a small organization like Environmental Enterprises who had about 40 employees and you have a simple management structure, then the management system documents and procedures can be

tailored to work effectively within that organization.

Now, not all elements of a total comprehensive management systems are pertinent to this event, so I've singled out the areas where I believe preventive measures would have prevented this accident from happening. First of all, written policies and procedures were needed for risk reduction and for regulatory compliance. In other words, a top-level statement from management that states, "These are the regulations that we must comply with, these are the risks that we must manage, and here are the procedures as the operations personnel of the plant must implement in order to accomplish those goals."

Management oversight was an issue that Johnny Banks identified as one of the causes of this event. There should be guidelines to management, I'm talking about supervisors on the line level, all the way up to the plant manager, on what oversight was necessary for day-to-day operations. And included in that would be scheduled audits and inspections. These are internal inspections by plant personnel to determine deficiencies in their own program and to act

upon those. Some of you might know of the term, "management by walking around." This is a way of formalizing that practice.

Written work instructions and operating procedures are also necessary. These work instructions and operating procedures would cover day-to-day as well as abnormal situation operations in the waste water treatment system as well as procedures and work instructions for things like mechanical integrity, maintaining the H2S detector.

Another pertinent management system that applies to this incident is a formal training program, and, again this does not have to be complex or a large document, but it should address what the contents of that training program are, who should be allowed to give the training, what they should talk about and which employees should attend. And those training programs would include hazard communication, which are, "These are the hazards of our process and these are the steps that we take to avoid them and what you should do, you as an employee," and formal training for the operator on those written operating

we obtained." The purpose for the verifiable records is not only to allow the employees themselves to effectively implement their procedures, but it also allows that internal audit and inspection program to work. This is where you will be able to determine are employees complying with what we, the employer, require them to do.

Subsequent to this event, Environmental Enterprises, Incorporated management has implemented several corrective actions to prevent recurrence of this event. They have in fact established written operating procedures for operating the waste water treatment that include a strong requirement to perform all chemical treatment in the proper vessels; that is, the treatment tanks. They have conducted training for all of the waste water treatment operators on these procedures and the proper operation of this process. They have also conducted training for all facility employees, and this includes the secretarial and front office staff as well as the employees in adjacent operations to the waste water treatment area on the hazards of hydrogen sulfide.

Improved ventilation equipment has been installed in that room we have been seeing in our photograph so that if there is a future release, it will be evacuated from the area more quickly. This will also minimize personnel exposure to the toxic gas. They have implemented a calibration program for the hydrogen sulfide detector. If you were very sharp and observant when Mr. Banks showed you the photograph of the hydrogen sulfide detector, you would have noticed a clipboard hanging by it. That photograph was taken on a return visit to the facility a few months after the incident. That clipboard contained the calibration records and showed evidence that the detector had indeed been repaired and been subsequently calibrated several times after the incident.

Finally, the facility installed warning signs at the entrances to the waste water treatment system to warn other non-operating employees that hazardous operations might be taking place, and they have instituted controls to prevent non-operating personnel from entering this area when there is a

potential hazard.

That concludes our fairly brief presentation on this case study report. I welcome anyone who has questions about this case study to visit our web site. There will be a copy of the report posted on the web site at csb.gov. You may also email me directly, angela.blair@csb.gov or you may call me, and that is my office phone number -- or that is the switchboard, and they will direct you to my office. Thank you.

CHAIRPERSON MERRITT: Thank you, Ms. Blair and Johnny Banks. Appreciate it. At this time, I'd like to open the floor to the Board if there are any questions.

MS. BLAIR: Mr. Banks, would you join me up here?

CHAIRPERSON MERRITT: Dr. Taylor?

MS. TAYLOR: You mentioned that the practice of putting the materials, the sodium sulfide and the aluminum, into the clarifier was a common practice.

MR. BANKS: Yes.

MS. TAYLOR: Did you inquire from the employee why he did not follow the proper -- of putting it in the proper treatment tank?

MR. BANKS: From interviews, we learned that it was a sense of achievement to get the job done. It was -- he got accolades for getting the waster water treated in a manner whatever it took to get the job done, and that included the activity of adding materials to the clarifier.

MS. BLAIR: Instead of sending it through the treatment tank.

MR. BANKS: Right. It would shorten the process.

MS. TAYLOR: It would have taken the process longer.

MR. BANKS: Yes.

CHAIRPERSON MERRITT: Dr. Poje?

MR. POJE: I thought you did a very nice job. This is a significant incident, not in the sense of our ranking of incidents with high levels of consequences but because of its potential impact on preventing similar such events at other places. Would

you hazard a guess as to the number of such facilities that there might throughout the country that have a similar scope of work? Cincinnati, I presume, is not the only city that handles household hazardous waste.

MS. BLAIR: In fact, no, they're not. I just saw an article in my own hometown newspaper, the Mobile Register, about a hazardous waste collection drive from household and other producers, so I know that that activity is going on all over the country. We're in the process of obtaining that information with the assistance of Dunn & Bradstreet to identify other facilities that are similar to this. But my initial research on the EPA database is that they number in the hundreds.

MR. POJE: And I just had the opportunity for returning from a meeting of the Society of Environmental Journalists, and I would just like to say that such case studies, shorter, synoptic reports that point directions on where there are systemic problems that affect large numbers of people, are very valuable documents to a very broad audience. So I salute you for your pursuit of this task.

CHAIRPERSON MERRITT: Thank you. Mr. Bresland?

MR. BRESLAND: You said that several other agencies were involved in the investigation of this incident?

MR. BANKS: Yes.

MR. BRESLAND: What was the result of those investigations?

MR. BANKS: Yes. The Ohio component of OSHA issued fines to the Environmental Enterprises to the tune of --

MS. BLAIR: It was over $130,000.

MR. BANKS: -- $136,000 for wilful violations.

MS. TAYLOR: They cited them for HAZCOM as well as -- were they cited for HAZCOM at all?

MR. BANKS: Yes.

MS. BLAIR: Yes. They were cited under HAZCOM, HAZWOPER and the general duty clause.

CHAIRPERSON MERRITT: Dr. Rosenthal?

MR. ROSENTHAL: Yes. They put this H2S detector in after an earlier incident.

MS. BLAIR: Yes.

MR. ROSENTHAL: Is there any record of did they initially start to calibrate it, pay attention to it or they never had a pattern of calibrating it?

MR. BANKS: It was a random approach to doing it. And the two gentlemen that we spoke to, the operator and the mechanic, they would, on occasion, go by, "Well, I haven't checked this in a while," and calibrate it. So there wasn't a systematic approach to saying it's checked every Tuesday by the maintenance group. It was very random, and as a result it fell between the cracks.

MR. ROSENTHAL: What was their -- I guess what I'm trying to find out is if the usual pattern that immediately after the incident they maybe checked once a week, two months later, once every three weeks. Do you detect a fall-off?

MR. BANKS: There's a very real possibility. When you looked at the overall culture there at Environmental Enterprises, you could see where there could be a drift back to a casual approach to doing things like that. It's our hope that this

report will kind of raise the importance of equipment such as that, that people will take the time to go and calibrate it and make sure that it's working properly, because part of our work in interviewing people was just to ask, "How much do you know about H2S," and the response that we got back was striking to me. There was very little knowledge that they had about the effects of H2S, long-term, short-term knowledge of what the characteristics were to tell if you've been exposed.

MS. BLAIR: If you've ever been in an operation where somebody comes in, "Oh, man, you smell awful," and the comment is always, "Well, it smells like money to me," because it smells like whatever we do that makes money for the company, and that was the kind of comments that we heard.

Our initial -- when we observed the clipboard by the detector there, the calibrations had been done on about a monthly schedule. So it's not too ambitiously overactive in the beginning, and monthly is probably adequate for that kind of operation.

MR. POJE: H2S is a well-known odoriferous chemical, and most of us get exposure to it in high school laboratories as the rotten egg smell, but it's also notorious toxic agent for which our noses can go through an olfactory fatigue and no longer detect that quite odoriferous chemical because we get used to it, which is another reason why it's so incumbent upon facilities that have potential like this to have calibrated detectors to provide adequate warning.

MR. BANKS: Well, that was one of the cautions that went out to the work force that worked in this area was that, well, as long as you can smell it, everything's okay. And so it led to a false sense of security where if you go to that next step of realizing that it does get the olfactory nerves and that you won't be able to smell it, it's too late, they didn't know that, So they didn't know what they didn't know.

CHAIRPERSON MERRITT: Are there any other questions or comments? Thank you very much, both of you.

MR. BANKS: You're welcome.

CHAIRPERSON MERRITT: Appreciate it, very good report. At this time, I'd like to open the floor to any public comment. Were there any registrations of wish to speak? Then there being none, I would ask if we have a motion to accept the case study on EEI?

MR. BRESLAND: I'd like to make a motion that we approve the CSB Staff Case Study Number 2003-02-C-OH regarding an incident at the Environmental Enterprises, Incorporated, parenthesis, EEI facility, in Cincinnati, Ohio. This case study describes a hydrogen sulfide exposure incident that occurred on December 11, 2002. One person was injured. The H2S exposure was caused by using the incorrect vessel to treat chemicals.

CHAIRPERSON MERRITT: Is there a second to that?

MS. TAYLOR: Second.

CHAIRPERSON MERRITT: Dr. Taylor seconds it. Is there any discussion from any of the Board members concerning this report, this case study?

MR. POJE: Madam Chair, I've had extensive discussions with the team in the preparation of this

work, and I think they've done a very good job.

CHAIRPERSON MERRITT: Okay. Thank you. Then at that time, I'd like to propose the question and bring this to a vote. Then the question is should we approve the CSB Staff Case Study Number 2003-03-C-OH, regarding the incident at the Environmental Enterprises, Incorporated facility in Cincinnati, Ohio. This case study describes a hydrogen sulfide exposure incident that occurred on December 11, 2002. One person was injured. The H2S exposure was caused by using the incorrect vessel to treat chemicals. Then I would call roll call. Dr. Taylor?

MS. TAYLOR: Approve.

CHAIRPERSON MERRITT: Dr. Rosenthal?

MR. ROSENTHAL: Approve.

CHAIRPERSON MERRITT: Dr. Poje?

MR. POJE: Approved.

CHAIRPERSON MERRITT: Mr. Bresland?

MR. BRESLAND: Approve.

CHAIRPERSON MERRITT: And I approve it as well. With that, the motion is carried unanimously without modification.

MR. ROSENTHAL: Just an informational question. I gather that Angela somewhere along the line is getting the name of all the waste treaters. Are we planning to distribute this report to such facilities? It's a small report.

MS. BLAIR: That's a good idea.

MR. ROSENTHAL: It just strikes me that this is this week's sermon and if we get it out, it will probably have effect for at least one week, but maybe a year or so. And given that there are a large number of these facilities, it's a common hazard, I would like to suggest the staff consider taking that list and sending out with the appropriate letter to those facilities.

CHAIRPERSON MERRITT: So noted. Thank you. Then if that concludes our business, with a vote to approve the EEI case study we come to the end of the scheduled business for this morning's public meeting. Let me thank the two investigative teams for their excellent work, John Vorderbrueggen, Mike Morris, Giby Joseph and Bill Hoyle for BLSR investigation and Angela Blair and Johnny Banks for

the EEI investigation. Both of these cases were brought to closure in well under 12 months, which I'm very pleased to report, and with outstanding final report in each case.

Let me offer an additional comment directed to BLSR, T&L, Noble Energy and Environmental Enterprises. As a former corporate safety official myself, I know that no company wants to be the subject of a federal investigation, even a non-regulatory scientific investigation like ours. No company wants its name brought up in the public where there are root causes and investigative findings are being discussed. For that matter, no company wants to have serious chemical accidents either involving employees or their contractors.

In this way, all of us share a common purpose. We all want to prevent this kind of accident from happening again. My appeal to everyone is simple: Join with the Chemical Safety Board in disseminating the lessons learned from these unfortunate events and help us build a safer future. Tell your employees, tell your customers, tell your

trade associations and your competition. Help get the word out about these hazards. Remember that our purpose here is not to point blame or to apportion responsibility. It's simply to save lives in the future.

There's an urgent need out there for more knowledge about oil field waste hazards, about hydrogen sulfide hazards and about all the topics that we've discussed here today. To the companies where accidents have occurred, you have a credibility that goes out -- to go out and warn others. Surely, all of us owe the service to the victims of these accidents.

On another note, today, September 17, marks the first anniversary of the Board's landmark study on reactive hazards, the hazards from uncontrolled chemical reactions in industrial settings. Last year, we reported that 167 serious reactive incidents occurred in the U.S. over the previous two decades. These incidents caused more than 100 fatalities.

Disturbingly, more than half of the chemical processes involved in these accidents were

not covered under EPA or OSHA process safety rules. One year ago today, the Board voted unanimously to issue 18 new recommendations to control reactive hazards. Importantly, we recommended that both EPA and OSHA broaden regulatory coverage of reactive chemicals and mixtures. We are no awaiting definite responses from EPA and OSHA on how they intend to proceed. I've had constructive discussions with Secretary Henshaw in particular, and I look forward to the progress that's being made on these issues. But there are glaring holes in the rules currently, and now is the time to close that gap.

Today, September 17, also marks another milestone in this process. Today, we are releasing the complete data set of 167 incidents that underpin the reactive hazard investigation. These data will be available from our web site, www.csb.gov, and on CD-Rom. Our hope is that this information will now be used by researchers and others to further understanding of reactive hazards and lead to greater efforts to prevent accidents. The public will now be able to review each incident by date, location,

company name, chemical involved, reported cause and impact.

In reading this information, one conclusion is clear: Too many reactive hazards are occurring, and they continue to occur, and they are causing tremendous damage and suffering. All are preventable through better safety management, and these incidents continue to happen today, including the Ohio incident we heard about this morning. The Board currently is investigating six significant reactive incidents.

On behalf of the Board, I'd like to thank Giby Joseph and Chris Kirkpatrick for their diligent work in assembling and clearing all the reactive incident data that we now have that is being released to the public. The Board's next public meeting is scheduled for Tuesday, September 30 in New York City where we'll take up a final staff report on the KalTech building explosion that occurred in April 2002. That event, also a reactive incident involving waste products, caused more than 30 injuries in the Chelsea neighborhood of Manhattan. That public

meeting will be webcast live from the Agency's web site, csb.gov.

And with that information, this meeting stands adjourned. Thank you all.

(Whereupon, at 12:08 p.m., the CSB meeting was concluded.)