Certification Form

I certify that I have read the transcript for the June 21, 2007, meeting of the Panel, and that, to the best of my knowledge, this transcript is accurate and complete.

Linda Zeiler, Designated Federal Officer

Dr. Jan M. Mutmansky, Chair

TECHNICAL STUDY PANEL ON THE UTILIZATION OF BELT AIR AND THE COMPOSITION OF FIRE RETARDANT PROPERTIES OF BELT MINING MATERIAL IN UNDERGROUND COAL MINING

CAPTION

The Technical Study Panel on the Utilization of Belt Air and the Composition of Fire Retardant Properties of Belt Materials in Underground Coal Mining met on June 20, 2007 and June 21, 2007 at the Best Western Airport Hotel, 5216 Messer Airport Highway in Birmingham, Alabama. The minutes of this Hearing were taken by Susan Bell, CSR, Notary Public in and for the State of Alabama.

AGENDA

Wednesday, June 21, 2007

9:00 to 4:00 p.m.

NIOSH Presentation on Belt Fire Detection Sensors and State-of-the-Art Smoke Sensors, David Litton

NIOSH Presentation on Effective Training Techniques for Emergency Response Preparedness for AMS operators and in General for Underground, Launa Mallett

United Mine Workers Association Panel; Presentations and Q & A

LUNCH RECESS

Public Input Hour

Center for Regulatory Effectiveness, Bruce Levinson

Jim Walter Resources, Dale Byran

Adjournment, Day 2

UMWA PANEL

Joe Weldon

Dwight Cagle

Larry Turner

Glen Loggins

Tom Wilson

TECHNICAL STUDY PANEL

Dr. Jerry Tien

Mr. Thomas Mucho

Dr. Jan Mutmansky

Dr. Jurgen Brune

Dr. Felipe Calizaya

Dr. James Weeks

ALSO IN ATTENDANCE

Linda Zeiler, Designated Federal Official

Kevin Hedrick, Electrical Engineer, MSHA

Debra James, Standards Office, MSHA

Hazel Haycraft, MSHA

Bob Timko, NIOSH Representative Presenter

PROCEEDING

MS. ZEILER: Good morning. Before we get started this morning, I would like to remind everyone who's here if you haven't signed in, please do so at the end of that table.

We have a couple of presentations this morning provided by NIOSH, and I had asked Bob Timko to make the introductions.

Bob.

MR. TIMKO: Thank you, Linda.

Good morning, everyone. We are going to have two presenters here this morning; Dave Litton and Launa Mallett. Dave will be leading us off this morning.

If you attended the Pittsburgh meeting, you know Dave did an excellent job on presenting a paper concerning belt toxicity. He's going to follow that up talking with us for a while this morning about belt entry sensors for mine sensors.

Dave has been with the Bureau of Mines and NIOSH for 36 years, and he is a Senior Research Scientist. He's well known throughout the industry for his work in fires and in sensors.

So, with no further ado, Dave, the floor is yours.

MR. LITTON: All right. Can everybody hear me?

Okay. Someone asked me to make a sort of a presentation on Atmospheric Monitoring Systems with a particular emphasis, I guess, on smoke detectors. So what I thought I would do is sort of give you guys, and ladies, a sort of historical prospective and brief overview of what's been done over the last several years, I guess.

So, basically, I would like to look at what's been done, why we did what we did, what's worked, what hasn't. We've had some success, some failures. I'd like to look primarily at simple sensors.

If you've been involved in fire-related research, in particular detection as long I have, what you find out eventually is that fire detection is not simply getting a gadget, sticking it under the roof of a coal mine or any other kind of mine and walking away. There's a lot of stuff that goes into trying to figure out what kind of sensor, where to put it, and what factors impact it.

So, very early on, we developed a philosophy about fire detection in general, and what we did basically -- the basic premise of fire detection was to prevent something like this from occurring.

What I've done is try to put something in a very general context to say that at some point in time, we get something happening. That's given by the red line here. If something happens in time, it's given by the red line.

Something happens, a fire

starts; and there's basically a time line that you have to work with. It's in the very early stages that you need to get something going in terms of detection because once detection happens, at some point, you're going to get what I call a critical hazard level or a situation that's untenable.

It could be the mine is just completely engulfed with flames and fire. It could be that people can't get out. It could be any of a number of things that happen.

It's at that point that -- anything beyond that point, you then transition into some sort of recovery or control operation or something like that. So you're left with a fairly finite time frame here to work with.

So the larger you can make this time interval here, by making it more sensitive, since this is not going to change too much -- depending upon what you're looking at in terms of the fire and everything, you need to work with very rapid detection, reliable and very sensitive sensors, and so on.

What we did over the years was we -- the research took on many different forms. We looked at sensors and systems. We looked at many types of fires -- smoldering fires, conveyor belt fires, wood fires, you-name-it kind of fires.

We wanted to look at the characteristics of the fires, we also wanted to look at fires and ventilation. How do fires affect the ventilation system, which they do. In turn, how does ventilation affect fires, the way they grow and develop. We did a lot of modeling to support these experimental activities.

What I'd like to do is sort of brush aside the fires, the fire modeling, and all the other research and just look primarily at sensors and systems in terms of this particular talk.

There are certain basic things that we'd like. We'd like the sensors to be sensitive. We'd like for them to be rapid or early warning. I think that's a term that's used by MSHA and other people. We'd like them to be reliable. We don't want them going off every other second, and we want to know that when they go off and they alarm or alert something, that there's something going on.

In my own simple mind, I like to keep things kind of simple. All right. Simple means anything that you can do up front in the sensor and make it easy to use without having to do a lot of processing, and so on. There's a lot of stuff that goes on sometimes. That way, the better off you are.

If you can make a sensor work for you, you're going to be way ahead of the game. So what did we do during this time period? We looked at heat sensors, we looked at temperature sensors, we looked at optical flame sensors, we looked at gas sensors, and we looked at pneumatic sensor systems.

These are two systems that were pioneered in Great Britain many years ago. We use them for detection. They have a place -- we actually used one of these along the belt line at one point. It can be designed, and it can be very rapid. It depends on what you -- how much you want to spend in your particular configuration.

We looked at smoke sensors until we were blue in the face. In recent years, John Edwards, at NIOSH, looked at multi-sensor arrays or neural networks.

The chronology basically was point-type heat sensors since we did have a lot of work when the Coal Mine Safety and Health Act of '69 went into affect.

A couple of people went together and pooled their collective resources and came up with a way to put heat sensors specified in the Safety Act along belt haulage ways at 125- or 50-foot spacings, depending on the ventilation flow.

That was basically what was written into the regulations, but they also put a little caveat in there called equivalency, which always rears its ugly head at some point. We have struggled with that over the years.

Between '73 and '77, there was a lot of work done on electrochemical CO sensors. A lot of that was done by MSHA and other companies. Some of you may have even been involved here, if you go back that far. There was a lot of developmental work. There were a lot of different companies involved. A lot of places ended up using basically City Tech sensors.

We had our own work, where we looked at -- this was a smoke sensor that we developed. It's very highly sensitive.

It's kind of fancy, wasn't simple.

We did the tube-bundle detection systems. You can look at smoke. You can design it to look at smoke, or you can look at gas sequences through a number of different points. Each point corresponds to a sensor location these days.

You can design it so it's equivalent to CO sensors at 1,000 feet or something like that just by selecting the right pumps and the right size of tubing and those kinds of things.

We looked at detecting fires in mines that use diesel equipment. That was a big thing at one time. We developed a pyrolysis sensor where you basically reburn smoke particles. That's a way of detecting a fire. It turns out the fire smoke reburns, the diesel smoke doesn't.

We looked at and worked with people at Carnegie Melon Research Institute, and I think Conspec did have at one time what's called a CO discriminator. It's a CO sensor for use in diesel mines.

We looked at optical smoke sensors. There's a good reason for that. We actually built some prototypes and tested them out, and we looked at a combination sensor, which is an optical sensor in combination with an ionization sensor. The last two are both smoke sensors.

Then, like I said, we also looked at a multi-sensor neural-network-type of system. So we've looked at many different types over the years.

Just some pictures of some CO sensors. These are just a couple that you could buy off the shelf. There's a Pyott Boone one, and I think there's a Conspec.

We looked at a smoke particle detector, a very sensitive one that we developed, the SMPD. Basically, you bring particles in with a flow here, you charge them, and you measure the current.

This guy works really well. We actually have -- even though this guy was built back in about '76 or '77, we still have a few working models on the grounds.

One of the nice things about it was that unlike a lot of other smoke detectors, you're always looking at a zero background. In other words, you're looking at a current, a charge-particle current. In the absence of particles, it's always zero. So your signal-to-noise ratio with this type of little gadget is extremely high. It's very sensitive.

We had it configured a couple of different ways. We actually loaned these to places abroad. At that time, there was a place in France. There was a Mine Tramonia in Dortmund. They both took gadgets and went on and evaluated them.

They did a whole series of tests and came to the conclusion that if we could get this guy underground, it would be great because it provided the earliest most reliable early warning at that time. This was back in the late '70s and early '80s.

CO discriminators. This is the one that -- I think Conspec makes this. If the Conspec guy is still here, maybe he can tell me. I tried to download most of your information, but I don't remember specifically.

Basically, it looks at carbon monoxide and nitric oxide. It's for use in diesel mines, and it's based on the premise that the ratio of carbon monoxide to nitric oxide is very fixed for mines that use diesel equipment because for diesels, that ratio is in the neighborhood typically of about two to four. It can ramp up and down a little bit.

So what you do is you look at the NO. It's three parts per million, and you multiply that by three. So you would expect nine parts per million of CO. So nine parts per million becomes your running baseline, and then you look at the CO above that for fire detection purposes.

I have a tendency to go quickly. If you have a question, let me know.

We looked at angular scattering sensors. We looked at it as something that measures angular scattering at 20 degrees. If we look at smoke concentrations at five milligrams per cubic meter for angular scattering, we found that diesel exhaust particles produce an output of roughly 30 millivolts.

Flaming fires produced an output of roughly three-tenths of a volt, almost a factor of ten higher. From smoldering fires, we got all the way up to seven-tenths of a volt.

So there was a lot of built-in discrimination because the diesel particles are very small in size. They don't scatter efficiently. So you're able to detect a fire with a simple optical detector -- an optical smoke detector.

We looked at a couple of different kinds. We looked at one that's what I called a dual angle, where we actually looked at 15 degrees and 30 degrees. It had a little laser diode. We built these gadgets. We didn't just do off-the-shelf. We tied these underground. They seem to work fairly well.

One of the things with smoke detectors they found at the lab in Pittsburgh is the fact that a lot of them always had to contain pumps, and pumps have notoriously been a hindrance when you are using these for detection. That's why you -- there was a lot of emphasis in the early CO sensors using the pumps, but they went to diffusion-type CO sensors because the pumps tended to fail.

There are better pumps out now, and something like this probably in the form of a detector -- I'll show you a couple later on -- could be incorporated fairly simply. I think this was in '90, '91, '92, somewhere in that time frame.

More recently, we looked at the combination of angular scattering and ionization smoke measurements, and we used the ratio to discriminate between smoke for fires and particles from diesels. For diesels, we get the ratio around 17; for flaming fires, it's around 1; and for smoldering fires, it's around .1 to .2. Very good discrimination capabilities.

We had several of these. Here's what the ratio looks like for different aerosol sources. We look at the ratio of the ionization to the optical. You see that it's real high for -- diesel particulate matters, this guy. For flaming fires, it decreases; and, for smoldering fires, it decreases even more.

For dust, it's way down here. So you could use this in a dusty environment and sort of predict the measurement against the dust if you could use this ratio to tell you whether or not you were looking at dust or something else.

Basically, the idea was an ionization source here. You ionize the air, and you measure the current or the voltage in this chamber. Then, you have an optical beam that scatters the light into a couple of different little optical detectors.

These guys are like four bucks a shot. The smoke detector ion source is like eight dollars, and this little laser diode is like fifteen bucks. You can build this thing quickly and simply, and we did.

We had 10 prototypes fabricated several years ago. We did some fire detection evaluation. We did some work out at the lab in Bruceton for diesel particulate sensitivity, and we also did a couple of current -- a couple of devices that are similar to this being evaluated at the University of California, Berkley.

This is sort of what the prototypes -- the 10 prototypes that we had built looked like, in the outside box. Inside, is the -- basically, here's the optical chamber, where we measure scattering. These are the two little detectors; one at 15, and one at 30.

This is the little ion chamber in here, and the rest of this is basically data processing acquisition, in that little box. It has a battery backup. We fixed it so you could monitor for extended periods of times and acquire a lot of data if you needed to.

We also worked with looking at basically some off-the-shelf home smoke detectors. It has the same principal of operation. It has an ionization chamber and an optical scattering chamber. It's a smoke detector you can buy from First Alert up in Illinois.

It's a pretty good little sensor, actually. This is what it looks like. I just blanked out the name, First Alert, in case you're interested. Inside, it has a little ion chamber, and it has a little optical scattering chamber, and it fits -- you know, it's about the size of a -- it's about the size of a doughnut round, and it operates off of a 9-volt battery, which lasts for a very long time.

Anyhow, long story short, what we did is -- the way they made the devices, is they had -- they supplied the power to these two sensors here, the ion and the optical sensor, and took off the analog signals and had simply an umbilical cord that fed their alarm circuitry.

What we did was just cut the umbilical cord and got rid of the alarm circuitry and stuck in a microprocessor and made an RS 232 connection there. So the microprocessor is now inside this guy along with these chambers.

This was worn around the necks of people in some homes in developing countries. I think to date, we have deployed on the order of like 400 of these devices in place like Guatemala, Mongolia, China, and India where we look at particulate levels, smoke.

People actually burn things in the homes. They use the fires in their homes for cooking and heating, but they don't have any stoves or anything to control the atmosphere. So they wear these little gadgets around their necks for a couple of weeks. We acquire the data and then bring it back and download it and look and see what the particulate levels look like.

The idea being okay, we know the baseline data. We go back and stick a stove in their homes and see how much the improvement is, or if there's any improvement at all.

These have a lot of utility

underground, too. Right now, we have a program in place where we're going to take three of these, put them underground in a mine out in Illinois. It's a limestone mine.

We want to see -- there's quite a bit of dust. There's quite a bit of diesel activity underground, but it's a small mine. So everything is fairly close, and we can get in and get a lot of data over a fairly short period of time.

We're going to stick three of these devices in underground. I don't expect them to last long because they will crud up over time. Historically, that's what's happened.

It will be interesting to see how these two guys, the optical guy and the ion guy, respond over time, you know, like 24 hours over a couple of months to see what's going on.

So, in terms of smoke sensors, if we transition into that, what's currently available, particularly for the mining industry as far as what's out there, Conspec has a smoke sensor that they can sell you. We've looked at it at the lab in Pittsburgh or Bruceton. It's basically and ionization chamber detector, which is very good for flaming fires. It's not real good for smoldering fires, but it will respond.

Then Rel-Tek has a sensor which is an inverted U-tube kind of sensor, which uses not optical scattering but optical extinction of smoke.

We always had a problem, when we evaluated this guy, of smoke diffusing into the chamber. It seemed to take long time. Once it got there, it was sensitive; but it took a long time to get there.

I didn't see any other sensors that were available here in the US. There was one sensor that we tested very much like the sensor. It's the Beacon sensor from South Africa. I didn't have a picture. Actually, I do have a picture of it mounted. It's part of a John Edwards neural network system a little bit later on in another slide.

It's basically an ionization-type smoke detector; but it uses a different type of source, one that makes the sensor pretty much impervious to dust. We have had really good success with that. Unfortunately, like I said, it's made in South Africa. We can't find a good distributor here.

Chuck said that when he retired, he might like to become the distributor for it. He's retired, but I haven't seen any action yet.

This is the sensor that we're pretty high on. It's an optical sensor. It's one that you can buy off the shelf for about $240, which is about half the price of a electrochemical CO sensor.

This kind of sensor we're going

to put in the mine along with the Berkley sensors I talked to you about. This one is designed to work in atmospheres that are pretty much what's called harsh environmental that has lots of dust, humidity, et cetera. It works this way. It has a little pump on the inside in here. It sits there; and, every 30 seconds, the pump turns on; and it draws a sample of air through filters to get rid of most of the big stuff; the dust, into an optical scattering chamber up here.

It samples what's in the air for eight seconds. It tells you if there's anything there, and then it goes back asleep, and then it wakes up again 30 seconds later. So it cycles on and off.

It does that from a control panel. One of the bad parts about this sensor is that we can't talk the manufacturer into providing us with like a stand-alone sensor that we could just buy and stick in a little data acquisition system. You have to buy the complete control panel. The control panel supplies the power.

It's a fairly inexpensive system. The panel itself is like $1,500, and will accommodate like 99 sensors. You add the wiring to that; and you can have a fairly sensitive smoke detection system, assuming that it would stand up to the dusty environment. That's the biggest problem with this.

Although, with the filters, when the filter clogs up, it will tell you it's time to replace the filter. So you can actually have an alert that's on the control panel. A little trouble alarm comes on and says "go in and replace your filters."

The way you did it is you just screw off this little head, take the old filter out, drop the new filter in, and screw it back on; and you're off and running. That's okay, except we have about 45-foot ceilings. So we have a little problem about accessibility, but we will figure it out.

We think this one is -- it essentially has a lot of promise. It has a lot of promise because it's an optical sensor that we think would go well in mines that use diesels, but that's a problem in some mines.

Since it's photoelectric, it's very sensitive to smoldering fires. Its sensitive to the flaming fires, but it's not quite as sensitive.

This shows you basically -- the sensor is called the Filtrex. This shows you basically that if you were in a dusty environment -- I don't know how they did this exactly. This is the manufacturer data. They just show you what a standard photoelectric response would be when you throw dust in the air.

This is what their sensor does. If you double the amount of dust, that's what the standard photoelectric guy does. You would expect that because they do respond quite well to dust. Because of the filtering and everything, you are still way below the alarm threshold.

We actually did some testing on a little smoke box in Bruceton. As you would expect -- this is the commercial or Filtrex detector -- for smoldering wood fire -- we did smoldering wood, flaming wood, smoldering coal, flaming coal, No. 2 diesel fuel, all sorts of things.

We consistently found that the smoldering guy worked quite well; but, for the flaming wood smoke, it didn't respond until later on in the process. That's because we needed a lot more stuff in there for it to work, but it did eventually work.

One of the things that you can see here is that this is the optical scattering signal from our little prototype, and this is the ion. You can see the different for a flaming fire. The ion is much more responsive to that type of fire.

This is stuff that John Edwards did over a period of about six or seven years. This is the Beacon sensor that I talked to you about a second ago. It basically has several sensors that were subjected to the products and fires of different types, and then the signals were then processed to compare to the same signals from diesels or from dust or from other background sources.

I know that they did work in the battery charging stations looking at that problem because a lot of CO sensors alarmed to hydrogen, but this sensor here also has a lot of promise. If you know anybody that would like to become a distributor, I'm sure they would be interested.

Basically, sensors that we're talking about are heat sensors, optical sensors, gas sensor, and CO sensors. We also looked at, over the years, hydrocarbon or gunk sensors, like MOS-type sensors. We've even done odor.

I think DR. WEEKS asked a question about odor sensors at one time, and I sent back a response. We actually had an odor eater that we evaluated in the lab at one time.

For smoke sensors, there's ionization-type, optical-type, or some others. There's a combination of the two. Then you end up with the neural networks.

We looked at mines and what their needs might be for sensors. This was in 2004. There were roughly 780 underground coal mines of which 85 used diesel equipment -- that may have increased by now -- but 695 didn't.

In terms of what we think, these are basically -- in my own personal view. These are not considered to be the position of NIOSH. So I will make that disclaimer before I go on.

Most mines need improved early warning fire detection systems. Even mines -- we've known for years that a mine that doesn't use belt air in the face -- which may be a moot point at this point in time -- and you have a point-type heat detection system over that belt, generally, you have a raging inferno before that provides you any alarm.

So we do need early warning. We would think that of those mines that don't use diesels, basically, a no-frills type of sensor is what you would use. For the other mines, you would like to have systems detectors that can detect the fire in the presence of diesel exhaust.

For mines without diesels, the CO are better than the point-type heat sensors; but there are lots of whiteouts and lots of smoke, no CO. There were 17 smoke alarms due to fires and frictional heating in one of our mine evaluations, but there was no CO.

You will find this data in BuMines 9311. We actually put them underground back in the late '80s, early '90s. In ten operating mines, we put smoke sensors and compared the response to CO sensors and compared optical versus ionization-type smoke sensors underground, side by side.

We were using pretty much top-of-the-line smoke sensors. That's kind of a caveat there, just to get an idea as to how they worked, what turned them on, what didn't.

For mines with diesels, diesels usually produce enough CO to cause frequent alarms to CO sensors. So, during that mine evaluation, this sort of gives you an idea. For mines that use diesel, you're going to have CO sensors at 10 PPM. We got 22.2 nuisance alarms a day on the average from the CO sensors at 10 PPM.

With ionization-type smoke

sensors, we got somewhere around one to two per day. That's not as many, but it's still, in my view, unacceptable.

With the photoelectric-type, we got .006 per day, which is definitely more in the line of being acceptable. We got, I think, two in a one-year period. So that's pretty good.

All that data can be found in BuMines IC 9311 that was published several years ago.

Personal recommendations. Mines without diesels, simple inexpensive smoke detectors. That would be the route that we would go. That would be the route that I would go.

Mines with diesels, you could use just say basic stand-alone optical smoke sensor. It won't be the best thing there in terms of no false alarms, but there won't be that many. Probably something you could live with.

You could use a combination

ionization-optical smoke sensor, or you could go the extra nine yards and look at a multi-sensor system using neural networks. You get -- each one is a little more complex. With complexity also comes a little bit more cost.

Those are sort of recommendations, in that order. That's basically what I have so say.

So, at this point, if anyone has any questions or comments; or there might be something I didn't cover. I'm sure there's a lot of stuff I didn't cover. I'm happy to address that now.

DR. WEEKS: I have a couple of questions. Well, first of all you answered a question I raised earlier, which is: What does a smoke detector add that the CO detector doesn't already give?

If I understand you correctly, you said there are instances where there is a fire, whatever that is, without CO. The smoke detector would pick that up, and the CO detector would not.

MR. LITTON: Right.

DR. WEEKS: That occurs in mines whether they use diesel or not; right?

MR. LITTON: Yes.

DR. WEEKS: So the smoke detector does add that additional bit of information.

The comment that was made yesterday was that the smoke detectors were unreliable and hard to maintain. What's your view on that?

MR. LITTON: I would say whoever made that comment probably is 90 percent correct.

The problem that we've had with smoke sensors is there has never been any concerted effort to get them underground. Many years we worked with Kevin and Triadelphia to try to get in standards for both CO sensors and smoke sensors, in terms of performance standards.

We were not simply evaluating them for the permissibility or intrinsically safe operations or anything like that. We were never able to get that through the mill.

Kevin probably knows more about that than I do, in terms of that process. The idea was at the time to try to get us some standards and then have smoke sensors that people wanted to put underground, to evaluate it against those standards.

All right. The problem is that that doesn't exist. So anybody can go in and get a permissibility stamp for a smoke sensor or an intrinsically safe operating whatever, permissible; and they can stick it underground and say "We have a smoke sensor under there;" but they may have to change it every two days; or they may have to do something with it.

So it may be unreliable. Okay. If you're going to use smoke sensors underground, there needs to be some

standard like you would find in above-
ground industry through UL or Factory
Mutual, some kind of written standard.
By that, I mean that they have
undergone all sorts of tests for
reproducibility, for alarm frequency, all
sorts of things. There are lots of
different conditions. That was the idea.
So, yes, I would say if you
take a smoke detector, any smoke detector,
and stick it underground right now,
there's a good chance that it's not going
to work. If it does work, it's not going
to work very long.
MR. KETLER: I'd like to make a
comment on that. I'm Al Ketler with Rel-
Tek. That was my smoke sensor.
MR. LITTON: I know.
MS. ZEILER: You need to come
up and get on the microphone.
MR. KETLER: There's detection,
and there's monitoring.
MR. ZEILER: Al, you have to

get on the microphone.

MR. KETLER: I apologize for this intrusion. I just wanted to make a clarification between detectors and monitors.

A detector is a smoke detector you have in your house or an optical. It could be ionization, but it's not a linear output. It doesn't give you a signal out, except it gives you an on and off. Am I correct on that?

MR. LITTON: Sure.

MR. KETLER: A monitor gives you an analog output, which is the obscuration aspect of smoke. It gives you a four-to-twenty milliamp signal. It gives you a zero and one percent optical density. It's reproducible, it's measurable, it's calibratable in the field.

There's no way to calibrate an unlinear detector in the field, on the other hand. So, unless you have smoke or some kind of chamber or whatever, it's highly unlikely that that would be brought underground to calibrate a sensor that's been dusted or changed since it's factory setting.

So, anyway, I'm just kind of defending the technology of the smoke-obscuration-type monitor, differentiating that from a detector, which is only a one-point alarm condition which is a fleeting factory set point which is almost nonreproducible in the field once it gets in a real-life mining environment.

I just wanted to make that clear. Thank you.

MR. LITTON: You're welcome.

MR. KETLER: As far as the speed is concerned, I think the air velocity is a minimum of 15 feet per minute. We tested that. We have less than a one-minute response time.

If you put it in absolutely still air, you're right. When you put it in absolutely still air, you have to have some movement of air through it; but the timing is plenty fast for normal mine ventilation velocity.

Did you test it in that situation?

MR. LITTON: We tested it at 100 feet per minute.

MR. KETLER: What was your --

MR. LITTON: You know, Al, it's been 14 years since we've tested.

MR. KETLER: The sensor isn't that old.

MR. LITTON: Well, whenever it first came out. Anyway, I didn't do the work.

MR. KETLER: It's quite a nice sensor. I would like you maybe to give it a second chance and give it a try.

MR. LITTON: Hey, listen, I don't have a problem with it.

MR. KETLER: Okay. Thank you.

DR. WEEKS: The follow-up

question that I had was: Do you think there's a solution to this reliability, maintenance issue on the horizon; or is that --

MR. LITTON: Well, he made a good point there. There is a thing to be said for a sensor that provides an analog output.

What he failed to say was that with any sensor that's a home smoke detector, that capability exists. You just have to wire around it. I mean, they all have an analog output. Every ionization chamber I've ever seen has an analog output.

The smoke detector manufacturers only use an alarm point. The reliability issues are dust, air interfering sources, cutting sources, welding sources, and diesel interfering sources.

You know, I think that probably the best route that I would go -- that I think should be pursued is to go ahead with -- we had a pretty nice standard, I thought, developed at one time for evaluating these.

DR. WEEKS: Complete the other sentence, go ahead with what?

MR. LITTON: What?

DR. WEEKS: You started into that sentence, you should go ahead with.

MR. LITTON: I think we should go ahead with trying to get a standard in place.

DR. WEEKS: Well, there's one in place now.

MR. LITTON: For smoke sensors?

DR. WEEKS: No. I mean for belt air.

MR. LITTON: In my opinion, that's the only thing that's going to give you uniformity and reliability issues, as well as address the sensitivity issues.

DR. WEEKS: Do we have IC 9311?

MR. ZEILER: That's in your

package.

DR. WEEKS: Okay. Thank you. I'm done for now.

MR. MUCHO: One of the things this Committee has been asked to take a look at is heat sensors versus whatever else is available. They most commonly, of course, are CO sensors.

I recall when one of your RIs or ICs made a comment that the equivalency of heat sensors to CO sensors -- you would have to put heat sensors on about a four-foot spacing. That IR was written a few years ago.

Would you stand by that kind of a comment as to trying to put some comparison between heat-type sensors and a CO sensing capability today? Is that about some relative gauge?

MR. LITTON: The problem with the heat sensors is that there needs to be open flame. So you have to have a flaming fire there.

That flaming fire, then, is -- whatever heat is being produced is being diluted by whatever the ventilation is. So, until you get a very large fire, it's unrealistic to expect that you would be able to get these things to alarm at 50-foot centers until you get quite a bit of flame there.

Even though you do get the stratification, you get the smoke and the hot gas traveling along the roof, especially at low-air flows. I think it's unrealistic.

We did try to quantify how these things respond. We did look at a point-type heat sensor in general. We sort of gave it the benefit of the doubt. What we actually looked at were fairly rapidly responding thermocouples located at different positions along the room and just measured their temperatures as a function of time under different conditions of ventilation.

We came up with fairly small numbers, definitely less than 50 feet. It was 6 feet, 10 feet.

MR. MUCHO: Another question is: One of the things apparent as you go through the presentation, and something that this Panel discussed in previous meetings, is the fact that when you're talking fires or precursors to fires; heatings and those types of events, it came out again here today that you have different signatures that come out, depending on the event and what's happening and what material is involved and so forth. So you can have events that produce a lot of CO, events that produce a little CO, and so forth.

The point being that for approved fire detection, one approach is the one that you talked about, which is the combination of sensors. In that case, smoke ionization and optical combination improves capability, reliability, and reduction in alarms. In general, the multiple-network types of sensors that you talked about with John Edwards improved fire detection.

Any comments in terms of quantification or qualification of a multiple-sensor approach to fire detection, especially belt fire detection -- which is what this Panel is centered on -- as opposed to what we currently do, which is generally single-type or one type of sensor alone?

MR. LITTON: I'm all in favor of a single stand-alone sensor. It could be a sensor that combines optical and ionization; or it could be a sensor that combines -- like the Conspec sensor CO,NO.

I'm all in favor of just a single stand-alone sensor, other than one -- a system where you have to have three or four or five or six sensors deployed at specified intervals.

The only thing that's different

primarily about CO detection relative to smoke detection -- there are two things. One is that the smoke detection is generally a much earlier indicator of a developing fire.

Now, that goes away when you talk -- if I had an instantaneous liquid fuel fire on the floor there, clearly there's no difference between that and a CO sensor. I'd get lots of smoke, and I'd probably get lots of CO, too.

When we're talking about fairly slow developing fires, either smoldering or very early flaming stages, like the ones that were created when we did a lot of the studies talked about at the Pittsburgh meeting, you get slow evolution of CO and a slow evolution of smoke.

Well, the smoke provides you an earlier indicator in a developing fire than the CO. Not to say that CO wouldn't work.

The point that Jim made a

minute ago about events occurring that produce lots of smoke but no CO are typically fictional overheating events, rubbing of the belt, belt slippage. It could be on the drive or take-up wheel or whatever where you get whiteouts or where you get lots of smoke.

We actually had -- when we did our smoke detector evaluation, which was several years ago, we had an ionization -- I can't remember the name of the mine down in West Virginia. They actually used the ionization detector as a diagnostic tool. Every time it went off, they had someone walk the belt; and they'd find a roller that was overheating due to friction.

We documented, I think, at least 12 to 14 cases where they did this over a period of time. They were actually reluctant to take their smoke sensor out because they were using it for other purposes other than fire detection because it was so sensitive.

In the -- I tried to give you a hierarchy of what I thought was the way to go, with smoke being the best, and CO coming in there. You know, it's still adequate for most cases. Then, the heat sensors would be the final ones, which are not quite as sensitive unless you put them real close together.

DR. WEEKS: Could I follow up on those comments?

Yesterday at the end of the day, we saw a demonstration of belts that burned without smoke -- with less smoke than other belts. So would your comment about smoke being a better earlier detector than CO, would that apply to those belts, or no?

MR. LITTON: My position is yes. In the belts that burn with less smoke, I think you need to put a qualifier in there that those belts burn with less visible smoke.

I think that you will find that

if you had something -- an absolute particle counter downstream, you would find that there's a heck of a lot of particles in the flow from that fire. The problem being, they're just not big enough to make any visible imprint.

DR. WEEKS: Would a smoke detector pick them up?

MR. LITTON: An ionization detector would pick them up.

DR. WEEKS: One other comment, and then I will cease here.

You mentioned that detection of particulate matter from a smoke detector is common from frictional events. That's one of the most common sources of belt fires, is frictional emissions.

MR. LITTON: I would say that if you have a frictional overheating, any kind of situation that's going to have low temperature smoldering of any kind, you're going to produce a lot more smoke than you are carbon monoxide until you get enough of the surface involved.

MR. CALISAYA: My question is related to this relationship between smoke detectors and carbon monoxide detectors. I'm looking at this article RI 9622, I'm sure you have seen that, by Edwards.

They did experimental studies comparing one with the other under the same conditions. In that report, you can see the difference between one and the other. It seems that the smoke detectors are quite -- well, they give you the early warning consistently. Can you comment on that?

MR. LITTON: I think that's true, yes, they are consistent.

DR. CALIZAYA: Based on that, is it fair to say that it would be advisable to have both, not only CO detectors?

MR. LITTON: Advisable to have both? I've never been a proponent of both, and the reason being is that if I have to have both and I need the alarms for both, then one is going to impact the efficiency of the other one.

I don't have a problem with using them in an analog way to look at their signals in terms of if there was some magical relationship between smoke optical density, as an example, and the carbon monoxide level to tell you what kind of fire you had.

That's something that could be doable, for instance, if you had a smoldering fire where the level of optical density is way high; and the level of CO is very low. So the smoke optical density to CO level is high. If you've got that and the smoke sensor went into alarm, you would say "Aha, I have a smoldering fire."

It could become a situation where you had the level of smoke and the level of CO pretty much the same. Then you would have a flaming fire, and you would say -- one of them would alarm, and you would say "Aha, you have a flaming fire."

That might be information that you could use to adjust your response to that particular scenario. Clearly if you've got -- if a mine operator knows when that condition is yellow, then I have a smoldering fire; but I don't have any flames yet. Then I've got more time to do something. It's true, you do have more time.

On the other hand, if you have a small flaming fire that you get an alarm, your response to that situation would be different.

For mines that use diesels -- also, I think, we did some work on backgrounds from flame cutting and welding operations and things like that. If you looked at the optical density of the smoke relative to the CO when that number was low, then there's a good chance that you had a diesel or a welding or a cutting;

and it would be -- even if one of the sensors went off, it would be an alarm that you could ignore because it would be something other than fire related.

So there are ways to use that, in your decision process, to tailor your response to different scenarios; and the sensors that you use can provide some of that information. If you're just going to use them as a go, no go, and you have a smoke detector alarm followed by CO alarm or visa versa, my position is just go with one or the other, whatever you want to do because, otherwise, you're wasting your money.

If I'm going to put a CO sensor in and put it along side of the smoke sensor, I don't know see the utility of that, if I require that both of them alarm. On the other hand, if I don't require that both of them alarm, I would just say get rid of the CO sensors and keep the smoke sensors, if you're going to do that.

DR. WEEKS: I have one more comment. This is not really a question, but I want to try to put this in context.

Our aim here is to prevent injuries from fires, belt fires particularly. There's kind of three stages. One is fire prevention. The other one would be fire detection, and then fire suppression.

The only part that we're talking about when you talk about sensors is fire detection. I think we need to spend as much or more time on prevention and suppression issues.

That, in part, is because if you look at the Aracoma fire, that fire was detected fine, both by people and by detectors.

MR. LITTON: Right.

DR. WEEKS: It was fire suppression where it failed.

MR. LITTON: Right.

DR. WEEKS: That wasn't the fault of any technology. I think that was the fault of mine management.

The point I want to make is if we detect a fire, we shouldn't automatically assume that it's going to be successfully suppressed. I think the margin for error is rather thin.

One of the presentations that Fred Kissell made when we were in Pittsburgh basically drove home that point, that the margin for error is relatively thin. So we need to be fairly conservative and, for example, not assume that if a fire is detected, it will be suppressed.

It was not a question, just a comment for the record.

MR. LITTON: Well, if you look at the data that we acquired when we did our simulated conveyor belt fires where we brought up 500 or 600 pounds of coal, we let it go to a smoldering phase, then it became like a little small flaming coal fire, and then the small coal fire ignited the belt; what we saw was that the time that you had from the onset of the coal fire to the belt-flame-spread point, which is the point that you really need to have everybody out, it was 30 minutes maximum, something like that.

So you're right. You don't have a lot of time. You can't presume that your system is going to put it out. So your response should be get out, if you have these alarms go off. Then we'll worry about what has to go on after that.

DR. WEEKS: Your selection of 30 minutes is interesting because until recently, that was the threshold at which fires become reportable. It's quite possible that, in fact, it's the case that there are a great number of fires that go unreported because they never reached that threshold.

MR. LITTON: Right. I think we

vary somewhere right between 25 and 40 minutes, something like that.

DR. TIEN: David, I'm surprised these guys have not brought it up and it hasn't come out yet today, the role of the human nose.

I read one of your one-page memos that either you or your wife has a good nose. So Dr. Thakur yesterday, so he said.

What is the role of human nose detection? I just want to hear from you. I know we have different opinions on that.

MR. LITTON: The nose is a wonderful detector. If you could recreate the nose, that would be wonderful.

There's a lot of variability in noses. So we actually, like I told -- you were the one that asked for that response?

DR. WEEKS: Yes.

MR. LITTON: I did write a little note to that effect.

We actually compared them -- we

actually looked at the response of this prototype smoke detector we developed a long time ago called the SMPD -- some might call them particle detectors -- and we plotted the response in the odor meter as a function of the response of that SMPD.

What we found was that the SMPD outperformed the odor reader, and we think part of that had to do with the fact that the particles serve as sites where these reactive gases can deposit, and then you can concentrate. So the odor you smell is actually gases deposited on a lot of very, very tiny small smoke particles.

We don't know the physiology of it. I don't know the physiology of it. I don't know if that answer is correct or not, but I do know that when we did the evaluation, we did detect an odor; but we also detected particles.

These were -- somebody said that some belts don't produce smoke when they burn. I don't think you could see a lot of these particles, but they were definitely there.

DR. WEEKS: Pramod volunteered his nose yesterday.

MR. LITTON: Did he?

MR. THAKUR: You can trust me always. I trust you in industrial hygiene areas. Mine ventilation, with my nose, you can trust me.

DR. MUTMANSKY: Thank you, Dave.

MR. TIMKO: Our second speaker this morning from NIOSH is Launa Mallet. Launa is with our Mine Injury Prevention Branch.

At the last meeting, the Committee had asked for us to bring someone in and talk with you about training and emergency response preparedness.

A little background about Launa. She's a Lead Research Scientist at

NIOSH at the Pittsburgh Research Lab. She is a Social Science graduate of the University of Kentucky.

She's known -- she's worked in a number of mines around the country, and her work is -- her most notable work is in the areas of Work Force Training and Emergency Response.

As soon as we get her program up, we'll be ready to go.

MS. MALLETT: I am pleased to be here today to talk about the human component of the Emergency Communications System. What I've been asked to talk about is training generally, and also training in terms of emergency response.

We've talked a lot in the last two days, primarily about the technology and the equipment; but, if we look at broader scope of emergency communication, the human component is a piece of it. If it fails, it will equally not get the message out in terms of what the monitoring system is trying to convey.

So, to increase the functioning of the system and ensuring the reliability of the system, we can't just have equipment that works. We also have to have trained personnel who can get that information across.

To kind of tell the story, I'm going to use the Marianna Mine fire -- for those of you who know something about that -- as a guide as we walk through this.

I bring this up because as part of our research background, we at the Bureau of Mines at that time and now at NIOSH, did research on human behavior in fires, looking at evacuation from three different fires.

In all cases, there was a total of eight sections of employees who evacuated the mine; 48 of those people we interviewed and talked about their entire experience.

We also talked to people responsible for Atmospheric Monitoring Systems and other parts of those events. We did that not as a way of saying this was the correct or incorrect way of doing anything, but to have a point of reference to talk about how the human component played a role in the use of Atmospheric Monitoring Systems.

So I have pulled together this story that I will relate to you as we go through various parts of the presentation.

This event, which happened in '88, as it says -- this was from the MSHA investigation -- these words. The fire occurred. The person responsible for the Atmospheric Monitoring System at that mine was the dispatcher with that job title; and, after the alarm happened, that person, as was his protocol, asked for confirmation of what was going on.

The mechanic at that mine went out and investigated it. Subsequent to that, they said yes, there, in fact, was a fire. From the time that that alarm happened until the time that the people on the sections were notified that they should evacuate -- three sections inby at that time -- 16, 17, and 21 minutes elapsed between that process.

27 miners were actually endangered by the particular event, and all of them escaped with relatively minor injuries, but not without complicated escapes and potential harm. We are all very happy that didn't happen.

As I said, I'll talk about sort of the role of the Atmospheric Monitoring System operator in this case to perhaps inform and guide us in a broader scope of this discussion.

I think we should step back and be sure as we think about the Atmospheric Monitoring System operator. While in this forum, we are very concerned about emergency response and what we could do at that point and how they should operate.

In the day-to-day operations of this employee, emergency response is not what they're going to be doing. So, to train this person in emergency response, we also have to be cognizant that their day-to-day work is a much broader scope of tasks and activities.

So, while they're trying to do the other things assigned to them, whatever they may be in a given mine, they are also responsible for reacting to this Atmospheric Monitoring System. So we have to keep that in mind when we're trying to keep them as a functioning part of our system.

When you look at the regulations, from my reading of them, I find there's very little, actually, said. Training is mentioned, but what we find out is that you have to train Atmospheric Monitoring System operators, and you have to keep a record of that training.

So, by doing that, you have basically met the training requirement to the letter. The intent, of course, is what we are here to talk about; how you do that and how do you ensure that to be appropriate. We'll cover that as we go through.

Let's get back to our story for a minute about Marianna. During the interviews when we talked to the various people at that event, we could discern some of the things that went into training of the operators at that mine. They, in fact, from what we have been able to determine, had a formal training system.

The quotes from an Atmospheric Monitoring Systems operator, or, in that case, the dispatcher, said -- what we can determine from the context of this quote -- that the manufacturer came in and trained them.

Yesterday morning, that was what was said over and again. As a manufacturer of this equipment, we go in, and we train the operators. In fact, that is what happened there.

What he said is "They came and trained me, and then they left me a book." So we had training both on-site, and we also had materials supplemental for them to go back and look at.

While I couldn't go back and ask this individual, he said "We had this computer on the side that was what you'd call 'animated,' if I read the notes from the response to that interview correctly. So I'm guessing they had some kind of simulation set up where there was something else for follow-up training that the manufacturer had provided.

I thought it was also interesting that this person said "What the manufacturers had told me" -- "They trained me how to do this, and they told me how to read the sensors, they told me that's what I needed to know. If I can just read the systems, I have fulfilled my obligation." That's what this is saying.

I think, as we go through this, this is something to consider. What is the role of the Atmospheric Monitoring System operator?

Yesterday, Jim Walters' representatives talked about a very different role that they saw for people in that control room than simply reading the sensors. So what is the human role in the system?

They also had job aids, when you get to the level of emergency response. So what they tell us is that it was the Company's position that they trained on emergency response. Once you've read the system -- or read the sensor, which the manufacturer trained you on, now the Company is going to train you on our emergency procedures.

They had whatever that training was, and they had a list posted in his office or the dispatcher's shanty or whatever it was, that was an aid for later, and what he called the drill book -- probably an emergency response plan -- that was available for him. So that was done by the Company.

They also may not have known it, but they had a system of informal mentoring because this person said "There was one of my colleagues on off-duty hours who helped me and told me some things I didn't understand."

So, while there was no formal system, perhaps, of finding out how to bring that person up to speed, he said "Sometimes I was given a task I didn't quite understand, and I would go to him and he would help me off duty and bring me up to speed."

Now, one thing to see about this structure is the formal training which was done by the manufacturers talked about the equipment. The job aids were provided as part of whatever the emergency response system was, which was provided by the Company.

Whatever happened in terms of keeping people up to speed on a day-to-day applied use of this training was done informally by coworkers. How the system went together and whether or not they all talked to each other, we can't know; but that is something to think about as you're trying to put together an effective system, all those components together.

How do we go about designing effective training where we do have all of our systems together? First of all, we have to have clear goals. So let's go back to that comment I made about what is the role of the Atmospheric Monitoring System operator? If we're going to train them to be effective and efficient, we have to know what we're training them to do.

What is their role? Do they

simply read a sensor, and then they become part of the communication system, and they relay that information to someone else? Our sensors is going off. Do they have a broader role -- which Jim Walters' people talked about yesterday -- where they read the sensors, they analyze that data, they think about what's happening, they make decisions based on that, and then they implement those decisions and make things happen at the mine?

Those are vastly different situations. So training has to know what is it that we want someone to know and what is it we want them to be able to do at the end of training.

So, based on those goals, then we have the content. What do we have to put into training to achieve those goals? We'll talk a little more later in the presentation about goals of emergency response training.

Then, based on those two

pieces, what is the appropriate delivery mechanism? Is it a video? Is it the emergency response plan that you can simply read? Is it something to do with a computer simulation?

Also, what about the delivery mechanism in terms of the personnel? Should it be coming from manufacturers, employees, or specialized training systems?

There are many appropriate and potentially effective ways of doing this, but they have to lead back to achieving our goals and our content.

Then we have to build in some sort of assessment. Assessment has two different parts. The assessment of the individual. Can they do what we have set out to help them do? Also, assessment of our training program. Is this training set up in such a way to assist our operators in being protective and effective?

One common mistake is developing training, and then tagging that assessment piece on at the end. Okay. I have all my training. I know it's good. Oh, yeah, I have to do some kind of evaluation of it. It should really be a component put together at the beginning as part of the training development process.

Then, a piece that again is sometimes forgotten, especially if you have outside persons doing your training, is the remediation. I sent someone away for training; they went there for two days; they learned everything they need to know, I guess; but then, I do the assessment and perhaps they are weak in one particular part.

How do I remediate that? How do I bring them up to the top level in all of the different goals? How do I make sure that over time, their lack of practice of these skills has left them no longer up to standards?

This is particularly important in non-routine skills that we're talking about here. We're not giving warning messages every day. So how long is it going to be before we're no longer effective at that? How can we bring that up?

Looking a little further at the regulations, or my reading of them, you can learn something about what the content of training needs to be for these people, based on their role as listed here, when an emergency occurs.

It says "When a malfunction happens or when an alarm signals, it's received, the AMS operator becomes part of a communication system." That's all that they're required by law to be able to do, is notice the alarm and pass that word on to some appropriate person.

They also have a role if the system malfunctions. It is their job to be able to communicate with someone who is taking readings on a hand-held piece of equipment.

So it's not just can they read the alarm and communicate to the appropriate person. If we have to switch to a manual-type system, can they communicate with the person underground effectively to get the information needed and pass that on.

So, going back, as I said before, on a normal day, this person is doing normal tasks and tasks of production and tasks of whatever their jobs may imply. They may not be thinking a whole lot about emergencies.

People tend not to. We talk sometimes about panic. We don't want to cause panic when things happen, but research shows that is not what happens. Actually, it's somewhat the opposite.

People tend to try to frame things as normal as long as absolutely possible. If a fire alarm goes off on this building right now, would your first thought be "Oh, there's a serious fire, and I have to get out of here;" or would you start thinking things like "Gee, I wonder if someone pulled the fire alarm." "Oh, maybe someone burned the toast."

You try to think of all the things that mean it's not happening to me first. So we have to get past this routine, what's happening every day, before we can move into a more serious potentially non-routine mode of thinking.

So how do we take a person from their everyday things that are just going along normally for them to move into this emergency frame of mind?

So, when talking to the AMS operator at Marianna, saying "How does this system work, and when do you know that there is something going on?"

He relayed basically what we were told by the regulations that certain alarms go off -- as they said yesterday, as well -- and we're supposed to notify someone. Then they go find out if this is really a problem, and they check things out for us.

Then, they will come back and tell me "Yes, this alarm was something real." So, in this case, this was the system for warning alarms; and his part of the system was to then notify someone.

Whether or not he was trained in how to notify someone is unclear at this point, and we can talk about how you would go about doing that.

So, at some point, he had to decide there's something unusual here, unless he simply called every time the alarm level was hit. We know in this particular case, that was not what was happening.

They had been having problems with false alarms a few weeks before that. They had fixed the system the week before, I think it was; but they had had a period of time where they were having constant false alarms.

So they had moved a machine, they had hit the button, false alarm. They moved the machine, hit the button, false alarm. So he had in some way been trained by the system to question whether or not this alarm was real.

So how do people go about making decisions and thinking about what's going on during an emergency? First of all, there's the detection of the problem.

Now, we talked about how there is an alarm; therefore, as the AMS operator, I have a problem, perhaps. Now, the real problem is that fire that's happening underground. We're seeing it through the filter of the CO system or through visible smoke or through our noses or whatever that is we're seeing it through.

Whatever that is that we're looking at, we're going to give a definition and a diagnosis to the problem. So, based on a number of things we'll talk about, we're going to determine is this real. Is it something serious, and to what degree?

Then we'll start considering our options. If people believe that the message is credible -- there's reason for them to believe it's true -- and then they believe there are options for them to take, then they will start moving toward an action.

They think about what those are. They will choose some form of action to take, whether it's communicating, the alarm went off; or whether it's simply silencing it because they determined that it's a nuisance. Then they'll take some action and then execute that decision.

Now, while I set these down in a really nice linear kind of logical flow, that's not the way it typically happens in the real world. You'll be thinking about your definition of the problem and thinking of your options, and then some new information will come in, and you realize your options now are expanded or contracted.

You will have chosen an option; and, about that time, you get new information that feeds back into your definition of your problem. Then you have to think again about what you're going to do.

So this model is not a straight linear kind of activity because people have to be aware of being flexible as they work through what they should do next.

All of these things are happening with background going on. One of those backgrounds, which we're talking about in the sense of training, is the skills, knowledge, and attitudes of the people who are going through this process.

Yesterday, they talked about how you should choose people who want the job. That's part of that attitude process.

They talked either during earlier conversations and I think here also about the ability to multitask. In talking about the background knowledge and skills, what do these people know and where have they learned that kind of information?

Have they experienced this before? Do they have a long history with this kind of activity, or is this all brand new to them?

They're also operating in a system of uncertainty. The higher that uncertainty, the more difficult their emergency decision making will become.

So, conversely, if we can decrease their uncertainty, we will make that process more simple as they try to live through it.

There will be stress. We're putting these people in a position where people's lives depend on them making the appropriate decisions. So that, in and of itself, is very stressful; and there can be background factors on this individual. Maybe they've lived through this before. Maybe their nephew is working on a section inby, but they don't realize that as they're making decisions.

These are the kinds of things that are going to impact their ability to make decisions. They need to be aware of what that does to them and when they should perhaps step back when they should consider why they're thinking the things that they're thinking.

This is also something we have a fair amount of research on at NIOSH, the impact of the stress on this individual post event. So we're putting people in a position that potentially could impact people's lives.

If they find themselves in that situation, this will impact them as people in the long term. So I'm suggesting that as a part of their training, they should be given some indication of what they can anticipate if they have to live through and emergency response.

Police, fire fighters, and other people in those roles are trained in how physiologically stress will impact them.

The complexity of the situation. Of course, how difficult is a given mine, the mine layout, the ventilation plans, the number of people involved, what information we have about their locations; all of those things are also going to impact this person's decision making and how they can function and how well those decisions will come out.

Now, as I'm going through this, you'll see there's references on the bottom to different ICs; and I can provide those. I have hard copies of some of them here if you want to thumb through them. They can all be downloaded from our website, as well.

So, in hindsight, let's look at a couple of things that happened for the decision-making process at Marianna in terms of informing us and giving us a platform for discussion.

I mentioned those false alarms. Those false alarms may have led to a delay in the diagnosis of the problem. We know that an alarm went off about an hour before the one where there was actually action taken.

Whether or not that was another false alarm or whether that was a precursor to what happened, I don't know. For our discussions here, we can say definitely that that impacted those decisions; and we have to take that into consideration.

After the fire was confirmed, then the dispatcher and someone at the dump site divvied up the role of informing the inby crew.

Now, whether both or either of those people had any training or specific procedures in how to give that message, I don't know; but this is how it happened. It wasn't that the AMS operator gave all the warning.

They couldn't call up all three at once. So it was like you call one, I'll call one; and we'll get the message out more quickly. That's probably what happened.

The three inby crews were told "You need to evacuate because the belt's on fire." Now, in these cases -- and it's not just at Marianna, it's at all of the events that we studied -- frequently, the warning message given to the inby crews was incomplete.

In 46 of the 48 people who evacuated through smoke and very dangerous situations, they didn't know where the fire was that they were trying to escape from. It wasn't that that information wasn't known by someone. It was that the information wasn't relayed.

So I'm suggesting that the lack of an emergency communication protocol in these cases increased the uncertainty for those outby crews and led to their decision making being more difficult.

So they didn't know where the fire was they were trying to avoid as they were choosing their evacuation route, and they didn't know the severity it. So they were trying to gather that information as they went. I think both of those things can be part of an evacuation protocol.

From our previous information about who gave the warning, it wouldn't be just the AMS operator that needs to know what that protocol is. Other people at the mine site, as well, need to know.

I suggest that the people getting the message also need to know what that protocol is. So, if they don't get all the information they need, they'll know what to ask for so the communication system and the information system will be complete from both sides.

Just a kind of quick look at what the AMS operator is, the first row across the top of this little easy chart says that "Day to day, they come to the mine and are in routine situations that have routine tasks." I'm sure they look at the -- as someone said yesterday "The screen is always up, you can always see it."

How much do they think about it? I don't know. I haven't studied that. I haven't talked to them directly and worked on that issue; but I would suppose, from what I've read to this point, that emergency communication is not on the top of their list as they go to work in the morning. It's not what they think they will have to be doing.

So we start with, where are they? It's something called divided attention. They're multitasking. They're doing multiple things.

Now, something happens with the AMS system. There's an alarm or there's a malfunction. Something happens to draw their attention to it.

At that point, now they have to go through that decision-making process to determine; is this something we really need to be concerned about; and, if so, what is my role in this system?

Those roles, whether it's to communicate to one individual what happened or whether it's to start analysis and some kind of broad-scale activities, those are two different roles that we have to determine, which we're trying to determine before we know how to prepare that person to play that role.

So, in whichever way we're starting, we determine that there's a real problem out there; and we seek more information. If we find out this is a false alarm, someone's doing maintenance and they neglected to tell us, or whatever else that's happening, we do no action. We have a good test of our system.

At that point, hopefully, we went back and thought about how well that system worked. We may or may not have thought to do that. When it's confirmed, then we have some type of action we have to take.

As I mentioned, if it is our role to then start that communication process, we have to know how to do that. We've also done some research at NIOSH on how to get those messages across in a simple and straightforward way.

I also have a document that you can look at, if you like, on a potential protocol for that emergency communication. I'm not saying it's the only one, but it is one that people could use as a model.

So some of the content from all of this and from what these jobs are about that an AMS operator in training might include would be, what is routine functioning of the system? If I don't know what it's going to look like normally, I'm not going to know what it's going to look like when things are not going so well.

I think yesterday there was quite a bit of talk about that part of the puzzle. We, as manufacturers, show them how this is going to work. How it's going to work out of the box, is that the same as how it's going to work in a given mine site? That's a technical question I don't know, but it's something perhaps worth considering.

Then, there's the next step of okay, we know how it's supposed to work in normal situations. What about non-routine situations, what will it look like then? How do I go about determining if that's appropriate?

Then, if my role is then to pass on the alarm from the AMS system to someone that can make things happen, then I have to know how to give and receive emergency warning messages.

As I mentioned before, because this is a role -- a highly important role that we're asking people to take on for their support and so that they will be prepared the next time you need them and so that they will be confident in themselves and in their jobs, we should also give them training on the impact that those experiences will have.

So, if they do have to live through multiple situations, they will learn from them; and they will improve, as opposed to being distressed and not being confident, if they find themselves in that situation again.

So, as I said, we've done quite a bit of work in the area of human behavior and fire. We have books on decision making. We have books on the communications or ICs.

The emergency communication triangle was something we put together as a safety talk for putting out there an emergency-information protocol that mines could use.

So I have sort of a wide range of things that we could provide to you, if it would be helpful in your deliberations. If you have specific questions, I can answer them here; or I can point you to further documentation; or I can go back and find the answers for you.

DR. MUTMANSKY: Thank you, Launa. I think you're going to hear a lot of questions.

I was just wondering, first of all, has there been any research done concerning how long a person should sit during a given day or during a given week at this type of job? Is there any reason to limit how many hours they spend in a given day at this type of a job?

Does their attention span wane after a few hours, or is it normally kept up throughout their work period?

MS. MALLETT: I know in mining there's work specific to all tasks in terms of shift length and accidents and attentiveness. I don't have that on top of my head. I would have to go look for that.

I don't know of anything done in terms of this kind of monitoring activity within mining. I'm going to guess that if we look at monitoring in nuclear power facilities and those kinds of places, they have done more work in that area; and we would be able to find such a thing.

I can't answer that today.

MR. MUCHO: Along those lines, I know Australians, last three or four years, have done a lot of work in that area relative to mining. Do you know if they -- do you recall anything that they've done that might be more related to mining functions, such as an AMS operator?

MS. MALLETT: I won't be able to tell you the most recent work in Australia in this area.

As of recently, I have been doing work in general training and evaluation of training. So I will have to defer to my colleagues in the disaster branch to get back to you on where that is in the last couple of years.

I don't know of anything, and I haven't run across it in terms of the training side of things. I don't know if they've changed anything from there. Whether they have solid research studies on that time and length of duration, I don't know that.

DR. WEEKS: First of all, thank you. That was very useful.

I have some questions about --

well, I want to underscore your comments about stress. A couple of the guys at *Sago, after that fire, committed suicide. I have to believe it was stress related in some fashion.

I wonder if you, in your concern with stress, if you investigated that sort of angle of things. The sort of post-emergency effects on people that were involved.

MS. MALLETT: The expert in that area -- I can speak somewhat to it, but the expert would be Dr. Kathleen Kowalski-Trakofler at our office.

She worked with Quecreek after that happened, not just with the people who were trapped and made the news, but also the people who effectively and safely left that mine and also went through some very serious situations for themselves and for their coworkers. It impacted all of them.

There's a long history of

research on the fire fighters, the police, and the military, on normal people's reactions to abnormal situations.

When you read that literature, if you're looking perhaps at training for fire fighters or for police, one of the things it'll say is "When does this become abnormal for them?"

They're used to car crashes or, whatever that they're dealing with; but one of the times it becomes an even higher level of stress and something they should be concerned about is if it impacts one of their colleagues or it impacts one of their friends or their family members.

We know in the mining industry that you're always talking about impacting your coworkers. You may well be talking about impacting your family, as well. It almost automatically puts any major mine problem in that level of extreme stress.

DR. WEEKS: I've got a question about retraining. I think most of the AMS operators will never see an emergency. The job of an anesthesiologist is described as 99 percent boredom, and 1 percent total terror.

I think the AMS is sort of a similar sort of thing. So it's asking a lot for people in that kind of setting to function effectively on a high-stress situation that's rare.

I learned that in other settings -- I think it's in Australia -- they go through what amounts to fire drills. They have simulated emergencies in which the AMS operator would be given information that would look like an emergency. They wouldn't be told it was an emergency or a test or a drill or anything. Later they might -- later they would as a form of training or testing.

That just raises the whole question of retraining and how to keep people up to speed on all the skills that are necessary. What's your sense of the role and the importance of retraining of an AMS operator?

MS. MALLETT: As you said, this is going to be a non-routine skill. So my practice is not going to happen during my daily work life.

So practice opportunities are going to be have to be created. There is research on things like the forgetting curve, how long do people remember to do certain kinds of tasks.

I think since what we're looking at here is a system of communication, they will have an opportunity to communicate with all of those people as part of their routine jobs.

Do they do that effectively? Are there ways that we can improve that so that any time I'm calling inby to relay information, I'm doing it in a structured way?

As part of drills, we could

set up fairly simply a way to convey information about these kinds of things to this crew and see if they receive the message appropriately.

You could also set those up through simulations of all sorts, with computer-based simulations or real people. There are many ways to do that that would allow that practice.

Yes, I believe that you have to have some form of practice if you're not going to be experiencing it over a period of time.

DR. WEEKS: What form of that practice? What is your sense of that?

Is it sufficient to go through another classroom drill, or should they have a hands-on training in which they're expected to not merely listen to some instruction, but to actually act out what they're supposed to act out.

MS. MALLETT: It's my personal opinion that the training ought to take a variety of forms? Any one form done over and over again no longer becomes interesting and engaging.

So, if I set up one drill; and I have you do that drill or that exact kind of drill every X amount of times, I don't think that's as effective as having mixed media. Perhaps, sometimes, they're real-life drills.

Sometimes, they're simply something that they're going to read, kind of a safety talk where they blitz the whole mine with "How do we communicate during emergencies?"

Sometimes it will be a computer simulation that they are asked to sit down and go through at the beginning of a shift. I think that it can take so many different forms, that any -- it probably isn't a one-size-fits-all, would be my guess.

Again, going back to "What is my role?" If we have a mine, and their only role for this person is when certain things happens, they have to decide if it's real and then go and tell another person, then they need a vastly different kind of training than someone whose job is to analyze this problem and determine what actions should be taken. Without knowing that, it's difficult to know what those are.

Now, another thing is, through some of the research that we've done looking at the different generations and the demographic changes in the mining industry, we need to determine can the kind of training we did in the '70s and '80s be effective with employees right now.

One of the things we found there was it didn't matter how old or experienced or whatever else was going on, the training preferred, and at least put you in the right direction toward engagement, was hands-on practical tied-to-my-job-type training.

So I would venture to guess that if you asked the operators what they would prefer, they would not like a talking head talking to them about what's important. They would like some form of practice drill.

DR. WEEKS: One final question. You know nobody comes to training with a blank slate. Everybody has their own skills and attitude and so on and so forth.

The question was raised yesterday, and I'll raise it again to see what your response is: In general, do you think it's better to take a miner and train him to read information on a computer screen; or is it better to take somebody who is more comfortable with a computer screen and teach them the AMS system? What kind of person do you want to get in that job?

MS. MALLETT: If I was to

select AMS operators, I would want to know what is the role of that person, which we talked about before. Do they need to understand the ventilation of this mine because they're going to make actions based on that, or are they simply a communication conduit, and they need to understand the look and feel of the computer systems? I'd have to know that, for one thing.

I'd also want to know what these computer screens are going to look like. In today's technology, you can have interfaces that practically anyone can use, and you can have interfaces that you need a Masters in Engineering to weave down through them.

So that's something that I'm not familiar with, what all these screens look like or how complicated they are. I don't know.

I think -- one part of my job, right now, is doing field testing with new miners, and the computer use, I believe, will become a nonissue in the future if we're trying to plan for miners 10 or 20 years down the road.

Right now, when you bring in a class of new miners, it's not even a question of will they have the computer literacy. So perhaps we're looking at two questions; what do we need right now, and what are we going to need for the new people we're training as they come in?

DR. MUTMANSKY: You mentioned the relationship between the AMS operator and some relative underground in the mine. Is there any research that has ever been done about the effectiveness of an emergency response person when some of the people who are in peril are their sons or daughters or that sort of thing? Is there any research knowledge on that?

MS. MALLETT: It's been a while since I read that literature. So I would have to go back and find the actual references.

As I recall, in situations where you're looking at the Red Cross volunteers manning the stations when you're looking at police or fire department and emergency rooms, people tend to focus on their jobs.

They will perform their jobs more effectively if they have that information about the safety of their family or friends; but, generally, they're -- particularly if they're in a response and it's happening now and I'm involved in this, they're going to be attentive to their task at hand.

Now, will they perform differently if there are strangers down there than if it's their brother and their uncle, I mean, that's human nature. I think we can almost by common sense state that yes, of course, that would be an impact.

Does that mean they can't do

the job? No. Some of that will also
depend on that individual and what else is
going on in their life and what level of
stability do they have for whatever is
going in their lives.
DR. BRUNE: On more quick
question.
Dr. Weeks just mentioned the
virtual-reality component that Australia
does for training, not just their mine
control center operators, but basically
mine management control all the way down
to the miners, depending on how involved
this virtual reality is.
Would you say -- and I know
you're working on virtual-reality
research, as well. Would you say that
this kind of training, where you put
somebody in -- let me also add that I
believe commercial airline pilots or even
mine truck operators are today training on
virtual-reality simulators where somebody
sits there and simulates an engine fire

and then has to do something without actually being in the hazardous situation; but he has to deal with it as if it was real.

Would you think that this kind of training is something where we could learn and train not only our emergency operators; but, in the future, even mine management and outside agencies -- fire departments, ambulances, and things like that -- where we can simulate a mine-emergency scenario and effectively train people that way?

MS. MALLETT: I believe that we could. Given the resources, we could do it -- personnel, programers -- we could do it tomorrow given the reality of things.

We don't have the whole system together to train in that scope, but the AMS operator would be relatively simple technologically because we're training them to look at a screen and communicate with people they can't see. So they don't have to visualize everything that's going on for that part of it, but what is more important is that there is not a reality of seeing what's going on underground, but a cognitive fidelity of this feeling real.

So you would have to be training them in VR in terms of looking at the screens, communicating with the people underground or other people in their virtual office, per se; and they would have to believe that what's being said is realistic, that the numbers that are being given from the system make sense in terms of their knowledge of mine ventilation and their mine systems.

So, yes, that definitely can be done; and I can see that in the future, you could have the monitoring system component here in this room and the underground people in a room down the hall; they're connected wirelessly by their laptops. That would be great.

It's not here today; but, as

you know, we're working toward that goal.

DR. CALIZAYA: You touched one interesting point, the human factor. I think sometimes we neglect that part.

I'm sure you are familiar with the statistics, 80 percent or maybe more, of the incidents are accidents that we have due to human factors. Conditions contribute only to maybe 15 or 20 percent. So here we are talking about human factors. It's 80 percent.

Then, we discriminate that into two groups; those who are working with the AMS system and those who are really at the mine, the ones that need to be evacuated or need to be taken to a refuge chamber and so on.

Don't you think we should also stress on the miners and the workers, give them the training that you were mentioning to the operator? Do we need to improve our training program?

Sometimes, we rely on Part 48,

this is what you need to do. That's all a miner gets.

We talk about evacuation drills. Seldom you will see people knowing how to go or where to go; and, what's worse is that sometimes they're confused and there are time constraints.

Any comments along those lines?

MS. MALLETT: Well, definitely, if it was my operation, I would be training everyone on a set communication protocol.

We know that at some of the events that we've studied, information wasn't relayed because of the way information was given.

For example, in one case, when it was called underground, the message was given: "There's a fire, you have to get out." The person heard "Fire," dropped the phone, and went to tell everyone else.

By the time he came back to say "Oh, wait a minute, where is it," it was too late. The fire -- the communication cable was no longer operational. So, if they had, in fact, had those couple of minutes of thoughtfulness to say "Where is this, what do you know about it, how might it impact us," it definitely would have helped them at that point.

So, yeah. I would think that another thing related to their movement from underground is that people will react -- people react to emergency warnings from credible sources, whatever they feel is credible.

So, if I'm selecting -- this is back to who should be that AMS operator. If I believe this person has vast knowledge and experience and they tell me I'm in danger, then I will believe them.

I think it's also possible that if I believe I understand how this person was trained and I believe that the training of an AMS operator is sufficient, then I will also believe what they say and that I'm in jeopardy.

So, in terms of the emergency system, what is the decision-making process? How do we reduce uncertainty? It's a communication. So it has to be trained from both sides for it to be truly effective.

DR. MUTMANSKY: In both the Sago incident and the Aracoma incident, it would seem as though the miners were not well enough trained.

What's your assessment of the annual retraining and whether or not it's effective? The miners really didn't have a very good sense of what they were supposed to be doing, in some situations at least, in those two incidents.

What's your assessment of the annual retraining issue and whether or not the average miner working today in the underground situation is well enough prepared in an emergency?

MS. MALLETT: Not speaking to

either of those events, not having that information in front of me about what they did or didn't do related to their exact training but annual refresher training in general, we're talking about 8 and sometimes 16 hours, depending on what state you're in to cover a whole lot of information.

If that was the only training that we were getting, I think we would all agree that 8 or 16 hours of safety and health in a year is negligible. I think you would not find a mine anywhere that doesn't see that as just one component of their broader scope, or at least let's hope so.

So, as a piece of training, it's an opportunity to bring people together and talk about important issues, whether you do it in one day, whether you do it in smaller blocks throughout the years. Those are some research questions I don't think are answered at this point.

Which is the best way to do that, I don't think is answered.

I've had a fair amount of experience of annual refresher training because I have attended those. Some of them are excellent and give people real opportunities to practice those non-routine skills.

Some other ones unfortunately are not so wonderful. So what those standards are and how those are set is something to be concerned about, I agree.

Did I answer your question?

DR. MUTMANSKY: Yes.

DR. TIEN: I just have one general question. Right now, we have 41 mines using belt air, according to the latest data. It has specifically come back to the AMS operator training.

We visited two mines out west. We know what they provide in their training, and we heard yesterday that at Jim Walter Resources, they do their own in-house combination.

What would you like to see specifically on the AMS operator training, and who are to be the trainers?

MS. MALLETT: You mean in terms of it being in-house versus manufacturers?

DR. TIEN: Yeah. What would you prefer?

MS. MALLETT: Well, I will go back again to saying I would have to determine my role for this operator and how extensive I think their role is in our emergency response decision-making system.

I would not want to see a situation where the manufacturer does all of the training on how the system works and the mine does all of the training on what the emergency procedures are without some kind of tight connection between those.

Now, this doesn't -- it could still be two separate training entities, but there has to be some connection to them, in my way of thinking. So I think more to the point is who is doing that training, not the manufacturers or the miners; but what is their skill in training?

I think, unfortunately, we sometimes take our best truck driver and say "You are the great truck driver; therefore, we want you to train everybody to be just like you." That person may have wonderful truck-driving skills but not necessarily training skills.

So, if we don't take those steps to determine who is doing the training and how that training is formally set up, sometimes those things slip.

DR. TIEN: I agree with you. We had that conversation yesterday. We need good trainers to the trainees.

Thank you.

MR. TIMKO: Thank you, Launa.

As a point of order, I would like to include two things in the record relative to Launa and her presentation.

First, in describing her background, I neglected to state that she had actually earned her Doctorate at the University of Kentucky. I didn't want to forget that.

Secondly, relative to the presentation itself, we were unable to get you copies. We will get each of you an electronic copy of the presentation and the publications that you saw at the back of it so that you are completely equipped.

With that, I believe we are done with the NIOSH speakers. I will turn the meeting moderation back over to Linda.

MS. ZEILER: Thank you, Launa and Dave.

I would like to suggest we take a 10-minute break, and we can set up for the UMWA Panel.

(Short recess.)

MS. ZEILER: Let's get started again, please.

Before we get to the UMWA Panel, I would like to give Kevin Hedrick a chance to respond to something David Litton brought up this morning, just for the record.

MR. HEDRICK: Dave had mentioned that we had developed some standards some years ago and wondered what the status of that was. I thought maybe I could address what we have done for reliability in smoke sensors.

When the Belt Air Rule was promulgated three or four years ago, whatever it's been now, we put the requirement in there that sensors, including smoke sensors, had to be accepted by a nationally-recognized test laboratory.

What we expected was that one of the commercial standards for commercial smoke sensors would be the one that would be used by the nationally-recognized test line that says American National Standard.

This was based on some

information that we got from the Bureau of Mines where they had suggested that one of these commercial standards be used. In addition, add a flaming and smoldering coal test to what UL already did.

In the intervening time since 2004, I have made the proposal to UL that they add this smoldering and flaming coal test to their commercial standard, and have a subgroup of the testing of what they do for coal mine sensors that includes testing to those two specific tests.

The Technical Panel responsible for that UL standard expressed some concern about environmental false alarms due to rock dust, and they are currently in the process of assembling some hardware from various manufacturers that may be available for testing in -- long-term testing in an underground coal mine, but that process has not yet begun.

We have started down the path of having a commercial standard modified to include testing for flaming and smoldering coal. So that's what we've done for reliability of smoke sensors.

MS. ZEILER: Thank you, Kevin.

Next on our agenda is a panel of UMWA representatives, and our first speaker will be Joe Weldon.

MR. WELDON: Good morning. My name is Joe Weldon, and I am Chairman of the Safety Committee for Shoal Creek Mine, Drummond Coal, both the Union 1948. I have 27 and a half years in underground mines.

I would like to comment on the duties and the monitoring of CO systems.

As she had talked earlier, the CO man who monitors these CO systems has various amounts of duties. I know at our mines -- and I would like to read some of the duties that I know that he has. It's definitely not all of these duties, but some of them.

He has to receive calls, requests from people who have days off, contractural days, Union business, people who are late, and people who go to the doctor. Those are his duties. Receiving general calls, relaying messages to and from mine supervision at home and at the mine, vendors, and contractors.

He also has to monitor the fans and the operation of the fans at the mines. He receives calls on the mine pager phone with people traveling to and from different areas of the mines, especially since this new MINER Act came about.

We have to call in when we leave the elevator bottom. When we get to a certain area of the mine where we're going to be working, we have to call then. He is the one that receives those calls. I usually call four to five times a night when I'm traveling from one area to another. So he has these responsibilities on him, as well.

If you have an accident in the mines, he's the one that notifies the paramedics and the ambulance service or the Medivac. He also has to monitor the CO systems and relay those messages to the proper people.

People who work overtime, who come in early or leave late, they have to check in with the CO man to make sure that their overtime is paid to them right.

I wanted to read y'all that because those are some of the duties that he has to do that separates him from the time that he needs to be spending watching the CO system.

I said all that to say this, it is in our opinion that we need to a person -- a responsible person solely trained and certified to monitor these systems to ensure the health and safety of each and every person in this mine.

We believe that this would result solely and directly their time being exposed to smoke or gas or whatever is in the mines in the event of a fire or an explosion. This would reduce those times of being exposed to those elements.

Our withdrawal time would be less, and the probability of someone surviving these would be greater.

Thank you very much.

DR. MUTMANSKY: Mr. Weldon, I would like to know what your conclusion is concerning belt air. Are you recommending that we just have a better system of the operator monitoring the CO system here, or are you -- is that what you're suggesting by your comments?

MR. WELDON: My suggestion to that would be that most of our mines do run on belt air. So, in consideration of that, I would say that if we do have to have our belt air in these mines, that we would have a responsible person there that would solely -- their job would be to monitor these systems. When and if an explosion or an accident happened, that our reaction time and our time of notification would be less than what we have now.

DR. MUTMANSKY: Thank you. I appreciate that.

So you are not recommending that we not use belt air in the face. You're recommending we have a better system of monitoring the CO systems in the mines or the AMS system in the mines; is that correct?

MR. WELDON: Well, again, I state that if we do -- which I'm not a big proponent on belt air, myself. That's just my opinion.

We do have belt air. So, in conclusion to that, if we do use belt air, I would like to see a responsible person there.

DR. WEEKS: I have a couple of questions. The AMS operators, I guess you commonly call them the CO man?

MR. WELDON: Yes, sir.

DR. WEEKS: Is that a bargaining-unit job, or is that a management job?

MR. WELDON: That's a management job.

DR. WEEKS: What are your thoughts about whether it should be a bargaining-unit job or a management job?

MR. WELDON: Well, again, I think that whoever the person is, that they be trained and they be a responsible person. Sure I'd like to see a miner in there, absolutely; but, in conjunction with that, I'd like to see a responsible person in there.

I'd like to see someone that's trained and someone where that is solely their job and they're not having to receive phone calls from somebody that is late from the mine or somebody calling in with other things because that man has a big responsibility.

To me, what is important on this is getting our reaction time down from where we saw it here on this other instance of 16, 17, or 21 minutes. You know, if we could reduce that in half, the probability of survival, the probability of someone being less injured, per se -- we feel like if we could do that, we could get someone in that role of solely doing that, that it would be better for our people.

DR. WEEKS: Does the AMS operator, CO man, does that person have -- if there's an emergency in an alert-and-alarm kind of level, does that person have the authority to call for an evacuation; or would he pass the word on to someone else; and then someone else would make that call?

MR. WELDON: From my understanding, he would pass that on to someone else in management, and they would make that decision.

DR. WEEKS: So, whatever information he's getting off the screen, he passes on to somebody else?

MR. WELDON: He would contact the responsible person there at that mine, whether it be the -- whatever shift, the shift foreman or the mine management, he would contact them; and they would make a direct assumption and then a quick evaluation of that, I would say.

DR. WEEKS: If there were people like inby a fire or inby suspected fire, whatever is going on, would he be able to tell those people what's going on; or would he leave that up to --

MR. WELDON: If he had a monitor go off, a CO monitor go off, he would -- of course, it would probably show that general area of where it was; and he would contact people inby, I would assume; and their reaction time on whether they got the phone or whether they saw a light going off or whatever, that would be determined if they were in that area.

DR. WEEKS: Dr. Mallett spoke about the need to have a kind of communications protocol, basically, who tells what to whom in what circumstances.

I'm curious how that works in your mine.
All right. That's all I have. Thank you.
DR. MUTMANSKY: Thank you, Mr. Weldon.
DR. BRUNE: I have one quick question, Mr. Weldon.
Is the CO man at Shoal Creek, is he or she a certified fire boss; or do you know?
MR. WELDON: Not to my knowledge.
DR. BRUNE: Okay. Thank you.
DR. WEEKS: Is he certified in anything, like a certified foreman?
MR. WELDON: I don't think he is.
DR. TIEN: So he simply just has mining work experience, for the management?
MR. WELDON: Well, I'm not even sure that he's even been -- that any of those have even been underground.

DR. TIEN: Of course, you're talking about your particular mine?

MR. WELDON: Pardon me?

DR. TIEN: You're talking about just your mine?

MR. WELDON: Yes.

MR. ZEILER: Thank you.

Our next speaker is Dwight Cagle.

MR. CAGLE: I've got 34 years experience in underground coal mines. I have worked my entire time, except for maybe nine months, for Jim Walter Resources' No. 7 mines. I'm going to touch on training, maintenance, and prevention -- fire prevention.

Proper maintenance, testing, and training -- if we could get through all this, that would help us a lot on this CO on the belt air.

From Mr. Patrick's comments, we all have the same point about tools and systems on the belt, fire nozzles, water sprays, rock dust, fire extinguishers, and also the AMS sensors. All of this is useless if the miners are not properly trained.

This system is not maintained. From actual testimony and comments from the factory representatives yesterday, they all have some fine systems. Rel-Tek sounds like a good system; but, to press a button to calibrate, someone needs to calibrate the calibration kit.

I don't know if that's in your system or not; but to press a button to calibrate, I don't go along with that.

I do like the nuisance system on the filter so it separates the diesel exhaust. That sounds good.

In our mines, we have a Conspec on ours, also mixed with Jim Walters on the boards on that; but the sensors are all Conspec, I think.

Pyott Boone is a good system. I dealt with that at another one of Jim

Walters' mines, an old mine, several years back.

As testimony from the factory reps on this, the best system in the world is useless and will not benefit the miners unless properly installed, monitored, and maintained.

We have the same problem that Joe Weldon has in his mine, our AMS operators are CO techs. He is the responsible person in our mines. He monitors the system, and he has basically the same job as Joe testified on. So he's got his hands full.

Also, they testified that -- Tommy McNider testified or made his comments yesterday that we have four; but, out of those four, they rotate seven days a week. They work seven days a week, two in a 24-hour period. They get a 12-hour shift each.

Also, along with these jobs, as Joe said, he keeps up with all of that, plus he's over meals. He's in charge of the cafeteria.

I would like to see an additional person added to this. One man can't handle all of this.

Monitoring systems. We get a lot of nuisance on our system from diesel. Say, for instance, we have a locomotive unloading supplies in a track. We get a nuisance trip that feeds back to him. He's going to have to clear it. We need more people in the CO room.

Belt air, I fought it in the past; and we ended up with it. So we need to make it as safe as possible through fire-resistant belts, more sensors, more CO people.

Our CO technicians are well trained. They come out of the working people at the Union side. In the past two years, we had bid off and bid on; but the same people are back in it again.

I've asked for -- at least in

our communication meeting, we want additional CO technicians because if one of them is off, we have an alarm, he calls the CO technician to handle it. These people have to work a 12-hour shift.

Right now, we've added one to a day shift. So we've got two on a day shift. On the evening shift, we only have one. If he's off, the other three have to divide the shift up to stay there.

So, if we're going to keep the belt air, we need to train, test, maintain, and make some improvements.

That's all I've got. Thank you.

DR. MUTMANSKY: Dwight, I didn't catch your last name.

MR. CAGLE. Cagle, C-a-g-l-e.

DR. MUTMANSKY: Thank you very much.

Anybody have any questions for Mr. Cagle?

DR. WEEKS: Yes. We had a

speaker in Pittsburgh who really emphasized the importance of maintenance. It's good to hear it again.

I'd like to hear some more from you about what is good maintenance? You know, you were talking about people doing their jobs. I just want to get some detail of what it is and how do you get them to do good maintenance.

MR. CAGLE: Good maintenance training, training from -- we've got good training facilities. We need to put more people into it because we can't just rely on one or two people to know everything to do on well, say, CO techs. We need to follow up behind them.

Maintenance on your headers. We've had -- some times in the past, we have had bearings to heat up and catch on fire. The bearings would burn. I think the law reads that once you find it, if it burns over 30 minutes, report it.

Between shifts, for a hot

bearing, I would think we need -- like our fans. We've got sensors and monitors on them. If the bearing heats up, it will send a signal.

I would like to see that mounted on some the main headers and some of those bearings. If they heat up, it will stop it before it catches on fire.

DR. WEEKS: In the training facility, are people trained how to recognize -- well, you know the common cause of these belt fires is friction; and it's complicated by -- that can be a frozen roller.

If a belt goes out of alignment, rubs up against something, when it stops, it ignites. If there's a lot of other combustible material around, that's going to burn, too.

I am just wondering, in the training facility, do you get people trained on how to recognize belt misalignment or a frozen roller or that sort of thing?

MR. CAGLE: Not at the training facility.

DR. WEEKS: Let me just say one thing. For people that have spent 20 years in the mines, I'm sure you could spot a frozen roller. I couldn't, probably; but people that have experience in the mines can do that.

I'm trying to -- this is not a totally dumb question. Well, maybe it is. That's where I'm coming from. I'm just asking whether or not people get that kind of training so they get the hands-on experience so they can recognize the circumstances that could result in a fire?

MR. CAGLE: Not our young people that have just come into the mines. They don't teach that in the training center. If you get a belt repair or belt installer job, a lot of times they'll have you walk the belt. The supervisor will tell them what to look for.

Like you said, we have a lot of

hot rollers. The older people can just walk down through there and can tell if a bearing is going bad or if it's sparking or there's shavings off the belts and stuff like that.

Once that drops down, you know, our belts are fire retardant; but it will catch on fire; and you have a smoldering fire. Our high velocity of air will sweep past that, and you will have to go hunt that fire. It may alarm downstream, but it won't pinpoint exactly where the fire is. You have to go inby from there and go hunt it.

Experienced people would recognize a roller, but not --

DR. WEEKS: Are you ever put in a position where you can pass that experience on to newer miners who don't know how to recognize things?

MR. CAGLE: That's what we try to do. The new people -- all our new people -- we get complete turnover now. We're in the 50s, and then we've got the 20-year-olds coming in throughout the industry. It's all over the country. We missed the 30-year-olds.

So we're trying to train most of these younger ones; but, most of the time, they know everything.

DR. WEEKS: Could you say that again? I think that's worth repeating. Most of them what?

MR. CAGLE: Most of the young ones know everything.

DR. WEEKS: Right. They're wrong. The old ones do.

MR. CAGLE: That's right. I know when I come in the mines, you had to listen to your older people. They would get your attention one way or the other.

We had ignition one time, and it scared them to death. That was the first time they had seen that. They had been in the mines about 30 days. They were burning some holes, and they had a small ignition. It scared them to death.

So, with stuff like that, they

will learn. It can happen.

DR. WEEKS: That's a pretty rough way to teach people, and dangerous, too.

MR. CAGLE: That's what I call hands-on, right there. That's firsthand experience.

Like I said, apparently, we're probably going to end up with belt air.

DR. WEEKS: What if you do?

MR. CAGLE: I mean to stay. We want our mines safe, which, through additional sensors or higher fines on float coal dust or a bad roller -- like I said, sometimes you have a bad roller sparking or a belt rubbing the brackets that holds the roller. We find a lot of them in the mines.

Then you've got accumulation under that. Usually, if it's running out of line, it's dumping coal right there on the bracket.

So we need a little closer look at those preventions.

DR. WEEKS: Right. Prevention is critical. It's easier to prevent a fire than to --

MR. CAGLE: If we stop it, we don't have to fight it.

DR. WEEKS: Thank you.

MS. ZEILER: Our next speaker is Larry Turner.

MR. TURNER: Hello. I'm Larry Turner. I work -- I'm the UMWA safety rep at the No. 4 mine for Jim Walter.

I appreciate your time, and my only hope and prayer is that you will listen to some of our concerns that we have as coal miners.

We may not have the degrees. We may not have the expertise, but there is one thing certain, that most of us have the experience that I think is invaluable and very valuable to input in changes and laws and things that need to be done concerning me as a miner and other miners that I represent. So I thank you for that.

I want to just touch on a few brief things. Yesterday, people spoke on several things that were very interesting to me; and they were very knowledgeable. I appreciate the Companies coming and telling us what is available and what obviously is not available. The technology just hasn't come forth yet for that availability.

Yesterday, that was very well done presentation by Jim Walter's employees, and they spoke on wearing dust pumps and doing dust samples on our employees on the belt lines and how those showed very favorable as far as the respirable dust that a miner takes in.

One thing, however, I don't think was touched on is the amount of citations that we get on our belts for float coal dust accumulations. I do not have a number of those, but I'm sure the Company could pull those and give those to you if you need it.

Most of our belts -- as you

know, all of our belts we use in face air; and some of those are a very high velocity of belt, basically those near fan shafts and those sorts of things. So we have a lot of trouble and a lot of problems with float coal dust on our belts.

We have crews that are dedicated just only to helping to prevent that; but, nevertheless, we still have citations because of a lot of different reasons. Maybe there's not enough belt sprays, or maybe there's too much air velocity on the belts.

I would like to see maybe some stricter regulations on how much air could be on a particular belt that is going toward the face where there are men and women working every day in our coal mines.

I would like to see maybe ways to help us with these accumulations like -- yesterday, we learned a lot of things about the monetary reasons for different things; AMS systems and smoke detectors and those sort of things.

We all know that what drives this industry is two things -- I believe, my opinion -- money and disasters. Those two things drive this industry in the manufacturers bringing forth new ideas to us, in you people as a panel creating new ideas or new ways for MSHA to implement new laws for us to work in and live in and stay in a mine.

So, you know, we're all in an uproar now about the amount of citations and how much those citations have escalated since our recent disasters. So, that's another substantiation, I believe, in why our industry is driven by either money or disasters.

It doesn't need to be that way. It doesn't have to be that way if we can collectively come together. If money is driving this, then maybe there needs to be a way that violations could be created so that -- if there was a step system on a belt, a particular belt, a North A Belt, one of our main belts.

If there were so many float coal dust citations in a certain area in a certain period, those citations would be monetarily stepped up each time. Substantiating what I believe, that money and disasters drive up and make these laws.

Most of the laws that are in our books now were created probably because of a disaster or a death. I don't want to see that happen anymore.

I have a son working in the mines now. I don't want to see that happen. So that was something that wasn't brought up.

We're all in favor of AMS systems, not only just on belts that are aired to the face, but we're in favor of those in -- on all of our belts, whether they be air in the face or not.

We know, again, that money drives that system. If the law doesn't make them put AMS systems on belts, there won't be an AMS system on the belt.

I work for a -- I'll stop for a minute. I work for a very good company. I've worked for four -- I'm in my fifth mine, and I have seen other companies. This is not my only mine. This is not my only way of seeing management run.

I've worked for U.S. Steel. I've worked for different people, and I worked for a good company. I work for a company that in most cases will listen to you; but I work for a company that I know is driven by their profits, just as your home is driven by profits.

Us coming to you today, we're just pleading for you to listen to the people that are actually in the trenches that actually see the things and that actually hear the things.

I will give you one personal experience. I don't want to go over my time. I happened to be working at our No.

5 mine, which is shut down now. At the time of the explosion, I was not underground at that time.

I don't want to speak about the explosion, but we all know what happened -- maybe we all don't know. Some of us know what happened by the report. There were so many boggles and so many mistakes made in the CO room.

I'm not pointing at one person. Just to add to the other two speakers, that man or that woman has so much to do it is mind boggling. I only applaud them for being able to do the job that they can do under the stress that they are under.

Jim Walter has implemented different things that they have to do and need to do and has brought other things to them and to the table to help them do their job, but working them -- as it's been brought up, we have four people -- just like No. 7 mine, we have four people. They split those shifts. They do 12-hour shifts, each one. They're seven on and then seven off. It's a high stress job.

The lady spoke about -- you asked question about that stress. Is twelve hours too much or eight or six hours. Adding all of that to them, I think, in a situation -- I've been in the CO room when a situation happened. It gets very, very stressful to not only him, but to other people.

Our CO man and CO lady are the responsible person at that mine. They do make that decision. They do make the call whether to call the men out of the face. As far as out of the mines, they may not make that call. I don't know.

I don't know if I have ever heard them make the call for them to evacuate. I think it's substantiated by other people that they make the call to, but I know they evacuated certain sections and that sort of thing.

So let me finish my story at

No. 5 mine. I got sidetracked.
I was walking a belt at No. 5, one of their main belts; and I started smelling smoke. I was doing a preshift exam, and I started smelling smoke. The closer I got to the source, which I didn't know at the time, the heavier the smoke got.
I looked at some of the CO detectors, and they were not alarming and they weren't elevated very much at all. My hand-held elevated some.
I finally got to the bottom of the hill where I could see flat to the header, and the big large fault coupling on the head roller was actually on fire from the grease.
Now, let me tell you, it was not smoking. It was on fire. Flames were coming from the fault coupling. The detector was not going off. Mine, as I got closer, did.
So I got the water, and I put it on the fault coupling. The phone was in

hand's reach. I called the operator. It didn't go off.

These AMS systems are not perfect. Just to have an AMS system is not enough. We need belt material that doesn't burn. We need stricter rules and stricter citations or elevated citations on float coal dust, all of the things that contribute to fires.

I asked "Why didn't it go off?" He said "The levels hadn't come up enough." Maybe, it's a question of where they're positioned.

Back to where I'm at now, No. 4 mine. If you walked any of the belts, those of you that were there, they are all on one side of the belt. They are all at the same height. They are all within the law, 1,000 feet apart.

I don't know. Maybe a study needs to be -- and it may have already been done. Do they need to be at different heights? Do they need to be at different sides of the belt? Where are the locations? How are the locations selected?

Yes, Jim Walter has been very successful in using belt air. We in the past -- mining in the past has mined very profitably without belt air. If we have to use belt air, help us to use it the safest way possible, and not make it to where money and disasters drive us in our industry.

Thank you.

DR. MUTMANSKY: Thank you, Mr. Turner.

Panel members?

DR. WEEKS: A couple of things. This panel was created because of the disasters. It was created by the MINER Act, which was driven by Sago and Aracoma. So you were saying what drives industry. It's right here in front of you.

You raised the issue of citations for float coal dust. One of the first things that we asked MSHA to provide were citations for a wide range of entry violations; float coal dust, accumulation of other combustibles, and a few other odds and ends.

I'm not quite sure how to interpret all of the citations. It would be useful to have you or someone else have a look at it and tell me you what see.

The issue you raised about -- you said if there are a number of float coal citations, you sort of suggested we should up the fines on those. There's a provision in the Act rarely used call the Pattern of Violations. I don't know exactly how they define a pattern, what you describe is a frequent or a lot of float coal dust violations.

Conceivably, it could fall into what could be called a pattern, which would apply. What's your sense? Do you think this would -- is it a pattern-of- violations kind of thing that should be addressed by the Agency, or should it be addressed in some other way?

I think it is the accumulation. It's not just the accumulation of float coal dust, but it's an accumulation of a number of problems all occurring together that results in a fire.

I'm curious what your thoughts are on how to handle that.

MR. TURNER: Well, you're right. There is a provision, and you are very correct in saying it is very seldom used. It's very seldom used.

I may be stepping out of bounds here. If I am, that's okay.

DR. WEEKS: Well, the name of the game here is to step out of bounds. That's what we were asked to do.

MR. TURNER: I've been in the mines quite a while. In the last few years, I've been on the Safety Committee. I am amazed how political the citation process and this process is. It just amazed me.

We are not always looking out for the best interest of the miner. What is best for the guy that's in the face mining coal? What is best for the lady that's cleaning the belts or the lady that's running the ram car? That's not what we're looking for. I'm so disappointed.

That's the reason I am more determined to do things like we're doing today. We've got some of the best inspectors in the world, but we have -- I'm not going to name any names. We have an inspector that was one of the best inspectors that I had ever seen.

That's one of my jobs, is to go with those inspectors. I hear them. I see them. I know what they're doing. I have a feel for what they're looking for and those sorts of things.

One of the best inspectors we've ever had goes from there into management. His opinion changed 180 degrees. He changed completely his opinion when he went into management.

He was a guy that we could go

to for anything and say "Look we think this is a problem. We think there's a problem here that we would like for you to address. What can you do for us?" It would be an almost instant reaction.

Now, we go to him, after about two or three years in management; and we get the biggest run around that you have ever seen. Sometimes we get no call backs. Sometimes we're referred to some other party. Sometimes an erroneous, I feel, answer to the problem.

So, you know, the provisions in the law are there. They can be used, but they are not being used. In my opinion, they are not being used to the fullest of the law. They are not being used to make these companies or make our companies act, for monetary reasons.

That's strictly an opinion of mine, as being a miner for over 20 years and being on the Safety Committee just the last few years.

DR. MUTMANSKY: Mr. Turner, for clarification, did the person go into management in MSHA or management in the company?

MR. TURNER: Excuse me. He was an MSHA inspector, what we called a "ground-roots inspector;" and he went into management for MSHA.

DR. CALIZAYA: Thank you for all the input. It was very, very interesting for me.

If I'm not mistaken, I will summarize your concerns in two words; reliability of instruments or the AMS system, and the other one is the number of operators or workers. Not necessarily the AMS operators, but also the technicians and the people who maintain the system.

Regarding reliability, the instruments are good. They tell us they are good. They test them; and, no matter where you test, they are doing their job. When they are deployed in the field, they are under harsh conditions, and they need to be maintained.

Sometimes you need to maintain them frequently. That needs manpower. You don't have the manpower, and that's not going to do the job.

Conditions also change. You talked about dust, the buildup of dust. We can't do that on an everyday basis. You can make changes in the schedule, or maybe you need to shut down certain sections. It's not that easy to deal with dust, especially with float dust that's accumulating there.

Then, again, you need to have scheduling; and you need to have work people. Is that a fair assessment?

MR. TURNER: Pretty general, yes.

DR. WEEKS: Very briefly, when you encountered this fire, you're saying it was the lubricant that was on fire?

MR. TURNER: Yes. The metal got hot and caught the grease on fire.

DR. WEEKS: I take it you would support the use of flame-proof lubricants?

MR. TURNER: Yes. I think my other point was, was the monitoring system placed in the right place? Why did that not go off?

DR. WEEKS: I don't want to exclude anything else. I just wanted a clarification on that point.

MR. MUCHO: I just want to follow up a little bit on what you just said, Larry. Jim picked up on it, the pattern-of-violation thing.

I think everybody has recognized that a mechanism where there is a pattern of violations might be a good thing from enforcement standpoint to get higher level compliance.

Just for the record, I think we need to recognize that here in the past week, MSHA has taken some action in that direction and announced eight letters of pattern violations for eight operations, one of which is an Alabama operation that received a pattern of violations.

Of course, you suggested a monetary increase. The pattern of violations tends to go toward maybe even a more significant one, a pattern of violations or repeat violations should become automatically an order, which may be even more monetarily painful to an operation than just raising the amount of it.

So there has been, I think, an issue, at least from my perspective, with the implementation of that conflict. It's been problematic. Just to recognize that MSHA seems to be, recently at least, moving in that direction. I just want to make sure we understand that on the record.

MS. ZEILER: Thank you. Our next speaker will be Glenn Loggins.

MR. LOGGINS: I ain't got much to say here. I've got one little issue I'd like to touch on, and it is on training.

Last year, on August 7th, we

had our CO monitoring system went into alarm mode. At that time, they called in to evacuate everybody. Instead of coming all the way out or outby, which our plan says you will come outby the alarm sensors, they chose to start calling at each phone they come to.

You know, when you've got a fire, time can be critical. If you're stopping at every phone to call and see if they found out what the problem was, you could be caught in that fire and burnt up and never make it out.

I think we should be trained to come out. I feel like when you start out of the mine, you shouldn't be stopping at phones. You should come all the way to the surface.

When you have to retreat outby the monitor when it's alarming, your fire could be outby that monitor because you still space on 1,000 feet. Well, you say come outby that -- you know, we've got a marker on our track where they're at. If you stop right as you come outby that monitor, your fire could still be 1,000 feet outby. You could have a monitor that fails. That could make it 2,000 feet.

So I feel when you start monitoring, when one goes in alarm mode, you train people to come to the surface. That would be the safest place.

Maybe the Lord will give us enough fresh air for everybody to breathe. When you're underground, and you get into CO, it doesn't take but one breath; and you can be dead.

I feel like we need to put a lot on training, not only with your foremen and your CO operators. I feel like the miners should be trained. A lot of them work by themselves. So there might not be a supervisor always there to tell them to withdraw.

So I feel you should train everybody in the mine. That's about all

I've got.

DR. MUTMANSKY: Would you repeat your name for us again.

MR. LOGGINS: My name is Glen Loggins.

DR. MUTMANSKY: How do you spell Loggins?

MR. LOGGINS: L-o-g-g-i-n-s.

MR BRUNE: What mine are you at?

MR. LOGGINS: I work at No. 4. I'm on the Safety Committee. I've got 29 years mining experience.

I didn't say that to start off with. Sorry about that.

MS. ZEILER: Thank you. Our final speaker, unless he corrects me if I'm wrong, is Tom Wilson.

MR. WILSON: I'm Thomas S. Wilson, UMWA International Representative. I started mining in 1976. I was first introduced to belt air in 1979. I have been around it ever since.

This exposure came about as a result of a Petition for Modifications filed by individual mine operators and by rule making by the Mine Health & Safety Administration, Section 101(c) of the MINER Act.

Federal legislation concerned with mine safety is a translation of conventional safe mining practices to legal requirements, thus adding the power of federal law enforcement to professional judgement and experience.

Historically, the conclusion reached by mine safety professionals is that belt entries should not be used to ventilate active workplaces. This conclusion has been translated into federal statutes and regulations. Therefore, it's useful to review briefly these legal requirements and the rationale behind them.

There are three sections of the mine safety statutes that apply to he issue of using air from belt haulage entries to ventilate working places. Number one, The Federal Coal Mine Health and Safety Act.

The Coal Mine Act passed in 1969 states that air from belt haulage entries "... shall not be used to ventilate active working places." Section 303 (y)(1). This section remained unchanged when the Coal Mine Act was amended in 1977 with the passage of the Mine Safety & Health Act, again, the Mine Act.

Number two, the prohibition of using air from belt entries for ventilating working places is one of several interim mandatory standards. Congress allowed and expected changes to be made either by Petitions for Modification filed by individual mine operators under Section 101(a)(9) or by rule making by the Mine Safety & Health Administration under 101(c) of the Mine Act.

Regardless of the means, any new rule had to be such that miners had at least the same degree of protection as afforded by the existing standard.

Furthermore, and more specific to regulations concerning ventilation to control exposure to respirable dust, MSHA is required "...to prescribe a minimum velocity and quantity of air reaching each working face...to reduce of level of respirable dust to the lowest attainable level." Section 303(b).

The rationale behind the prohibition against using belt air to ventilate active working places arises from the potential of miners exposure to at least three hazards.

The first and most important is fire in the entry. If there is a fire in the belt entry, the products of combustion will go directly to the face area where many miners work. The occurrence of fires in belt entries is more common than in other entries because all three necessary and sufficient sources of fire are present: Fuel, sources of ignition, and a ready supply of air.

Inadequate maintenance in belt entries is a contributing factor to the occurrence of belt fires, resulting in the accumulation of fuels and creation of sources of ignition.

The most common source of ignition is frictional heat. It can occur if idler rollers seized or if a belt becomes misaligned. Idler rollers are placed about every two feet on conveyor belts. Therefore, for each mile of belt, there are over 2,640 rollers.

If any one breaks or seizes, a belt continuing to pass over the rollers can cause frictional heating. Frictional heating has also occurred if the belts become misaligned and rub against adjacent structures.

This heat may be sufficient to ignite grease, accumulated coal dust, or other combustible material. When the belt stops, there may be sufficient heat to ignite the belt. Other sources of ignition include sparks from welding or from malfunctioning electrical equipment.

Fuel for combustion is either the belt itself, coal or coal dust, lubricants, or other combustible materials such as wood, trash, et cetera. Since the belt entry used to ventilate the face is an intake entry, there is typically an abundant supply of air to fuel a fire. None of these conditions occur in any entries.

Poor maintenance on the belt and for the belt entry itself is an important underlying cause of fires on belt entries, contributing both fuels and sources of ignition. If rollers are inadequately lubricated or if they break or become jammed and such problems are not observed and repaired, they may seize.

Since freshly cut coal is carried by the belt, float coal dust is common in belt entry. If it is not removed on a regular basis, it may become fuel for fire.

Belts used in the US mines are an additional source of fuel. Other combustible materials may accumulate, and the belt may become misaligned for a variety of reasons. If the ribs of the belt entry are not adequately rock dusted, the coal that constitutes these ribs may also ignite.

Citations for such violations -- accumulations of combustible materials, inadequate belt maintenance, failure to rock, and others are common.

The second hazard is that use of the belt entries to ventilate the face almost always results in a reduction in the number of entries that miners have to escape the mines. While a reduction in the number of entries is often celebrated as more efficient and as a means of solving ground control problems, it nevertheless is a reduction in the number of possible esapeways and therefore a reduction in miners' safety.

Means of escape are essential if there is a fire or explosion or inundation, regardless of its location. Even in the absence of a fire, a belt injury can be a cumbersome escapeway because of the belt and its supporting structures.

Third, compared with other entries, air in the belt entry usually has high levels of respirable dust and methane. The most common sources of dust in a belt entry are transfer points and, to a lesser extent, re-entrainment as air enters over coal on a moving belt.

Since the Act requires that ventilation be designed to reduce exposure to dust to the lowest obtainable level, using air from a source with a higher concentration of respirable dust compared to other sources; ie, air from a belt entry compared to air from an intake without a belt does not meet this requirement of the Act.

To summarize, ventilating the

face by using the belt entry as an intake air source exposes miners to hazards to which they are not exposed when belt entry air is not used for ventilation as follows: The products of combustion in a belt entry will go directly to the face. The number of escape routes is reduced. Belt air used to ventilate the face is more contaminated with methane and respirable dust than is air from other entries.

Permitting this method of ventilation, in the absence of any controls, reduces the protection afforded miners under the existing rule. Therefore, in order to meet the requirements of the Mine Act, provide at least the same level of protection as provided by the existing rule, MSHA should be compelled to take steps to control these hazards.

What has MSHA done for each of these hazards? The Agency's actions are described in detail in its final rule, published in 2004, and in the preamble to both the proposed rule in 2003 and the final rule in 2004.

MSHA's principal response to products of combustion going to the face has been to require mine operators to use Atmospheric Monitoring Systems, AMS; but what does the AMS system provide?

The most basic protection provided by the AMS system is to give early warning of fires. Early, in this context, means before a fire is detected by other means, by smell or sight.

In principal, early can be measured in minutes; but, to our knowledge, there are no estimates. MSHA's reports on detection of 75 reportable fires in belt entries, at least burned 30 minutes from the time they were detected under the 30CFR Part 50 Regulation, and showed that in all circumstances when they were in use, the AMS systems detected the fire.

In contrast, when point-type heat sensors were in use, fires were detected by sight or smell, illustrating the clear advantage of the AMS over the point-type heat sensors.

However, in 13 nonreportable fires using the AMS system, six were detected by sight or smell rather than by the AMS system. This is hardly a representative sample because the reporting of nonreportable fires is voluntary, even though it was solicited.

Nevertheless, it's suggested there are circumstances under which the AMS system does not, in fact, provide warnings before a fire is detected by sight or smell. In fact, in those cases, it did not provide an early warning at all.

The AMS provides, however, other advantages. In addition to early detection, AMS detectors are placed along the entire length of the belt entry, making it possible to identify a location of fire with greater precision than can a miner who needs only to be inby the fire.

It is linked to a communication system making it possible to warn miners, to withdraw them from dangerous areas, and to coordinate fire-control efforts. Still, the only improvement provided by an AMS system is early warning of a fire.

Smoke from a belt or fire will contaminate the face, with or without the AMS. The mine operator and the miners still have to find the fire, bring it under control, evacuate anybody who is inby, and decide whether to evacuate the mine.

The AMS system does not prevent fires from occurring. It does not result in controlling combustibles or sources of ignition, and it does not prevent the products of combustion from being conveyed to the face.

It is essential to control fuels, sources of ignition, and air to prevent fires to ensure a means of detecting and controlling fires should they occur and a means to escape. All methods of preventing injury are necessary primary preventions of fire, fire control, and escape.

Fuels include the belt itself, methane, and other combustible materials in the belt entries. Other combustibles include float coal dust, lubricants, trash, timber, and other materials.

Sources of ignition include frictional heating and sparks from welding and electrical motors and other devices. Oxygen is provided by incoming fresh air.

Fuels can be controlled, but not eliminated, by using flame resistant belts, fire resistant lubricants, by monitoring and controlling methane, and removal of combustibles.

MSHA considered but ultimately decided against requiring mine operators to use flame-retardant belts. MSHA offered this as a principal reason for deciding against such a rule that the number of belt fires had decreased over the past decade.

It is true that the number of fires has decreased, but so has the number of mines. A decrease in the number of belt fires could be due to a decrease in the number of mines or belts, or it could be due to a greater success at preventing belt fires. It is the former.

If we measure the number of belt fires per thousand mines, there has been no decrease at all. The need to reduce belt fires remains. Consequently, we recommend that MSHA should require flame-resistant belts.

Even so, belts are not the only combustible materials in belt entries. Accumulation of other fuels could be prevented with improved belt entry maintenance.

MSHA also considered belt maintenance as a contributing factor, but they also decided against any change in rules or enforcement of policies pertaining to maintenance of belt entries.

MSHA's principal response to controlling these hazards is to require mine operators to install Atmospheric Monitoring Systems, which rely on the early detection of fires by monitoring carbon monoxide.

CO elevated above ambient levels usually indicates a fire. MSHA required that mine operators install and maintain these devices every 1,000 feet in belt entries, that they be maintained with alert and alarm levels set at five and ten parts per million above ambient levels, and that there be a trained AMS operator on the surface.

If an elevated level is detected, MSHA specifies procedures to alert and evacuate affected miners. These are all steps that improve the ability to detect and respond to a fire in the belt entry. Additionally improvements are still needed.

The essential benefits provided by the AMS is early fire detection. By itself, it does nothing to prevent fires, and it does nothing to prevent the products of combustion from being transported to the face area.

When a trained AMS operator witnesses early detection, additional time is gained both for escape and fire control. How much time is gained is not clear.

UMWA would request and suggest that the Panel address the following recommendations: Flame-resistant belts, revision of 30CFR 18.65, flame-resistant lubricants, noncombustible standing roof support.

I want to stop there for just a second, and then I will get back to the recommendations. I will read the recommendations and then come back to that.

Better design at belt headers and transfers -- that's better entry design -- improved automatic fire suppression systems, address what occurs when there's a communication failure -- on that communication failure, I'm referring to a telephone device for warning miners inby -- address the required belt maintenance, address more stringent dust controls, address the physical and pressure separation that should exist in our opinion between the intake escapeway and the conveyor belt, address the standards for installation of AMS systems -- including what one of our speakers spoke on earlier, the actual location of sensors -- and address the standards for training.

I listened to persons testify who I have tremendous respect for. Among them was Randy Watts, Tommy McNider, and Keith Plylar who gave presentations yesterday. All are top-notch coal miners, and they have always had my utmost respect.

We cannot take their presentation as the norm for the industry. We must learn from, for example, Jim Walter's failures and successes and established standards for all mines currently using belt air. We simply can't sit back and wait for each operator to do it one at a time.

One of the Panel Members mentioned just a few minutes ago about MSHA recently taking action on the pattern by issuing eight pattern notices. One of those was in Alabama. From personal experience, if you look at the belt lines compared to maybe the belt line y'all visited earlier in the week versus this mine that was pattern, the difference is night and day.

We have to protect all miners; and, by doing that -- to do that, we must establish standards.

Going back to the list, I mentioned noncombustible standing roof support. Early in my career, I unfortunately had the experience of responding to a belt fire that had just turned into a blow-torch situation.

We were some 2,000 feet underground, the shift was lined out; and, by chance, the mine foreman traveled to an area of the mine where he was actually going to mine some coal, even though it wasn't lined up for him to do on that shift. He was going to try to get a jump on his other sections where he was supposed to be mining coal.

By traveling to that area of the mine, it was found that one of the belt lines which was idle was not running. It was blazing. It actually burnt to the point the chain hangers, the thing that holds the conveyor belts up, had melted in to.

Even though that belt fire was successfully gotten under control, miners were put at risk to get it under control; and jobs were put at risk.

After the investigation, what was determined have caused that were two standing supports, wooden timbers; and they had a footer that actually went under the belt that both of those timbers were sitting on; and combustion had gotten in there next to that.

There was an accumulation on the outby side of that timber that crossed under the belt, and it sat and smoldered. With time, it caught the timbers on fire and then caught the whole entry on fire.

That did occur at one of the Jim Walter Resources mines, and I was personally involved in that. We have had a good record with belt air, but it's not quite the spotless 30 years that was conveyed to you yesterday. There's also been other belt fires at these mines.

Jim Walter representatives spoke yesterday about their training -- or one of the speakers spoke about the test that was actually given for a CO room operator. Again, we support that, making sure the right person is in that room and in control of the situation.

We don't just support it at Jim Walter Resources. It needs to be industrywide.

With that, I'll take any questions.

DR. MUTMANSKY: Addressing your last few comments, who makes an ideal AMS operator, in your opinion? What type of person should be in there?

MR. WILSON: I want to answer this with -- Larry Turner mentioned some of the investigation after the mine disaster at Jim Walter's No. 5 mine. With all the extra duties that are put on this operator, I don't think there's anybody -- any super man alive that could actually fulfill those duties.

I think we have to better define what their duties are and better train them because when an emergency occurs, everything changes. If we haven't defined those duties and limited those duties to protecting the miners that he's watching out for, and trained him to do that, there will be mistakes in the system. Ultimately and continuously turn to mistakes that will result in loss of lives.

For example, until maybe this panel better defines the duties and training, I don't think that can be answered.

I will say it is absolutely necessary for them to have a good working knowledge of the underground works. That must be continuously regained as the mine develops.

Just having a map on the wall often is not good enough. We actually need to know how that mine develops and restrictions that may be interfering with escape in different areas of the mine. That's a training that needs to be ongoing.

DR. MUTMANSKY: Any other Panel Members have a question?

DR. BRUNE: I have a question. You mentioned as one of the hazards; the fire hazards, number of entries, and the amount of dust that gets entrained in the belt air that is sent to the face.

Do you, in your experience as a
miner and as a mine representative, see that
amount of -- let me put is this way. There
is certainly some additional dust at the
face, but you also get additional air, from
what we've heard from other people in prior
sessions. Typically, the amount of air that
you get in addition to the face dilutes the
dust more than what you get in addition to
dust in the face.

Is that something you can
confirm, or would you doubt that? What's
your take on that?

MR. WILSON: My take on that
is from -- there are clear advantages to
ventilation, any ventilation you get to the
face.

I personally don't believe and
haven't seen enough emphasis placed on
controlling the respirable dust, especially
in areas along the conveyor belt in a
restricted area, like under an undercast or
overcast.

There are tremendous problems across the country with the float coal dust. Nobody has currently solved what type of maintenance it takes to counteract that float coal dust accumulation that's constantly accumulating along the belt lines.

DR. WEEKS: I have resisted making comments about the dust issue. This is partially in response to that last question.

I think the way the question is put determines the answer. Let me put it this way. If you take air from an entry with, say, a tenth of a milligram of dust and you use that to ventilate the face, can you compare that to the results of air with entry that has two-tenths of a milligram and the effects with that?

Clearly the one with less dust is going to have lower dust at the face, just looking at two different entries. If you look at air at the belt entry versus not air at the belt entry, different creatures all together, what you say is correct. The air will dilute, provided the dust concentration at the belt entry is less than what it is at the face already. So the way you put the question determines what the answer is.

Regardless, however, the difference one way or the other, whether you use belt air or not, is really small. In fact, it's impractical. Without going into detail, in practical terms, it's too small to measure.

I could go in much more detail on that, but that's kind of my thinking on the dust issue.

I had another question I wanted to ask. It's actually to you and other panel members. It has to do with defining the job of an AMS operator.

Who was first up?

MS. ZEILER: Joe Weldon.

DR. WEEKS: I think anybody can

respond to it since he's not in the room.

Mr. Weldon sort of ran down a list of tasks that the AMS operator does, including dealing with overtime workers and passing on information from one person to another -- any kind of information -- taking general calls, and so on. Those tasks are clearly not directly related to safety issues.

There are a bunch of other tasks that are related to safety; such as, monitoring the fan, monitoring the people in the mines in an evacuation situation, notifying people of accidents, and so on. That's in addition to monitoring the CO system.

I guess my question is: In your view, where should the boundary exist in terms of what the AMS operator does? Should he only look at the CO monitor, and that's it; or should he also look at some of these other issues that are related to safety; such as, the performance of the fans or monitoring people as they go through the mine and that sort of thing?

What's your sense on how to draw the lines on what that person should do?

MR. WILSON: Properly tracking a person as they go through the mine is a complicated and pretty tedious undertaking when you do it simply by having an electronic system. You have to keep in mind that when the phone call comes in that there's an emergency or when the alarm goes off that there's an emergency, everything changes.

I think you also have to look at how each operation is prepared to step in at that moment, and the availability of the assistance, trained assistance, for that AMS operator. There are several variables.

I guess my sense is what I am observing currently. With no name on the AMS operator, they are not -- their job duties are so wide that they cannot properly focus on the safety of the miners.

DR. WEEKS: Right. That's the sense I get. I'm just trying to find out how to pare that down. What's dispensable and what isn't in terms of the tasks?

MR. TURNER: When I've been in the CO room for maybe ten or fifteen minutes or so, or sometimes even longer, most of the calls that Joe was talking about, happen at our mines, as well. It's mostly on the off shift. There's someone else fielding those calls if you want a day or you're late or whatever. There are other people fielding those calls.

Somewhere there needs to be a cut off to where that guy is doing -- on our system, he goes to a computer, and pulls up your job classification and your number and puts in whatever day you're taking off, and that takes a little time. That does take him away from his job.

These people are very -- in my experience, they are very well trained. I don't know if training is the issue at our mine. I can't speak for other mines. I think the issue that I have is them doing so many tasks at one time.

I've been there when an alarm goes off and seen how he or she checks that alarm and those sort of things. In my view, it's done professionally. Then, all of a sudden, three calls come in, and their attention -- we're talking about on an owl shift usually when that happens. It doesn't happen quite as frequently on a day shift.

I don't know where those guidelines are because different people can do different things and multitask in different ways. Somehow, there needs to be a cutoff on what that person's actual tasks are and how much he or she can handle in a 12-hour period and still maintain where people are in the mines and whether they called back in 30 minutes and those sorts of things.

Again, I will add that the four

that I know that are at our mine, No. 4 Jim Walter, they all four have mining experience underground. Most all of them were face bosses at one time. They are very well trained and knowledgeable.

I don't know how often -- maybe someone else can answer -- they go back underground to go to other developed areas. Maybe that's something that needs to be put in. If they go underground to the newly developed areas, to know how far it is or how hard it is to get from point A to point B if there is a problem in one of the newer developed areas.

MR. WILSON: One of the areas is the ability to control and eliminate outside phone calls from coming into the AMS room with a flip of a switch. It is essential if you ever want to control an emergency.

We live in the day of cell phones. On September 23rd, when that disaster occurred, as the emergency personnel started responding to the coal miner, that CO operator was absolutely consumed by outside phone calls that he had absolutely no control over. He had to answer them to get use of his phone, and he needed to be calling underground.

I mean, everybody in the little town of Brookwood that saw ambulances and fire trucks and police cars arriving at the mine that happened to know that phone number was calling it. It totally took his attention away from monitoring what was going on underground by having to answer that telephone.

That is a situation that if we ever hope to control an emergency situation, that CO operator or AMS operator must be able to control how he controls his time so that he can focus on the emergency at hand, versus it being dictated to him by incoming telephone calls.

DR. WEEKS: You're suggesting something like a switch?

MR. WILSON: Yes.

DR. BRUNE: I'm suggesting I'm pretty sure there are technologies like what is in the 911 call center. They have ways to handle these things.

That's an excellent point, I believe. That's a very good recommendation.

MR. TURNER: We do have a system at our mines when there is an inundation of calls now, since the disaster. It's at the CO operator's discretion to bring in -- there are certain people lined up that he or she would bring into the CO room to start fielding those inundated calls. I think that's something Jim Walter management introduced after the disaster.

We have a situation at our mines that we just recently -- we suggested it a couple of years ago, but recently we asked for a so-to-speak 911 number. So, if you were underground and you had an emergency, you would dial that number. It's not 911, but that's what we called it. We had some resistance to that because of maybe a lot of reasons, but it was finally inputted.

One of the reasons we wanted that is as Union officials, we had some situations underground where you would call the operator -- personally, I had two events, not in the same day, where I called the operator.

I was fire bossing on the weekend once, and once was just a regular day. One time I had -- and I may be wrong here, but I'm close -- I had 19 rings before I had an answer, and the other one I had 12 rings before I had an answer. That is just to substantiate why we needed a 911 number.

It's implemented now, and it's on all of our phones. You will get in trouble if you call that number and you don't have an emergency. We need to integrate that, and we do in our mine.

So that came about. I believe it was because the operator's duties were so massive, sometimes they were juggling five or six balls in the air at one time; and they simply didn't have the time.

DR. MUTMANSKY: We would like to thank all of you gentlemen for coming by this morning. We would like to thank those from NIOSH who made presentations, and we'd like to thank all of the UMWA members who came today and explained to us so clearly how they feel about some of these issues.

Are any other comments from the Panel at this point in time?

MR. WILSON: I would just like to introduce to the record Citation Number 7688586 that Glen Loggins spoke to. It's just for your review and for the record.

DR. MUTMANSKY: Tom, if you have your comments written out and want to submit them to Linda, she would pass them on to us. She'll get them to us, and that may also be of help in the future in case we have to refer to the specifics of your comments.

MR. WILSON: Thank you very much.

DR. MUTMANSKY: Linda, what time should we be getting back together here?

MS. ZEILER: I think we should reconvene at 3:00 o'clock. That would give us enough time to do lunch.

Anyone who wishes to give public input, be sure to sign up on the way out at the other end of the table.

DR. MUTMANSKY: Okay. Thank you, Linda.

(Lunch recess.)

MS. ZEILER: We are ready to start again. We have reached the part of our agenda today that's public input hour. We have two speakers that have requested time. The first is Bruce Levinson from the Center for Regulatory Effectiveness.

MR. LEVINSON: I don't have any slides, but I have this great temptation to borrow the laser pointer anyway. I do want the instructions on how to use it after I fumble with it for a couple of minutes.

One issue that's come up that a number of people have raised that's been raised at a number of these presentations now and that was talked about in Pittsburgh is the issue of flame-resistant standards and smoke standards. If you have a tight enough flame-resistant standard, you also need a smoke-emissions standard.

One distinguished speaker in Pittsburgh had said "No fire, no smoke." If you have a tight enough flame standard, if it's not propagated as self- extinguishing in itself, then you don't have any smoke coming off, or not enough. You really don't need to worry about the issue.

Also, at that same presentation, they showed a experiment that had been done where coal had been laid under a belt, a pile of coal, and then it ignited over time with electric igniters until the coal caught in the belt.

It struck me that in that kind of situation, you're going to have a lot of combustion products coming off the belt even if the belt itself is not propagating the fire. So I wanted to take a look and try to resolve this -- we've heard it today and other times -- by sort of going outside the standard paradigm of a dry debate.

What I wanted to do is look at what other agencies do, specifically, are there analogous situations that other agencies have dealt with? What are they? What have they done? What research has supported those decisions?

I am defining that as simply material specifications and fire safety specification from materials to help people escape from an enclosed potentially burning environment from a fire disaster. It turns out the Federal Government has been setting smoke emissions standards as a part of fire safety standards for over 30 years now.

This is from a paper done by

the Building and Fire Research Laboratory at the National Institute of Standards, called the "Evaluation of Passenger Train Car Materials in the Cone Calorimeter," as presented at the '98 International Fire and Materials Conference.

The reason I picked this is, that it goes over some of the regulatory history. It states: "In 1973, the Urban Mass Transportation Administration initiated an effort to improve transit vehicle safety. As part of that effort, the guideline specifications for flammability and smoke emissions tests and performance criteria were developed."

Then it goes on to explain that in 1984, the Federal Railroad Administration adopted those same fire safety guidelines and performance criteria; and then they revised them in 1989, both to make them more specific to trains, but also to include smoke emission performance criteria for floor coverings elastomers.

So they had prior safety and smoke emissions criteria for most of the parts in locomotive cabs and in passenger cars and then went back in 1989 and added additional smoke emission criteria.

They talked about this topic and research they did in which they identified heat release rate as a key indicator of fire performance. "Even if passengers do not come directly in contact with the fire, they could be injured from high temperatures, heat fluxes, and toxic gases emitted by the materials involved in the fire. Accordingly, the fire hazard to passengers of these materials can be directly correlated to the heat release rate of a real fire." They go on to talk about some of their experiments.

Then the Federal Railway Administration updated the regulation in the '90s. When they did that, I thought it was interesting that there were comments from the Union involved, the Brotherhood Railway

Carmen, part of the Transportation Communications International Union.

In the final rule, the FRA is saying "The BRC, in its comments on the NPRM, stated that interior materials in passenger equipment must be required to meet strict standards for flammability and smoke emission."

So we've seen -- there's this consensus, at least, within the Federal Railway Administration on having both together. The latest iteration of the rule was completed in 2002. They have integrated a flame propagation standard and a smoke emission standard for almost every different component in a railway car.

These tests are standard ASTM tests. The smoke emission test is E662 and it gives a little detail about how that's conducted. Then they have their ASTM flame-resistance test. For just about every material you've got actually three standards, three performance criteria to meet.

One is a flame-resistant test and then two smoke-emission tests. One after one and a half minutes in the test chamber, and one after four minutes.

For example, for window gaskets, door nosings, inter-car diaphragms, and other materials, you have ASTM C 1166, the Standard Test Method for Flame Propagation of Dense and Cellular Elastomeric Gaskets and Accessories. Then they set a performance criteria with an average flame propagation of no more than four inches.

With those materials, you've got to meet the ASTM E662, where you've got an optical density of no more than 100 after one and a half minutes and no more than 200 after four minutes.

The last page of this document is actually a table taken from the Federal Register, and it lists the performance criteria test methodologies for just about everything in a passenger car. Everything from floor coverings, light diffusers, window gaskets, seat upholstery, and so forth.

I thought that was interesting, but that is one agency. You've got the Federal Railway Administration. What about other agencies, do they also set a separate smoke emission standard; or do they think a flame-retardant standard alone is sufficient?

Now, it turns out that there's some correlation. The Federal Aviation Administration also uses both flame-resistant and smoke-density standards. The FAA's regulations include the test method to determine smoke emission characteristics of cabin materials, which is Title 14 of the Code of Federal Regulations. The Disney version is better.

Okay. That's still within the Department of Transportation. Are there agencies outside of the DOT? What have they done in this issue?

It turns out NASA, which is I guess also a transportation agency in some sense, has a safety standard for fire protection. That's quite recent. It was initially set in August 2000 and revalidated in April of 2006. It sets the Flame Spread Index at less than 25 and the Smoke Density Index at 450, using standard test methods.

Now, if this were standards for a spacecraft or something like that, I don't know that it would be particularly relevant. NASA set these joint Smoke Density and Flame Spread Standards for their headquarters. An agency with a tremendous amount of scientific expertise, knowledge of combustion in material science has decided that their own officials, to protect them sufficiently, required using both a flame propagation and a smoke density standard.

So this is for their headquarters and covers such things as interior walls, partitions, modular partitions, and ceiling finish materials. They have to meet these standards.

Okay. That's NASA. Has anyone else done this? Well, yes, the State Department uses both flame resistance and smoke density standards to protect diplomats and embassies, at least in this instance.

The Department of Energy's Sandia National Laboratory has a similar standard for using flooring used in clean rooms. So we have a number of agencies that are basically saying the same thing.

I also wanted to know what about some research. Is there any sort of clean sheet approach going outside of that? These are all very specific situations on fire safety.

A study was completed, looking for a slightly different perspective, and this was completed in November of 2004. It was done jointly by the Federal Transit Administration, The Volpe Research Center -- which is the research arm of the DOT --

The Transit Cooperative Research Program of the Transportation Research Board, the American Public Transportation Association, and some other stakeholders.

They were charged with looking at how to protect transportation systems following a terrorist attack. Looking at flammability issues, they said "While there is no completely non-combustible non-toxic material in existence, certain materials will hinder fire spread, smoke emission, and the release of toxic gases. These types of materials should be used throughout the vehicle to the greatest practical extent, balancing their benefits against other criteria such as durability and cost. All materials in the passenger area should comply with existing fire safety standards ASTM 162 and E662."

I took two things away from that. One is that basic fire safety is smoke emission and flammability protection. The other is that they tell us their factor of toxic gas emissions. This is sort of a clean-sheet approach. I was wondering, do any agencies have that embedded in their own requirements.

I see that in engineering notes from the Department of Energy, and this is with regard to actually something fairly exotic, cables used in part for physics experiments. It says "They must be chosen with regard to fire safety; ie, flame propagation and smoke characteristics. Cable must be rated to a recognized standard which shows they are self- extinguishing and will not spread a fire. Cables with low smoke density, toxicity, and corrosivity of gasses are preferred. Smoke produced by overheated halogenated cable insulation is corrosive to electronics. Whenever possible, cable should be specified as halogen free."

My response to that was why? Here we have the exact same situation we discussed earlier. You have a material that's required and tested to be self-extinguishing and nonpropagating.

Under that paradigm; no fire, no smoke, this would seem to be a needless specification raising costs. Why are they worried about gasses from materials where it was already required that those materials be self-extinguishing and nonpropagating?

I did some checking, and there is an interesting article from "Trade Press Magazine," a 1996 article in the "Data Communications Magazine" that discussed this halogen issue and halogen free. It noted that when halogen is heated, "The fumes can disorient victims, preventing them from escaping the blaze. They cause respiratory damage, and they can kill. Recognizing this potentially deadly problem, a number of international governments have already standardized on zero-halogen cabling."

The article goes on to describe what it calls a deadly double-blind. On the one hand, halogen insulation helps prevent cables from catching fire, which is the goal; but, if the cable jackets do ignite -- these self-extinguishing ones -- the resulting fumes can drive up the death toll.

Then it traces the interest in this to the Falklands War. It says "Research showed that most shipboard fatalities during the conflict were the results of the smoke from fires started by missiles and bombs rather than by weapons themselves." This is the quote I keyed in on, "Acids gasses also prevented personnel from fighting fires."

That was a quote from Karen Long, who is responsible for developing fiber cabling standards for the US Navy which has decided to go halogen free.

The article notes that a variety of countries; including, Australia, France, Italy, Japan, Korea, New Zealand, and the UK have all moved to halogen-free cabling. It's comparing US and international standards.

The US standards were weaker than almost everyone else's. In the International Standards to address three issues; fire resistance, smoke density, and toxicity. The National Electric Code addresses fire resistance and smoke density and is silent when it comes to toxicity.

Again, you get this idea that toxicity is important, but smoke emissions and smoke density is an essential part of fire safety, even in the relatively weak US standards.

So, after looking at the Urban Mass Transit Administration and the Federal Railway Administration and NASA and the Federal Aviation Administration and the State Department and the Defense Department and the Energy Department, I found that they have all addressed smoke issues and fire safety in very similar ways.

What I took away from this, and what I hope you take away, is really only one simple point, that's that coal miners deserve as much protection as do railway workers, transit passengers, and federal employees.

Any questions?

DR. MUTMANSKY: I am so surprised that you present us with this at this point in time. It presents a new thought and a new thinking for our group. I'm sure we will consider what you've said.

Do we have any questions by the Panel Members?

DR. WEEKS: I think this could be very useful. Thank you for bringing it up.

DR. MUTMANSKY: How do you feel that the current standards that are used for belt conveyors compare to these other standards of the Federal Railway Administration and so forth?

MR. LEVINSON: They are different in two ways. One, the Federal Railroad is using off-the-shelf ASTM tests; and both the current 2G and the fairly likely BELT are agency-unique standards. That doesn't make them bad standards.

The other key issue is that MSHA is really the only place where I've been able to find where flammability alone is sufficient to help people escape from a burning environment. Everyone else, whether it's Federal Railroad or Aviation or even Office Building Standards, the smoke emission criteria is an integral part of their standard.

DR. MUTMANSKY: Tom has some very interesting points. One of the points being that what our responsibility is to sort of even the playing field for the belt manufacturers. It's very important for us not to seem to be favoring any one of the manufacturers, yet there is a sort of Catch 22 in all that because to some extent, there is only one major belt manufacturer manufacturing in one specific category of belts where we might be interested in making a step.

So you have any thoughts about that?

MR. LEVINSON: Yeah, I do. That's one reason I was going back to some of the stuff on cables. This goes back to the "Data Communications Magazine" articles from 1998. It's ten years old. This is not a cutting-edge technology. It may be new for conveyor belts, but this isn't -- I think the manufacturer presents that these were off-the-shelf chemicals. Clearly, now we see these standards are literally, at least with cables, all over the world.

One thing that struck me with the belt manufacturers, all three that presented, was they said "We meet standards all over the world. Whatever the standard is, we meet it." Given that these are off-the-shelf chemicals and they have been used around the world, I don't see that that should present a real issue.

Looking at the economic side, I don't know if that cable is -- the belt is going to be in production or not. What's actually in production is going to be driven by the standards. If you don't have a smoke-emission standard, then you will probably not have low smoke and low toxicity belts.

If you do require it, I bet all those companies are going to be able to make products that meet it.

DR. MUTMANSKY: Thank you, Bruce. I appreciate you coming today, and I appreciate the comments you've made. Thank you for the written presentation, as well.

MR. LEVINSON: Glad to help. I was wondering if I could ask the Committee a question.

DR. MUTMANSKY: As far as I'm concerned. We may not answer it, but you can ask it.

MR. LEVINSON: The process up to now, I think, has been genuinely terrific. With help from MSHA and NIOSH and the Committee, this has been a very open process, very transparent, very welcoming to anyone with anything to contribute.

Right now, you're about halfway through your charter mandate of producing a report. This information-gathering stage has been very open. Are there going to be any steps you take to help keep the process open as you develop your report?

DR. MUTMANSKY: Well, we have no problem answering that. We'll be happy to tell you exactly what's going to happen over the next several months.

There are a couple of solicitors sitting over here. If one of them jumps up and says "Stop," I'll stop.

As it turns out, we will begin what's called our subcommittee process. Here, at this meeting, we will set up a schedule when the various subcommittees are to report back to Linda with recommendations.

The subcommittees will consist of no more than three of our Panel Members at any one time. They will negotiate among the three to try to come up with reasonable recommendations to present to the entire panel.

Sometime in September, perhaps the second or third week in September, the Panel will then meet in a public meeting. When the recommendations are presented to the Panel, the three-person subcommittee who has presented them will try to give their rationale for those recommendations, and then there will be an opportunity for the other three members to speak for or against those recommendations and to try to bring about enough knowledge that when we vote, we will be voting with knowledge of all six Panel Members. Whatever happens at that point, happens, I guess.

MR. LEVINSON: Sounds like a great process. Will the voting take place at that meeting?

DR. MUTMANSKY: I believe the voting will take place, and you will be there watching us, I have a feeling.

MR. LEVINSON: Sounds like a great process. I thank you very much.

MS. ZEILER: Our next speaker is Dale Byran from Jim Walter Resources.

MR. BYRAN: Good afternoon. Earlier today, there were some questions posed by some of the presenters; and I felt like there may have been some confusion as to one particular area. From Jim Walter's perspective, I would like to clarify.

At Jim Walter Resources, the control room operators have an unquestionable authority to call for a mine evacuation at any time. To further strengthen that, our responsible person, as outlined through MSHA's regulation, is given the authority and the duty to call for mine evacuation.

At Jim Walter Resources, any person underground at the mine can call for a mine evacuation if they think that there is a situation that endangers miners' lives.

DR. TIEN: I'm just curious why this confusion came about and why that information is not carried to the record file.

MR. BYRAN: I don't know that our rank and file -- that our employees were confused. I think the gentleman -- if you go back and look at the notes, the gentleman that was confused works for another coal operator, not Jim Walter Resources.

DR. MUTMANSKY: Well, Dale since you appear here, you are subject to questions, too. I have one for you.

How did Jim Walter Resources come to the conclusion that it was necessary to have the AMS operator be in charge, so to speak, and be able to evacuate the mine; and what was the rationale for that decision?

MR. BYRAN: I can give you my opinion. That opinion is that the control room operator is probably the single greatest point of communications within our operations. They are in contact or have the ability to communicate with everyone underground. They also have vital information available to them at the monitors in the control room.

Of the group of the Panel that the opportunity to visit our No. 4 mine control room, I think they saw several of these monitors where it shows both visual and audible alarm systems associated with our AMS.

Again, as the responsible person, they also tracked the trajectory movement of miners.

Another commenter earlier today said they were concerned about the workload that these men and women have. We recognize that, too, as being an important issue; and we continually deal with this.

One of the control room operators, in a conversation with me where we were discussing that, said "Yes, but you do understand that our procedures are whenever there is an emergency, everything stops as far as the control room person. They are the ones that handle the emergency.

We have emergency response protocols. One of the first steps, after they are notified of an emergency, is to bring a salaried support person in to handle all other calls and business while they focus strictly on dealing with the emergency.

It's not just a mine emergency requiring total evacuation. If we have a miner that's injured or if we have a medical emergency underground, the same procedures take place.

DR. BRUNE: You talked about the emergency response protocol. Is that something you might be able to share with the Panel?

MR. BYRAN: Yes. I couldn't do it today; but we can provide it in written comment.

DR. BRUNE: I would appreciate that. Thank you.

MR. BYRAN: About a year and a half or so ago, NIOSH had a program, and Dr. Kawalski and Charles Voit participated in where they visited several operations in the country and evaluated their emergency response capabilities and their communications with local emergency services.

They visited our operation. I'm sure that they would have information also that might be helpful to you because they talked with our people, too, at that time.

DR. TIEN: Dale, if I may ask you another question. Some of the presenters from Jim Walter Resources this morning seemed to give me the impression they are overwhelmed, these control room operators. Among other things, they even take orders from a cafeteria, or something like that. I just want to hear your perspective on that.

MR. BYRAN: There are a lot of

things that take place in our control room. As with continue to move forward, we try and identify areas where we can remove unnecessary work off of our control room operators.

Again, the strongest point that I think we have in favor of an emergency situation is that every one that works in the control room knows and does respond when an emergency comes in. They call off or remove unnecessary work from themselves and handle or focus on the emergency.

I cannot remember a situation where we have had an emergency to where a control room operator has been overwhelmed with duties or responsibilities in the last five years where it was even questioned that the emergency was not handled properly.

DR. TIEN: I presume this particular procedures has been in placed for quit a while, and it evolves over the years.

In its current form, how long has it been like that? Is it perfected, or are you still working on it?

I don't think you ever perfect emergency response procedures.

DR. TIEN: Thank you.

DR. MUTMANSKY: How long has it been that the control room operator or the AMS operator at Jim Walter Resources has had that authority? Did that exist before the 2001 explosion?

MR. BYRAN: I believe with my involvement that they have always had the opportunity to call for a mine evacuation. However, to be specific with it, when the 1501 and 1502 requirements came out, it was clearly understood from that point on.

DR. MUTMANSKY: Okay. Thank you.

Panel Members, this is your last chance.

Thank you, Dale. We appreciate you coming in today, and we appreciate the fact that you decided to come forth with some additional information that may be important. Thank you very much.

MS. ZEILER: Okay. Those are the only two speakers that signed up. I believe we have completed everything on the agenda for today.

If the Panel has anything further they wish to discuss? If not, I guess we can adjourn.

DR. MUTMANSKY: Linda, you can go ahead and tell people here what you currently know about our final meeting. Unfortunately, everything has not been set yet, but you can tell them what we know.

MS. ZEILER: I can't add a whole lot to what you gave as an explanation to Bruce as far as plans for the final meeting.

It will most likely be the second or third week in September, and it will most likely be in the Washington DC area. It will be a public meeting. We will not have public comment at that meeting because of the work process that was described previously.

I think that's it. We are adjourned. Thank you.

(Whereupon, the Technical Study Panel on the Utilization of Belt Air and the Composition and Fire Retardant Properties of Belt Materials in Underground Coal Mining concluded their two-day hearing.)

CERTIFICATE

STATE OF ALABAMA)

COUNTY OF JEFFERSON)

I hereby certify that the above and foregoing deposition was taken down by me in stenotype and the questions and answers thereto were transcribed by means of computer-aided transcription, and that the foregoing represents a true and correct transcript of the testimony given by and witness upon said hearing.

I further certify that I am neither of counsel, nor kin to the parties to the action, nor am I in anyway interested in the result of said cause named in said caption.

Susan Bell, CSR

Notary Public