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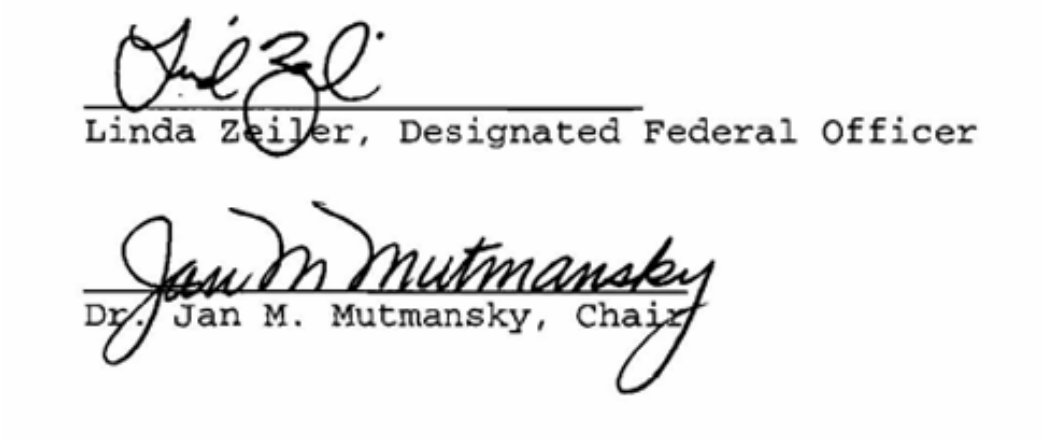

Linda Zeiler, Designated Federal Officer

Dr. Jan M. Mutmansky, Chair

TRANSCRIPT OF PROCEEDINGS

IN THE MATTER OF:)
)
TECHNICAL STUDY PANEL ON THE)
UTILIZATION OF BELT AIR AND THE)
COMPOSITION AND FIRE RETARDANT)
PROPERTIES OF BELT MATERIALS IN)
UNDERGROUND COAL MINING)

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hrc@concentric.net

UNITED STATES DEPARTMENT OF LABOR
MINE SAFETY AND HEALTH ADMINISTRATION

IN THE MATTER OF:)
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TECHNICAL STUDY PANEL ON THE)
UTILIZATION OF BELT AIR AND THE)
COMPOSITION AND FIRE RETARDANT)
PROPERTIES OF BELT MATERIALS IN)
UNDERGROUND COAL MINING)

Tuesday
September 18, 2007

Sheraton Reston Hotel
11810 Sunrise Valley Drive
Reston, Virginia 20197

The parties met, pursuant to the notice, at 9:06 a.m.

BEFORE: LINDA ZEILER
Designated Federal Officer
Deputy Director
MSHA Technical Support
1100 Wilson Boulevard
Arlington, Virginia 22209
(202) 693-9478

Panel Members:

Jim Weeks, Ph.D.
Director
Evergreen Consulting, LLC
Silver Spring, Maryland

Jerry C. Tien, Ph.D., P.E.
Associate Professor
Mining Engineering
University of Missouri-Rolla
280 McNutt Hall
1870 Miner Circle
Rolla, Missouri 65409-0450
(573) 341-4757

Panel Members (continued):

Jan M. Mutmansky, Ph.D.
Professor Emeritus, Mining Engineering
Department of Energy and
  Geo-Environmental Engineering
The Pennsylvania State University
156 Hosler Building
University Park, Pennsylvania 16802-5000
(814) 863-1642

FELIPE CALIZAYA, Ph.D.
Associate Professor, Mining Engineering
The University of Utah
135 South 1460 E No. 318
Salt Lake City, Utah 84112

DR. JÜRGEN F. BRUNE, PH.D.
Director
Spokane Research Laboratory
National Institute for Occupational
  Safety and Health
315 East Montgomery Avenue
Spokane, Washington 99207
(509) 354-8001

THOMAS P. MUCHO
Thomas P. Mucho & Associates, Inc.
Mining Consultancy
Washington, Pennsylvania

P R O C E E D I N G S

(9:06 a.m.)

DR. MUTMANSKY: Good morning, ladies and gentlemen. We would like to call our panel meeting to order and begin deliberations again.

As you may remember from yesterday, we had had some discussion of the recommendation called "Escapeways," and we decided that it was very important for us to also simultaneously think about the recommendation called "Leakage." So our order of discussions today will first involve the Leakage recommendation, and then we may go back to the Escapeways recommendation. The Leakage recommendation will be discussed by Felipe.

DR. CALIZAYA: First, I would like to start highlighting the volume of leakage in coal mines. It's a serious issue. In some mines, leakage is on the order of 50 to 60 percent. That means a significant amount of air is lost without being directed to the workers.

There are two issues here. One is related to construction techniques of stoppings, which are used to avoid leakage, and the other one has to do with the materials.

To illustrate this point, I would like to

present a couple of pictures.

This diagram shows a coal mine that has more than one intake. In fact, I think this mine had six intakes and one main return. The main return is shown on the F, where it says "a fan," and, in fact, they had one fan there that was operating at 7.2-inch water gauge. The total flow weight was 830. Now, from Point 1 to Point 2, there are 103 stoppings. Each line represents two intakes on the intake side and two returns on the return side.

The air that is supplied from different sources is directed to the workings. In this case, I'm illustrating only two cases: one, continuous miner and one long-wall section.

Here, we have the main intakes, and here we have the main return. The air is directed from all of those intakes towards the workings, and here, near the working face, they had about 30,000 to 40,000 CFM. The same thing here in the long-wall section; they had about 60,000 CFM.

From this total of 830, they had two continuous miners, one here and one there, on the long-wall section, and they had shops, but a significant percentage of air was lost through stoppings. We are talking about maybe, in this case,

20 percent of air that's used here and maybe 10 percent of the air that's used here, and they had a total leakage of 64 percent. That one has to do a lot with stoppings, doors, overcuts, and other places where leakage takes place.

This diagram shows the way how the leakage takes place. Each stopping, down here I have the location of the cross-cuts relative to the main fan. So this one is very close to the main fan; this is close to the main split. You can see here the way stoppings are subject to high pressures. The one in blue; that represents leakage, the pressure on the stoppings from belt to return, and down here the one in purple represents the leakage, the pressure on the stoppings between the intake and the belt.

Now, you see the difference here. The ones close to the main return; they are at very high pressure, and the ones close to the vent; they are really at very high pressure; in this case, almost four-inch water gauge, and we are talking about maybe 10 to 16 stoppings that are really crucial in this system.

In this diagram, we are talking about that section, from one to two. So what's happening here is air is trying to short-circuit through this straight

to the main return. Through measurements, we found that between .1 and .2 in almost 100 stoppings; about 22 percent of air was lost. It's not used at all. It's going straight to the main return.

The other thing that illustrates -- you can see that in more detail down here -- illustrates short-circuit from one to four through the stoppings.

Now, in this mine, most of the stoppings were made of steel plates. We call then "Kennedy stoppings." The ones down there; they were built of concrete blocks. But, still, in spite of that, we had a significant amount of leakage.

This one also shows that between .3 and .4, the leakage was also on the order of 20 percent.

So leakage is really one main issue. To reduce leakage, we are proposing two things. One is to use solid concrete blocks of at least eight inches thick with mortar joints for the stoppings that are located near the mains and the mains, in fact, main intakes and main returns. Then we are also recommending that they should be lined using sealants.

The alternative is to use yielding stoppings, but, in this case, we are talking about double stoppings, the ones that are called "near-zero-leakage stoppings." So that would be the alternative.

Here, we can see construction of one of these stoppings. They are made of concrete blocks. In fact, it's in the area where the section is closed through seals.

This is the other type of stoppings that you can see. We have Omega blocks, and they are very easy to build. Apparently, here, it's very well sealed, but when we measure flow rates, you will see that air is leaking through the stoppings.

So that's what we recommend for stoppings that are located near the main fans. Now, the stoppings that are located away from the main fans -- we call them "panel stoppings" -- are not subject to high pressures, and, in this case, the yielding stoppings could do the job, or we can use these hollow cinder blocks, and they can also do the job.

Through measurements, it was found that when we used the metal stoppings, the leakage may be on the order of 300, but when we used solid stoppings, this can be cut by half or maybe more than that.

Here, we can see one example of yielding stoppings. These are metal stoppings, and, in this case, the construction plays an important role. It's in good condition, but the leakages taking place here are on this main door.

One alternative, at least, to reducing leakage is the use of booster fans. We don't use booster fans in this country, but it's a proven technology to reduce leakage. What we are suggesting is MSHA should start looking at this seriously as an alternative to reduce leakage. Now, we will need this in the future, especially for those mines that are going deep, and they are having very high leakage rates. So that's one of the recommendations: to study this and come up with some discussion points in the following two years.

Now, what are the problems with booster fans? One problem is the possibility of uncontrolled recirculation, but this issue now, with the advent of AMS, can be solved to some degree by means of these units. We can monitor the quality of air, and we can pick up if there is any problem with the fan.

So one recommendation is to study this issue of booster fans and come up with discussions points in the following three years.

Another recommendation in this section is to start developing cost-effective stoppings and sealant materials. We have materials which are good, but they are expensive now, and we need to do something along those lines.

Those are my discussion points about this.

DR. MUTMANSKY: Thank you, Felipe. I would like to open discussion on this particular recommendation and open up to the panel members at this point in time. Anybody now who would like to speak to this recommendation?

DR. TIEN: This is just more a curiosity problem. To the folks at the panel, what do you think of a leakage rate of 50 to 60 percent? Would that be a reasonable number, now you have seen the fills?

Okay. Also, another question that has to do with the rate of leakage; that is the type of stoppage. If you're going to search your memory, percentage-wise, metal stoppings -- you see a lot of them across the board in most coal mines, east and west -- what would your folks say?

DR. MUTMANSKY: You see them.

DR. BRUNE: My experience has been that the metal stoppings typically leak more. However, they do have certain advantages when the convergence rate in the roof and floor is high. They have an ability to yield better than box stoppings.

The other problem that hasn't been addressed in this discussion, Felipe, is the leakage that goes around the stopping that goes through that creates

some cracks in the coal, and some coal seams are very prone to that. So no matter how well you build the stopping, you may not be able to avoid the leakage that goes around the stopping.

Another point that I wanted to make and, actually, that I had somewhat expected here is whether we should, as a panel, discuss a recommendation of trying to pressurize the intake escapeway as far as we can towards the face because, by pressurizing the intake escapeway, no matter what the leakage is, if we can keep the intake escapeway pressurized over the belt, then smoke from the belt will not leak into the intake escapeway.

So if we can maintain a positive pressure differential, and I realize that's not always possible, but that ought to be a goal, and that perhaps ought to be a recommendation that this panel makes. I'm just throwing that out for discussion.

DR. MUTMANSKY: Felipe has done some work on that also. Basically, I think it's correct to say -- hopefully, everybody agrees with this -- that if you have a main intake and a belt air intake side by side, normally the pressure into the main intake would be somewhat higher than in the belt intake. However, that can, at times, reverse itself, and occasionally

it would be advantageous to maintain that pressure somewhat higher in the main intake so that a belt fire, of course, does not leak smoke and contaminants into the main intake.

I'm not really certain how easy that would be to do, but I guess the proposal would have to come from somebody here as to how it would be best approached, and maybe we can discuss that. I have two other points concerning the leakage recommendation that I thought should be brought before the panel.

Number one is, I'm wondering if it wouldn't be worthwhile to take the booster fan concept and put it under our research recommendation. The reason I'm saying that is that MSHA has always avoided booster fans like the plague, for a variety of reasons. They are not something that would be easy for them to accept. So it may really be that it is appropriate to research these, and maybe this should be part of our research recommendation.

The second problem I want to point to is that some of the comments that we've had back from the MSHA personnel have said that, in general, the concept of controlling leakage is addressed in current regulations, and that would be a hint that maybe we really don't need this particular recommendation.

That doesn't mean we shouldn't present it or that we shouldn't pass it, but we have to consider whether or not it has the impact that perhaps it might have if it weren't already addressed, to some degree, in the current regulations.

So I just wanted to bring that before the group before we do anything else.

DR. BRUNE: I think it would be important for us to recognize that minimizing leakage is a safety aspect that is well worth recommending. I'm just wondering whether we should get in too deep. We also have how stoppings should be constructed because that's something that may differ from mine to mine.

The mines that I've worked with, we've had a lot of success with coating the stoppings on the high-pressure side with a fabric called Tyvek. It's a material that is used as house wrap to insulate house walls from moisture, but it also has proven well reducing leakage, especially in situations with the interface between the roof and the floor, and the stopping would deteriorate, and the leakage would go around that.

So I would tend to not be so prescriptive as to tell the mine operator how to minimize the leakage, but the fact that the leakage ought to be minimized is

something that I think this panel ought to recommend.

DR. MUTMANSKY: Jürgen, would you also fill us in on whether or not NIOSH does any current research on stopping constructions and effectiveness of a variety of stopping materials?

DR. BRUNE: NIOSH does not do any current research, as far as I'm aware, for stoppings concerning ventilation properties. They do some research in understanding how stoppings can withstand closure and then convergence from roof support or rock mechanics perspective but not from a ventilation perspective.

DR. MUTMANSKY: Okay. Jerry?

DR. TIEN: Just a thought. If one were going to read some of the literature back in the thirties and forties, Montgomery being one of them, you will see that the leakage rate being quoted in that article, you're talking about 90 percent, 80 percent, if my memory serves me correctly. Then the numbers have somewhat improved over the course of some 60 or 70 years now. We having using constantly about 50 percent. Now, some of the researchers, such as Bob Timko, have been doing that for a long time. Have we maxed out? Is there a natural physical limit underground that we'll have to live with?

DR. MUTMANSKY: One of the reasons we don't seem to be improving on leakage percentage is just simply we're going to bigger mines now, longer long-wall panels, and so forth. So even though our stoppings may be getting better, we still have the problem of 50 percent leakage.

DR. TIEN: So the gain has been offset by the increased pressure and distance and all of that.

DR. MUTMANSKY: Yes.

DR. BRUNE: The other thing is that the power consumption of the overall ventilation system is typically relatively constant over the life of the mine, and it does not show up as a major cost spike where somebody would get his attention drawn to, hey, why are we suddenly using much more power on the fan and much more power overall in the mine? So power is relatively constant. That's probably 10 cents, 15 cents a ton, on a per-ton basis, and it's not as big a factor as it would have to be for the operator to pay more attention to stopping construction.

DR. MUTMANSKY: Tom?

MR. MUCHO: Just a little add-on to that, one of the big ones that I've found in my experience and did a little self-research on is spray-on sealants applied sometime after the stoppings have been in

place, and -- will do a remarkable job in terms of -- and I'm talking about the polyurethane-based sealants in this case -- of cutting down leakage, but, as Jürgen points out, there is not a lot of impetus to go back and redo stoppings and other ventilation controls to cut down on leakages. What we tend to see is to accept, but it's a wise move in a lot of cases.

DR. MUTMANSKY: I guess my question is, what does the average company do insofar as restoring the integrity of their stoppings, say, after five years or 10 years. Does the average company go back and occasionally try to seal them up?

DR. TIEN: Probably not munch, especially with some of the low coal. It's so far away, it's just too much trouble to do it. They would rather pay the money and live with it.

DR. BRUNE: Most stoppings don't have a life more than six to nine months anyway because, on the long-wall sections, they get driven up, they get mined out, and that whole process happens within a year, and the stoppings on the mains, they sometimes go back but only when it becomes very obvious that the stopping is leaking.

So it's not something where somebody would pay particular attention. You could probably keep a

crew busy year-round to maintain stoppings.

DR. TIEN: Well, Jürgen, I would somewhat have a different view of that. Even those stoppings at the bottom of the shaft typically will last a long time, but poor maintenance I've seen many, many places. By its very nature, high-pressure differential across those stoppings, the leakage is terrible in those cases. They can do much better, going back with a vigorous maintenance program.

I do have a question. Felipe showed a picture of the Omega stoppings. Are they still being used since the bad publicity last year?

DR. CALIZAYA: Sure.

DR. MUTMANSKY: Sure. They are used quite extensively, and, as a stopping, they are a reasonable material.

DR. TIEN: Thanks.

DR. MUTMANSKY: Okay. We now have -- you have --

MR. MUCHO: Yes. Just to address your comments on the booster fan, I would agree that belongs in the research area. I think that's where it would be more proper to put the booster fan.

As best as I can see, that was an add-on comment, not part of the recommendation. I think

Felipe designed it that way. Felipe and I discussed issues somewhat as we were approaching this meeting, and Felipe decided to put that as part of the discussion. Now, we can opt, if we wish, to make that part of the research recommendation, and we can take it out of the discussion here. It does not appear in the recommendations, so that's not an issue.

And to your other point, I tend to agree on the -- I think the current regulations cover the construction of ventilation controls fairly well. Saying that leakage should be minimized is sort of like motherhood and apple pie. If we want to say that for emphasis, I think that's fine.

DR. MUTMANSKY: I guess the question is, is there harm in passing this recommendation?

MR. MUCHO: To emphasize it, to be part of the recommendations, it's probably a good thing.

DR. MUTMANSKY: Jürgen?

DR. BRUNE: Again, my suggestion would be to -- my proposal to strike the second sentence and the third sentence, starting with "Main entry stoppings should be constructed of solid blocks" because that's something I'm not sure if this panel should get into the details of how these panels and stoppings should be constructed. If the recommendation is to minimize

leakage of contaminants, then it should be left up to MSHA and the mine operator how to achieve that, and we should not be prescriptive.

Maybe there are mines that can't use solid blocks in their main entries because they have got too much convergence, or they have got other reasons. I'm not sure if we want to get into those descriptive things, whether I can use hollow blocks or metal panels, yielding stoppings for panel entries. I'm not sure. I'll throw that out for discussion.

DR. MUTMANSKY: Jerry?

DR. TIEN: Also along that line, I really don't know -- I'm thinking aloud -- the higher leakage rate of the metal or Kennedy metal stopping is because of poor maintenance, poor construction, or because of the nature of the stoppings. I've seen both cases, so I'm not sure it's proper to blame the metal stoppings for being not as good as the solid stoppings.

MR. MUCHO: That's correct. Installed correctly initially, and assuming there's not a lot of convergence and things going on, you can seal them up pretty good.

DR. MUTMANSKY: I think our basic problem now is this: Can we assume this is not a safety problem? Is there a safety issue here? Is there a

safety issue as we relate it to escapeways? Is there a safety issue as we relate it to a belt fire, for example? I think that's our major concern, is belts and belts and belt fires, and so forth, and escape under those conditions.

So now the question is, how do we address that in this? Do we just simply pass this recommendation or combine it with the escapeway recommendation or, in some other way, affect the way that the words are being used in these recommendations?

MR. MUCHO: I think we simply pass this recommendation in terms of the leakage, but to address your first lead-in comment, I do believe there is a safety issue here. As far as I'm concerned, the construction of stoppings very much impact, and can impact, safety. Going back to what Jürgen said, and I agree totally, it would be nice to be prescriptive and be able to say everything fits in a nice box here and a nice box there as to what should be done, but it doesn't work that way.

I would like to see solid block stoppings on all main lines. There is application for some of these other stoppings. They are quicker to install. They get the job done. They are short life. There is

good rationale for using some of the other types of materials in doing it, but I think it can impact safety relating back again to, in terms of belt air, having the district manager approve it under the ventilation plan is something that the district manager and his people can be looking at and seeing if they believe there are some issues there.

One of the things about these stoppings, for example, the metal stoppings -- take a pressure, a pulse of about 1.3, 1.2 PSI, which can come from roof falls, especially in bumper environments and things like that.

So I think there are some issues about stoppings and constructions that are safety-wise, but trying to prescriptive about it is just very difficult, especially in generic prescriptions.

DR. MUTMANSKY: Felipe, are you okay if we delete the specifics in sentences two and three there? Are you okay with deleting that part?

DR. CALIZAYA: Well, maybe when we add up in the discussions section. Following each recommendation, we have discussions. Right?

DR. MUTMANSKY: Yes.

DR. CALIZAYA: So maybe we can switch --

DR. BRUNE: I think that would be a good

place to do that.

DR. MUTMANSKY: I think so. That's a good point. That's a good point. Okay. You're okay with that.

DR. CALIZAYA: Yes.

DR. MUTMANSKY: Is everybody okay with that?

DR. TIEN: Yes. Jan, I'll agree totally, just trying to endorse what Tom was talking about.

Another point is sometimes if it's difficult to build stoppings, the chances are it don't get built in some cases, low coal and so forth. So that's another advantage of using the metal stoppings. They are easy to be built, and they can be reused, if you use them properly, several times, and they just are a very, very hard chore to direct the concrete block stoppings many, many thousand feet just to build stoppings. So the end result is it doesn't get built at all. So, again, I agree with you, what you're talking about.

DR. MUTMANSKY: Okay. We're in agreement. We will remove that, and now let's see. This is called our "Leakage recommendation", and it reads: "Primary escapeway should be designed, constructed, and maintained in accordance with the provisions of 30 CFR § 75.333(b) through (d) to minimize the leakage of

air contaminants." Are there any word changes and addition we need?

DR. BRUNE: Looking at the Recommendation No. 14, since this is about primary escapeways as well, should we add the last sentence of number 14 to this and combine the two and then just vote on the combined? Would that be an acceptable compromise?

DR. MUTMANSKY: That's an interesting discussion. This one reads: "Escapeways. Primary and alternate escapeways from working faces ventilated by belt air should be designed, constructed, and maintained to maximize the possibility of escape in case of emergency. They should be ventilated, with intake air preferably."

Now, that would become the second sentence. Is that what you're recommending, Jürgen?

DR. BRUNE: Yes. Yesterday, we had discussed that the first sentence of this recommendation is pretty well already contained in existing regulations: "It should be designed, constructed, and maintained," and all of that. That's pretty much what the law already prescribes, so the question is --

DR. MUTMANSKY: While Bill puts that in, we may want to discuss the title. The title now?

DR. BRUNE: It should be "Escapeways and Leakages," something like that.

DR. MUTMANSKY: Okay. Now, could we also make note of that pressure difference that you had originally thought we should be discussing? This is the logical place for it, I believe. I'm saying it's my thought.

DR. BRUNE: Yes. That certainly could be added to that recommendation, in my opinion.

DR. MUTMANSKY: What we could say is, "They should be ventilated with intake air preferably and with a higher pressure in the main intake airway."

DR. BRUNE: The intake airway should be pressurized over the belt. It's always pressurized over the return by nature --

DR. MUTMANSKY: Yes.

DR. BRUNE: -- but over the belt, and it should be pressurized.

DR. MUTMANSKY: Can we put that in as a requirement?

DR. BRUNE: I would say, as far as possible, I would throw that in because there may be situations -- I've seen rare situations where one possible -- I did ventilation modeling.

DR. MUTMANSKY: Okay. And to the extent

possible, the main intake should have a higher pressure than the alternate escapeway. Is that what you're saying? We have to get the wording right now. We've really done a lot of surgery here on this, and now we need to, I guess, consolidate all of our thinking and make certain that the words are correct. What will we call this "Leakage"?

DR. BRUNE: Escapeways and Leakage.

DR. MUTMANSKY: Escapeways and Leakage. Okay. Yes, Jerry?

DR. TIEN: While Bill is working on that, I'm just curious. In some cases, we will have to be aware of that, in a fishtail arrangement, there might be intake next to the return, so when we increase to pressurize the intake, you kind of aggravate the leakage, in some cases.

DR. MUTMANSKY: I don't think that's a big problem because what you're basically doing is you're just ensuring a small pressure difference rather than a big pressure difference there. I believe it would always be possible to maintain a higher pressure in the main intake just through the use of a partial Brattice. It would be easy to do, I believe.

DR. TIEN: Or you introduce artificial resistance.

DR. MUTMANSKY: A small resistance into the belt airway, yes, some small resistance of some sort.

MR. MUCHO: What does the term "main intake" mean?

DR. MUTMANSKY: Good question.

DR. TIEN: The intake.

MR. MUCHO: I thought we were talking about the primary.

DR. MUTMANSKY: The primary escapeway, yes, to the extent possible.

DR. BRUNE: Is that correct? In some mines, the track is considered the primary escapeway. If you have a four-entry system, typically the track is considered the primary escapeway. You have an isolated intake escapeway; that is the secondary escapeway. Is that correct? I'm looking at Bill.

DR. MUTMANSKY: He is saying no. Bill is saying no.

MR. FRANCART: No. The isolated primary escapeway wouldn't be the track in that situation. That would be a secondary escapeway or an alternate.

DR. BRUNE: I stand corrected then.

DR. MUTMANSKY: Okay. All right. We are moving here. We're making great progress, if you just consider how many changes we've made here. So let's

start analyzing in detail and see if we can accept the language and so forth.

"A primary escapeway should be designed, constructed, and maintained, in accordance with the provisions of 30 CFR § 75.333, to minimize the leakage of air contaminants. The primary escapeways should be ventilated with intake air preferably, and, to the extent possible, the primary escapeway should have a higher pressure than the belt."

Okay. I think you should take out the first comma and put commas around "to the extent possible." I could be wrong about that. Let's see if it reads properly after putting the one comma after "and." Does that read better now?

DR. BRUNE: Yes.

DR. WEEKS: Shouldn't that refer to the belt entry rather than the --

DR. BRUNE: The belt entry, yes.

DR. TIEN: Do you need the second primary escapeways over there? Will that be okay?

DR. BRUNE: It's a question of semantics.

DR. MUTMANSKY: A question of semantics. What is your proposal there, Jerry?

DR. TIEN: Either way.

DR. MUTMANSKY: Is that all right as is?

Are we close to where we want to be here? That's the question here.

DR. TIEN: Jim, you want to make sure. You have squiggles there, just one.

DR. MUTMANSKY: Are there enough squiggles there, Bill? Bill says there are enough squiggles. He is the authority on squiggles, so we'll go with his recommendation there.

All right. Let's get some thinking. Felipe, they have done great harm to your two recommendations. I want to make certain you're okay with them.

DR. WEEKS: Do you recognize them?

DR. MUTMANSKY: Are you okay with those?

DR. CALIZAYA: I have no problems with this. Maybe when it comes to discussions tomorrow, we can modify the discussion part. I think we have one more point here that deals with tertiary escapeways, which is not in the main recommendation, but it shows up in the discussion section.

DR. MUTMANSKY: Okay. All right.

MR. MUCHO: Just to jump, though, leakage of air contaminants; all we're talking about there is the primary escapeway, and we really don't want leakage of air, really. I'm kind of confused by air

contaminants.

DR. BRUNE: If you prevent leakage of air, you automatically prevent leakage of contaminants.

DR. MUTMANSKY: That is a good point. The word "contaminants" there is superfluous. I would say so, yes.

DR. TIEN: Or simply call them "air leakage."

DR. MUTMANSKY: "To minimize air leakage," yes. Let's go with that language. Is everybody okay with it?

Okay, gentlemen. Are we ready to do the vote on this? We will now vote on this. Jürgen?

DR. BRUNE: I vote yes.

DR. MUTMANSKY: Jerry?

DR. TIEN: Yes.

DR. MUTMANSKY: I vote yes. Jim?

DR. WEEKS: Yes.

DR. CALIZAYA: Yes.

MR. MUCHO: Yes.

DR. MUTMANSKY: Okay. Everybody votes yes on this one. That is going to be now number 14, "Escapeways and Leakage." Thank you for making progress on that, and our next recommendation will also be presented by Felipe. It's the air velocity

recommendation, and, in this particular case, we will take our basic discussion of this from Felipe, and Felipe will present his arguments for these.

DR. CALIZAYA: Thank you. Here, the key point is to talk about these two numbers: minimum velocity of 100 feet per minute and the maximum velocity of 1,000 feet per minute.

I'm a strong believer in numbers. When we leave any of those open, then we can interpret the way you want. So I want to have numbers like the ones that are posted here.

Before I talk about this, I would like to present a couple of pictures. Next, please?

Okay. Minimum air velocity. One of the reasons for increasing the air velocity from 50, which is described now, to 100, is the ability to detect all of the contaminants by the same source that we might use. Fifty feet per minute is really low. It's barely perceivable. How do we measure this, with the smoke tubes? Not that reliable.

The other alternative is to use anemometers. The lower end of the anemometer for this one; it says "30 percent correction." Therefore, we are really unable to come up with a picture of this 50. It could be 50, 60. It could be 40. Next?

There are three reasons for increasing that minimum velocity to 100. One is the transport time for products of combustion to reach the sensor, smoke sensor, the CO sensor or smoke sensor. Now that depends on where the sensor is located. If the sensor is located just above the fire, that could be very coincidental. The sensor will do the job, will recall the right number. But if this is downstream, and there is no air velocity, then the chances of detecting that are very low and not reliable. So that's one of the main reasons for increasing this minimum velocity from 50 to 100.

Are there benefits that we can get from increasing? Is there the possibility of reducing the methane layer in gassy mines?

The last one is decreasing the fogging problem that shows up in wet mines. When you have velocities of less than 100, it's really hard to see because of the fog. This becomes a safety issue.

This diagram shows how the air velocity is distributed in a mine. You can see in this diagram, here, we have one obstruction that could be the conveyor belt, and, depending on the size of the opening, the maximum velocity is located somewhere here, and that will happen. You will have a center

line. But near the edges, you can see the ratio. It decreases from three to one in that order. Sometimes near the roof, you cannot even detect whether the air is moving, especially when the average velocity is 50 feet per minute. So what we want to do is increase that.

Now, depending on where the monitor is located, according to the regulations, the sensors should be located in the upper third. In the upper third, what you will have is even lower velocities. If the average velocity here is 50, then up here that means we are seeing velocities of 20 or maybe less feet per minute.

That's telling us that the sensors are not giving us the right reading. So that's one of the reasons for increasing the velocity.

This one explains the transport problem, and that applies not only for carbon monoxide, which is lighter than the air; it also applies for smoke. Smoke is also lighter than the air, and it will try to stratify.

Other issues: methane layering. A hundred feet per minute is not going to prevent layering. We might need more than that, but it will assist.

Fogging. Again, 100; it's not going to

solve the problem, but it will assist. We might need to have higher than 150 per minute, 150 feet per minute, to eliminate the problem.

So those are the reasons for the lower end. Now, in the upper end, a maximum velocity of 1,000 feet per minute. Well, this number is suggested by more than one author of ventilation books. I want to come up with some other reasoning.

I had the chance to work in areas where the velocity was more than 1,000 feet per minute, and especially if this is a conveyor belt, you will see the dust, the float dust, in the airway, and that float dust is really a safety issue. I'm sure most of you, you are exposed to these problems. The dust will get into your eyes, into your nose, and it's a headache. So that's one reason.

I have two other reasons other than discomfort. McPherson suggests 800 feet per minute. Excessive dust will -- settled dust and transport it for long distances. Now, this becomes a serious issue: settled dust. What is "settled dust"? That's mainly float dust, but we also have respirable dust air, and once we stir the dust, that will fly to the workings, and that's what we want to avoid.

Now, what I did is read my research in this

area, and I found two interesting articles published by Rider and Colinet from NIOSH. What I will do is explain that to some detail.

Based on this research, the first article was published in 1999, and that one was in the U.S. Mine Ventilation Symposium in 2002. The article is in that book, and there you can see a couple of numbers. This is at the face. That's the place where we have the largest air velocity.

When the air velocity is on the order of 400 feet per minute, the respirable dust, as we saw in other discussions, is less than the allowable limit, maybe 1.5 or in that order. But when that increases to 800, respirable dust concentration has increased by a factor of three or four. So that's a major concern.

Another thing that we can see in that paper is that the average velocity at the base during that time was 633. Last year, at the U.S. Mine Ventilation Symposium, Rider and Colinet reported that this has increased, and it has to do with the production rate.

But you can see this number, 665 feet per minute. That's the average of, if I'm not mistaken, eight mines at different places. The paper talks about maximum velocity of a little bit more than 1,000 in one case, but, on the average, it was in that

order.

So that's telling us that, even at the working faces, at the long wall-face, we don't have velocities that are above 1,000 feet per minute. Next, please?

This diagram shows Colinet's report. This is for the long-wall face, and here we can see the lower concentration of dust particles at the velocities which you have in the order of two meters per second; that's about 400 feet per minute. What we are seeing here is that when the dust concentration -- this is experimental work -- increases to eight meters per second, which is 1,600 feet per minute, the dust concentration -- this is respirable dust concentration -- increases from almost .5 to 13 or 14 milligrams per second, way above the TLV limits.

Something similar to this was presented in the same paper for total dust. So that's telling us that dust becomes a serious problem when you are dealing with very high velocities. Next?

This is Malcolm's graph, diagram, that he uses in his textbook, and it shows the effect of air velocity and dust concentration. For respirable dust, we're talking about particles that are less than five microns. We can see that, at low velocities, that one

is quite high, and, after that, it decreases. It's decreasing because of the dilution factor.

The other one here, the graph above 10 microns; that one represents float dust, and that one is telling us that the total dust concentration, it will follow this pattern, and it says that, from that point of view, maybe right here it would be about three, three meters per second at 600 feet per minute. Maybe that's the optimum one. If we extend that a little bit more, we are increasing the total dust, but if we go to 1,000, we are really up here.

So those are the reasons that I used to establish the 1,000-feet-per-minute limit.

DR. MUTMANSKY: Thank you, Felipe. I think we want to discuss minimum and maximum air velocities separately. I guess there really are separate issues involved.

Let's, first, discuss the minimum-air-velocity issue and get comments on that for the 100-feet-per-minute recommendation.

MR. MUCHO: I'll take a go at that first.

DR. MUTMANSKY: All right, Tom.

MR. MUCHO: For the reasons given by Felipe, the methane layering and so forth, the transport time to sensors, especially, I think most of us agree that

100 feet per minute makes a lot of sense as a minimum, but there has been a reluctance to change with that 50-feet-per-minute number.

One has to wonder why that is. My suspicion, and I will say this is only a suspicion, is that the problem, and we'll get into it with the other velocities, too, is the exceptions, the small areas here or there where maintaining either a maximum or minimum is a problem.

For example, we talked about the fishtailing of a point-feed onto a belt line. Right in the area, and we've talked about that, one of the objectives is to dump the air inby the terminal units of the take-up, the belt drive, and to dump that air to return, taking the fresh air inby to the face.

Typically, the ventilation in that area for that kind of a system is air comes off the main belt over the transfer point to the drive area, where it's dumped to return, and air is brought back down the belt from the point-feed inby the take-up-type unit and dumped.

The problem is, right in that area there, you can have some rather low velocities, depending on where you're measuring it and how close you are to the regulator that you're dumping it through.

Similarly, there are other kinds of situations like that where there are small areas where maintaining 100 feet per minute is an issue. As a result, you get citations, and the companies are upset about those kinds of citations, and so on and so forth.

So I think that those kinds of issues are kind of the root of hanging onto that 50 feet per minute. It doesn't sound logical. We're using belt air to do a better job of ventilation. You would expect to find the velocities above 100 feet per minute.

So I think, and I'm going to recommend it for both of them, is that we should state something about the handling of small areas that, for some good reason, are an exception. When you jump to the max, you get to things like some restrictions, constricted area as a result of the velocity through that area, and so and so forth.

So that's the main thing, I think, in terms of the minimum, that we need to somehow stipulate some means to not make that an issue in the industry.

DR. MUTMANSKY: Jürgen?

DR. BRUNE: I agree with Tom. We need to have some kind of an ability to exempt small areas. I

just want to give another example. In a case where you ventilate the belt air out-by, not to the face but away from the face, that requires what's called a "belt regulator," and typically the miners call it "dog leg," where you dump the belt air into the return.

That belt regulator should technically be built as tight as possible because if you don't build it tightly, then you lose air, and that's a source of leakage, and, at that point, if you can build it tight enough, likely the velocity in this cross-cut, likely the overcast from the main belt, is less than 50 feet per minute, on average.

DR. MUTMANSKY: Okay. Jerry?

DR. TIEN: I agree with him, but I'm just wondering -- look at the words he is proposing, "should," but it's not "shall." Is that kind of implying that exceptions can be made?

DR. MUTMANSKY: If we're going to have exceptions, I think we have to state them. I think it's important. I didn't think there would be any problem with this minimum air velocity of 100 feet per minute. I personally think it's a very good idea. I think Fred Kissell's presentations in Pittsburgh were very indicative of a quicker response time from the

sensors, and so the 100 feet per minute, I think, is something we really should go with.

Now, to make that acceptable and to make it practical, we may need to provide language that permits a smaller velocity in very small areas perhaps.

Tom, will these areas always be very short areas, or will they sometimes be bigger areas and cover a bigger extent of the mine?

MR. MUCHO: In general, the situations I'm aware of were always small areas, but just to jump to the maximum, for example, we toured the Jim Walters Mine. We looked at a point-feed. Now, we didn't go in and measure the air on the belt line right in that area, but I suspect it was quite high. They had an intake shaft there. They were dumping through a regulator point-feeding onto the belt line.

We were well into the mine, where I would suspect that belt air from the original source was almost nonexistent, except for the point-feed. So they could have been splitting the air in both directions on the belt. I think, as I recall, they were only point-feeding to move it in by.

So there is an area there where, in the area of the point-feed, the velocities could be quite high

until they drop down to a more normal kind of an area. I wouldn't think it necessarily would be small, but it might be numbers of cross-cuts and that the velocity might be kind of high through that area.

Of course, I know that Jim Walter's has been one of the people who raised an issue about the maximum velocity also, so I'm suspecting that it's those kinds of situations that are reasons why they were raising objections to the maximum.

DR. MUTMANSKY: Jim?

DR. WEEKS: A couple of matters. A question for Tom: In the areas where the velocity is likely to go down, how do you deal with methane layering in a situation like that?

MR. MUCHO: In general, to be quite honest, we haven't seen a lot of problems with methane layering on the belt line irrespective of velocity. It can happen. As Felipe pointed out, it can happen even at velocities over 100 feet per minute, but, in general, we haven't seen that many problems. People find the problems. Of course, people who are examining these belt lines, they find gas, and they do something using baffles and so on to create a mixing situation to address the layering.

DR. WEEKS: One possible way to deal with

the exception would be to talk about an average velocity of 100 feet per minute or to specify some reasonable point along the entry which you measure it rather than to require that it be at least 100 feet per minute, the entire length of the entrance.

MR. MUCHO: When Felipe was talking, I had the same thought, but then I haven't had enough time to think about it to know if that really made sense and think that all the way through. But it seems like it might almost be a way to handle, but then average velocity, so I have 50 here, 500 over there. It's sort of like you want an average minimum feet per minute or something.

DR. WEEKS: What if you measured at some identified place. I don't know where that place would be, the belt head where it enters the section.

DR. MUTMANSKY: It's complicated by the pattern of ventilation. There is now question about it. At the point-feed, you require 300 feet per minute through the regulator. That generally would provide you an awful lot of air, but if you split the air in both directions, then most of the air will go toward the working face, and there may be areas in there that just simply don't easily meet 100 feet per minute.

MR. MUCHO: You want very little. You just want enough going back the other way to pick up the contaminants, mainly dust in this case, and get rid of them. You don't want to be wasting that air.

So the incentive, from an engineering standpoint, is to have a varying minimum going back that direction. Correct.

DR. BRUNE: Likewise, on the maximum end, it is well possible that you have a tight overcast where you force the belt air over the track of the return, and the overcast is not high enough. It may only be three or three and a half feet high, just to barely let the belt through, and you get exorbitant velocities up there just because the area gets reduced. If your overall belt velocity is 800, you may see 1,500 on top of the overcast.

DR. MUTMANSKY: Sure. Okay. Well, we have a lot of different issues pointing to these recommendations here.

I'm somewhat surprised to hear somebody say that some of the belt entries had 1,200-feet-per-minute velocity. Is that correct?

DR. BRUNE: Yes, I believe so.

DR. MUTMANSKY: And those are for entry systems. Correct?

DR. BRUNE: Yes, and they claim they need the quantity of air to ventilate their long-wall because of -- to dilute gas.

DR. MUTMANSKY: To dilute gas. I understand that. Okay. What would the velocity on the face be, then, in that case?

MR. MUCHO: Probably much higher than --

DR. MUTMANSKY: Much higher than 1,200.

MR. MUCHO: No, typically not.

DR. MUTMANSKY: No?

MR. MUCHO: Because on the face you have a larger cross-sectional area. You typically have 140, 150 square feet cross-sectional area on the face.

DR. MUTMANSKY: You're probably looking at 800 feet per minute on the JWR face.

DR. WEEKS: I would think, on the face, also if it's a longwall face, there is a lot more resistance just because of the shields and all of that.

DR. BRUNE: Yes, but that wouldn't change the velocity. That would just affect the pressure drop.

DR. TIEN: By the time you get to the face, some of the air has already gone to the gob so only part of that high air volume comes to the face area.

You're right. It's because the shields and the shear is a reduced area in the face area.

DR. BRUNE: Plus you do lose a significant amount of air through the first 10, 15 shields into the gob which is part of the purpose of why you have a large quantity on the face just to keep the methane on the gob.

DR. WEEKS: The other issue with the maximum velocity; I would think, with higher velocity, there would be a dilution of the CO which would delay -- as well at the other end.

DR. BRUNE: One comment that I would like to make regarding the high velocity is I agree with the entrainment comments that you made. After 800 feet per minute or so, the dust entrainment gets higher, but we already have a regulation on the books that requires the overall dust concentration at the designated area sampling point just before the belt air meets the face air to be less than one milligram per cubic meter.

So there is a limitation to how much dust you can allow the belt air to load up. If you increase the belt velocity too high and entrain too much dust, you would be unlikely to meet that maximum dust specification at that point.

MR. MUCHO: Jumping to the maximum on the dust is almost apples and oranges, in a way. If you're going to talk about longwall face dust and compare it to conveyor belt dust, that's a different animal, one of the major differences being that shield movement, shield dust composition, the size particles of those. You really are mixing apples and oranges when you start taking data from longwall face dust, respirable dust, and start talking about it in a conveyor belt entry. It's just apples and oranges.

Basically, I don't think any of us have a problem with the numbers we got up there. I think the lone issue that I can see is dealing with the legitimate exceptions out there so that MSHA and the companies can deal with them. I think the numbers make sense to most of us.

DR. WEEKS: The other issue with the dust -- actually, there are a couple of other issues. One is, if the air is going in one direction, and the belt is going another, the effective velocity of coal on the belt is the sum of those two velocities.

DR. MUTMANSKY: That is correct.

DR. WEEKS: So that's one other factor.

The other is that there is a section of the Act that -- I forget the exact wording, but it says

basically that whatever the ventilation is, it should be to minimize the generation of respirable dust, basically saying you should get it as low as possible. One milligram is an upper limit set by regulation, but, even so, there is kind of a mandate to get it down.

Then, finally, the biggest source of respirable dust on the belt entry is not reentrainment anyway; it's the transfer points.

MR. MUCHO: In terms of the velocity, I guess I rely on Mitchell. He has made a couple of statements about what that maximum velocity ought to be, but, generally, considering the belt going the opposite direction than the air in the case of belt-air mines, you're still generally with Mitchell's numbers that at 1,000 feet you're okay by some of the numbers that he has quoted.

So I think that's all right. I think, when you look at some of the other studies that have been done for belt air, some of the MSHA work, again, the transport, I think we're okay at that kind of a maximum number, a thousand. I think it's not a bad number.

DR. WEEKS: Well, that's true, but, according to the data that Felipe showed, if you're

getting significant reentrainment at 800, why set the limit at a thousand? Why not set it at 800? I'm just talking about the logic of it.

MR. MUCHO: What part did he say, 800, as far as reentrainment? Is that using longwall face data?

DR. CALIZAYA: No, no, no. The diagram that I had --

MR. MUCHO: From McPherson? Well, that depends on particle size, too. Right? It depends on distribution of your particle size.

DR. WEEKS: That one.

DR. BRUNE: From that diagram, I agree, it's difficult to deduct a thousand feet per minute when the diagram only shows 200 to 600. So it's kind of like grabbing things out of the air.

DR. MUTMANSKY: We have to also consider that feeling of being pelted by dust, and, of course, that's a good reason not to work there or to avoid working there. But it is somewhat of an issue.

The real problem is, on a belt conveyor, there are not very many personnel being employed in that area, so that's somewhat of a limiting factor.

I guess my question now is, what are we leading to? This is what we have to address. I,

personally, believe that the minimum velocity should be increased in some realistic fashion. I'm uncertain about the maximum velocity. I still have questions about it.

So my thought is let's work out the minimum velocity first, see if we can come to a conclusion on that, and then we'll attack the maximum velocity.

DR. TIEN: Just like you said, there is no perfect system. Look at the chart you put on, the diagram, yesterday, there always pluses and minuses, and we all can cite one or two or three of them. So I guess our goal is to look at the safety issue and minimize the block you have over there and compromises and trade-offs.

DR. MUTMANSKY: Yes. I, personally, believe that 100 feet per minute should be passed in some fashion. If somebody comes up with a way of expressing those exceptions that we're talked about here, and we can put that in words in our minimum-velocity recommendations, then I think that's what we need to have. Jürgen?

DR. BRUNE: Yes. I would perhaps add something like, in the areas where the 100-feet-per-minute minimum cannot be maintained, the district manager should carefully examine this exemption before

approving the ventilation plan or something like that.

DR. MUTMANSKY: Okay. Well, we need to express that. We need to express it in such a way that it's perfectly obvious what meaning we have there.

DR. WEEKS: The principal concern there would be methane. Is that right?

DR. BRUNE: Not just methane but also the travel time of contaminants, CO and smoke, to the nearest sensor. If we're talking 50 feet per minute, it takes 20 minutes to cover 1,000 feet. So maybe, at that point, if there is an area of the belt, and they cannot ventilate it with more than 50, then the sensor spacing needs to be decreased, but that's something that should be, in my opinion, decided on a case-by-case basis by the examining ventilation officer or the district manager that approves the ventilation plan.

DR. WEEKS: I think there is language in the 2004 rule that gives the district manager the option of considering -- as I recall, it's in relation to the upper velocity when you get a dilution effect. Then he might change the threshold at which the signal goes off. I don't know whether it applies to a minimum velocity as well. I just don't know the rule quite well enough.

MR. FRANCART: The rule said, unless otherwise approved in the mine ventilation plan, the maximum velocity would be a thousand feet per minute. That particular regulation was overturned in court, though, as a result of litigation that was brought forth by Jim Walter's.

DR. WEEKS: Yes, but the district manager has an option, on his own discretion, to determine what the threshold level is for setting a signal. That survived, though, didn't it or not?

MR. FRANCART: The district manager can still require decreased spacing, additional sensors, and reduce alert and alarm levels based on higher velocities.

DR. WEEKS: Okay. That's what I thought. But it doesn't apply to the lower velocities.

DR. MUTMANSKY: One other thought here. Could we change the minimum-air-velocity recommendation by simply stating the sensor time element as opposed to the velocity of air? As you probably recognized, one of the arguments that Fred Kissell had talked about was how long does it take the sensor to pick up a CO condition? In the entry, and, I believe, as he discussed that, or somebody discussed it early on, it takes a fair amount of time for a

1,000-foot sensor spacing to pick up CO levels in a given entry if the velocity is quite low.

It gets complicated if we try to state it in some other manner, I think.

MR. MUCHO: That would really complicate the industry. They would be scratching their heads for a while.

DR. MUTMANSKY: Yes, I think so. I think it would.

DR. BRUNE: I would simply say, "Exemptions may be granted at the discretion of the district manager," and simply leave it at that.

DR. MUTMANSKY: That's an easy way of expressing it. It lets us out of complicated explanations, but is that the way to go? That's the question.

MR. MUCHO: I would like to see some language that heads it off in the meantime. For example, when I operated a mine and put in a belt-air petition, it wasn't long before the inspector walked on the belt line and found the first high spot -- where we had a fault and we got a citation. Okay. Well, for a minimum velocity, it's quite a high fault. So we worked that out, and, sure enough, if we didn't walk and find another high spot where there was

another problem, another citation.

So it would be nice if we had some language in it that would kind of head that off ahead of time before we get into a case-by-case assessment of every inch of the belt, the conveyor system. I like the average minimum velocity. Let people try to figure out what that means.

DR. MUTMANSKY: "Average minimum velocity"; is that an oxymoron? I think we know what "average minimum" means.

(Discussion held off the record.)

DR. WEEKS: I think the language that Jürgen was headed at was not merely exemptions can be granted, but you're saying that the district manager ought to look at situations and approve them or make recommendations or something like that.

DR. BRUNE: Yes. I'm adamant about that, that the district manager, in his or her decision of approving the ventilation plan, ought to take a look at these exemptions and really judge whether that makes sense in this area. Likewise, the mine operator, in preparing the ventilation plan, would have to anticipate potential areas where they may encounter low or high velocities and bring this to the attention of the district manager when submitting the

ventilation plan.

I think, in that respect, then it can be addressed, and the mine operator can say, "Hey, in this area, we have only 50 feet per minute or 70 feet per minute, but, in order to improve the reaction time of the AMS system, we will space the sensors so and so. So you, District Manager, we bring it to your attention, and this is how we're going to take care of it."

I think that would be a good recommendation because it brings the district manager and his or her responsibility into play.

DR. WEEKS: Now, can you reduce that to a sentence?

DR. BRUNE: As I said before, we could, as far as both of these recommendations, we could add. The district manager may approve exemptions to these minimum-maximum recommendations in the ventilation plan.

DR. WEEKS: I thought you were headed in a slightly different direction, which is that you wanted to require the district manager to look at those exemptions, not merely give him the authority to do it. I don't know what kind of language that would be, but --

DR. BRUNE: If we state the recommendation as a minimum or a maximum, like we have here, and then say the district manager may approve, then that's up to the discretion of the district manager.

DR. WEEKS: Okay. We still need a sentence.

DR. MUTMANSKY: We need a sentence, yes. Are we going to address both minimum and maximum at the same time here? Are we okay with that? I think, Jürgen, you and Tom have been leading the discussion here. I would think that one of you should propose a word such that the district manager has some discretion, and I want to have the words be as understandable and as straightforward as possible, I would think.

DR. BRUNE: Okay. I propose to say, "The district manager may approve exceptions to the minimum and maximum air velocity recommendations in the mine ventilation plan." That sentence should follow the second paragraph. It should be "recommendations."

DR. MUTMANSKY: Okay. I think that's a good start. Now, I think we need to put the intent here. Our intent here is to allow him exceptions in small areas of the mine or in certain specific areas of the mine. Isn't that correct?

DR. BRUNE: Yes, but I would not limit it to

small areas. I would limit it to specific areas because the mine operator may have reasons why a larger area needs to be ventilated at a higher velocity, but then, again, it's something that should be dealt with as part of the ventilation plan approval.

DR. MUTMANSKY: I have no problem with that. I have no problem with the ventilation plan approval. I don't think we've given him enough guidance, is what I'm saying. I think we need a more specific description of where he may approve these exceptions.

DR. CALIZAYA: Jim, may I ask?

DR. MUTMANSKY: Yes, sir.

DR. CALIZAYA: I want to ask Bill about the current law. We know that at the point-feed, the minimum velocity is 300. Is that average velocity? Here, the background is also average velocity. We won't be able to measure minimum velocity near the roof, especially when you have such velocities that are close to zero. We don't have the instruments to do that.

Here, when we are talking about minimum velocity, we are talking about average velocity at a given point, and that given point may be, as we have right now, so many feet from the loading point or so

many feet from the point-feed because at the point-feed, I'm sure, at Jim Walter's, we have more than 2,000 feet per minute. We know that they have tappets near it. That's not what we are after. We all have that one. No one works in that area. If someone works, he knows that we have very high velocities.

So, really, what we need to do is specify where these readings -- we want this average in the belt entry, this minimum velocity in the belt entry, and inby. Can I ask Bill for some clarification?

MR. FRANCART: Yes. The minimum velocity of 50 feet per minute is a minimum average air velocity, and that's in any location within the belt entry, but, in the rule we do have a caveat that says that it has to be measured at a location with typical dimensions of the entry. It wouldn't be in an abnormally high or low area.

DR. WEEKS: One thing -- I don't want to muddy the waters any further, but there's two different kinds of averages. One would be a cross-sectional average in which you do a traverse, and the other would be an average across the entire length of the entry. Conceptually, those are really quite different creatures.

DR. BRUNE: In fact, an air reading, by

definition, as a traverse, is an average. It denotes an average already, even if I'm traversing one spot or one cross-section. So that's why the term "average" itself is kind of ambiguous here. Like Jim says, it does muddy the waters a little bit.

That's why I think, if we leave it to the district manager to approve exceptions, then it's up to the operator to determine where, in his belt ventilation plan or his mine ventilation plan, he may encounter velocities lower than 100 or higher than 1,000. Point it out to the district manager and tell him, "This is what we have, and this is how we're going to deal with it."

MR. MUCHO: I don't think we really need to provide the guidance. These issues have been around for a while. They have dealt with them, whether you're talking about velocities on track entries and things like that. So companies and district managers have been down these roads. So I don't think we need to provide detailed guidance.

DR. MUTMANSKY: I don't doubt that, Tom. I would just ask, Bill, would you agree that the district managers will clearly understand the intent of this recommendation and can deal with it? Is that something you would agree with?

MR. FRANCART: Yes.

DR. MUTMANSKY: Thank you. Do we need more discussion of this air velocity recommendation at this point? Would anybody else like to bring thoughts to the process at this point in time? Is the language of the air velocity recommendation in good shape? Is there any reason to say that we should apply this to other mines where they are using belt-entry air at the working section, or is this the way we want the language to read at this point in time? You do. Okay. Everybody is happy with that? Jerry?

DR. TIEN: Felipe and Tom talk about the average minimum air velocity. Should we reflect that in their wordings, or is that implied?

DR. MUTMANSKY: I think it's implied. I think it's implied.

MR. MUCHO: As far as the average of the cross-sectional area, that's implied. I was actually talking about an average --

DR. TIEN: Along the belt line. Right?

MR. MUCHO: That's why I said, let people figure out what it means.

DR. BRUNE: That's where you get into whether it's a weighted average over certain sections of the belt, and then you have different velocities

anyway because you lose air due to leakage. It's going to be extremely difficult to even mathematically come up with an average of a certain stretch.

DR. TIEN: Plus the fact that they change so quickly.

DR. BRUNE: Yes. That's what I'm saying.

DR. TIEN: One hundred feet per minute is not a lot of air at all.

DR. WEEKS: You know, there is a section of the Mine Act that attempts to define what an average dust level is, and it absolutely defies description, if you want to see how messed up the concept can become.

DR. MUTMANSKY: Well, we certainly don't want to make it more complicated. The language here is not terribly complicated. As long as it's well understood, I think that we can move this forward.

Do we have any additional comments from the panel, at this point in time, before we vote on this? I think the language is pretty straightforward here: minimum and maximum air velocities. We're talking about minimum air velocity and mines using AMS as a condition for using the belt entry to ventilate working sections.

The minimum air velocity in the belt entry

should be 100 feet per minute. In mines using AMS as a condition for using the belt entry to ventilate working faces, the maximum air velocity should be 1,000 feet per minute. And we're saying the district manager may approve exceptions to the minimum and maximum air velocity recommendations in the mine ventilation plan.

We have heard from several people who said the language should be well understood, and we should be able to get the intent of this implemented in the mine ventilation plan, and that's what we're mostly concerned with here.

Are we ready for a vote, gentlemen?

MR. MUCHO: I would just like to add something. We're not going to get 75.371 ventilation plan requirements. Some Subsection JJ -- I'm not sure which one it is. The locations where velocities in the belt entry exceed limits set forth in 75.350(a)(2) and the maximum approved velocity for each location. It's talking about what needs to be specified in the plan and the map.

So, in a way, some of these things we're talking about seem to have already been anticipated, and they are sitting right there, so that should be able to be handled quite easily, and it's already

facilitated in the requirements for the ventilation plan and, of course, for the district manager to look at it.

DR. MUTMANSKY: Okay. Should we call for the vote, gentlemen? All right. I call for the vote, and, Felipe, you vote first.

DR. CALIZAYA: I agree.

DR. WEEKS: Yes.

DR. MUTMANSKY: I vote yes. Jerry?

DR. TIEN: Yes.

DR. MUTMANSKY: Jürgen?

DR. BRUNE: Yes.

MR. MUCHO: Yes.

DR. MUTMANSKY: We record the vote as a unanimous vote for the minimum and maximum air velocities recommendation.

Okay. Good. Is this a good time to take a 10-minute break? Thank you. We will take a 10-minute break.

(Whereupon, at 10:45 a.m., a short recess was taken.)

DR. MUTMANSKY: Ladies and gentlemen, we would like to go back into session, and it is our task right now to look at the point-feeding recommendation that has been presented, and you'll see it there on

the screen. I will present the arguments for the point-feeding recommendation, and I would like to mention that the point-feeding recommendation came about in our field visits to the Utah mines, and, at that particular point in time, when I began to understand the point-feeding concept, I had some thoughts that it was an inherent defect in the ventilation plan.

My additional study of the point-feeding concept led me to believe that I should forward this recommendation to the panel. Some of the problems with the point-feeding concept are that the point-feeding regulator is actually quite far from the working face, and when incidents would occur, there would be an awful long distance to travel to the point-feeding regulator.

So the biggest problem that I see, of course, is if there is a fire in the main intake before or outby the point-feeding regulator, then both the intake, the primary intake, escapeway and the secondary intake escapeway could be contaminated with the combustion byproducts if that fire occurs beyond that regulator.

Now, to support the idea that this is important, I would refer to the testimony given by

Fred Kissell at the Pittsburgh meeting. At that particular meeting, he said that there were four common features often associated with fatalities involving mine fires, and these common features were delayed evacuation, lack of lifelines, confusion in locating escapeways, and malfunctions of SCSRs.

As you probably realize, some of the events of 2006 have led to improvements in use of lifelines and, hopefully, will result in significant improvements in SCSRs. So some of these features that Fred was referring to have already been addressed. At least, the intent is to provide better lifelines and better SCSRs.

However, delayed evacuation and confusion in locating escapeways could be complicated by the point-feeding strategy. So the point-feeding strategy is something that, I think, presents some problems. However, I do believe that the point-feeding recommendation that you see before you here can solve some of these problems using the AMS system.

As you probably recognize, what I'm recommending here is that the AMS system close the regulator to keep the intake escapeways separated immediately if CO is detected by two sensors outby the point-feed regulator.

As was discussed in the early discussions that we had, and I don't remember which city we were in at the time, but it was discussed at that point in time that to close a point-feed regulator, you don't have to go to the regulator. You have a point close to the regulator where, as you're evacuating from the mining operation, you can close that regulator.

In this proposal, the point-feeding regulator would be closed automatically by the AMS system. If two outby sensors detect CO at their locations, the section would be notified of the closing of the regulator, and the regulator would be automatic. In other words, the AMS system would close the regulator immediately upon sensing those conditions. I think this is one way to overcome some of the problems of the point-feed regulator.

We'll have to read the point-feeding recommendation here. What we specifically are asking is that two CO sensors be placed in the primary escapeway outby every point-feed regulator and that a certain amount of space be put between these two sensors so that a very small, local situation, such as a diesel piece of equipment or something of that sort, would not immediately set these sensors off.

If both of these sensors reach the alert

level of the mine, a warning signal will be given at the regulator location, and that point-feed regulator would be closed.

Okay. I have presented sort of the basic logic of this point-feeding situation. I'm open for discussion and for those who might have comments rebutting the basic logic of this proposal.

MR. MUCHO: I would like to just address two areas. Basically, I think this is a very strong proposal because, as we talked about in earlier meetings, a real problem is if you have a fire in the primary escapeway outby the point-feed, and one of the reasons it would be nice to have the belt entry on the intake air toward the face would be to have that escapeway out. So this goes a long way to maintaining the integrity of that or providing integrity of that for escape. So I think it's quite important, and I think it's a nice way to accomplish it.

I have two concerns. One is the automatic activation. I'll be honest -- I say it's a concern; it's something that I've thought about. Since we have an AMS operator there, we also have the possibility of an alert coming up to the AMS operator, and the AMS operator triggering that action. So we could have a person intervening, which may have some additional

data, perhaps on the performance of those two sensors or whatever, that maybe they wouldn't do it.

The basic reason for that, of course, is when we close that point-feed regulator, especially with the 300-feet-per-minute requirement and so on, we're probably at quantities greater than 9,000 feet per minute, so we're into a legal air change which has been something -- to do an air change without taking the precautions that are in the regulations for making a major air change are something we've tried to avoid, period.

One of the reasons for air change provisions are that it's hard to know for sure the whole impact when we're making an air change like that. Many of us have been surprised when we've made air changes as to what happened.

In this case, it's going to be the less of that case. We pretty well know how it will impact things. So, certainly, in terms of an emergency, we can weigh over the safety benefits over the chance of making an air change while power is on and people are in the mine and so forth. But I just wonder -- it's just a caution -- would it make sense to have that personal intervention in there in the event they have more data rather than have it automatically happen?

So that's the first one.

The other one -- I touched on this in an earlier meeting -- is the automatic activation of the system, the point-feed. I know some people have developed some systems to do that, but I think, from an engineering standpoint, having a good system that will reliably do that, be able to perform in the face of various types of emergencies, is an engineering challenge, to an extent, and there's probably some good ways to do that, and there's probably a lot of bad ways to do that.

So that might be one of the kind of things you might want to be moved to the research thing. I think some people who are some people maybe in NIOSH, maybe MSHA, or a combination, whoever, really ought to look at that. There are some good, reliable systems, good air seals, provisions for potential power failures because of the emergency. There's a real a lot of engineering issues there. So those are the two comments.

DR. MUTMANSKY: Jürgen, did you want to also add to Tom's comments?

DR. BRUNE: Yes. I, first of all, share Tom's concerns with respect to the air change. What might happen is that you get dead air on the belt

after you close that point-feed regulator. There may not be enough air to ventilate the belt, and you may end up getting smoke rollback. If you have the fire inby the point-feed regulator, you may end up getting smoke rolled back.

So it's an issue that, I believe, has to be decided by a competent mine foreman, or somebody who has equivalent experience, and would relay that information to the AMS operator to close that. In specific situations, I agree that closing the point-feed can be helpful and beneficial to improving the chances for escape to the miners, but, in other cases, that may be quite the opposite, and we may make things worse by reducing the air speed on the belt inby the point-feed where there is no more air coming in from the intake, and reducing contamination with methane and potentially smoke and other gases.

I also agree with Tom that the engineering of an automatic door or regulator that will function after it has been subjected to convergence and roof changes -- often we can't make regulators stand up to convergence and then sagging roof and heaving floor, let alone automatic doors. So it's a challenge.

MR. MUCHO: Just to that last part, the one we saw at the Jim Walter Mine was using sort of the

industrial garage door concept, which helped address a lot of the convergence and so on issues. A lot of the engineering issues I'm referring to -- the activation of the system, the powering of the system, a fail-safe design, again, in the event that we lose power -- there is a lot of engineering there that's pretty tricky, in my opinion.

DR. MUTMANSKY: Okay. I would like to rebut your comments just a bit. I think your concerns are very real, and I do believe that there will be issues that have to be addressed if you were to try to do this.

I do believe, however, that a gravity-powered door would be just as good as a garage door. A garage door has a lot of utility because it can be opened or closed using a power source, and that's very nice, but as far as a regulator closing is concerned, you can use a gravity-powered door. That, I think, would be, in some cases, acceptable. I don't know if that's the best way, though. I certainly would not argue that it's the best way. It isn't necessarily the best way. There is research that must be done, I think, to overcome any of the problems that you're mentioning.

I'm just saying it's not so certain that

it's that much of a problem.

MR. MUCHO: My point is I totally agree with you. I don't think it's an insurmountable engineering problem. I'm just saying that I think there are better ways and worse ways to do it, and we certainly don't want a lot of installations that end up in that latter category. So I think it ought to be looked at and detailed up and some aspects of it thought out that, I suspect, aren't thought out in all cases.

DR. MUTMANSKY: Okay. If you're serious about the AMS operator being the decision-maker --

MR. MUCHO: I'm just raising the issue.

DR. MUTMANSKY: You know, the problem of closing the door still remains. If the AMS operator is still the decision-maker, she has to have a trigger somewhere that triggers the mechanism, and then that mechanism still has the same kind of problems there.

MR. MUCHO: Well, it's the same basic system. AMS system doing it automatically or the person doing it through the AMS system; it's the same system.

DR. MUTMANSKY: More or less, the same system.

Anybody else want to weigh in on this?

DR. WEEKS: Well, first of all, this reaches

the limits of my expertise in mining so I'm somewhat uninformed on this area. However, my instinct is to agree with a lot of what Tom and Jürgen are saying, and that is, I somewhat distrust automatic systems in general, especially when it comes to safety, because in a situation where there is an emergency, many things go wrong. That's the nature of an emergency. But I see the value of having it automatic, for the reasons that Jan mentioned.

So one possible solution would be to just specify, it has to have a manual override, and most automatic systems do, one way or another, but I think it's important to have that feature in there so that a person could intervene, depending on the circumstances.

DR. MUTMANSKY: Felipe, do you have any comments?

DR. CALIZAYA: My comment is regarding the possibility of failure that you may have when you really need to stop or close that regulator. It is a serious business. It's very much the same thing with booster fans. There would be times when you need to stop that, and, for that, you need redundancy. The power supply needs to be in a separate light. I think that's a very well-known technology.

You need to look at this regulator. Just like a booster fan, it's such an important item. We don't have point feeds everywhere. In Jim Walter, we saw one, and it was very good. It was doing the job, I should say. In this particular case, I don't know if it were possible to install two sensors upwind. It was very close to the main shaft.

Maybe in that case, for instance, another sensor would be sufficient. In order to find out whether this point-feed is working or not, I think, by the regulations, we need to have one monitor in front. Maybe that one is already in place. What we need to add is just another one to make sure in case we have some unusual situation.

MR. MUCHO: In that case, the point-feed was about 150 feet away from the shaft, so you wouldn't have room to put in two sensors, but I'm sure most of us would agree that point-feed sitting right off the shaft, even with the one sensor there, you would have to wonder why you would put it in there. Jürgen?

DR. BRUNE: I'm just thinking about another possibility, that the closing of the point-feed may ultimately fail the objective of making things safer. I would have to run a couple of models to verify that, but I could imagine that, in certain situations,

if you reduce the belt air velocity and the belt air quality, you will then also reduce the pressure loss that is experienced on the belt over the length towards the face, and, at the same time, if you run more air, since closing the point-feed, if you run more air down the intake, you increase the pressure loss due to resistance of the length. So, eventually, you may end up reversing the pressure balance between the belt and the intake, and that leading to smoke leaking from the belt towards the intake downwind and towards the face.

So there is that possibility. I'm not sure, right off the bat, how to document that, but it's certainly something that can be easily modeled with a ventilation simulation.

DR. MUTMANSKY: That would be correct, but I think, when you close the point-feed regulator, you would increase the pressure in the primary intake, which, in most cases, would be okay, but this would be a case where something outby the point-feed regulator were on fire. So it wouldn't be the belt that was on fire.

This requires careful consideration of all possibilities, and that's what you're pointing out. You're pointing out that we need to think of every

possibility, and that's basically true.

DR. WEEKS: I've got a question on another detail. You specify that if the monitors reach the alert level, a warning be given. Why the alert level and not the alarm level?

DR. MUTMANSKY: That was an arbitrary decision. If you want me to change that to alarm level, I'm okay with that, but I think the basic problem was just simply an early warning that there was a problem. That's the only reason.

DR. WEEKS: Because there's likely to be more false alarms at the alert level than at the alarm level, I would think.

DR. MUTMANSKY: I think my biggest problem is some of these point-feed regulators are miles from the working section. That's the biggest problem I see. You're vulnerable there because of the distance, and my initial reaction to that was not very favorable, and I would like to find a solution to it.

Somebody said, early on in our discussions, but we almost never have a fire in the intake escapeway. "Almost never" is not never, and you have diesel equipment operating there at times, and occasionally you will have a diesel fire. There are other types of equipment operating.

I think this is just a thought that we need to do a better job with regard to fires in that primary intake outby the point-feed regulator. It's an inherent defect, which may not have huge probability of occurring; that is, you may not have fires there very often, but when you do, I think there is a serious problem there.

How do we fix this? That is my question. Do we fix this? Tom and Jürgen, you're leading the charge here. Would you like to propose?

MR. MUCHO: Well, as I said, I just was raising some concerns. The one point I raised about the engineering on the automated point-feed close; I think that ought to appear in the research section, so we don't need to address that here.

The question of AMS operator intervention; I was really throwing it out to see what the rest of the panel's thoughts, if anybody had some strong feelings. I'm kind of ambivalent about it. On the one hand, I like it, and, on the other hand, I don't like it.

DR. WEEKS: Could you run over it again, when you were talking about AMS operator intervention? What were you suggesting?

MR. MUCHO: Well, instead of the system automatically closing the point-feed regulator, the

system comes up and tells the AMS operator, You have this problem. Two sensors are alarming. You should close the point-feed regulator or whatever.

I'm saying, in terms of the intervention, and Jan pointed out, for example, the spacing tries to address the issue of diesel equipment triggering both of them, but possibly there could be information available to the AMS operator that might understand that something other than a fire triggered that, so they wouldn't take that action. They certainly may even think about it for a few minutes and look at the trends and then do it. Is that a benefit? Rather than, bang, we just made an air change, and deal with it.

DR. MUTMANSKY: Jim, the way it's currently done, somebody has to go to the regulator in the primary intake escapeway and trigger the closing of the regulator.

In this particular case, if we were to do this with the option being available for the AMS operator to close it, it would certainly improve the situation. There wouldn't be as many false alarms, there wouldn't be an air change unless there is a fairly high probability of a problem rather than a false alarm, so that would be a possibility.

Jürgen, you were going to say something.

DR. BRUNE: Yes. I'm trying to spin this even further. Traditionally, the understanding in underground coal mining is that all ventilation responsibility lies with the general mine foreman, and if the general mine foreman is not available, then it's the shift foreman on the afternoon-to-midnight shift.

Those people, in my opinion, have the ability to understand the consequences of air changes, and they should, in my opinion, review a decision to close a point-feed before it is made. I would endorse the ability of the AMS operator to initiate this closing, but I would recommend that this only happens after the AMS operator speaks to the general mine foreman or the responsible shift foreman.

I think that would give it a lot more basis for the decision, and those people that then make that responsible decision would have the necessary level of understanding and maturity in this case to make a decision like that because, again, any air change, especially in a fire situation, is extremely tricky and requires very careful thinking. In fact, a lot of times, even with MSHA on site, air changes are pretty much the last thing that is considered in a mine fire

situation.

MR. MUCHO: The person that Jürgen is talking about, in terms of the ventilation decision, is the responsible person. In some cases, the AMS operator is that responsible person. They can talk to themselves and make a decision and move on. The problem, of course, following that line of thinking, is the responsible person is underground, and I can't get a hold of him real fast. Now what do I do? Do I push that button? Do I keep trying? That's the problem that I see.

DR. WEEKS: Is there a problem with remotely closing this off as opposed to somebody being on site, as Jan and you suggested? That's not a problem?

DR. BRUNE: I don't think so, provided the technical implications of remotely closing. In fact, if you want to remotely activate it, then you ought to have also the opportunity to deactivate it and open it up again. If things show, and this speaks against a gravity-operated door because you can't reverse gravity that easily.

So that requires some research, some engineering. If you close it remotely, which, I believe, is a good thing and would be a good thing to have, then you ought to have the ability to also open

it, should the closing reveal that, "Hey, wait a minute. This wasn't a good idea."

DR. MUTMANSKY: It's interesting that you mentioned this garage door. At Jim Walter Resources, how do they open that once it's closed?

MR. MUCHO: It was through an electrical system done remotely. It was not tied into the AMS system, however.

DR. MUTMANSKY: Okay.

MR. MUCHO: So the triggering device was a cross-cut or two away.

DR. MUTMANSKY: Yes. Okay.

MR. MUCHO: An electric motor with some backup; that installation seemed well engineered. We didn't get into a lot of detail about it, but -- I didn't want to press the issue.

DR. WEEKS: Is the language change -- I want to try and put some words in your mouth here. Are you saying that, in the event that these two alarms go off, that there should be a signal on the screen to the AMS operator to close the door and contact the responsible person? Would that be a satisfactory way to deal with this, from your point of view?

DR. BRUNE: Yes.

DR. WEEKS: So that's the language you're

essentially talking about.

DR. MUTMANSKY: Okay. I see Tom and Jürgen saying yes to this. Can we fix this? Can we fix the point-feeding recommendation by a word change or by changing that particular aspect of the recommendation? If so, let's go ahead and fix it. Tom, are you in agreement we can fix this?

MR. MUCHO: Oh, yes.

DR. MUTMANSKY: Jürgen?

DR. BRUNE: Yes, we can fix it.

DR. MUTMANSKY: Now, the rest of you, are we okay with that? Is everybody okay with that? All right. Let's propose, and I think it's important that we recognize we still have to decide whether the responsible person is the person that is the decision-maker here, and, if so, we state it in there, and we can say that the AMS operator can be the person who triggers the device to work but that the person has to consult with the responsible person. Okay. Let's see where this should go.

DR. BRUNE: A warning signal should be given at the regulator location, full stop. And then the next sentence is the one we would modify.

DR. MUTMANSKY: Well, the warning may not need to be given until after the responsible person

says, Move ahead.

DR. BRUNE: No. I would say, the warning signal should be given because we have a CO alert in two independent sensors. So I think that's perfectly good at that point. Then follow by the AMS system operator should have the ability to close the point-feed regulator after consulting with the responsible person.

DR. MUTMANSKY: I think that would be okay. I would think that that would be a good way of fixing the thing in such a way that the responsible person becomes the primary decision-maker and that we would move from that point on. So a warning signal would be given at the regulator location, period.

DR. BRUNE: Period. And then say the AMS system operator -- the AMS operator -- we wanted to leave the system out of that -- the AMS operator shall have the ability to remotely initiate the closing of the point-feed regulator after consulting with the responsible person.

DR. CALIZAYA: Jürgen, do you mean "ability" or "authority"?

DR. BRUNE: Okay. Ability and authority.

DR. MUTMANSKY: Ability and authority, yes. We need both.

DR. BRUNE: Now, the other question is, should we expand that to not just a closing but also adjusting and opening? There may be situations where you just reduce the point-feed, and you achieve the --

MR. MUCHO: I think we're getting way too complicated.

DR. MUTMANSKY: That's too nebulous, I think. We either close it or we don't.

All right. Let's see how it reads. Okay. We propose that if both of these monitors reach a CO alert level of the mine, a warning signal be given at the regulator location. The AMS operator shall have the ability and authority to remotely initiate the closing of the point-feed regulator after consulting with the regular person.

DR. BRUNE: The responsible person.

DR. MUTMANSKY: With the responsible person. The section foreman must be notified. The point-feed regulator should be opened only after the AMS operator and the foreman decide definitively that no fire or other emergency situation exists. Should the foreman be the person?

DR. BRUNE: The responsible person in this case.

DR. MUTMANSKY: Well, actually, the foreman

is in a better position to --

MR. MUCHO: May be there and may be better aware of the situation than the responsible person.

DR. MUTMANSKY: Better aware of the situation, yes.

DR. BRUNE: But then I would say, make it the section foreman because we mentioned him before.

DR. MUTMANSKY: Yes, section foreman. Right.

MR. MUCHO: I think, or a responsible person.

DR. BRUNE: Yes. Section foreman or a responsible person.

MR. MUCHO: It just depends. That section foreman may still only be halfway down the panel --

DR. MUTMANSKY: That's correct.

MR. MUCHO: -- and the responsible person may be the person who knows the most.

DR. MUTMANSKY: There may be somebody else feeding information that confirms that no hazardous situation exists.

DR. BRUNE: Also, I would replace the word "decide" in the second-to-last line with "determine."

DR. MUTMANSKY: Determine, yes.

DR. BRUNE: Definitely, I think that's

really superfluous. If you determine that no fire or emergency situation exists, you've got to be pretty definitive.

DR. MUTMANSKY: Okay.

DR. TIEN: Jan, this is very long.

DR. MUTMANSKY: Yes, it is.

DR. TIEN: I wonder if you could break it into several paragraphs logically.

DR. MUTMANSKY: Well, I don't see any problem with that. I don't see any problem with that. Let's read it all over and see if there is a natural place to break it into paragraphs.

DR. WEEKS: Can I suggest one word change? In the third line, it says "as required by 30 CFR," et cetera. It makes it read as if point-feeding is required, and that's really not the case; something like "as provided by," something like that. That doesn't help with the length. Sorry.

DR. MUTMANSKY: Okay. Let's read it quickly.

"The technical study panel recommends that when point-feeding from adjacent entries into the belt entry is done to supplement air flow --" "performed" perhaps would be a better word "-- is performed to supplement air flow through the belt entry, as

provided by 30 CFR § 75.350(d), those mines have an additional requirement to more quickly provide two separate escapeways in an emergency situation.

"Specifically, the panel recommends that two CO sensors be placed in the primary escapeway outby every point-feed regulator with 1,000 feet of space between the two, if possible. We propose that if both of these monitors reach the CO alert level of the mine, a warning signal be given at the regulator location.

"The AMS operator shall have the ability and authority to remotely initiate the closing of the point-feed regulator after consulting with the responsible person. The section foreman in the affected section must also be notified so that checking on the cause of the problem and evacuation can be initiated in a quick and orderly manner.

"The point-feed regulator should be opened only after the AMS operator and the section foreman or responsible person determine that no fire or other emergency situation exists."

I see some word changes I would like, but, nonetheless, do you see the natural place to separate paragraphs? Jürgen?

DR. BRUNE: Let me throw one other thing in

that's a bit of a concern of mine. The last sentence: "The point-feed regulator should be opened only after the AMS operator and the section foreman or responsible person determine that no fire or other emergency situation exists."

Provided we have a fire, and we determine that closing the point-feed regulator makes the smoke situation worse, what do we do then? The fire exists, but this does not allow us to open up again and restore the original ventilation pattern. I'm not sure if that's something we want to recommend.

DR. MUTMANSKY: That's a good thought. Is there ever a situation that you can envision where the fire --

DR. BRUNE: As I said earlier, if you have a fire just inby the point-feed regulator on the belt, when you close that point-feed regulator, you are changing the air and air flow to the fire, and you may encounter smoke rollback to a point inby the point-feed regulator, and from then on you may then experience leakage and smoke in-by the point-feed regulator.

DR. MUTMANSKY: I missed the point. Where is the fire located, out-by the --

DR. BRUNE: Just in-by, just in-by.

MR. MUCHO: In-by wouldn't be triggered under these criteria.

DR. MUTMANSKY: It wouldn't be triggered.

DR. BRUNE: Depending on how far the fire has advanced and how much heat --

DR. MUTMANSKY: Do you want to know something, though? If there is a fire --

MR. MUCHO: -- between the two sensors.

DR. MUTMANSKY: -- between the two sensors. That's an interesting point. There is also the implication that really maybe this feature should be used even if the fire is in by the point-feed regulator. It can be used.

MR. MUCHO: I think that gets real cautious. I think you really need to watch that one.

For one thing, the issue Jürgen brought up a little earlier: If you close that point-feed, you're going to increase the leakage from the primary into the belt, and you may be jeopardizing that as an escapeway. So I would rather slide by with --

DR. MUTMANSKY: Well, I would say that the leakage through a point-feed regulator would always be greater than the leakage through the stoppings.

MR. MUCHO: Well, I'm saying, if you close it.

DR. BRUNE: You increase the pressure on the intake, and you decrease the pressure --

MR. MUCHO: You're going to increase the leakage into the belt.

DR. MUTMANSKY: That is correct. Let's assume you close it, and there would be leakage into the belt. Would that leakage be less or greater than the leakage through the point-feed regulator?

MR. MUCHO: Well, if the fire is in-by, I would not get any leakage through the point-feed, unless, as Jürgen points out, unless it's in the first cross-cut inby the point-feed, in which case I get some smoke rollback and feeding.

DR. MUTMANSKY: It's complicated, isn't it?

MR. MUCHO: I think you try to cover as many and as much of the situations as you can. To try and cover every detail you would start writing major books on the topic.

DR. MUTMANSKY: Right.

DR. BRUNE: Well, the question still remains. We had discussed earlier that we would like to see, or, at least, I personally would like to see, the AMS operator also having the ability of remotely opening that point-feed again, based on decisions.

So if it can say that the point-feed

regulator should be opened but only after the AMS operator and the section foreman or responsible person review the situation and determine the best course of action.

DR. MUTMANSKY: We put closing and opening right in that one sentence that begins, "The AMS operator shall have the ability to initiate the closing and the opening of the point-feed regulator."

DR. BRUNE: Yes. And then strike the last sentence.

DR. TIEN: Tom, may I?

MR. MUCHO: Yes.

DR. TIEN: Your concern is that the fire inby the point-feed would not be detected in case of what you're saying.

DR. BRUNE: My fundamental concern is that if we initiate an air change that has otherwise proved detrimental to the escape situation, through some circumstance that we cannot foresee, then it may be advantageous to the rescue to close that point-feed again and restore the original air flow.

DR. MUTMANSKY: Sure.

DR. BRUNE: And I would like to have that ability in the hands of the responsible person through the AMS operator.

DR. MUTMANSKY: I would agree with that.

DR. BRUNE: If we say it should only be opened after the AMS operator and everybody determines no fire emergency exists, well, we take that ability away because if the fire and emergency exists, we still want that ability.

DR. WEEKS: I've got a couple of suggestions for simplifying language here. The part where it gives the AMS operator the ability to open or close the door; I would just say that the AMS operator shall have the ability and authority to remotely close or open the point-feed regulator.

DR. BRUNE: Yes. That's fine.

DR. WEEKS: I have another question. The way the last sentence reads, both the AMS operator and the section foreman had to determine that no fire, et cetera, exists. If the AMS operators are on the surface, how can they determine, you know, definitely that there is no fire, when only the person on the scene can do that?

DR. BRUNE: The section foreman, isn't it?

DR. MUTMANSKY: Well, actually, it's a cooperation between the AMS operator and the section foreman. The AMS operator has to say to the section foreman, "I still have two CO readings in so-and-so

entry. Go and check them out."

DR. WEEKS: But then it's the section foreman who sees what's going on. You know, the AMS operator can tell him where to go, but the person who is there is the one that can determine definitely whether or not there is a fire.

DR. BRUNE: Can I propose to strike that last sentence?

DR. WEEKS: Altogether?

DR. BRUNE: Yes. We have, in the second-to-last sentence, "The AMS operator shall have the ability and authority to remotely close or open the point-feed regulator after consulting with the responsible person."

DR. MUTMANSKY: It's true.

DR. TIEN: Well, if that's the case, do you also like to have the AMS operator and the section foreman?

DR. WEEKS: Well, it's going.

DR. BRUNE: Again, I would take that sentence out completely because it does not add value but, rather, can potentially cause complications because once we close it, we can't open it anymore, even though it may be better to open it.

DR. WEEKS: Push the delete button. You may

recall that movie, "2001: A Space Odyssey," the memorable line, "Close the pod bay door, Hal." It's sort of like what's going on here. There are historical antecedents to our deliberations.

DR. MUTMANSKY: This is a very relaxed panel here. This is a serious matter. It's nice that we're taking our time with this. I do believe that the panel has improved the recommendation considerably, and I think we are making good progress on this one. I think the section foreman issue, when you took out that last sentence, the section foreman gets eliminated sort of from the opening of that regulator again. So I still think we need to consider the possibility of reentering some of that information back into the recommendation.

Let me start up. About halfway through, I'll start reading it, and we can then reword it, if necessary.

"We propose that if both of these monitors reach the CO alert level of the mine, a warning signal be given at the regulator location. The AMS operator shall have the ability and authority to remotely close or open the point-feed regulator after consulting with the responsible person. The section foreman in the affected section must also be notified so that

checking on the cause of the problem and evacuation can be initiated in a quick and orderly manner."

Now, at this point in time, the operator and the responsible person still have the authority to open that, but the section foreman is not involved. My question is, should we have the section foreman involved, and should we state that?

DR. BRUNE: I think having the responsible person involved and having him or her being the decision-maker in this case is appropriate, and he or she would not make a decision without consultation with the section foreman, but if the section foreman is not available due to some circumstance -- he is getting his crew together, rounding up his men -- at some point, the responsible person has to make the call, and he or she is the one most capable. I would leave the section foreman out of that decision-making process.

DR. MUTMANSKY: Okay. What about wording? Are we all comfortable now with this one, and should we work on the wording some more, or should we work on any other issues here?

Okay. Let's work on the wording. "Point feeding. The technical study panel recommends that when point-feeding from adjacent entries into the belt

entry is performed to supplement air flow through the belt entry, as provided by 30 CFR § 75.350(d), those mines have an additional requirement to more quickly provide two separate escapeways in an emergency situation.

"Specifically, the panel recommends that two CO sensors be placed in the primary escapeway outby every point-feed regulator, with 1,000 feet of space between the two, if possible.

"We propose that if both of these monitors reach the CO alert level of the mine, a warning signal be given at the regulator location. The AMS operator shall have the ability and authority to remotely close or open the point-feed regulator after consulting with the responsible person. The section foreman in the affected section must also be notified so that checking on the cause of the problem and evacuation can be initiated in a quick and orderly manner."

I no longer like the thousand feet. I think Tom raised a very important point. Tom says, What happens if the fire is between the two CO sensors?" I think we need to question that thousand feet at this point in time. Is there a better way of having two sensors implemented here?

DR. BRUNE: Can we say, "at appropriate

locations out-by," or we can say, "The locations for these sensors shall be determined in the ventilation plan"?

DR. MUTMANSKY: That would be better than saying a thousand feet, I would say, yes.

DR. WEEKS: What if -- this complicates it too much. What if the criterion was not both at the alert level or one at the alarm level?

DR. BRUNE: I think it would be appropriate because, at that point, the AMS operator gets the alarm, and he can decide the course of action. That's his responsibility. But we have two sensors so that we can --

DR. MUTMANSKY: So you're saying, "We propose that if both of these monitors reach the CO alert level, or if one sensor reaches the alarm level, a warning signal --" I would like to add one word in there. "The AMS operator shall then have the ability." Does that make sense to you, in stating it in that manner, "... shall then have the ability and authority"?

DR. WEEKS: The warning signal now is given at the regulator location, and I guess we should assume that when the signal that goes to the AMS operator hits the alert or alarm level, that's what

goes up there. So there is no need to have a special alarm go to the -- yes, okay. I was thinking out loud.

MR. MUCHO: One point that sort of aligns it with 75.352(c), in terms of the reaction to an alert level or alarm level, say, parallels that also. So it's easier to train the AMS.

DR. MUTMANSKY: How are people feeling? Are we at a comfortable point now where our wording is in good shape, and the point-feeding recommendation is feeling considerable in your own minds? I think that's a good point to ask this type of a question.

Tom, you and Jürgen have pointed out some very important issues, and are we now satisfying those issues?

MR. MUCHO: Yes.

DR. BRUNE: Yes.

DR. MUTMANSKY: Felipe?

DR. CALIZAYA: Yes.

DR. MUTMANSKY: Jim, you're okay?

DR. WEEKS: Yes.

DR. MUTMANSKY: And Jerry?

DR. TIEN: That's very good. You have said all of the things that need to be said.

DR. MUTMANSKY: In that case, let's vote on

this recommendation. Tom, you're first.

MR. MUCHO: Yes.

DR. MUTMANSKY: Jürgen?

DR. BRUNE: Yes.

DR. MUTMANSKY: Jerry?

DR. TIEN: Yes.

DR. MUTMANSKY: I vote yes.

DR. CALIZAYA: Yes.

DR. WEEKS: Yes.

DR. MUTMANSKY: A unanimous vote for this point-feeding recommendation.

We have three more recommendations. It would seem as though, at this point in time, we should probably take lunch and address all three of the recommendations that remain after lunch.

I do know that we still have some things to bring into the research recommendation. We can discuss those after lunch as well. So unless there is an objection from somebody here, let's take a break for lunch.

(Whereupon, at 12:09 p.m., a luncheon recess was taken.)

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A F T E R N O O N S E S S I O N

(1:36 p.m.)

DR. MUTMANSKY: Ladies and gentlemen, we would like to proceed with the afternoon session. We would like to mention that we have four recommendations still to be considered, and we will start with the recommendation called "Research," and, in this particular case, I would like to lead the discussion on our research.

The initial thought about having a research concept here came in some of my discussions with others about why people use certain entries as escapeways as opposed to others, and in the ensuing discussion, there were a number of different thoughts that came about. Among other things, I believe that Jürgen had told me that return airways are often used for escape in Europe. I know that at times they have been used in the United States as well. Somebody had mentioned using tertiary escapeways as added protection for underground miners.

Most of these concepts are pretty far removed from what we're currently doing, and so it was important to recognize that, in many ways, this would be more appropriate as a research recommendation as opposed to any implementation of changes.

In previous discussion this morning, there were additional concepts that were recommended to be covered under "Research" rather than under any specific changes in current policy.

So, in this particular case, we might want to add a concept to our research list here, and that concept would be to utilize auxiliary fans underground to better control pressures in our entries and to reduce leakage and so forth, but, again, that's a concept that is not being currently utilized, and booster fans or booster auxiliary or booster fan systems are not currently allowed in the United States. It would take some considerable amount of, what I would say, research before we could ever implement such a system.

Now, I put this list together, so I'll have to defend the list, but, in many cases, I was just musing through ideas of ways in which we could expand our possibilities.

If you look at the research listing here, there are four listed here using two intake airstreams totally separated from intake to the working section. That's not much of a new idea; the concept is already implemented in some cases.

Implementing secondary escapeways in return

entries is another possible idea, and using belt conveyors and return entries is another idea. Now, I understand from people that these ideas are used in some mines, but they are not widely used, which perhaps makes sense under certain conditions and not under others. Then using tertiary escapeways. If we add the other suggestion here, it would be the use of booster fans in underground mining operations.

No matter how you feel about these, there are advantages and disadvantages, and this is why research needs to be done. If you're going to use these systems, it's important to scope out what problems exist with the systems, what the advantages and disadvantages are, and you have to move forward very carefully before you could implement any such system.

So, in this particular case, it is necessary for us to consider the possibilities here, and, based upon this, maybe come up with a recommendation for MSHA to take a look at some of these systems.

Now, as we implement our thinking here, I think it's important for people to react to it. I'm certain some of you may have questions in your mind, and this where we are now. What specifically do you feel about this kind of a recommendation? Is this

recommendation within the purview of our charge, and is it appropriate for us, at this point in time, to recommend research possibilities for MSHA to follow up on? Questions?

MR. MUCHO: One I have, Jan, is the way that reads, first of all, five listing applies to trying to find an alternative to point-feeding ventilation air. Is that correct?

DR. MUTMANSKY: Well, that was the primary motive for doing this, yes.

MR. MUCHO: I'm not sure about that because it's a ventilation science fact that when we have an entry, especially an entry with high resistance, such as belt conveyer entries are, when we're talking our larger mines, there is a limitation, in terms of distance that we can go before the air would be below the minimums we talked about this morning. In addition, the other factor is how many times we split that, and where those splits are at.

So there is a physical limitation to how much air we can bring in a single entry over some distance, unless we start putting shafts into the belt entry or something like that.

So some of these points, it just doesn't seem like it directly applies to that issue of point-

feeding. First of all, the point-feed, the issues we talked about this morning with the regulator and the gyrations we're going through to provide that in a safe manner, certainly is something we wish we didn't have to do, but I think it's a physical fact.

DR. MUTMANSKY: Okay.

MR. MUCHO: So I'm not sure what we're saying about that. Some of those things seem to apply more to escape and some other things.

DR. MUTMANSKY: It is true. I think your point is very clear, that there is a lot there that doesn't necessarily pertain directly to point-feeding, and maybe the whole research recommendation needs to be changed to reflect that.

Other thoughts about research? Jürgen?

DR. BRUNE: Yes. I have a comment about the number two, "Implementing secondary escapeways in return entries where belt air is used at the face." If we do use belt air at the face, and the assumption is that a fire breaks out on the belt, then within the next 10 or 15 or 20 minutes, depending on distance, the return would be engulfed with smoke because the smoke will eventually collect on the return air.

So I'm not sure if that's a reasonable expectation at all for the escaping crew to find a

clear return to escape. The other thing is, typically, those guys, when they encounter smoke on the intake, they will invariably test to see if the return is clear, and perhaps it's still clear at the point where they entered the return and find the entry that is best suited for their escape.

So I'm not sure if that's a subject that we would need to expend much research on other than running a few models and then finding out what the possibilities are. But in most cases, I would say, if you run belt down the face, and then you have smoke in the belt, 10 or 15 minutes later you have smoke in the return.

DR. MUTMANSKY: Right. Good point. I agree. Jim?

DR. WEEKS: Well, it's a question about this is a recommendation to MSHA. MSHA is not really a research organization. They are not equipped to do this kind of research. I think it's more a recommendation to NIOSH.

DR. MUTMANSKY: It doesn't say MSHA has to do the research.

DR. WEEKS: Somebody said "MSHA" a minute ago.

DR. BRUNE: I think the Technical Panel has

been instituted by Congress to MSHA governing it, so what we could do is make a recommendation to MSHA that MSHA initiate such research with whoever they feel is the appropriate research agency.

DR. MUTMANSKY: Sure.

DR. BRUNE: I think we need to point that out. Fundamentally, I agree, like in response to your earlier comment, that it is well suited for us, as a panel, to make recommendations in areas where research is felt necessary. So we'll just let that recommendation stand and let MSHA determine who would be the suitable party to conduct that research.

MR. MUCHO: Just on the mechanics, I thought our report goes to both the MSHA side and the NIOSH side having to apply to both secretaries or assistant secretaries. I'm not sure how it went. Then I think only MSHA has to respond to Congress as to how they are going to deal with our recommendations. I thought that's the way it went. But, at any rate, the point being, it goes to both organizations and to Congress.

DR. MUTMANSKY: One other thing I might mention is, in some ways, some of the language is too specific in here. We should probably open up the thinking process. For example, implementing secondary escapeways and return entries when belt air is used at

the face. Maybe we should be saying "implementing secondary escapeways in the tail-gate when belt air is used at the face" because a tail-gate could actually be on intake air in some systems, and that would make a very good escapeway in some types of mine fires involving belt conveyors or even other types of fires.

It would make more sense to just simply open it up to any concept that might be an improvement over trying to accommodate the smoke that comes off of a fire located in the belt entry or even in the primary intake, in that case.

MR. MUCHO: Part of the problem I have is I don't understand totally the research aspect. Most of those things up there can and are being done and have been done. Running an escapeway on the tail gate of a longwall; we did it in the mid-eighties. It's done today. So I'm not sure --

DR. MUTMANSKY: Well, tell me which are unsafer, Tom, and we won't have to do this research.

MR. MUCHO: The reason we did it is we felt that was safer, to have two ways up -- the head-gate or the tail-gate --

DR. MUTMANSKY: Okay.

MR. MUCHO: -- on intake air. So I don't understand the research aspect. Can it be done? Yes.

May it be better to do it? That's a decision based on a lot of things.

What research do I need to do? Jürgen mentioned running some models in some cases, and perhaps that could be done.

DR. MUTMANSKY: Running models is one possibility. Doing risk analysis is another possibility. Some sort of analysis that relates the hazards to the practices that we're proposing here. The practices here are, in some cases, well understood. I think the risks are not necessarily well understood.

MR. MUCHO: I would agree with that. Putting those two kind of things together and looking at various systems and doing risk analysis on them is something that I would say would be beneficial to do.

DR. MUTMANSKY: Okay. Jerry and Felipe, you've said nothing about this. You just kind of echoed yes when I proposed this. Maybe you're not in favor. I would like to see how you really feel.

DR. TIEN: Well, obviously, we're on the same subcommittee, so I had a chance to look at this before today. I cannot quite remember. Did we have number five, a booster fan, in there before?

DR. MUTMANSKY: No. We did not have that in

the original. In the original construct of the recommendation, that was not in there.

DR. TIEN: Right. Obviously, we probably should not restrict ourselves to the point-feeding, so you want to combine the two sentences to reword it.

So the technical committee suggests that following research be done, or something like that, to that effect, because a lot of them are not necessarily point-feeding specific.

DR. MUTMANSKY: Okay. Leave the word "that" in, and we'll leave one of the words "that" in. "Recommends that research should be performed."

DR. TIEN: Now, number two: In that particular situation where everybody is happy with the work face in the working station; that's a longwall.

DR. BRUNE: There, the face is small.

DR. TIEN: Is "face" okay?

DR. BRUNE: I think "working section" should be the same one because we've got to be consistent.

DR. MUTMANSKY: Sure. I agree. I agree.

DR. TIEN: So we'll change that to the working section.

DR. MUTMANSKY: No problem.

DR. BRUNE: I think the first three points, research ideas -- actually the first four, we may be

able to combine them into saying something to the extent that research should be conducted in finding better alternatives to escapeway design and escapeway routing in general, depending on certain mining situations, whether we add escapeways or whether we use the return as escapeways or whether we use the tail-gate on intake as an escapeway; those are all alternatives that are being practiced in certain situations, but we may want to steer the research in giving the mine operators and MSHA, as they evaluate mine ventilation plans, some guidance into what's really best.

What's the best way to do this? I'm not sure if we can find wording for that, but I think that may be a smart way to combine those four and say, let's figure out what the best escapeway scenario is that gives the crews at the face, in every situation, the best opportunity to escape fire.

DR. TIEN: Maybe something after the Technical Panel recognizes some of the practices that have already been going on for a while, but we're interested in finding a better way to insert the risk analysis somewhere over there and to better what's already been done. Is that what you have in mind?

DR. MUTMANSKY: Well, we might want to say

that research utilizing ventilation simulation and risk analysis.

MR. MUCHO: You're modeling various potential scenarios, ventilation scenarios, and then you will want a risk analysis based on those various scenarios and see what that tells you. I think that would be beneficial.

DR. MUTMANSKY: Okay. You feel it would be a better explanation of the desires. Is that what you're saying?

MR. MUCHO: Yes. I think a lot of cases in the mining industry, people weren't understanding the implications of a system and what the impacts may be. If a fire occurs, a fire occurs there, a fire is over here, what does that mean with a given ventilation system?

DR. TIEN: Tom, along that line, shouldn't we also keep the first three words? Should we do that for the existing mines as well?

MR. MUCHO: I would hope that we would implement the results of the research as fast as possible. It showed us some really meaningful things, I would hope we would get it in practice.

DR. BRUNE: I also think that the general exercise of ventilation modeling would help mine

operators understand better what happens in case of a fire, and there's a number of good modeling programs on the market now that are, in my opinion, somewhat underutilized in the U.S. mining industry in terms of modeling the what ifs. What happens if I have a fire here? I can run this model, and I can see exactly where the smoke travel. I can see how long it's going to take the smoke to travel from here to there and how long a particular crew has to escape, and how long a certain entry stay clear.

I can see those things in a very convincing way. That's not only good as an exercise to understand alternatives of escapeways, but it also is an exercise that would help in training crews and training rescue teams in mine management in guiding an escape.

DR. MUTMANSKY: Are you referring to using MFIRE, for example?

DR. BRUNE: Well, MFIRE is an old one that refers to the Bureau of Mines Code, but there are a number of others. I believe the program out of California, Fresno, VNET-PC, has a version of MFIRE implemented that indicates smoke travel, and then the Polish, together with the Australians, have a model that is even more sophisticated in terms of fire

modeling and fire gas modeling.

So there's a number of those on the market, and with today's computing horsepower, that should be a fairly compact research assignment that you can give to universities, or even to NIOSH, to undertake.

DR. TIEN: I totally agree. Along that line, should we drop the word "should," the second line?

DR. MUTMANSKY: You're recommending taking out the word "should"?

DR. TIEN: Yes.

DR. MUTMANSKY: I think that's okay. It reads perfectly well without it. Anybody agree or disagree?

DR. TIEN: Yes. I agree with that.

DR. MUTMANSKY: I agree. Take it out. Okay. Try taking it out.

DR. WEEKS: It's somewhat redundant. It's implied in "recommend."

DR. MUTMANSKY: I have a question. In what situations are tail-gates or return airways normally used as an escapeway, and what specific ones are you aware of? You've mentioned that they are being used.

DR. BRUNE: That, in my opinion, depends on how well the tail-gate stays open in-by the face

towards the bleeders. If you can afford to send intake air up and not diminish the quantity that comes off the face, because you have to take the intake air that you send up the tailgate plus the face quantity. You have to send all of that out through the tailgate into the bleeders, and if you have those bleeder entries open enough that allows you to get that quantity through, then I think every prudent mine operator will put the tail-gate on intake.

In other cases, where the tail-gate caves too tightly, and you cannot get enough quantity to the face, then you may have to connect the tail-gate up to the main return.

MR. MUCHO: It can be impacted by return ventilation, your bleeder ventilation, and then there's a lot of different cases, as Jürgen pointed out, in terms of resistances due to conditions.

DR. MUTMANSKY: These would normally be three-entry tail gates. Is that the traditional place where you would use these?

MR. MUCHO: Right.

DR. BRUNE: If you have four entries, typically, you have even more of an opportunity to send more air up the tail-gate because then likely two of those four entries may stay open enough to send air

through.

MR. MUCHO: And there may be other advantages and reasons you would do that, in addition to escape reasons, the pressure you want to put on a tail gate through that kind of a system versus traditional U ventilation and so on.

DR. BRUNE: Plus you also do not get rock dust off the face that goes into the tail-gate in by. So if you can send all of that float dust into the bleeders, that's the better place for it to go.

DR. MUTMANSKY: Now, Jürgen had originally proposed that we fold Alternatives 1 through 4 into a more general nature of some sort. What is the feeling of the panel about that proposal?

MR. MUCHO: What does that accomplish?

DR. BRUNE: Perhaps rather than giving very specific points here that we could probably have in the discussion, I would suggest that we say that the research evaluate alternative escapeway designs and guidelines for such escapeway design based on modeling and perhaps risk analysis rather than specifying certain conditions that should be researched that we could better put into the discussion area. We'll leave it open and open it to a wider variety of research alternatives.

DR. MUTMANSKY: That's a possibility. I see your argument. We're being specific when we didn't necessarily have to be specific.

One thing we can do is we can say we should investigate alternative methods or routing escapeways, and then we could say, "Some possibilities that may be of value are."

Now, we could also put that same wording into the discussion section as opposed to in the recommendation.

So we still have several possibilities, and I think we want to decide as to how the panel, as a whole, reacts to Jürgen's proposal. Do we want to move some of this material into the discussion points, or into the discussion section, and make our recommendation more compact?

MR. MUCHO: I think so.

DR. MUTMANSKY: You think so. Tom thinks so. Jerry likes that.

DR. CALIZAYA: I like that. Can I add a few more things?

DR. MUTMANSKY: Yes. Felipe, go ahead.

DR. CALIZAYA: I think the first four points can go into the discussion section and can come up with one general research area that would include

topics of risk analysis, fire simulation, ventilation studies for specific cases of that kind. That will be, I think, one solid recommendation.

Then, yes, booster fan is one issue, and I had one more area of research, and that has to do with the quality of stoppings in sealing materials. I think that's really a research area. We talked about different types of stoppings this morning. Some of them are expensive, are real expensive, and what we need is to come up with products that can be applied in the industry.

DR. WEEKS: I don't particularly like this.

MR. MUCHO: Just to jump back, though, booster fans does not fall under that first sentence. "Booster fans" is a broad topic. It's the second point not by itself or something.

DR. MUTMANSKY: You're right, Tom. Booster fans is a somewhat different topic than the other four. As you probably realize, MSHA has been against booster fans since Day One, and there are many people in the industry and many ventilation consultants who are saying we need to look at it. We need to look at booster fans as a new possibility. So it's a different type of topic altogether in many ways.

DR. WEEKS: What's accomplished by putting

this into the discussion section as opposed to leaving it here? I'm afraid of having a recommendation that is so general as to be kind of meaningless. If we have recommendations about research, we ought to say what they are, and then you could fill them out in the discussion section. What would you replace this with when you put all of this in the discussion?

MR. MUCHO: I think it's still pretty specific, Jim. You're saying, I want you to use ventilation modeling and risk analysis to look at alternative escapeway schemes in different ventilation scenarios.

DR. WEEKS: That would be the recommendation, just like that.

MR. MUCHO: Yes. That, in essence, is those four and anything else anybody can think of.

DR. WEEKS: Well, I'm not going to have a heart attack over that, so it's fine.

DR. BRUNE: My point for combining them into a more general way was to not tie the research to those four specific points because if we make those four specific points for the research, we may limit the alternatives that the researcher has. If we say, and this would be my wording, suggestion, development of guidelines for improved escapeway design in

different ventilation scenarios, then we leave it open to the researcher, and, ultimately, the goal is to come up with an improved escapeway design.

MR. MUCHO: By covering it in the discussion session, we give -- we've thought about to provide some guidance.

DR. WEEKS: They have got a lot of latitude anyway because these are only recommendations, and we're not telling people what to do. We're just giving recommendations. That's fine.

DR. MUTMANSKY: Okay. Jerry, do you want to say something?

DR. TIEN: Yes. I'm just curious. Felipe, you're talking about the research of the stoppings and the sealants. That area has been going on since Don Mitchell times or even older, earlier. What are some of the new things that have not been done, other than the cost factor, that we should address or point our emphasis to. I'm just curious. Do you have anything in mind?

DR. CALIZAYA: The two points that I mentioned this morning were about, first, the durable stopping, and durable stoppings, I think you mentioned, the stoppings are good for six months, and after six months, they are not good anymore.

Now, Omega stoppings are used in the industry. If you're going to have one section that's open for six months or in that order, then maybe it's okay to use those. But when we install stoppings of this kind in the main entries, where we have high pressures and so on, then they are not good.

Now, when I'm talking about stoppings in general, we are talking about materials. We can build one air-tight stopping, but that's very expensive. I remember building stoppings, and those were $200,000. If we are going to live with this, then mining is not going to be competitive anymore.

So we need to come up with what Bill Kennedy had in mind about these near-zero leakage stoppings. I don't think those are used extensively. Right? I think they are double stoppings, double metal stoppings, and you have some kind of form in between, but they are durable, and they are also yielding-type stockings, but it's not used extensively in the industry.

DR. TIEN: Because of cost.

DR. MUTMANSKY: Felipe, you had also introduced the word "seals" into your thinking there, and one of the things I would mention is that, in the last year or so, NIOSH has been very intensively

looking at seal designs and seal construction procedures, and they have done a lot of work in that general area. I don't know that there is much need to suggest research work on seals because there has already been a lot done, and I'm certain they are looking very seriously at all aspects of seal design at this point in time.

On the problem of stoppings, it's fairly clear to me what the basic problems are. The problems are that we have new materials that come into play quite often. The same old problems generally exist; that is, you put a stopping in, and it has a certain integrity and a resistance to leakage, and, within a few years, of course, that deteriorates, and that's probably one of the biggest problems, deterioration of the stoppings.

It's really hard to, I think, see a lot of results of research here, in part because things change from year to year with new products and new procedures, but I think it still is important to keep researching stoppings. I wish there was more research done in stoppings, but I'm not so certain it's an easy thing to research and find long-term results. It may be quite difficult.

In any case, I think we have to move now.

We've had a lot of thoughts, we've brought them out on the table, and now we have to make a move, and I would like somebody to propose how to restructure this recommendation in a manner that would be acceptable to everybody. Anybody want to take a stab at it?

DR. BRUNE: Should I dictate to Bill what I had in mind earlier so he can put it on the --

DR. MUTMANSKY: Yes, sir, you may.

DR. BRUNE: That would be point one, "Development of guidelines for improved escapeway design in various ventilation situations," and I'm not sure if the first sentence, last word, "alternatives," is still correct. I would propose to make that "research" or "following areas" because we have the word "research" already.

DR. TIEN: Essentially, you only have one. Right? You're going to move the booster fan out of that --

DR. BRUNE: No. The booster fan is still the second recommendation.

DR. TIEN: Okay. Risk analysis. Okay.

DR. MUTMANSKY: But he is changing the wording, Jerry, to help accommodate that by saying, "To investigate the following research areas," and then he is using number one is development of

escapeway procedures, and number two is use of booster fans.

MR. MUCHO: Again, we're saying "ventilation modeling and risk analysis," and "booster fans" is not limited to that.

DR. MUTMANSKY: You can certainly model that, and you could also model it with --

MR. MUCHO: You could model it, but we don't want to limit it to that. You want to investigate booster fan in totality, things like how they are powered, how they are protected from explosions. When you look at booster fans, you want to look at the whole animal.

DR. MUTMANSKY: That's a good point.

DR. BRUNE: But doesn't the risk analysis -- you could also say "ventilation modeling and engineering design and risk analysis." You could add that to it.

DR. MUTMANSKY: Yes.

DR. BRUNE: Would that help it?

DR. MUTMANSKY: Yes. I think it would help. That would help. Make it a little bit more general, and it would apply better to use of booster fans.

DR. BRUNE: I don't know, Felipe. You seem to be very adamant about reducing and controlling the

leakage. I think that's the fundamental idea behind the better stopping concept. Maybe that could also be a point, and that could be achieved with additional resource as ways to reduce leakage in stoppings.

DR. MUTMANSKY: I don't see anything wrong with saying that.

DR. BRUNE: Throwing it out for discussion.

DR. MUTMANSKY: Yes.

DR. BRUNE: The fundamental idea is that reducing leakage limits the possibility for smoke to travel into areas that it's not supposed to travel in, and it also improves the efficiency of the ventilation system.

DR. WEEKS: Well, leakage occurs in other ways than through stoppings. Just put "ways to reduce leakage."

DR. BRUNE: Yes, leakage, period, yes. It's stoppings or overcasts.

DR. MUTMANSKY: Overcasts and stoppings would be the two primary ones.

DR. BRUNE: Ventilation controls.

DR. TIEN: Reduce or minimize? Which one is better?

DR. BRUNE: Reduce.

DR. MUTMANSKY: Okay. Are we getting to the

point where the wording is acceptable to most people here?

The third paragraph doesn't apply as well. The final paragraph; it doesn't apply quite as well, but because we're no longer comparing the four primary ones --

DR. TIEN: I would say strike it.

DR. MUTMANSKY: Strike the whole thing out? Okay. Now do we have enough in the recommendation that it's clear and straightforward in terms of its meaning? I think we'll have to write a good discussion section here, and since this was my area, I'll try to accomplish that, and, hopefully, we'll be able to discuss it in tomorrow's meeting. We'll try to do as much as we can in tomorrow's meeting.

Okay. Let's read it through one time and try to get the words.

DR. CALIZAYA: Before you read, can we clarify that Point 2 where it talks about booster fans? It's a broad area. It really needs to be narrowed down a little bit.

First of all, we don't have a design, so we need to come up with a design, and "design" means the types of things that could be useful for these types of operations. Here, I want to stress this one, "use

of booster fans." It's really kind of an alternative to belt air because we are pressurizing the air at the place where we need it, and we are reducing leakage when we have all of the controls in place.

So we need to talk about design there, talk about monitoring and control and safety issues. Redundancy. I don't know if that one has to do, but we need to have interlocks, electrical interlocks, so that we can stop, just like we were talking about point-feed this morning.

MR. MUCHO: I think those areas all belong in the discussions section, but we do need to add underground coal-mining operations because they are used in metal mining, of course.

DR. MUTMANSKY: Yes, they are.

DR. BRUNE: Also, they are used in other countries. In the European coal mines, they are using booster fans today. So there are certain engineering design solutions. I'm not sure how they are applicable.

The wording is "use of booster fans," and up there we are saying "ventilation modeling, engineering design, risk analysis." We are covering the essential elements that require. Therefore, if I want to use a booster fan, I need to think about these things, and I

need to have a sound engineering design, and, obviously, it has to pass muster with MSHA and with other parties that are concerned with the safety of the miners.

DR. MUTMANSKY: Are you okay with that, Felipe?

All right. The wording is getting to be pretty well thought out now. The Technical Study Panel recommends -- yes, Jerry?

DR. TIEN: While we're at it, can I also throw something on the table for the panel to consider, and that is controlled recirculation?

DR. MUTMANSKY: Controlled circulation.

DR. TIEN: The use of booster fans in a lot of cases.

DR. MUTMANSKY: We seem to be rising out of the graveyard here concepts that MSHA has always opposed. That doesn't mean that they can't be utilized in the future. Controlled recirculation is a concept --

DR. TIEN: -- and a practice overseas.

DR. MUTMANSKY: -- and was a practice in mines at times. It's a practice in other parts of the world, even in coal mines. Controlled recirculation is a concept that has interesting advantages and

disadvantages. I'm not opposed to that, Jerry, at all.

I think the truth of the matter is that MSHA themselves may not be favorable to this type of thing, but if it's valuable to do research on this, I think it's perfectly okay to ask for that research.

DR. BRUNE: The difficulty will be to actually do the research *in-situ* and not in a model. I'm somewhat opposed to the topic of controlled recirculation because we already have difficulty right now to assess the dust load and the conditions under which we control our dust to the established standards, and if we get into controlled recirculation where we are not even sure about how we properly analyze the ventilation patterns in the mines -- I'm not comfortable with going there quite yet. It's primarily a personal opinion here, but I'm not very comfortable going near that right now.

MR. MUCHO: Nor am I. The situation I see is different with booster fans. I think there have been a lot of technological developments and changes, things such as monitoring and control and so forth that merits taking another look at booster fans and how we can use them safely, and some of the advantages that Felipe was pointing out, in terms of things like

ventilation situations and using belt air leakage, definitely has some advantages if it can be done safely, obviously safer than what we have today.

So I think there's good reasons for booster fans, but controlled recirculation; I don't see that in the same light.

DR. WEEKS: I'm not sure exactly what it is that you're talking about, but, in other settings, it would be -- instead of returning the air to the return, it gets recirculated around, and it's a way of conserving air.

DR. TIEN: Not only that. The return air, or contaminant air, is going through a filter system, so the reintroduced air to the face or working section area is not going to be totally dusty. It is very, very clean, to some degree.

In some cases, of course, it doesn't apply in the U.S. Actually, you can lower the heat, the temperature, because the refrigeration system sometimes can also be added in the circuit. So those are the advantages.

DR. WEEKS: What about gas control?

DR. MUTMANSKY: There is no effect on gas control. It does not increase the gas. It does not increase the dust, and you can actually improve some

dust characteristics by putting in, as Jerry says, filter systems, but there are some serious problems with it, and one is you have to use a recirculation cross-cut, and that's not easy to implement in all systems.

Number two: If there is a fire in the area of the recirculation cross-cut, you absolutely have to have some sort of automated system to shut down the recirculation and establish the normal unrecirculated ventilation. So there are serious problems with it; however, it has been used.

It has been used to great advantage in metal mines. It's been used in some of the undersea coal mines. It's been used in other areas in other parts of the world, but it has always been off limits to mine operators in the United States.

DR. TIEN: Jim, for the sake of discussion, maybe it's not applicable here in our situation in the U.S. where Jan was talking about application in North Sea where it's almost impossible to drill air shafts in North Sea. So we just reused the air. Instead of bringing air all the way, many miles away, and to come back, and all went to the surface. So reused air, after they have been cleaned up over and over again.

DR. WEEKS: We don't have any mines in the

North Sea.

DR. TIEN: Obviously. Not yet.

DR. WEEKS: Not yet. What's the advantage? What do you gain by it?

DR. TIEN: Power savings.

DR. BRUNE: It's really not a safety -- what are we making safe by recirculating air? I don't see that.

DR. MUTMANSKY: I understand. I agree with that. There is no safety advantage.

DR. BRUNE: Besides, my fundamental concern is that we have enough trouble controlling all ventilation systems now, and adding recirculation to it adds, I would say, an exponential amount of complication, complexity of the ventilation system and may render it unmanageable.

DR. MUTMANSKY: I understand.

DR. BRUNE: Ask me again in 10 years, and we'll talk about it.

DR. MUTMANSKY: That is a good reason not to include it here.

DR. TIEN: We do not need another hole in our heads.

DR. MUTMANSKY: It's pretty difficult to justify on the basis of safety, and, therefore, it may

be better that we dispense with that one and just go with the three ways.

DR. TIEN: I agree.

DR. MUTMANSKY: Okay. Should I read this, and we'll get final wording here? "Research. The Technical Study Panel recommends that research utilizing ventilation modeling, engineering design, and risk analysis be performed to investigate the following areas: development of guidelines for improved escapeway design in various ventilation situations; use of booster fans in underground coal mining operations; and, three, ways to reduce air leakage through ventilation controls.

Now, do we want to eliminate those three caps, one, two, and three, there? Is it better? Jerry?

DR. TIEN: For the sake of flow reading and the weight of it, may I suggest to switch two and three?

DR. MUTMANSKY: What was that, Jerry?

DR. TIEN: Switch the two and the three.

DR. MUTMANSKY: Switch two and three.

DR. TIEN: Because it looks like leakage is more a part of the system, the first one.

DR. MUTMANSKY: Okay. You're saying one and

two are more closely related to each other, yes. Okay. I don't see any problem with that? Does anybody have any comments about that?

(No response.)

DR. MUTMANSKY: All right. Do we want to read it one more time, or is it all pretty clear?

I think Tom is calling for a vote. Okay. There is no football game on tonight, Tom.

MR. MUCHO: No. I know.

DR. MUTMANSKY: Okay. I think we're ready for a vote now. I think we're all ready at this point in time.

Okay. Tom, you vote first.

MR. MUCHO: Yes.

THE COURT: Jürgen?

DR. BRUNE: Yes.

THE COURT: Jerry?

DR. TIEN: Yes.

DR. MUTMANSKY: I vote yes.

DR. WEEKS: Yes.

DR. CALIZAYA: Yes.

DR. MUTMANSKY: Thank you. We have a unanimous vote on that research recommendation, and thank you for coming to that compromise.

I think we now want to take up the issue of

coal mine dust and the dust recommendation. This particular dust recommendation came out of a concern that Jim Weeks had expressed about remarks that he had from a number of different people about the situation in which people perceive that the dust coming off the belt conveyor is contributing to the dust load on the working face or in the working section, and so, in this particular case, this recommendation was drawn up based upon some of these concepts.

First of all, as you probably recognize, the current regulations require that dust not exceed one milligram per cubic meter. I think the statement is 200 feet before the tail of the belt, and, in our particular case, with one milligram per cubic meter coming off the belt, there is some possibility that that may increase the dust concentration in the working section.

However, basically, for all practical purposes, many of the situations that you will have, if the dust is kept to the regulated concentration of one milligram per cubic meter, that will, in general, not increase the dust at the working face area.

However, at the moment, I believe it's basically true that district managers do have the authority to force improvements in dust control on the

belt if the dust concentration does exceed the one-milligram-per-cubic-meter average value.

Normally, this particular recommendation would be a great concern if we could see that the dust concentrations on the working section were being worsened by the dust coming off of the belt.

I put this recommendation together primarily because I was concerned about it, and I did a number of different calculations, and basically all of my conclusions came to the same general point, and that is that unless the average concentration coming off the tail of the belt was higher than the concentration normally seen at the designated occupation on the working section, there would be no worsening of the dust concentration.

It is true that the dust coming off of the belt contributes to the dust in the section, but it also contributes to the amount of air flowing through the section. By increasing the air flowing through the section, you also reduce the dust at the working section face.

Jim and I had communications with each other concerning this issue, and I showed Jim some basic calculations that utilize basic principles, and I think those principles were shown in a paper that Bob

Haney produced a few years ago, and we used those basic calculations to take a look at that situation.

So, in presenting this recommendation to you, I would like to mention that I don't believe there is a serious problem here. But the recommendation was put together in case the panel would like to show that they considered the dust problem and wanted to make a recommendation that would ensure that the dust problem did not contribute to the dust load at the designated occupation in the working section.

Now, I would like Jim to weigh in on this because I think it's important, and I want to make certain that his concerns were addressed on this particular issue.

DR. WEEKS: I didn't realize you wanted me to weigh in on it today.

Well, basically, I agree with what Jan just said. By the way, before I forget it, I think the title should be "Respirable Dust" instead of just "Dust."

Whether or not belt air improves or not dust concentration at the face depends almost entirely on what you're comparing it to. Clearly, if it's a question of air or no air from the belt entry, if the

dust concentration in the air in the belt entry is lower than what's there already, there is going to be a reduction at the face.

However, if one compares it to, either really or hypothetically, air coming in an intake entry that has a lower dust concentration than the dust concentration in the belt entry, you'll have a better control over dust at the face if you do it that way.

Either way, if you go through -- I forgot who gave the presentation in Pittsburgh did that equation that basically showed what's the net effect if you took a look at the amount of air and the amount of dust in different mixes. Unless there are very large differences, the net effect, one way or the other, is really quite small in terms of the effect on the dust concentration at the face.

So I think this recommendation; basically, I support it the way it is.

DR. MUTMANSKY: One other thing I might mention to you is that, in receiving comments from the MSHA personnel, some of the comments that I have received read like this: "The recommendation to allow district managers to force improvements is already in place." In other words, what they were basically

hinting at is we don't really need this recommendation.

I also carefully considered the possibility that I would recommend, or that we, as a panel, would recommend -- we, as a panel, could recommend that the concentration coming off the belt be lowered to some other value than one milligram. That would pretty much always ensure that dust would be lowered at the working face area or in the working section. But I'm not certain that's achievable, and, in particular, when we're dealing with high air velocities on the belt, it may be very difficult to ever achieve.

So, in this particular case, if we use this as our recommendation, I don't think we're going to see any improvement. I don't know whether we really need to make this recommendation. It may be that we can dispense with this and say, "We don't need this; let's move forward."

DR. BRUNE: I would support the recommendation just because we have a very powerful statement in that last sentence, and I would recommend that we change two words. "If the improvements are not effective, the district manager shall have the authority to revoke the authorization to use belt air at the face."

I think it's already there in the law, but I think, by making this statement, by making this recommendation, we, as a panel, show our concern with the dust issue, and we make clear that the district manager has a responsibility here.

DR. MUTMANSKY: I like your recommendation. I would also change the words from "shall have the authority" to "shall use the authority."

DR. BRUNE: Well, I don't think we can force him. I think that's a judgment call for the district manager. But "shall have the authority" is very clear. We're laying it in the hands of the district manager to pay attention to what's happening.

MR. MUCHO: There are some other issues there, picking up on what Jürgen has talked about, like, we say district managers have the authority to force improvement if the dust concentration exceeds -- what does that mean? If I take one sample, and it's over one milligram, does that at all kick in?

Well, no. We know that there are some details that need worked out as to how that would happen, and the same for raising the concentration at the working face.

So I think the more conditional "shall have the authority" makes a little more sense than sounding

like it's a once-and-done deal, and the district manager is revoking it and so on and so forth. People have to work out details if they do this.

DR. MUTMANSKY: Right. Thanks for that, Tom. Anybody else have thoughts here?

DR. WEEKS: Yes. Either in the recommendation -- probably in the discussion section -- I think it's important to invoke a section of the Act or some language in the Act that, on this issue, has systemically been avoided.

What that language is, it's in Section 303(b), and it reads as follows: "The Mine Act requires MSHA to prescribe the minimum velocity and quantity of air reaching each working face to reduce --" this is the regulation that applies to ventilation "-- shall prescribe the minimum velocity and quantity of air reaching the working face to reduce the level of respirable dust to the lowest attainable level."

That's a requirement that's imposed upon the development of ventilation policies. I've seen that section of that kind of systematically ignored, and I think it's kind of an oversight. Whether it's deliberate or not, I don't know, but it's been ignored, and I think we should refer to it, at least

in the discussion section of this recommendation.

DR. MUTMANSKY: Okay. No problem. One other thing. I did notice that we're using "to use belt air at the face." Again, we may want to change the words to "to use belt air in the working section." Okay?

So, Bill, if you could make those changes, as long as everybody is in agreement.

DR. BRUNE: That's kind of interesting. Jim just read from the law. The law says "working face."

DR. WEEKS: So it does.

DR. BRUNE: At least we're consistent in our recommendations.

DR. MUTMANSKY: So what? Not be rude, but --

DR. TIEN: Oh, sure, sure. Of course, you are.

For this consistency, should we also look at the first sentence, the last few words, "the belt conveyor"? Do you mean entry? What is "belt conveyor"?

DR. MUTMANSKY: To use belt entry ventilation air.

DR. TIEN: No. The first sentence: "The air is forced over the belt conveyor."

DR. BRUNE: Forced through the belt conveyor into belt entry.

DR. TIEN: Which one is better? I don't know. It should be "belt conveyor" or "belt conveyor entry."

DR. MUTMANSKY: Okay. We can change it to "through a belt conveyor entry." Is that what you would like, Jerry? I think that's probably a better wording, "through a belt conveyor entry."

DR. TIEN: And also the fourth line, it says, "Improvement in the dust control on the belt," or do we mean something else, "or in the belt entry"?

DR. BRUNE: In the belt entry.

DR. MUTMANSKY: In the belt entry. Okay. Maybe in the last sentence, you use "in the working section." Would that be better?

DR. BRUNE: Yes. "In the working section."

Also, there is another one, "the working face," the third line from the bottom.

DR. BRUNE: That's also in the working section, yes.

DR. TIEN: No, not yet. The third line from the bottom?

DR. BRUNE: That's also in the working section, yes.

DR. TIEN: No, not yet. The third line from the bottom, in the middle, "working face"?

DR. BRUNE: That's what I mean. That needs to be the "working section."

DR. MUTMANSKY: Should we mention the designated occupation at all?

DR. BRUNE: Designated area.

DR. MUTMANSKY: Designated area?

DR. WEEKS: Well, DO would be at the face. This is a designated area.

DR. BRUNE: Yes.

DR. WEEKS: That's where the one milligram applies.

DR. BRUNE: I think that's implied.

DR. WEEKS: Yes. The one milligram applies to the designated area.

DR. BRUNE: That's applied.

DR. MUTMANSKY: All right. Should we say "at the working section" or "in the working section"? There are two of those there.

DR. BRUNE: "In" the working section.

DR. MUTMANSKY: "In." Okay. Down below, the last one there.

Okay. How is the panel now feeling about the expression of the recommendation? Let's read it

over. It's called "Respirable Dust."

DR. WEEKS: Before you start, I just want to point out, there is an important thing that this recommendation does not say. It does not say that belt air will help reduce dust control at the face. Sometimes it would; sometimes it wouldn't, and it really depends on the circumstances on how it's used and what the basis of comparison is.

So rather than get into a long discussion about the ins and outs of that issue, I think the recommendation avoids it altogether, which, I think, is appropriate.

MR. MUCHO: Comment on the working section, working face, I hate to be picking here, but, technically, if I have, say, room and pillar section and a belt section, the belt coming into it, and I'm using belt air, in the area immediately inby feed or breaker, I probably am raising the concentration and the working section, but, overall, because of the increased air and a mixing that will finally occur, hopefully, it doesn't happen at the working face.

That's picky but --

DR. MUTMANSKY: You're right, Tom.

MR. MUCHO: And the same for the longwall situation.

I'm not sure that that's not a case where we want to use "working face" as opposed to "working section." Really, we're talking about the designated operator, the DO.

DR. WEEKS: Jerry, we appreciate the can of worms that you opened up.

DR. MUTMANSKY: But he is right, Jim.

DR. WEEKS: Unfortunately, that's true.

DR. MUTMANSKY: But he is right. That is unfortunate because you can't treat them quite exactly the same.

We can fix that up, if you would like.

MR. MUCHO: It's not that big a deal. I'm just pointing it out.

DR. TIEN: Let's propose to do that Wednesday.

DR. MUTMANSKY: What's that?

DR. TIEN: Do that on Wednesday.

MR. MUCHO: No. We've got to do this now.

DR. MUTMANSKY: Do it as is. Okay. Is everybody happy with the wording now? Should I read it over?

DR. BRUNE: Please do, yes.

DR. MUTMANSKY: Just one more time. Let's read it over one more time: "Respirable dust

concentrations in the air course through a belt conveyor entry and used to ventilate working sections should be as low as feasible and must not exceed the current regulated concentration of 1.0 milligrams per cubic meter. District managers should have the authority to force improvements in dust control in the belt entry if the dust concentration exceeds an eight-hour TWA of 1.0 milligrams per cubic meter or is shown to be raising the concentration in the working section. If the improvements are not effective, the district manager shall have the authority to revoke the authorization to use belt air in the working section."

DR. BRUNE: The first word in the fourth line should be changed to "shall" to take the conjunctive out of the language.

DR. MUTMANSKY: Okay. I think I'm okay with that. Everybody else okay?

ALL: Yes.

DR. WEEKS: Yes, although I like it the way it is. We probably should have, where it says "is shown to be raising the concentration in the working section," it probably should say "above the exposure limit" because you could raise it from, you know, one to 1.1, and that would be raising it, but I'm not sure

that makes a whole lot of difference in terms of the health effects.

DR. BRUNE: I see what you're saying.

DR. WEEKS: Do you see what I'm saying?

DR. BRUNE: That's probably prudent.

MR. MUCHO: It's an interesting point.

DR. MUTMANSKY: I'm okay with that.

DR. BRUNE: Because if you have basically clean air coming up the intake, and any dust in the belt, it always will raise the concentration.

MR. MUCHO: It could be a situation that is changing with time as to what situation --

DR. WEEKS: Now, just to point out one other thing, if that is the case, then, technically, that's a violation of the section of the Act that says you should control it to the lowest attainable, whatever the language is, lowest possible level. So, you know, it's not a totally clean-cut issue. Do you see what I'm saying?

DR. MUTMANSKY: Okay.

DR. BRUNE: But then again, we have discussed the trade-offs between additional quantity and additional gas dilution and potentially entraining more dust. We've been around that block a couple of times.

DR. MUTMANSKY: Okay. We've worked enough on this. Are we ready to plunge into the vote? I'll start, and I'll vote yes. Jim?

DR. WEEKS: Yes.

DR. CALIZAYA: Yes.

DR. MUTMANSKY: Tom?

MR. MUCHO: Yes.

DR. BRUNE: Yes.

DR. MUTMANSKY: Jerry?

DR. TIEN: Jerry is yes.

DR. MUTMANSKY: We vote unanimous for the recommendation as currently stated, and we can go on to our next recommendation here.

DR. BRUNE: Mr. Chairman, may I suggest a quick break?

DR. MUTMANSKY: Would you like a break?

DR. BRUNE: I personally need one, yes.

DR. MUTMANSKY: Okay. We will have a five-minute break or a 10-minute break?

DR. BRUNE: Five minutes is fine.

DR. MUTMANSKY: Five minutes.

(Whereupon, at 2:52 p.m., a short recess was taken.)

DR. MUTMANSKY: Ladies and gentlemen, we would like to get to our final two recommendations

here. So I would like to call the group to order, and our first discussion will be on mine gases, and I would like to take some time to discuss the recommendation.

Basically, what we have in a situation where we're coursing air through a belt conveyor entry and carrying that air to a working section is the potential for carrying methane gas or other mine gases to the working section.

Now, in general, what we're going to be worried about here is methane gas being carried to the section, and, of course, it is necessary that the methane be below one percent at the face or in the working section.

So, basically, what we're interested in is trying to find out how much of a problem this is. As the person who put this together, I did some homework by basically talking to a number of MSHA personnel, and basically what I found was that most of the MSHA personnel were saying to me, Well, we don't have a lot of mines where this is a problem. There are not many mines with significant amounts of methane in the belt conveyor entry that then get carried to the working face.

In my queries to the MSHA personnel, there

were a few people who did say, however, that they were aware of certain conditions where gas content in the belt entry was then being carried to the face. One was Mark Eslinger, who is supervisory mining engineer in District 8. He was mentioning the knowledge of one mine where primarily a rib liberation of methane in the belt conveyor entry was then carried into the working section.

He also made mention of the fact that some of the inspectors in his district have, on occasions, found as much as five percent methane in the belt conveyor entry. Now, that wouldn't be continuing, on a continuing basis, but occasionally would find certain amounts of methane occurring that raised a certain amount of concern.

Bill Knepp, who is assistant district manager for technical services in District 9, mentioned high methane contents in the belt entries at the mines of the Mid-Continent Coal Company near Carbondale, Colorado. In those mines, they actually went to monitoring the methane in the belt conveyor entries because there was a significant amount of methane occurring in that particular case.

Additional information on gas liberation in the belt entry was found in a publication by Robert

Krog, and I believe the authors of that publication were Krog, Schatzel, Garcia, and Marshall, and that reference is given in the discussion section.

As I understand it, those emissions -- they found that, in studying a particular mine in the Pittsburgh seam, that about 20 percent of the total methane occurring in the working section was actually being derived from the air flows from the belt entry. In this particular case, the mining company, as I understand it, the mining company was basically unaware of how much of the methane in their working areas was being contributed by the ventilation air being coursed through the belt entry.

So, in that particular mine, it made a lot of sense for them to reverse the air in that belt entry and, therefore, reduce their gas in the working section.

So, in conclusion of what I did find in this particular case, we did notice there were some mines where there were significant amounts of methane being generated in the belt entry. It would sometimes be carried to the face and would, therefore, result in additional methane being carried into the working section, and, in some cases, maybe this was creating some problems.

So, in this particular case, this particular recommendation was put together, and it basically recognizes that, in some mines, this can affect the ability to keep methane below one percent at the working face.

Now, in our recommendation, we're recommending that the MSHA district manager should have the power to require reversal of the ventilation air on the belt conveyor if the belt air is being utilized at the face, and this is causing difficulty in keeping the methane below one percent in the face area.

Now, in addition, it's recommended that the district manager regularly scrutinize working sections where the belt air use at the face has a methane reading at or above a half a percent methane measured 200 feet out-by the end of the belt so that you could prevent the gas liberated on a belt conveyor from reaching the working area of the mine in this particular case.

So, in this situation, what we basically know is that, on occasions, methane gas generated in the belt conveyor entry can cause some problems at the working face.

Okay. This is the basic discussion now.

Would anybody like to start with questions or comments concerning this particular recommendation?

DR. WEEKS: I have a very simple question. Two hundred feet out-by the end of the belt; that would be the end of the belt that's in the section. Is that right?

DR. BRUNE: By the tail-piece.

DR. MUTMANSKY: This is the belt coming up the belt entry to the section, Jim.

DR. WEEKS: And it's 200 feet from where?

DR. MUTMANSKY: It's 200 feet out-by the tail of the belt.

DR. WEEKS: Okay. All right. I just wanted to make sure I understood what you were talking about.

DR. MUTMANSKY: Okay. Do you have any reaction to that?

DR. WEEKS: No, not yet.

MR. MUCHO: The first problem I see, Jan, is prescribing the action the district managers should take. That's going to have a big consequence. I've got a problem with gas in the face. I'm using belt air to try and address that, and now you're going to turn around and take that air off me and add air down the belt. I really have a real problem, the point being that what we need to say there is, "The district

manager has the power to take action to require changes to the system."

For example, the main thing I may want to do is actually increase the air on the belt to address that problem.

DR. MUTMANSKY: Okay.

MR. MUCHO: In fact, that's probably what I should do. In some of these situations, Ketchum, where really it's the mine operator has too little total air in the belt entry that causes this kind of a problem.

DR. MUTMANSKY: Okay, Tom. That may be correct; however, you won't be able to do any good by doing that if you're robbing air from the primary intake.

MR. MUCHO: Yes, but, again, our problem here with this recommendation is prescribing how that's to be done. There are many, many, many, many ways that somebody could think of to address it, and for us to prescribe that, we're really getting into a can of worms.

DR. WEEKS: Well, it seems to me that the recommendation presumes that the source of the gas is coming from the belt, and the source could be elsewhere. Right?

DR. MUTMANSKY: Well, it either comes from the broken coal on the belt, Jim, or from the ribs of the belt entry. I guess it could be from the roof or floor as well.

MR. MUCHO: This also assumes, though, the point that Jim was making: Somebody has made that analysis and understands that.

DR. WEEKS: I think the analysis should come first.

MR. MUCHO: Yes.

DR. MUTMANSKY: Jürgen?

DR. BRUNE: I would like to add to your comments earlier. The research paper that was done by Krog and the others found that about three-tenths of a percent, if I remember correctly, of methane was contributed by the belt, and that led to the longwall gassing off or the longwall methane monitor either on the tail-piece of the longwall section or the monitor in the shear gassing off at above one percent methane in certain situations, particularly when the shear was traveling towards the face.

I also want to add to that that, as far as my knowledge goes, the company in question has since reversed the ventilation system and is coursing the belt air away from the face.

On the particular recommendation, I agree with Tom. We should be careful requiring or recommending what the district manager ought to do. I would go simply to say, like we have in prior recommendations, that the district manager shall have the power to revoke approval of the ventilation plan because that forces the operator to get in and say, "Hey, what are we going to do about this?" and makes some real improvements, some of which might be actually to run more air across the belt because you have a fixed amount of methane that comes off the belt and off the belt into the ribs and roof and floor, and if you are able to course more air to the face, then you could actually succeed in reducing that.

So there's a variety of possibilities that the operator has, and I think we should leave it to them and the responsible inspectors to work out what is the best course of action we have.

MR. MUCHO: The power within a ventilation plan, that's already in there. The wording, I think, ought to be what we used with methane: "adjustments to the ventilation system" kind of thing.

DR. MUTMANSKY: I think you have reasonable objections, and I think what we have here is some way of implementing those on a workable basis.

I would want to mention to you that, in general, if you're going to add air to the belt entry, it has to be robbed from somewhere else, or you have to increase the fan settings to provide more air, one or the other, and as long as you can do that, then it makes perfect sense to do it that way.

DR. TIEN: Is it also possible because of the increased availability of the belt entry, the fan is able to pull more? You lower the resistance. Right?

DR. MUTMANSKY: That is correct. That is correct.

DR. TIEN: So, probably, we're not robbing. We're just reallocating or something.

DR. MUTMANSKY: That is correct.

MR. MUCHO: -- off the mains into the belt entry, which is one of the options.

DR. MUTMANSKY: That's all the more reason, though, to leave the options open.

MR. MUCHO: That's correct.

DR. MUTMANSKY: That does support the concept that we should leave options open so that any viable option available can be used to reduce the methane content.

Okay. That being the case, we need, again,

to construct the recommendation in such a way that we meet all of the needs that you're expressing. Jerry?

DR. TIEN: Would you elaborate? What is so particular about that?

DR. MUTMANSKY: There is nothing that prevents us from changing that, I don't think. Two hundred feet from the tail of the belt would give a more accurate reading of methane than right at the tail because at the tail there would be other flows of air coming in perhaps from cross-cuts or something. That's the only reason I used 200 feet.

Now, 200 feet maybe makes sense in some cases and not in others, but I thought that would be a more accurate place of measuring methane content. Yes. Felipe, go ahead.

DR. CALIZAYA: Is there any reason for limiting this 0.5 methane?

DR. MUTMANSKY: There isn't any critical logic to that. You can measure and limit it to some other value.

DR. CALIZAYA: I agree with 0.5 because that gives you some room for the maximum limit of one that we want to have at the face. We don't like to live with one. We want to live with less than that, 0.8 or something. So this gives you some freedom from that.

DR. MUTMANSKY: I think it's a reasonable trigger point. Actually, as Jürgen pointed out in the study he did at NIOSH, it was only a couple of tenths, but the quality of the belt air was so low that it was aggravating the situation on the face.

But 0.5 sounds like a point where someone had to look at it and do the calculations. I have 0.6 here in some quantity, and I have another quantity over here, one-tenth, some quantity, calculate that up and see, am I aggravating, or am I helping? It seems like a good trigger point.

One thing about it is that if you're having gas-outs at the face, then it is very important to understand that one way of addressing that would be to look at the belt area. You don't have very many ways of addressing that.

You can degas, of course, and, in some cases, degassing may be the appropriate action to take, but once you're in the section, and you're working, and you have a methane problem, and it's too late to degas, and you have to do whatever is necessary within the ventilation system to adjust the situation.

Okay. Are we -- go ahead, Felipe.

DR. CALIZAYA: You mentioned the mine gases,

and we're talking about methane. Have you considered the possibility of hydrogen sulfide maybe or whatever gases you might have in mines?

DR. MUTMANSKY: Well, I have not considered hydrogen sulfide specifically, although I do know that some mines have that as a problem. Maybe we should change this to mine methane.

DR. BRUNE: Yes. Hydrogen sulfite is typically a gas. If it occurs, it occurs at the face itself during cutting. Am I correct?

MR. MUCHO: Not correct.

DR. MUTMANSKY: Hydrogen sulfide is very similar to methane. Just like we have at the face on a longwall methane being produced mainly at the shear, a lot of it coming off on the pan line, a lot of it coming off as we go through the crusher. Depending on the coal bed and its residual characteristics, coming off the belt and so forth. Hydrogen sulfite acts the same way.

DR. MUTMANSKY: It is. It's strata gas released in much the same way.

MR. MUCHO: It's released by the breaking of the coal, it emanates up. It does that, but, in general, from the couple of investigations I've done, which were at belt air mines, they helped the hydrogen

sulfide situation. It's the same argument as the methane. It helped more than it hurt to use the belt air, even though hydrogen sulfide is being generated along that trail.

DR. MUTMANSKY: Okay. Jerry, do you have a thought?

DR. TIEN: Yes. So along the same line, are we comfortable -- Bill probably could help us -- using the gas and the methane interchangeably? Should we change that to "Mine Methane" or "Mine Gases"? Title. That's your job.

DR. BRUNE: I think the main focus of it is methane, so we shouldn't just title --

DR. MUTMANSKY: The main focus is methane, I would say. I'm comfortable changing it to "Mine Methane," I think.

DR. TIEN: And there are a few other places also shows to be used gas.

DR. BRUNE: It's methane gas.

DR. TIEN: In quite a few places, there's gas.

DR. MUTMANSKY: Yes.

DR. BRUNE: But it becomes clear that we're talking about methane, not other gases.

DR. MUTMANSKY: Methane gas; you can take

out the word "gas," if you want to there, Bill. "The methane released."

DR. TIEN: And the second line from the bottom.

DR. MUTMANSKY: The second line from the bottom, yes. Take out "gas" and put in "methane," I guess, would be more appropriate.

DR. MUTMANSKY: Okay. Now, does anybody have any arguments with the 0.5 percent methane, or is that just going to be a trigger point that's your reasonable trigger point? Are you okay with that?

DR. MUTMANSKY: Okay.

DR. TIEN: Shall we also come back to revisit our face area?

DR. MUTMANSKY: Our face area, yes. Below one percent at the working face. We want to change that to one percent in the working section. Do you want to call it that?

MR. MUCHO: I think, in this case, it's appropriate, "working face."

DR. BRUNE: It's the face, really, because that's where you measure methane.

DR. MUTMANSKY: Okay. All right.

DR. BRUNE: We still need to rework that power to require what's highlighted there.

DR. MUTMANSKY: Power to require. Okay. Give us your thinking on the wording.

MR. MUCHO: "Require adjustments to the ventilation system."

DR. MUTMANSKY: Okay. "The district manager shall have the power --"

DR. BRUNE: No. Just say "shall have the power," "shall require adjustments in the ventilation system."

DR. MUTMANSKY: "Shall require adjustments in the ventilation system." And we can take out air on a belt conveyor there, I think.

DR. BRUNE: Yes.

DR. MUTMANSKY: Okay. "In addition, it is recognized that we scrutinize any working section at or above ...

Okay. Now, do we need further refinements in that? Let's read it through and see if there's additional wording changes or logic changes here.

"The methane released from broken coal on the conveyor belt and from a solid coal rib." There is a problem there, "solid coal rib." Why don't we just simply say "and from the ribs, roof, and floor --"

DR. BRUNE: "From the belt entry."

DR. MUTMANSKY: "-- and from the belt entry --" okay, that's simpler "-- represents a problem in some mines that can affect the ability to keep the methane below 0.1 percent in the working face. It is, therefore, recommended that the MSHA district manager shall require adjustments to the ventilation system if the belt air is being utilized on the working section and is causing difficulty in keeping the methane below 0.1 percent in the face area.

"In addition, it is recommended that the district manager regularly scrutinize any working section where the belt air used on the working session has methane readings at or above 0.5 percent methane measured 200 feet out by the end of the belt to prevent the methane --" Should we say "tail of the belt" there instead?

DR. BRUNE: "By the tail-piece" would make more sense.

DR. MUTMANSKY: "-- outby the tail-piece of the belt --" okay "-- out-by the tail-piece of the belt to prevent the methane liberated on a conveyor belt or from the belt entry from increasing the methane content that the workers face.

Okay. Now we've reworked the words a number

of times. Are there any further changes that are necessary here?

DR. BRUNE: I think we had the same discussion about the dust with respect to increasing the methane content at the working face. If we have zero methane coming on the intake, and let's say we have both intake and belt contributing 50,000 cfm in equal quantities to the face, and we have any amount of methane in the belt entry but zero methane on the intake, then any methane coming from the belt entry will, de facto, increase the methane content on the face as opposed to if we have the belt ventilate outby, so we have to kind of put a cap on that.

DR. MUTMANSKY: You're right about that.

MR. MUCHO: It's a tricky problem. It's what happens when everything finally gets to the shear location or the methane monitor on the tail. It's an interaction that is a little bit difficult.

DR. BRUNE: Can we add "beyond statutory limits" to the end of that sentence? Then we're there, beyond the 0.1 percent.

DR. MUTMANSKY: Is methane described in the statute?

DR. BRUNE: Yes.

DR. MUTMANSKY: Beyond regulatory limits?

DR. BRUNE: Beyond one percent. Let's call it that.

DR. MUTMANSKY: Okay. What was the final opinion on wording?

DR. BRUNE: That the working face be beyond one percent, I would suggest, because that's consistent with --

DR. MUTMANSKY: Okay. "Beyond the 1.0 percent limit. Is that what you want to say? Or just "beyond one percent."

DR. BRUNE: "Beyond one percent is fine."

DR. MUTMANSKY: "Just beyond one percent."

DR. BRUNE: That says it.

DR. MUTMANSKY: Should we say "above one percent" instead of "beyond"? "Beyond" is well defined as "above."

DR. TIEN: Yes.

DR. MUTMANSKY: Jerry says yes. Jerry votes yes. Is it better to say "above," or is it better to say --

DR. BRUNE: That is fine with me.

DR. MUTMANSKY: "Above," okay.

DR. BRUNE: But if we say 1.0 percent there, we ought to use the same digits of precision up above.

DR. MUTMANSKY: There you go. Okay. All

right.

DR. BRUNE: Line 3 as well, Bill.

DR. MUTMANSKY: Okay.

MR. MUCHO: If we want to stay consistent with current regulations, 75.323 says "working place."

DR. BRUNE: So what?

DR. WEEKS: Let's ignore that.

MR. MUCHO: It's directly parallel to the one percent requirement.

DR. MUTMANSKY: Okay. There is another place up above on the third line there, Bill.

DR. BRUNE: Line 3 also.

DR. MUTMANSKY: If we want to be so consistent, we should do it there also.

Okay. Do we have any other changes?

DR. BRUNE: Let's read through again.

DR. MUTMANSKY: Do we want to read it again or not? No. I get the general idea. You don't want to read it again. Okay. I think the words are much better -- I think it's much better expressed now.

Are we ready to call for the vote on this one?

DR. WEEKS: Yes.

DR. MUTMANSKY: Okay. Felipe?

DR. CALIZAYA: Yes.

DR. MUTMANSKY: Jim?

DR. WEEKS: Yes.

DR. MUTMANSKY: I vote yes. Jerry?

DR. TIEN: Yes.

DR. BRUNE: Yes.

MR. MUCHO: Yes.

DR. MUTMANSKY: Thank you.

We have one more recommendation that involves MSHA inspections of belt lines using air at the face.

Now, once again, I'm going to deliver the initial support for this proposal, and we're basically indicating our concern about inspecting mines where belt air is being used at the working face. As you probably recognize, the impetus for this recommendation comes from a study of the report of investigation of the Aracoma Alma No. 1 Mine fire that occurred in January 2006.

In that report, there were quite a large number of significant and substantial violations of federal mining regulations that were revealed after the accident. Many of these violations should have been identified in the inspections that occurred previous to the mine fire.

This raises a question, of course, of why

these violations were not discovered during the inspection visits to the mine. The recommendation was drawn up by myself, and, at this particular time, I tried to figure out basically how inspections normally occur, and what are the inspection practices at various types of mines?

It's fairly obvious that there are a large number of different types of coal mines, some using pillar, some using longwall; some using belt air at the working section, and some not using belt air at the working section. So I thought it might be interesting to know whether or not there were any set procedures used for each type of mine.

So I did talk to a number of different people, people who are either working inspectors or who are involved in the districts and who are involved in the inspections in one way or another.

In my investigations, I found that, in the not-too-distant past, MSHA had tried to do some sort of computerized reporting systems, and it seemed to me as though a computerized system might make a lot of sense because you could have a computerized list of inspection requirements for each type of mine.

What I found was that the computerized tracking system, as they called it in this particular

case, was a system that had been attempted by MSHA, and then was dropped because of a number of different reasons. Bill Knepp told me that Allen Dupree was one of the persons I really should be talking to because the computerized system was something he was quite familiar with, and he was also quite familiar with the reasons that the computerized tracking system on mines was dropped.

Basically, my discussions with Mr. Dupree indicated that the system ran into trouble because, number one, it was not user friendly, and, number two, it, more or less, required inspectors to go underground, take notes about the mining system, and then come out and enter them into a computer system.

There was a certain amount of reluctance on the part of the inspectors to do this, and it was, more or less, doubling the amount of work that they had to do, and, therefore, they reverted back to simply using the inspector notes as the inspection report for the individual mine.

I basically believe that this indicated to me that there has to be some sort of a regimented procedure that was required for inspectors when they go into an underground mine. That regimented procedure may involve different types of mines, and,

therefore, there may be a set of measurements, a set of inspections that are required for one type of mine that are not required in another type of mine. But I think it's perfectly possible for them to have a computerized set of measurements that must be made in each mine, a computerized set of inspections that have to be completed in each type of mine.

So my recommendation would be that we recommend that a more structured and regimented procedure be instituted to help mine inspectors complete their inspection duties. It does not necessarily have to be computerized after the fact, but I think it's necessary that, as you walk into each mine, you know exactly what you must inspect for, and you must report on each one of these points when you submit your report to the district manager.

Now, what does that do? Well, hopefully, what it does is it does not allow the inspector to overlook certain aspects of the mine, and it could be any number of different things.

For example, if, at Aracoma, the inspectors were required to test the firefighting system, whether or not there is water in the pipes, so to speak, that would have avoided one of the problems.

The second thing would have been if they had

gone into Aracoma and been required to ensure that the air coming off the belt is kept in a separate entry from the air in the primary escapeway, then the escapeways would have held their integrity all the way to the working faces, and, of course, it's so obvious to us after the fact. After the fact, it's obvious, but if there had been a more regimented system, perhaps the inspectors would have been held to a better standard of inspection.

So I submit to you that perhaps a regimented system is required for each type of mine, and that can be a computerized set of questions or a computerized set of checkoffs that the inspector must complete before the inspection of the mine is completed.

Now, this recommendation is really aimed at the mines that are using belt air in the working sections, but, basically, these can be applied to any underground coal mine. I would suggest that we recommend that it be applied to all coal mines, that there be regimented procedures that an inspector must follow.

Are there any comments now on my thinking? Jerry?

DR. TIEN: I'm just curious. Can you share with us a little bit more about the reason for

dropping the computerization system because I found out it's quite interesting. You do not have to be a computer expert to use some of the things. They do that in Wal-Mart, in restaurants, in grocery stores.

DR. MUTMANSKY: Okay. First of all, I'm not certain I'm the right person to answer that question. Somebody from MSHA could probably answer it better than I can. Mr. Dupree, who gave the reasoning to me, gave me some thoughts about that. Perhaps we could have comments from somebody in MSHA. Bill, are you the right person?

DR. TIEN: Yes, because the reason was given, "user friendly," is relatively easy to fix.

DR. MUTMANSKY: Tom, you're smiling. That indicates you have something to say.

MR. MUCHO: Some of my observations are just some random sampling of the use of the computer by MSHA inspectors. They have been a little bit reluctant to do it, even inputting the citations and so forth. It's not something that they had done in the past. I've been around many complaints about having to do that.

It's just fact. If you look at age demographics and what they have done in the past, and now to start working away at the laptop, I think it's

pretty understandable and natural that there would be some reluctance to do that. That's what I've observed.

DR. MUTMANSKY: But that doesn't negate the use of a set of requirements. As he goes into the mine, he has a set of requirements. Even if you're not a computer-oriented person, you could still respond to a written set of requirements.

MR. MUCHO: I've done a lot of safety inspections and a lot that's in my career has counted on me to do that, and nothing was more helpful than checklists and going on. The other side of that might be "responsibility and oversight of things coming back the other way."

Quite frankly, something we have to do is oversee each other sometimes. So I think it's a very beneficial suggestion. Just relying on the inspector notes -- that's sometimes not complete, to the extent that if you had, as you point out, a regimented, structured process that they were going through.

DR. MUTMANSKY: Jim?

DR. WEEKS: I think the word "regimented" is troublesome. Folks will see it and dig in their heels, especially people like inspectors. They are out there, they have to deal with things all of the

time, and they have developed a way of doing their job, and I think they might resist that word. If they are going to not use computers, I can imagine they are not going to respond well to that. So I think it would be sufficient to say "structured."

DR. MUTMANSKY: I have no objection to that, Jim. That's perhaps fine.

Jürgen, you've been wanting to say something.

DR. BRUNE: I think the fundamental question is not whether they use computers or not for the structured approach. You can do it either way.

I think the fundamental thing is that a more structured or more diligent method of inspection may be called for.

The question that I have, and Tom alluded to the matter of checklists, if we give the inspector a checklist, is that a way for him to check off the things on the list and potentially ignore and overlook other things that he should address, and does that limit the inspector in his expert approach to finding violations and finding sources of hazards for the miners?

I'm not sure if we are limiting the quality of inspections by giving inspectors rigorous

checklists to work from, and basically once he has got the checklist off, he is free to go home.

DR. WEEKS: The alternative is to take Part 75, you know, paragraph by paragraph, and go from beginning to end, but then you've got a checklist that's the size of a phone book.

DR. MUTMANSKY: That's correct.

MR. MUCHO: My experience doing safety inspections, we would target an area and, in fact, often target specific aspects of safety to do that. I mentioned earlier one thing on fire prevention, fire preparedness along belt lines, and we would use checklists to go in and do that. But in my experience, we would walk into a lot of other things. We weren't blind what we walked into, and often we would find many things totally unrelated to what our main objective was.

You don't have blinders on. I don't think inspectors have blinders on because they have a checklist of things they were looking at. I don't really think that would be an issue.

DR. MUTMANSKY: The design of a structured procedure would certainly have to be done by MSHA personnel. There is no question about that, and the most knowledgeable people can probably do a pretty

good job at this in such a way that all of the major points are covered. That doesn't mean that inspectors should not cite other things that they find along the route, but I just don't know any other way of trying to address this problem of inspectors who, for one reason or another, have overlooked serious problems, particularly the SNS problems, in many mines.

If you don't provide him a structure, you're throwing your chances up in the air. You're rolling dice, I think. I would prefer to have loaded dice here, if you ask me. I would like to see them have a structure they can follow. In some ways, you could say that an inspector would look at this and say, you know, "Don't they understand that I have certain expertise?"

But I don't think that's the point. I think the point is that we want to help them do their job better. We don't want them to overlook things that are important, and if we don't provide that structure, it's perfectly possible for any person, no matter how diligent, to overlook some things. If you're human beings, you can overlook some things.

Structure provides you with an aid that helps you do your job, that doesn't work against you; it works with you. It tries to make you more

efficient and to do your job better rather than an unstructured approach. Jürgen?

DR. BRUNE: I have a question regarding the inspector's notes, actually two questions. Are the inspector's notes a matter of public record, and also is there a review process, either internal or external? Are they subjected to any audits by either the inspector general or any outside parties? That would be helpful to understand.

DR. MUTMANSKY: I don't know the answers.

DR. BRUNE: Maybe we can talk to the lawyers about that.

MR. KALICH: Well, inspector's notes are a matter of public record. They are able to be obtained through the FOIA process. Inspector's notes; their supervisors provide regular audits, say, of the notes in the inspection process. Not every inspection receives that scrutiny, but a number of them will throughout the year, and then, of course, they are subject to higher level reviews and audits also.

DR. BRUNE: Thank you, Mike.

DR. MUTMANSKY: Okay. Mike, don't leave yet. I have a question for you also. I just want to get your input on this. Is this a workable thing, for the district managers to have some sort of set lists

where everybody goes in? Is it workable and helpful to the inspector?

MR. KALICH: We have checklists for various things that are looked at in the mine, and I think a checklist for inspection of the AMS system, CO-monitoring system is certainly a useful tool. Naturally, there's all levels of experience here with the inspectors. Some inspectors would just, through their experience, naturally go above and beyond a list. Some inspectors that are newer would probably find a list more useful in helping them perform the inspection so they wouldn't miss an item that should be looked at.

DR. MUTMANSKY: Thanks, Mike. Any other questions? Felipe?

DR. CALIZAYA: I have one question.

DR. MUTMANSKY: Did you want to ask this of Mike?

DR. CALIZAYA: Yes.

DR. MUTMANSKY: Yes.

DR. CALIZAYA: It has to do with the inspection team. Who does the inspection, physically, one MSHA inspector and one from the mine operator, the area owner? Do you have a third person? Tom, you mentioned that you did several inspections. I did

several inspections, but we always had a third person, a third eye, which is not necessarily --

MR. KALICH: The MSHA inspector at the mine, by the Act, is required to offer the miners an opportunity to travel with him, and, in most cases, a representative of the company would also travel with the inspector.

So I would say, in most instances, you would normally have a representative of the operator traveling with you as an inspector, and you would, most likely, also have a miners' representative travel with you, maybe not in all circumstances, but in a number of circumstances, you would.

DR. MUTMANSKY: Mike, how many people normally work on a team? There are not individual inspectors; there are generally a team. Is that correct?

MR. KALICH: As far as conducting an inspection of what?

DR. MUTMANSKY: Well, let's assume it's a large coal mine, and your job is to go to that coal mine on a given Monday, and you're going to do an inspection. How many inspectors go on that?

MR. KALICH: One. One inspector would normally be assigned to a larger coal mine, and he

would go to that mine every day throughout the quarter in order to make a complete inspection of that coal mine. Of course, some larger mines may require some assistance from another inspector from the field office.

You have one-section coal mines that one inspector might be able to complete in a week, and you have other coal mines that are complex, that would take one inspector, or maybe even two inspectors, the entire quarter to complete the coal mine.

DR. TIEN: Are there cases that if you were going to inspect an electrical system, you would have a team of inspectors doing just that?

MR. KALICH: Well, normally, we have electrical specialists, so if you have some particular questions about the electrical system, you would ask for that specialist to come to the mine. The regular inspector would ask for that specialist to come to the mine, and he would perform the inspections of the electrical system; the same way with the roof control, the ventilation, depending on what area the inspector would want some assistance in.

DR. MUTMANSKY: Does the ordinary inspector who goes into a mine, as you say, for a period of days, a long period of days perhaps, does he do

ventilation measurements?

MR. KALICH: Yes. He'll take ventilation measurements, the gas measurements. He would most likely be the person that would be taking all of these measurements.

DR. MUTMANSKY: All of the measurements.

MR. KALICH: The specialist might be called in for maybe to help do a ventilation survey or a study on a particular section, or if there would be a particular area of concern where he would need some additional expertise.

DR. MUTMANSKY: One final question, I think, from myself. As I understand it, in talking to Mr. Dupree, the reason for the original computerized system was for tracking a mine's violations over a period of time so that you could review their history over the last several years. Is that the basic reason that they have a computerized system, or were there other reasons as well?

MR. KALICH: Not just for the violations. The violations would be trackable without this inspector tracking system. It was more to try to streamline the amount of notes that needed to be taken and to enable the field office supervisors, the front line supervisor, and the second-level supervisors to

be able to look at the inspection, and they would be able to view the inspection report electronically, and the idea behind it was to streamline the process.

DR. MUTMANSKY: And I take it that it wasn't streamlined at all. Is that what you're saying?

MR. KALICH: As it turned out, it increased the workload and slowed the process, but we're in the process of revisiting that to attempt to, again, streamline the process, and, in fact, it's moving more toward a checklist type of system, something that you were speaking to earlier.

DR. MUTMANSKY: Jerry, go ahead.

DR. TIEN: Yes. You just answered some of my questions. The issue is totally out of the question. So you are revisiting. I can just see so many benefits, advantages that we can take advantage of the computerized system.

MR. KALICH: And it is being revisited to try to have a more manageable system than the original was laid out. The original turned out to be a very complicated and layered system that wasn't user friendly to inspectors that don't have a lot of computerized experience.

DR. MUTMANSKY: I'm certain Mike would welcome any other questions you might have, I think.

Any other questions?

Mike, thank you very much. I appreciate your help. You did lend some clarity to this process, and it's helpful for us. Thank you.

MR. KALICH: You're welcome.

DR. TIEN: Jim has a question.

DR. WEEKS: I didn't have a question for Mike. It was just sort of an observation. You mentioned the Aracoma report, to begin with. You know, let's just take the problem of the belt that was out of alignment at that mine. You don't need to be an experienced mine inspector to notice something like that, and it remains something of a mystery to me as to how did that happen.

The inspectors are in that mine. The belt was out of alignment. Nothing was done about it. You know, I don't know the answer to that question. I don't know whether a more structured approach would deal with that kind of a problem or what, but, you know, I would be curious to see how that particular oversight occurred.

DR. MUTMANSKY: Well, essentially, Jim, just moving up the tail-piece during the normal course of a longwall operation could, at any given time, bring the belt out of alignment. It's just a matter of the

attendant and the crew to move the tail-piece up and realign the belt every time. There is very little necessary to bring a belt out of alignment.

DR. WEEKS: That's not the issue. The issue is how the inspector didn't notice it.

DR. MUTMANSKY: Well, Jim, that speaks to the fact that we should try to depend on having experienced inspectors, and a structured system should be able to help him, but it's not going to solve all problems. This is not a cure-all for all problems of inspection. It's obvious that we need good people in those jobs, but I don't think it's going to hurt the structure.

DR. WEEKS: No. I don't either. I agree with that.

DR. MUTMANSKY: All right. Now that we've had some chance to think about this, do we want to move ahead and start looking at this inspection recommendation?

Okay. Do I hear any call for changes or improvements in the wording here? Jerry, what do you say? Do you want me to read it?

DR. TIEN: Yes.

DR. MUTMANSKY: Thank you, Jerry. "The Technical Study Panel has considered the inspection of

mines utilizing belt air on the working section as a priority that must be addressed. Accordingly, the panel recommends that a more structured procedure be instituted to help mine inspectors complete their inspection duties with reduced chances of overlooking the important aspects of the ventilation pattern and checking on the essential design features of the AMS and CO monitoring systems. This recommendation is aimed at the mines using belt air at the working section but can be applied to any underground coal mine."

DR. BRUNE: Just one minor change to stay in a consistent tense, in the first sentence, "The Technical Study Panel considers the inspection of mines," and so on, "a priority that must be addressed," not "has considered."

DR. MUTMANSKY: I think that's a good change.

DR. BRUNE: Because we always use the present tense.

DR. MUTMANSKY: I think that's good. Thank you.

DR. TIEN: Jan?

DR. MUTMANSKY: Yes.

DR. TIEN: Well, with the changing mode, the

third line from the bottom, the "AMS and CO monitoring systems" are singular or plural?

DR. MUTMANSKY: Maybe they could be better expressed by just simply saying, "By checking all of the essential design features of the AMS and monitoring instruments" perhaps.

DR. TIEN: "AMS."

DR. MUTMANSKY: Okay. "AMS." Okay.

MR. MUCHO: What does "design features" mean?

DR. MUTMANSKY: What do you want it to mean?

MR. MUCHO: I don't know. That's why I'm asking the question.

DR. MUTMANSKY: Well, I think you're saying maybe we should be more specific as to what we're looking for. Is that what you're saying?

DR. BRUNE: How about checking on the proper function of the AMS?

MR. MUCHO: I think we're looking for a lot of things here: function and parts of it, where we get into the monitoring parts.

DR. MUTMANSKY: Checking on essential components?

DR. BRUNE: I think if you say "checking on the function of the AMS," you include it all because

if it's malfunctioning, or if it's not properly designed so that it functions properly, then that needs to be reviewed.

MR. MUCHO: I would just say "basics."

DR. MUTMANSKY: One of the things about it is maybe we should take out the language about "AMS system" altogether and just say that all inspections should be better structured and should have a working structure for each type of mine section and each type of mining system.

DR. WEEKS: Well, but we're limited by our charter to address belt air, and whatever recommendation we made, it has to be linked to belt air.

I've got another suggestion. All I know about this computerized inspection system is what has been discussed here today, but my guess is that the reason that people didn't like it was because it made their job more difficult and less easy. So I was just thinking -- this may be just tokenism, but put some language in here that says the intent is to make the inspector's job easier so he can do it with greater efficiency.

So let me just suggest -- I'm not thoroughly pleased with this, but where it says, "Inspectors

complete their inspection duties with greater ease and efficiency and reduced chances of overlooking," et cetera. "With greater ease and efficiency and with reduced chances of," et cetera.

DR. BRUNE: "[O]f overlooking safety hazards." Could you live with that as a more catch-all phrase?

DR. WEEKS: Yes. Okay.

DR. BRUNE: "[E]fficiency and reduced chances of overlooking safety hazards." Then we can leave the rest out and just say, "Essentially, that's what the inspector does. He or she addresses the safety hazards."

DR. MUTMANSKY: You're saying you want to take the rest of that.

DR. BRUNE: Yes. Take the rest of that sentence out, not restricting it to the ventilation pattern. If you look at the ventilation pattern, you will not address the belt misalignment and things like that.

DR. MUTMANSKY: So that will take the AMS wording out of it altogether.

DR. BRUNE: Right.

DR. WEEKS: Except for what's implied in the first sentence.

DR. BRUNE: Yes. "[A]nd reduced chances of overlooking safety hazards." It's not just "important aspects," but just "safety hazards" right there. And, again, "important" doesn't add any quality to that sentence. It's important automatically.

DR. MUTMANSKY: Okay. Is everybody okay with that now?

DR. BRUNE: It sounds a little better.

DR. WEEKS: One of our earlier recommendations basically dealing with mine maintenance urges the same sort of thing: Pay more attention to inspecting belt entries for a variety of things.

DR. MUTMANSKY: Okay. Do we want to read it one more time and just see how it flows now?

"The Technical Study Panel considers the inspection of mines utilizing belt air on the working section as a priority that must be addressed. Accordingly, the panel recommends that a more structured procedure be instituted to help mine inspectors complete their inspection duties with greater ease and efficiency and reduced chances of overlooking safety hazards. This recommendation is aimed at the mines using belt air at the working section but can be applied to any underground coal

mine."

I would guess we might want to say "in the working section." Is everybody okay with that word change? Any others?

DR. BRUNE: I have one letter change. If we change, in the third line from the bottom, we change the word "reduced" to "reduce" -- take the D off -- I think that makes more sense: "[H]elp mine inspectors reduce the chances of overlooking a safety hazards."

DR. MUTMANSKY: Yes, yes. I think you're right.

DR. BRUNE: Even though, grammatically, both of them are correct.

DR. MUTMANSKY: Correct, yes.

DR. TIEN: How about add a comma after "efficiency"?

DR. MUTMANSKY: No.

DR. TIEN: There are too many "ands."

DR. BRUNE: No commas before "and".

DR. MUTMANSKY: Okay. Are we comfortable now? Are we comfortable with the wording? Are we ready for a vote?

Felipe, should we take a vote, Felipe?

DR. CALIZAYA: If you want to.

DR. MUTMANSKY: We're going to vote. Felipe

says yes. Okay, Tom. You vote first.

MR. MUCHO: Yes.

DR. MUTMANSKY: Jürgen?

DR. BRUNE: Yes.

DR. MUTMANSKY: Jerry?

DR. TIEN: Yes.

DR. MUTMANSKY: I vote yes. Jim?

DR. WEEKS: Yes.

DR. MUTMANSKY: Thank you very much. Before we close for today, I just want to ask questions about whether or not -- is there anything else that the panel feels they should discuss at this point in time?

As you recognize, we're through the recommendations that we have proposed, and tomorrow's activity will be primarily oriented toward reworking our discussion sections for each of these 20 recommendations and providing to the MSHA staff additional references that we have cited in those discussion sections.

One of the things that MSHA wants to do is to provide any of the references that we have cited so that people who are interested in reading those references can access that information. So we need to do that as well tomorrow.

Are there any comments by the panel members

at this point in time?

MR. MUCHO: None here.

DR. BRUNE: No.

DR. TIEN: No.

DR. MUTMANSKY: Well, I have one comment. I would, again, like to thank all of those persons who helped out in any way today, the MSHA staff members who answered our questions and provided us with support in our efforts. I would like to also thank all members of the Technical Study Panel for your cooperation in working through these recommendations, compromising your own thoughts and trying to work with the group to come up with the 20 recommendations which we all unanimously supported. Thank you very much.

(Whereupon, at 4:18 p.m., the hearing in the above-entitled matter was adjourned, to resume at 9:00 a.m. on Wednesday, September 19, 2007.)

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REPORTER'S CERTIFICATE

CASE TITLE: MSHA: Technical Study Panel

HEARING DATE: September 18, 2007

LOCATION: Reston, Virginia

I hereby certify that the proceedings and evidence are contained fully and accurately on the tapes and notes reported by me at the hearing in the above case before the Department of Labor.

Date: September 18, 2007

Mona McClellan
Official Reporter
Heritage Reporting Corporation
Suite 600
1220 L Street, N.W.
Washington, D.C. 20005-4018