THE NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH/NATIONAL PERSONAL PROTECTIVE TECHNOLOGY LABORATORY (NIOSH/NPPTL) PUBLIC MEETING

Tuesday, July 19, 2005

DISCUSSION OF CONCEPTS FOR STANDARDS FOR APPROVAL OF RESPIRATORS FOR USE AGAINST CBRN AGENTS AND GUIDELINES FOR THEIR USE

Commencing at 10:00 a.m. at Holiday Inn Select, Pittsburgh South, Pennsylvania.

P R O C E E D I N G S

MR. BOORD: Okay. Good morning everyone. I would like to the welcome you all to this NIOSH/NPPTL two days of meetings to discuss concept requirements for CBRN closed-circuit, self-contained breathing apparatus, CBRN powered air-purifying respirators, industrial powered air-purifying respirators, and CBRN respirator guidance documents.

For those of you who have participated in any of our previous public meetings -- is that okay? Can everybody hear?

For those of you who have participated in the previous public meetings, I think you will recognize and appreciate the importance that this process plays in developing the respirator standard requirements and performance requirements.

I think that the interactions that occur during these public meetings and other discussions relative to the concepts that we are looking at and evaluating are very helpful in developing and providing clarity to the ultimate requirements that

we use in the standards.

And for those of you who don't know me, my name is Les Boord. I am the acting director of NPPTL.

And the activities that we are going to discuss over the next two days, particularly those focused on the CBRN respirator standards and guidance documents, are well emphasized by the recent activities that we have relative to the threat of terrorism.

I'm sure we're all aware of the most recent events that occurred in London two weeks ago, but the list goes back quite a ways, 1999 through this month in London. And who really knows what the future activities will be.

Which really, I think, emphasizes the importance and the need to do the types of activities that we're conducting over the next two days.

What we have done in the past is, as I'm sure most of you are familiar and aware, we have developed and implemented CBRN standards for

self-contained breathing apparatus. And we have implemented standards for CBRN air-purifying respirators, gas masks, and for CBRN escape respirators.

The statistics that are illustrated on the slide here reflect some of the activity that we have had in actually approving respirators to the CBRN category of devices.

The number of self-contained CBRN approval holders are six different manufacturers, or applicants, have those approvals.

The total number of SCBA approvals is 36. And in addition to that, the number of CBRN/SCBA retrofit capable approvals issued are 20, which is a very important number because that really gives us the ability to go out into the field and to upgrade existing equipment to CBRN status.

In the world of the air-purifying respirators, the number of CBRN/APR approval holders is five. And we have a total of five CBRN/APR approvals.

The last standard is the CBRN escape.

And to date, I think there are no approvals that have been issued, but we have several applications that are in the process of being evaluated for approval.

So with that, I would like to turn the agenda over to Mr. Szalajda, who will review the plans for the next two days, and go over some of the protocols for conducting the meeting.

Thank you.

MR. SZALAJDA: Does this one work? Can everybody hear me?

All right. I guess one thing about our group, we usually, you know, address the different technical challenges that come up. And today apparently is no different with the computer setup, but we will work on that as the day goes along.

One thing that you should know, at least in terms with regard to this disclaimer, the purpose of the public meeting is to exchange our concepts and ideas as far as the requirements for the different respirator standards. And in turn, we look to you for feedback on those items.

One thing, at this point, until other documents, other policies are put in place, these are all conceptual discussions until you are otherwise notified.

The way we are going to proceed today, the discussions today are going to focus on the closed-circuit, self-contained breathing apparatus. And then also what we are doing with regard to CBRN respirator guidance documents.

This morning we're going to focus on the closed-circuit SCBA going through an overview of the program as well as changes that have been made to the conceptual requirements. And also providing some information on benchmark testing that's been done over the past several months since our last public meeting.

This afternoon we're going to complete the discussion on the closed-circuit SCBA and also provide some input on the guidance documents as well.

As far as the meeting logistics, I think everyone signed in as far as entering when you

entered the room.

What we're trying with this public meeting, or the meetings today and tomorrow, is a little different in that we usually provide the information handouts in the back that you could pick up and take home and make copies.

But what we are trying to do at this time is to provide information on CDs that you can take back to the office with you to replicate and share with your colleagues.

The meeting is also being transcribed. The process for getting information remains the same with regard to the actual -- the meeting itself.

Within a month, we will have the presentations from today and tomorrow posted on our website with the actual transcript of the docket as well as any docket submissions. You would need to contact the NIOSH docket office in Cincinnati to obtain these documents.

And the contact information for the docket office you will see throughout the

presentations. Also, you will see the contact information on the back of your agendas.

And the way that we have set up the contact information for today's presentation, there are two separate docket numbers. One for the closed-circuit SCBA, which I believe is 039. And one for the guidance documents, which is 052.

If you have any particular questions or comments that you want to make regarding either of the concepts we're discussing today, they use those docket numbers to transmit your information.

After each technical presentation, we welcome your comments. There will be a microphone -- this microphone up here in the front. If you would please identify yourself and your affiliation and provide your question, we will address it at that time.

Also there is some time built into the program today that if there is -- if you have information that you would like to share with us, there will be an opportunity for you to make a presentation as well.

The docket information for the closed-circuit SCBA, again, it's 039.

There's several different ways. There's snail mail, email, or the telephonic communications.

Just a word about partnerships.

You know, one of the things that has been a note for our program is that we have tried to develop our standards in partnership with all of the stakeholders involved with the process, whether they are users, manufacturers, academics, anyone that has an interest in the technology as well as in promoting worker safety and health.

And we continue to work with our partnerships, not only with the other federal agencies, but also with the stakeholder community as well.

Our program has been funded and continues to get support from this, originally through the Department of Justice, National Institute of Justice, and now through the Department of Homeland Security, as well as monies that we have received

from the CDC to promote our work.

What's the importance of the CBRN standards? And I think with regard to the impact that the user community sees, it's pretty significant.

And I think the bottom line is if you look at the grant monies that have been made available for the responder community, the Department of Homeland Security signing the purchase, where possible, of equipment to standards, to buy equipment that meets a recognized standard.

And for NIOSH, it was important that -- this is an important factor to note, that for the CBRN respirators, these were among the first standards that were recognized by the Department of Homeland Security and tied to the grant funding for the purchase of equipment.

And they have also been recognized by other organizations. In particular, the NFPA, with adopting the use of CBRN respirators as a part of their ensemble requirements.

And the last note is we have been having some discussions with our colleagues in Britain with regard to implementing these as European standards because there currently are no CBRN respiratory protection standards identified in ISO or any of the UN standards.

A little bit about where we have gone and where we are going. I think probably most people have seen this in other forums.

We are looking during this calendar year to complete our technical work on the PAPRs, for the CBRN PAPRs, which we are going to talk about tomorrow, as well as the closed-circuit SCBAs.

What we are looking to in the future is initiate work on combination units, combination SCBA/PAPR, SCBA/APR, as well as looking at addressing any other requirements for respirators that may be in Part 84.

And one other aspect I wanted to bring to your attention, our standards, or at least our first standards, have been out in the public purview for about four years now.

And we have adopted other voluntary standards for the gas mask and the escape respirators. And since we adopted these using the policy provisions that NIOSH has afforded in 42 CFR Part 84, we think it's a good time now to do some housekeeping and take advantage of some of the lessons learned with the application process as well as with the actual application and conduct of the testing and the certification process.

And we are going to take a look at providing some clarifications for our documentation in making that available as an update to the community.

And I think the one thing of note -- and we need to make sure that everybody has this in mind -- we're not changing -- we're not changing the requirements that have been identified for any of these classes of respirators.

But what we are doing is focusing on, you know, looking at things that we have learned as part of our testing and some of the local nuances that may have come up with regard to the process

and providing some clarity to that, either in the statement of standards itself or in the test procedures, and then reissuing that by the end of the year.

But our focus is -- our plan is to identify those clarifications and post them to the web.

We would notify the user community through mailings and email that the standards have been -- or these drafts have been posted for comment, have a 30-day review period for the stakeholder community to make comments back to us, and then address those comments and release the updates by the end of the Calendar Year.

And so with that, if there are any questions, any general questions on the program, I will take them at this time.

I just -- as far as a couple of housekeeping things go though, the restrooms are located in the back of the facility to the left. For lunch, you are on your own. There are several places within a reasonable distance from the hotel.

There's some chain restaurants in the surrounding shopping mall area. There's also the South Hills Village across the street. There's a food court as well as some other restaurants located there.

We do ask that if you have cell phones, if you could put them on vibrate or on the silent mode for the conduct of the presentations.

And with that, are there any questions?

MR. KOVAC: Okay. Good morning.

What I'm going to talk about are our efforts at developing standards for closed-circuit, self-contained breathing apparatus.

Our goal is to develop a full-facepiece, closed-circuit, self-contained breathing apparatus standard to address the CBRN materials identified as inhalation hazards or possible terrorist hazards for emergency responders.

The use idea would be for long-duration missions involving entry into an atmosphere where contaminant concentrations are IDLH, and which may not contain adequate O2 Levels.

In terms of history, closed-circuit devices have been deployed since the beginning of the last century. They have been put to good use primarily in this country in mine rescue, for search and rescue and recovery missions in IDLH environments and constrained spaces.

The regulations under which these apparatus have been approved have afforded a means for technological improvement. The standards which the earliest devices were approved are the standards today that we approve current devices.

And again, these devices are used in mine rescue, and they confer significantly longer durations because they are closed-circuit.

The process that we use to develop concepts for standards is threefold. We begin with public process, which is transparent and open to debate and inquiry. We identify key stakeholders, in this instance, NFPA. And we form productive partnerships with them.

The standards themselves incorporate best practice, good experimental science, meaning the

standards are reproducible and repeatable.

We conduct much of our testing to analyze where matters stand with current technology. Where there are drops in our technical knowledge, we conduct research. And we also subject what we do, our inquiries, to peer review.

The standards themselves focus on performance and functionality. They begin with the hazards analysis. They account for human capabilities while wearing the respirator. Built in are quality assurance issues. We look at reliability, and we look also at practical use of the devices.

The model for certifying what we are going to talk about involves three tiers.

NIOSH approval under the program will signify that a respirator is expected to provide needed protection to first responders in situations where an act of terror has released harmful chemicals, pathogens, or radioactive materials into the air.

And approvals will always be based on

positive results from rigorous tests of sample units submitted to NIOSH by manufacturers and from stringent evaluation of manufacturers' quality-control practices, technical specifications, and other documentation.

As I said, it's a three-tiered process. The devices have to pass Part 482 (sic), loaded on top of our special requirements in terms of environmental ruggedness, reliability. And layered on top of that is CBRN requirements.

Next slide.

In this particular case, Tier 1, would be the applicable sections of Part 482.

Tier 2 would incorporate and expand upon NFPA 1981. They would look at a comparable high work rate performance test; can I get over from open-circuit to closed-circuit.

And we also look at operational performance of the apparatus in terms of exposure to high radiant heat and flame and other environmental requirements.

And lastly, we are looking for exposure

and permeation of the agent.

That's fine. Next slide.

Because we are dealing with closed-circuit devices, the only way to evaluate their performance is to look at both the delivery and consumption of oxygen as well as the effectiveness of the carbon dioxide scrubber.

This means that you have to test the devices in as humanlike a way as possible, but do so under better control of experimental conditions.

So we call for adapting the NFPA 1981 standard on open-circuit devices to closed-circuit. And in doing so, we advocate the use of an automated breathing and metabolic simulator for performance testing.

Briefly, a simulator is simply a computer-controlled breathing machine whereby we can reproduce conditions of human respiration, programming it for a variety of work rates and ventilation rates.

Next.

And that's about all I have to say, and

of course, I'll take questions. And if there are any, let's have them.

Okay. Frank, have at it.

MR. PALYA: Welcome to the NIOSH public meeting. My name is Frank Palya from NIOSH.

I'm going to present the current requirements of the CBRN closed-circuit, self-contained breathing apparatus, the concepts standard, and any updates made to the requirements and the test methods from the previous concept paper.

Okay. Next.

The purpose of my presentation is to discuss the special requirements and updates of the concept standard. And that will include the chemical warfare agent permeation and penetration resistance requirement, and the laboratory respiratory protection level testing.

Next.

And the requirements from relevant sections of NFPA 1981 to 2002 edition and updates.

The NFPA 1981 standard is the standard on

open-circuit self-contained breathing apparatus for the fire emergency services.

And you're probably asking why as well, geez, why are you bringing up the open-circuit, and we are developing standards for the closed-circuit.

Well, many of these requirements are relevant, as far as operational performance, vibration, level of the durability. So they do transpose right over to the closed-circuit. However, albeit some slight modifications in the test methods to accommodate the closed-circuit.

But these are some of the requirements for the operator -- environmental temperature operational performance, the vibration endurance, some of the flame resistance, heat resistance tests, accelerated corrosions, particulate resistance, the facepiece abrasion resistance, communication performance, and the heat and flame operational performance.

First I would like to -- I want to dive into one of these -- each requirement in some detail here.

The update from the previous concept papers, that we waive the wet-bulb temperature breathing gas requirement, which was -- it had to be less than or equal to 50 C, because when you're conducting these environmental temperature operational performance tests, you're cold soaking these; you're hot soaking these; there's extreme temperatures; and, plus, you're testing the apparatus.

So there would be no way to get in there and still meet this requirement. It's just -- it wasn't realistic.

The test conditions still remain the same, though.

For the vibration endurance requirement, the requirement was updated, and it changed the vibration profile from the U.S. Highway Truck Vibration profile, much like we used in the APR, to the profile specified in NFPA 1981.

The reason why we did this was that the closed-circuits would have to be as durable as the open-circuit to become CBRN certified for NIOSH.

Next is the fabric flame resistance requirement. The requirement for fabric flame resistance remains the same as in the previous concept paper.

The requirement is when it was tested in accordance with ASTM D 6413 is that the fabric average char length is less than or equal to four inches, and the fabric average after flame is less than or equal to two seconds.

The test method was changed to use ASTM D 6413 when an apparatus is not on the wire lattice test frame that is specified in 1981.

This method was updated to use ASTM D 6413 because test standard of 191A is being phased out, so it's going to be replaced by ASTM D 6413.

All right. The fabric heat resistance requirements will be the same. The fabric shall not melt or ignite when tested in accordance with the NFPA 1981 Section 8.5.

Again, the -- we updated the test method because our federal test method 191A is being phased out.

For the thread heat resistance requirement, it remains the same, and it is that the thread shall not melt or ignite when tested in accordance with NFPA 1981, 8.6.

It's basically the same test method, but it's better defined by specifying NFPA 1981, and also that standard of 191A is being phased out.

Next.

The requirement, the accelerated corrosion resistance requirement is the same as in the previous concept paper.

And that is, after being subjected to accelerated corrosion, the SCBA apparatus must meet the performance requirements in Section 3.1, as in Table 1.

The test method didn't change for the accelerated corrosion resistance, which uses the MIL Standard 810F, Method 509.4.

The next one.

The requirement is the same as in the previous concept paper for the particulate resistance requirement.

And the requirement must be the operational performance requirements in Section 3.1, the apparatus, while being subject to the particulate dust.

However, this is a very difficult test when you are trying to attach it to the ABMS because you are trying to minimize the trachea tube length.

So there was some slight modifications done to this test method because what it was was the headphone was placed against the wall of the dust chamber while the apparatus was been tested.

In 1981, the apparatus is right in the middle of the dust storm, facing the dust. And halfway through the test, it was rotated 180 degrees.

Well, this wasn't possible with the ABMS because, again, we were trying to shorten the length of the trachea tube.

The requirement test methods are the same that were identified in the previous concept paper for the facepiece lens haze, luminous transmittance

and abrasion resistance requirement.

And the requirement is that the change in haze has to be less than or equal to 14 percent. The test method used to test this requirement is the NFPA 1981 Section 8.9.

The communications performance requirement test methods are the same as were described in the previous concept paper.

And it requires that the average calculated value must meet or exceed 70 percent when the communication test is conducted in accordance with NFPA 1981 Section 8.10.

The heat and flame operational performance requirement, the -- it was changed.

Again, we waived the wet-bulb temperature breathing gas requirement of -- the breathing gas has to be less than or equal to 50 degrees C as stated in Table 1.

This test presents us with some technical challenges because on the open-circuit, the apparatus is tested in operational mode.

And, again, if you're going to test a

closed-circuit in operational mode, you're interfacing with the ABMS. And if you understand this test method, it moves on the track from the oven, and then it goes into the open flame.

And that's very hard to do because, again, you're trying to shorten the length of the trachea tube.

However, in other words, if you want to get it into the full operational condition, you have to have a full oxygen cylinder. And having a full oxygen cylinder around high temperatures and open flames is really not a great idea because of the explosion hazard.

So those are -- there are still some technical challenges that we're working out with this test method here.

Next slide, please.

The next is the -- I'm going to discuss the chemical warfare agent penetration and permeation resistance requirement.

GB and HD agents will be used to test the chemical warfare agent permeation and penetration

resistance requirement. Basically it hasn't changed from the previous concept paper.

This test will also -- will be conducted with an ABMS while the apparatus is mounted on a SMARTMAN test mannequin.

These are some of the test parameters for the GP. The vapor challenge will be 2,000 milligrams per meter cubed. The maximum breakthrough -- level breakthrough would be 0.087 milligrams per meter cubed.

When there are three consecutive peak readings of that, it constitutes a failure, or it shall not exceed 2.1 milligrams per meter cubed, Ct.

This is the same requirement as the open-circuit.

However, the test times was changed. Before, we had six hours for the total -- the total test time now is the applicant's identified duration plus one hour.

The breathing rate was also changed. We had a variable breathing rate of 40 and 100. Now,

we keep it at a constant 30 liters per minute. That's the standard temperature and pressure dry.

That's 30 liters per minute at that standard temperature. But at room temperature, it basically equates to around 40 liters per minute.

Also on this, in order to keep it with the same -- keep the test method the same, we are going to try to incorporate a dilution. I mean, it will dilute the same profile as the open-circuit would.

Because with the closed-circuit, there's no fresh air flushing out the agent out of the challenge chamber.

So we're going to try to work on a profile that the decay or dilution of the agent out of the challenge chamber will be the same as the open-circuit.

For the HD mustard, the vapor challenge is 300. The liquid challenge is 0.86 milliliters. Again, this is the same as the open-circuit. These are the maximum breakthroughs.

The vapor challenge will be for the first

30 minutes. The liquid challenge would be throughout the duration of the entire test.

And the test time -- or minimum service time would be the applicant's identified duration plus one hour. And, again, the breathing rate would be 30 liters per minute.

The next is the laboratory respirator protection level testing.

This is the fit-factor or corn oil aerosol test.

What it does, it just measures the inside of the -- concentration on the inside of the respirator to outside the respirator. And then it develops the ratio.

The purpose of this test is to establish a benchmark level of protection under laboratory conditions. It is not intended as an indication of protection in an actual respirator scenario.

For the LRPL, it has to be greater than or equal to 10,000 when a human subject tested with the entire apparatus on.

Now, what we did do is we added an

additional requirement where the LRPL would have to be greater than or equal to 500 for each human subject when just the facepiece is tested with a filter on.

So it's -- again, it's pretty similar to the open-circuit.

The -- when -- there will be eight systems tested there, full systems, and they must meet -- must fit two small, four medium, and two large facial sizes.

Again, we are doing this to fit the Los Alamos panel.

These are some of the exercises from the LRPL test: Normal breathing, the deep breathing, the head turn side to side, the head movement up and down, recite the rainbow passage, sight a mock rifle, reach for the floor and ceiling, on hands and knees and look side to side, facial grimace, climb stairs at a regular pace, and normal breathing.

There are eight basic U.S. Department of Labor or OSHA quantitative fit test exercises, plus

three additional quantitative fit test exercises generated from the emergency response forms, and they are indicated by the plus signal on it.

These will be one-minute routines devised to stress the face sealing material, the integrity of a respirator facepiece.

And the protection factor is measured for each exercise. Doing the overall LRPL is a harmonic average of individual PS of the level of exercises. That's the overall.

And that concludes my presentation.

And it's time I will address any questions.

MR. LINKO: My name is Bill Linko. My company is Micronel US.

On the last subject matter, what about coughing and regurgitation, you know, urgency and explosions and so forth or dealing with something which causes greater -- so when you cough, you have maximum positive pressure in the mask.

Is that in the exercise anywhere?

MR. PALYA: No, no, sir. That wasn't in

it.

MR. LINKO: The second question is once you expose the equipment to a chemical, biological, how do you decontaminate it? Or is it a one-shot deal?

MR. PALYA: Yeah. Once it's contaminated with agent, it's --

MR. LINKO: It's gone?

MR. PALYA: -- it's deconned and disposed of.

MR. LINKO: Okay. So it's a one-shot deal?

MR. PALYA: Yes, sir.

MR. LINKO: Thank you.

MR. BERNDTSSON: Goran Berndtsson from SEA.

The change in the total testing to manufacturers' operational times plus one hour, shall we read that as a new policy? Is that what you are going to do?

I mean, it -- on equipment from now on -- before you have always had six hours there. And

now you are going to the manufacturers' operational time plus one hour.

Is that only for this type of equipment, or are you going to use that for other standards in the future as well?

MR. PALYA: Yeah. That was just for this because -- yeah.

MR. BERNDTSSON: I thought that that had something to do with the overall exposure.

I mean, when you look on your guidance documents for using respirators, it -- the permeation test is giving you the overall time you can use that piece of equipment.

MR. PALYA: Well, the thing is that with the closed-circuit -- with the open-circuit, you have had a way of going ahead and replacing your cylinders.

MR. BERNDTSSON: Uh-huh.

MR. PALYA: With the closed-circuit, there is just no way to go ahead there and replace a lot of that internal scrubbers and all.

MR. BERNDTSSON: When it comes to the 500

per model, I mean, what's the logic with that?

MR. PALYA: Pardon me?

MR. BERNDTSSON: When you have the total leakage test where you are doing 10,000 per system and 500 per model, what is the logic of testing the model?

MR. PALYA: Again, we wanted to go ahead there and ensure that you capture and fits the whole Los Alamos panel.

Get facial sizes, so that it will meet the whole, you know, that they are capable of -- the certified respirator will meet the whole realm of facial sizes within the Los Alamos panel.

MR. BERNDTSSON: Well, couldn't you do that to complete systems?

MR. PALYA: No. No. Just there's eight systems that -- there's just eight systems that were test -- complete systems we're testing for 10,000.

And then the other facepieces were just going -- the facepieces with the filter, and they will have to be the ones that test the entire --

MR. BERNDTSSON: I understand that.

But is the logic to try to cut down on the testing cost or the cost of submitting equipment? And if that is the logic, are you going to apply that to the other pieces of equipment that we are sending in for approval as well?

MR. SZALAJDA: Well, I think part of this for the closed-circuit, when you look at the cost of these systems are -- they are very expensive.

So we looked at modifying the LRPL. We are doing a two-phase requirement for the LRPL to reduce the cost burden of the applicant when they submit them.

So the requirement was split so that you have the modified LRPL panel which addresses the small, medium, and large portions of the panel. And then you use the -- and that's tested at 10,000.

And then you use the 500 fit factor value on the whole panel just in an effort to minimize the cost.

But I think you have a good point with

regard to, you know, looking at this on other types of systems.

And we will take that under advisement.

MR. BERNDTSSON: Yeah. Because the cost of some of the other equipment is pretty high as well.

And I mean, the numbers of samples you have in the draft is -- I mean, you -- they could be values up to 100,000 US equipment cost to submit to you.

MR. PALYA: Uh-huh.

MR. SZALAJDA: Yeah. We will take that under advisement.

MR. PALYA: Another thing is when you are testing this, there's a lot of hygiene factor, too, as far as reusing the same respirator when you are testing different human subjects, as well.

MR. SELL: My name is Bob Sell with Draeger Safety.

Going back to what Goran was saying, I'm still quite hazy about the reason for the two tests on the LRPL at 10,000 and 500.

If I understand correctly, at the 500 level, you are still doing the -- whatever number of max, depending upon facepiece sizes.

And then you are also doing a system test just testing eight and using the various sizes.

Again, I'm not -- I'm still a bit hazy on this requirement.

MR. PALYA: Okay. Well, let me better explain this.

We want to find out how the overall system -- I mean, it doesn't meet or exceed the 10,000 mark.

And then once we identify the yes, it does meet it, the overall system does get that high of a PF, now we want to make sure that we capture the whole realm of facial sizes.

So that's why this test is pretty much twofold.

Okay? I mean ...

MR. SZALAJDA: Well, I think to follow along with Frank, I think there's some precedence here when you look at the other standards, you

know, for the open-circuit SCBA.

We tested 500.

And, again, it's to provide -- to assure that the fit of the facepiece is providing the degree of fit to the individual, and also that you are fitting the panel, that your respirator is fitting the -- the requirements of the Los Alamos Panel. So that's one.

And then the other precedents are for doing a modified LRPL.

If you look at our APR standard, when you look at the -- what we do with the modified LRPL and for the interchangeability, or to evaluate interchangeability, that we look at a smaller number.

But, again, that's -- you know, we looked at those two standards for precedents.

And, again, getting back to the costs, you know, associated with these, I don't think, you know, it didn't seem reasonable to us to ask an applicant to submit, you know, 30 or 40 of these full-up systems to conduct this test at 10,000, you

know, with the costs associated with this type of technology.

So we wanted to assure ourselves that the facepiece was fitting the panel. And that's why we looked at the other standards for precedence with testing the facepiece in a negative pressure type scenario with the open-circuit.

And we applied that thought to this device.

MR. SELL: And then the pass/fail criteria for the system test would be zero failures, similar to the APR then?

MR. PALYA: Yes.

MR. SELL: And then you also consider about taking this same type of rationale as Goran had mentioned to the other documents that are already out, the open-circuit and things like that?

MR. SZALAJDA: Well, we will have to look into that.

I'm not sure what -- you know, at least with regard to the requirements that go back, you know, and then look at what we have already done.

But we will do an evaluation the next time we need to get together in one of these forums, we will let you know.

MR. PALYA: The thing is when you're using human subjects, again, there's a hygiene issue with these.

I mean, as far as going ahead and really -- I mean, it's one thing if it's an air-purifying respirator where you go ahead and sanitize the respirator.

But now you have a system where your exhaled breath is going through a scrubber and it's going through all the plumbing in there, and then breathing it back out.

So, you know, we didn't really want to require a lot of those full systems. But, yet, we wanted to see how well the LRPL values were, if they were above 10,000.

MR. SELL: But wouldn't any of the bench testing that you have done kind of indicate that there may not be an issue in this area?

MR. PALYA: Well, at this time, you know,

I mean, with some of the bench testing, yeah. I mean, we got some good values for that, but we still want to confirm it in a future certification.

I mean, there may be others coming down the pike, too. There may be other systems manufacturers bringing new items on, so we want to confirm those.

MR. SELL: And another thing is that as a manufacturer, a slight issue is the cost of this equipment is awfully expensive.

MR. PALYA: Yes.

MR. SELL: And so you have just added in another set, another eight units for certification purposes, when there's going to be a lot of other units also being submitted similar to the NFPA requirements with those.

So I mean, it becomes a very expensive endeavor here.

MR. PALYA: With the NFPA?

I mean, these --

MR. SELL: Well, as far as the NFPA, there's a lot of SCBAs that are used.

MR. PALYA: There's -- I believe there's eight full systems.

And then many of those are, if you looked at the little chart in the back of the standard, the table, a lot of them will be used for communications.

MR. SELL: Right.

MR. PALYA: We try to use them as wisely as possible, even with the agent testing.

I mean, those are a one-time shot there.

MR. SELL: Right.

MR. PALYA: But as far as the communication test, the LRPL test, we are trying to be very prudent when we go through this testing, you know, scheme, and try to use as little as possible on those.

So, again, you know, I mean -- plus, we want to meet -- we had to meet a lot of these requirements that were up here as far as the communication requirements and the other requirements.

So we try to go with as minimal as

possible and yet try to meet all of these requirements to satisfy our needs here.

MR. SELL: Okay.

MR. PALYA: Okay. I would like to introduce our next speaker, Mr. Kyriazi.

MR. KYRIAZI: Good morning, my name is Nick Kyriazi. I'm with the NPPTL Group also. And I'm here to talk about the same thing everybody else is talking about, just in much more detail.

I'm going to talk about anything that has to do with simulator testing of the closed-circuit apparatus.

Here is a picture, and a schematic of the simulator for those who are interested. Just briefly, the simulator moves air back and forth from the lung to the mouth.

So in addition -- and in addition to moving air, it also heats and humidifies gas and simulates CO2 production from a cylinder here. And simulates oxygen removal with this vacuum pump.

The latest concept standard includes changes to both the work rate and the stressor

level limits.

The moderate work rate has been adjusted to be more humanlike.

If you will recall, this is a chart of the ventilation rate for the proposed protocol.

For the first half an hour, the ventilation rate is 100 liters a minute. That is the entirety of the open-circuit standard for at least the 1,200 liter apparatus.

At that, that after 12 minutes at 100 liters a minute, the 1,200 liter apparatus are empty.

For a closed-circuit apparatus, they will not be empty, so what do you do next?

And what -- it was decided that a person could not go for very much longer at a ventilation rate of 100 liters a minute for the full capacity of the closed-circuit apparatus.

So the NIOSH open-circuit ventilation rate of 40 liters a minute was chosen to complete that half an hour.

Now, the next four half an hour periods

are composed of the, again, the NIOSH ventilation rate of 40 liters a minute, except for the last five minutes where we go back up to the NIOSH -- I mean, the NFPA 1981 100 liters per minute.

Repeat that cycle four times and then continue at the NIOSH work rate, the moderate work rate of 40 liters a minute until the apparatus is empty.

The moderate work rate changes are listed here.

The ventilation rate, as I said, was unchanged from 40 liters per minute. And this is, for those who are interested, absolute volume displacement or the lung temperature, that 40 liters a minute measured at the lung temperature.

The VO2 is being reduce from 1.60 to 1.35 liters a minute STPD, standard temperature pressure dry.

The CO2 production is being reduced from 1.60 to 1.15 liters a minute.

The respiratory frequency is decreasing from 24 to 18 breaths a minute.

In essence, what this is doing is overall making the waveform look more humanlike.

And the title volume is going up. The respiratory frequency is going down.

And whenever we were running the previous work rate, the original numbers, we were getting in title CO2s of 10 percent, which is extremely unhumanlike.

I'm not sure how -- I was a member of the NFPA 1984 committee, and I don't really now know we came up with that, but it was 20 years ago.

Here are some of the stressor level limits that we are recommending or that we have proposed to be changed.

Exhalation peak pressure, we're increasing from 89 to 200 millimeters of water pressure. Average inhaled CO2 is increasing from 2 to 4 percent.

Average inhaled oxygen concentration being reduced from 19.5 to 15 percent. And the inhaled wet-bulb temperature is being increased from 45 to 50 degrees centigrade.

Justifications for these.

The new stressor level limits are based on human physiological tolerance, not tradition or apparatus capability.

This is simply what people can tolerate.

If a stressor level exceeds its limit for more than one minute in the proposed test, the apparatus fails.

Keep in mind that the high stressor levels, if there are high stressor levels, they will occur during the high work rates.

At low work rates the stressor levels will be low.

If the stressor levels are already high at low work rates, when we get to the high work rates, they will exceed the stressor level limits.

And also remember that the high work rates are not sustainable for long periods of time.

Therefore, the user will not be exposed to the high stressor levels for any length of time.

Another note, if an apparatus is engineered to be comfortable at the highest work

rate at which it is ever likely to be used, it will be bigger and heavier than it need be for normal work rates.

Here, I'm contrasting the current NIOSH 42 CFR 84 testing with the proposed CBRN testing, just two measures of comparison.

In the present regulations, the breathing pressures are measured on a breathing machine test, which is just an air mover with no humidity or carbon dioxide being injected into the circuit.

In the proposed CBRN testing, the pressure is measured on a simulator with humidity and carbon dioxide, which elicits a more humanlike performance.

In the current testing, the CO2, O2 temperature are measured only during rest periods on the human subject tests.

In the proposed testing, it will be measured -- all three, CO, O2, and temperature will be measured continuously, including during the high work periods.

So we will see everything that the user

experiences.

Also, some definitions and some detail background. The ventilation rate versus the peak flow rate.

Ventilation rate is as stated there. It's a minute-volume of exhalations. So over a minute period, if you simply collect everything that a person exhales, that is called the ventilation rate or the minute-volume.

The peak flow rate is during any one breath, what is the instantaneous, the high instantaneous flow rate.

Here is a simulator waveform.

It's just a sinewave, and not a lot of people believe this, but this gives you an idea. Here is the exhalation and then the inhalation.

This is the instantaneous flow rate here for this particular waveform.

So you can see, we have a peak exhalation flow rate of, looks like about 175 or 180 liters per minute.

Again, contrasting minute-volume versus

peak flow rate, for the moderate work rate, the NIOSH one, which has a ventilation rate of 40. The peak flow during that ventilation rate or during a particular breath in that minute of collecting those breaths, is 115 liters a minutes.

For the NFPA, the 103 -- the ventilation rate is targeted to be 103 liters a minute, and the -- but the peak flow rate during the breath is 255 liters a minute.

Note that the peak pressure will occur at the peak flow rate. And we define resistance as a pressure at a particular flow rate.

There's -- even in the literature, resistance and pressures are interchangeably used, and we do not do that.

But resistance is defined as a pressure at a particular flow rate.

And a resistance, a given resistance, say a straw or some sort of an orifice that you are trying to breathe through, it will exhibit different pressures at different flow rates. The faster you blow through it, the higher the pressure

buildup behind it.

We came up with this -- with a test stand, a variable resistance test, in order to determine that the -- or to try to link the current pressure level limit with the proposed and the NFPA current pressure level limit.

And what we did was we adjusted a variable resistance -- or the question was -- that we wanted to answer was, if an apparatus exhibits a pressure of 51 millimeters of water, which is the NIOSH pressure level limit, at the 40 liter a minute ventilation rate, which has a peak flow of 115, what pressure will exhibit at the NFPA ventilation rate of 103 liters a minute, which has a peak flow rate of 255 liters a minute.

Here is the test stand that we rigged up, and we were able to connect a variable voltage to a fan which blew air through a variable resistance right here. And we measured the pressure right in front of the resistance and measured the flow rate after the resistance with a pneumotach, after the variable resistance.

We found that -- we adjusted the -- we adjusted a flow of 115 liters per minute, and we adjusted the variable resistance until we got a resistance -- until we got a pressure, I should say, of 51 millimeters of water.

Whenever we increased that flow rate up to 255, the pressure now, for the same resistance, the pressure went up to 225 liters per minute, which is higher than our recommended limit of 200, the tolerance level for people, we believe.

This is where we drive the pressure level limits.

This was done at Penn State whenever we were funding research there in physiology. We had ten subjects, five firefighters, two mine rescue workers, two scuba divers, and the professor who ran the study were involved with this pressure test.

And we found that -- you can see here, for a pressure, when people were subjected to a pressure of 50 millimeters of water, 100 percent of them could tolerate that for four minutes.

Same with 100 millimeters of water pressure, 100 percent of them could tolerate it.

150 millimeters of water pressure, still 100 percent of the subjects, all ten of them, could tolerate that pressure.

80 percent of them -- or let's say two out of ten dropped out whenever the pressure got to 200 millimeters of water pressure.

And you can see down the line who was able to tolerate what breathing pressures.

And now, if we have any questions, you can send them to this email. Goodbye.

MR. HEINS: My name is Bodo Heins from Draeger Safety.

I would like to suggest, again, to change the beginning of the high breathing rate for 100 liters per minute, not to do at the beginning, but after this first cycle is 40 liter. It's much more the characteristic of the closed-circuit breathing apparatus.

MR. KYRIAZI: I agree with you that it is more characteristic of the breathing apparatus

in -- probably in actual use, but we were fairly much obligated to reproduce the NFPA 1981 tests for open-circuit apparatus, which began and ended at 100 liters a minute.

MR. HEINS: In open breathing apparatus, not in closed-circuit breathing apparatus.

You have here to fulfill the practices of for CO2 binding unit, so that normally needs a little bit of time to become active 100 percent.

MR. KYRIAZI: We will take that under consideration.

MR. BERNDTSSON: Goran Berndtsson from SEA.

Can you explain to me how we get 103 liters to get to 115 liters?

I mean, it's -- if you have a long inhalation and longer exhalation time.

MR. KYRIAZI: Back up to the sinewave. Okay. There we go.

Here is -- I'm not where this waveform came from, but there is a peak flow of 175 liters a minute, but that does not mean that -- if this were

a square wave and it was 175 liters a minute from beginning of exhalation to the end of exhalation, then immediately dropped down like a square wave, the same thing on the other side, that would be a ventilation rate or a minute-volume of 175 liters per minute.

But people don't breath, in general, like square waves. They breathe more like this or maybe a waveform like that, or a blended sinewave, or something like. But the peak flow rate is not the minute volume.

And if you are asking where I got 255, that is from the NFPA 1981 standard. They list a chart where they specifically detail the waveform.

MR. BERNDTSSON: You have to check the calculation.

Because if you take 103 liters, if you equal the inhalation, exhalation time, you will have 320 liters peak flows.

So if you make it shorter inhalation time, you will have a higher inhalation peak flow. If you make it longer, it will be short, but then

you will have it on the exhalation side.

So you have to look on your facts. It can't be right.

MR. KYRIAZI: Well, from -- I have a 1981 book here, and what it does is lists a change in volume every 1,000th of a second, or something like that.

And if you simply divide the -- one of the increments, the highest change in volume over that amount of time, you get 255 liters per minute.

MR. BERNDTSSON: The book must be wrong.

MR. KYRIAZI: Well, we will look into that.

MR. FLYNN: Hi, Bill Flynn from Biomarine.

My question has to do with the CFR breathing rates that are required to be met before you can even submit to the CBRN standard.

And the fact that in this CFR, the open-circuit systems are allowed a much higher exhalation resistance compared to the

closed-circuit systems.

And I was wondering whether or not there would be some consideration to give us an equal footing or take that consideration over into the proposed breathing rates that are in the current standard.

MR. KYRIAZI: Yes. We are aware that the present regulations don't seem to be -- there doesn't seem to be a parity between open- and closed-circuit, and they are certainly not based on physiology.

But changing 42 CFR 84 is not an easy task. So we will take that under consideration. Thank you.

No other questions? Thank you.

MR. REHAK: Good morning. My name is Tim Rehak.

I'm with NIOSH/NPPTL, and I will be talking about the benchmark testing that was conducted on the closed-circuit SCBA since the last public meeting.

Okay. The benchmark tests that we

conducted so far were the laboratory respiratory protection level, the LRPL test.

We conducted modified heat and flame tests. We also did the accelerated corrosion resistance and the particulate resistance.

Okay. First I will review the LRPL.

The procedures that we followed for this test are the same as the existing NIOSH CBRN LRPL tests. And I believe the standard test procedure is on our website.

The tests were conducted at the U.S. Army Research Development and Engineering Command in Edgewood.

We used equipment from two different manufacturers. Eight subjects were used for this test. Each subject went through two trials.

For this we used, again, equipment from two manufacturers. Two of the eight subjects were under Manufacturer A's apparatus, and two were under Manufacturer A facepiece with filter adaptor plus a P-100 filter, and likewise for Manufacturer B.

The pass/fail criteria, as Frank alluded to previously, for the full system, it has to be greater than or equal to 10,000. And with the filter adaptor, it has to be greater than or equal to 500.

And, again, Frank, in his presentation, covered the exercises. I'm not going to go through them since Frank already did it, but each of the exercises were conducted for one minute.

The results through all the testing, 16 total, we had one subject that was wearing a filter adaptor that did not pass the LRPL of 500. And the reason for this was because their hairline was down into the periphery. And it was a one-size-fits-all mask, so no resizing was able to be done.

So the conclusion that we reached was that current closed-circuit SCBAs would be able to -- or should be able to pass existing LRPL tests.

All right. Next was the heat and flame resistant.

The treatment is covered in Section

8.11.5 of NFPA 1981, 2002 Edition. The treatment -- the units are exposed to 95 degrees centigrade for 15 minutes in the oven.

Next, it is brought out of the oven and exposed to direct flame contact for ten seconds.

Then after this, the mannequin with the apparatus is raised to 150 millimeters, and then dropped freely.

And note, just like Frank says, the challenge that we had to face. We did the tests at Intertek Testing Services in Cortland, New York. And for safety concerns, they didn't want the test conducted with live oxygen cylinders.

Again, for this, we used equipment from two different manufacturers, and a total of two closed-circuit devices were tested.

Okay. Some of the problems that we noted, there was afterflame beyond 2.2 seconds at one of the hoses for the apparatus.

Also, one of the harnesses had afterflames -- an afterflame beyond 2.2 seconds along with the facepiece hose connector.

These afterflames caused a hole to be burnt through in the hose and also with the facepiece hose connector. And after the drop test, one of the backpacks fell off the mannequin.

We also later on noticed that one of the bypass valves was fused shut along with the oxygen bottle strap was burnt through.

And, again, note, we used existing closed-circuit devices that are currently on the market, and these devices are not hardened to go through this type of test, and so we did anticipate problems of this type.

And that is, again, one of the reasons why we didn't use live oxygen cylinders when we conducted these tests.

Okay. After the heat and flame treatment, we brought the units back to our facility where Nick ran ABM tests after retrofitting the devices.

And, again, like we had the one with the hose that was burnt through, we replaced the hoses with new ones.

With one of the units -- with the first unit, we noticed no difference with the ABM test results from untreated units. And this test was terminated after 240 minutes because the oxygen bottle was empty.

With the other unit, again, we noticed no difference from untreated units. And this test was terminated after 167 minutes because the oxygen cylinder was empty.

Conclusions: Heat and flame treatment did not adversely affect the performance when compared to untreated units.

The accelerated corrosion resistance. This treatment is mil standard 810F, the environmental test method, Method 509.4, the salt fog.

The test conditions: The apparatus is exposed to 5 percent plus or minus 1 percent of salt fog for 24 hours.

After this, it was put in a drying chamber which is set at 35 decrees C, plus or minus two degrees, for 24 hours. And two cycles of the

above is completed for the device.

Again, for this test, we used two closed-circuit devices, one each from two different manufacturers.

The results: No damage to the control and operating features of the devices.

Again, these were brought back and tested on the ABMS test protocol, and there was no difference from untreated units.

Next, we did a particulate resistance test. This is treatment mil standard 810F, method 510.4, Procedure 1, blowing dust with modified NFPA 1981 test procedures.

As Frank alluded to in his presentation, the closed-circuit SCBA was not rotated during the test because it was attached to the headform in lieu of a torso or a mannequin.

And this was done to minimize the trachea tube length between the ABMS and the SCBA.

Again, the ABMS would have been right outside the wall here, so we wanted to minimize the trachea tube length to the respirator. So instead

of having it out here and up on the mannequin, we wanted to minimize that length.

The test conditions, yeah, it was -- we had an air velocity of 533.4 liters per minute plus or minus 76.2.

The temperature inside the chamber was 23 degrees C, plus or minus 3 degrees. And it was operated, the ABMS, at workload B, which is 40 liters per minute.

Again, like the other tests, we used two closed-circuit SCBAs, one each from two different manufacturers.

And the results, we noticed no difference from untreated units.

The remaining benchmark testing that we are looking at doing is the chemical agent permeation and penetration resistance, environmental temperature operation performance, vibration endurance, communication, and the facepiece lens haze, luminous transmittance and abrasion resistance, and then flame and heat test for fabric and the thread.

And that's all I have on the benchmark testing.

MR. BERNDTSSON: Goran Berndtsson from SEA, again.

I just need to ask a question just out of ignorance. Why do we do heat and flame testing to CBRN?

MR. REHAK: Pardon?

MR. BERNDTSSON: Why do we do the heat and flame testing for CBRN?

MR. REHAK: We might be doing more heat and flame testing.

MR. KOVAC: He says why.

MR. REHAK: Why.

MR. KOVAC: Why.

MR. REHAK: Because basically, you know, these units potentially could be used by firefighters or first responders.

MR. BERNDTSSON: Yeah. So do you -- you intend to use them for firefighting? Is that what you are leading to?

MR. REHAK: They might have to go into a

flame environment, yes.

MR. BERNDTSSON: But it seemed to be dangerous.

You didn't want to have the oxygen cylinder there when you did the tests, so that kind of indicates that you shouldn't be using these in the fire. And then you ...

MR. REHAK: Well, we are taking this testing one step at a time.

MR. BERNDTSSON: I see.

MR. REHAK: The final heat and flame tests may be a combination, but we don't want to expose the factory or the independent testing agents to a potential safety hazard.

But we are planning to do testing for this certification with a live cylinder.

MR. BERNDTSSON: Is that -- do you have the long term that the rest of the CBRN-approved equipment is also going to go through the heat and flame test?

Is that the long-term view then, as we start driving into the -- because I mean, when

you --

MR. REHAK: For the closed-circuit, yes, we plan to do that.

MR. BERNDTSSON: The PAPR.

MR. KOVAC: I misunderstood, then.

No.

MR. REHAK: No.

MR. KOVAC: No.

MR. REHAK: No.

MR. PALYA: No. Because that's not going to be used in IDLH conditions.

MR. REHAK: Or a heat and flame environment.

MR. PALYA: Exactly.

MR. REHAK: This will potentially be used in the heat and flame environment, so, yes, we wanted to expose it to the heat and flame test to make sure that they would be able to withstand those conditions.

MR. FLYNN: Bill Flynn from Biomarine.

A simple question about the end of service time for the testing of the two apparatus

after flame test.

You have some specific numbers. Were they similar to pretesting?

In other words, one ended at 167. The other ended at 2 plus, so very similar to numbers at pretesting.

MR. REHAK: Yes.

MR. FLYNN: At least you specified these numbers, and that's the reason for the question.

MR. REHAK: Yes.

MR. LAMBERT: I said I wasn't going to do this, but I'm going to do it. I'm Barnum Lambert, ESS, from California.

I'm currently doing a project with TSWG, and it bothers me this question has come up about flame and heat testing for across the board because it's inconsistent with a statement that was made earlier about if you want a unit that's going to do everything, then you are going to wind up with a Sherman tank.

Now, you say first responders may be able -- or may be subjected to the same things that

a firefighter would. But first responders don't wear the uniform and the turnout gear that a firefighter does.

And so to expect a piece of equipment for say a police officer to go in, or a CIA agent, or a DEA agent, or the Coast Guard, or any of those that might have to go in and inspect a toxic spill or for whatever else, other than fire, for them to -- that unit to have to pass heat and flame tests, you are putting requirements on that unit that are unrealistic.

Because the first responder that goes in is going to be wearing blue jeans and light stuff, and they can't stand the fire test anyway.

So if the person wearing it can't survive the situation, why should the unit?

So my point is is that I think maybe that it should be seriously looked at here.

I have sat on the NFPA Board, and I sat on the last two rebreather boards for them, and I listened to all of this several years now running. And I agree for firefighters, yes, the flame test

is valid, but I don't think it's valid for a police officer. And I don't think it's valid for an FBI agent. And those are the people that right now really need units. There's more of them than there are firefighters.

Thank you.

MR. REHAK: Thank you. That's it.

Next agenda.

MR. SZALAJDA: I think we're running about a half an hour ahead of time.

But unless anybody has any concerns, we will just keep going and finish the closed-circuit this morning, and then we will take a break for lunch.

MR. KOVAC: Once again. Good morning.

And now I'm going to talk about modeling the facepiece leakage using computational fluid dynamics.

Next slide.

The most vexing issue of what risk a firefighter or first responder might have wearing a closed-circuit device.

And there was imperfect facepiece, slow leakage of oxygen into a high radiant heat or flame environment.

So our objective is to use computational fluid dynamics to simulate outward leakage, and then to experimentally validate the simulation so that we can gather a scientific understanding of leakage and the risk it poses.

We are partnering with the NIST Buildings and Fire Research Laboratory. And our timeline for completing the modeling is sometime before the start of Fiscal Year '06.

Next.

Let's talk a little bit about computational fluid dynamics.

The idea is simply to use a computer to analyze problems in fluid flow. And what the image is is something that you could do in a straightforward fashion.

When I computed closed form, it simply shows the flow paths around a cylinder or sphere.

We're going to deal with issues involving

turbulent flow, mixing things which are hovering at the edge of chaos.

So primarily the computational fluid dynamics gives us a means of visualizing flow and an understanding of what happens, especially when there's turbulent mixing.

But we must temper all of this. All the computer modeling and simulation means literally nothing independent of verification and verifying the reality that they are supposed to simulate.

So we propose checking the accuracy of the simulation using experimental methods.

Next.

Our protocol involves scanning actual heads and facepieces into a 3D data set for entry into our computer onto a computational fluid dynamics software, and this will provide the physical boundary conditions for the fluid problem to be solved.

We will examine different leak geometries representing an imperfect seal, and then we will look at oxygen concentration fields and flow

streamlines for those geometries during normal breathing and high stress breathing patterns.

And then we're going to look at what the results are and try to verify them experimentally.

Next.

Where we stand, we are able to model the human head, and able to model the interface between a half mask, in this case, and the head form.

We could do this with a full facepiece so we have the appropriate geometries to begin looking at the computational mesh that we need to do the -- basically the integration levels and equations for the fluid flow along the facepiece breach.

So what we are really talking about is just a work in progress. And it's something to help us gain a better understanding of the kind of risks involved due to leakage of oxygen into a high heat or flame environment.

And it's something that we will be reporting on in a fuller fashion later this calendar year.

Next slide.

And that's really all I have to say. It's a very brief presentation.

So if you have any questions or comments. No?

Okay. Again, it's a work in progress, something that we need to do.

And basically, what we need to do is just review where matters stand and where we are likely to proceed.

So we will revise and post all the revisions to our concept. We are going to continue stakeholder discussions. And we are going to continue benchmark testing, completing the protocols that we have outlined.

Our next public meeting will be sometime in November of this year. And the target date for completing the technical requirements will be at the end of this Calendar Year, in December of '05.

And we have the information for communicating with us by putting information through a docket, both by email and by regular post.

So that pretty much finishes our presentations. And we have an open mike now for comments, questions, whatever.

MR. MCKENNA: Doug McKenna from Micropore.

Nick, I had a question, how long -- what was the duration in time that two out of ten people dropped out because of the high pressure drop?

MR. KYRIAZI: They had to tolerate each pressure for four minutes.

So the study was that they were put on a treadmill at a certain speed, and then every four minutes the grade would increase.

And what they did, there were four different resistances and -- which are pressure -- four different resistances. I forget if they were -- it was like four different orifice sizes. And then every four minutes the grade would increase, therefore, their ventilation would increase and the pressures would increase.

MR. MCKENNA: If I understand that correctly, my question is that if the test standard

is a high rate for 12 minutes, and then down to 40 liters a minute, I think you said starting at 100 and then down to 40, in that 12-minute period, how many people wearing a unit performing that kind of work rate would drop out?

Would it be all of them or half of them?

And so I'm seeing a question between the daily use to support the breathing resistance which will cause two people to not be able to continue, and a higher work rate test on the rebreather, which might cause more people to not continue.

MR. KYRIAZI: What I think you are calling for is a specific research study for this particular test for a population of people, likely users or such.

Is that correct?

MR. MCKENNA: I guess I'm just seeing an inconsistency between the two tests.

Your data shows that two of the ten people are going to drop out, and -- but only after four minutes at that high work rate.

And so the test specification of 12

minutes at a higher work rate is going to cause more people to drop out.

And do we -- should we lower --

MR. KOVAC: Say that's a simulator test, Nick. They're not perfect.

That's a simulator test that he was talking about rather than a real person on a treadmill.

MR. KYRIAZI: That's correct.

MR. KOVAC: So we are looking at what's humanly tolerable and gauging it against that.

Whether we would put a person on the treadmill and duplicate that test is another matter.

MR. MCKENNA: So I'm just suggesting you are going to have more than two people dropping out at your current 200 millimeter pressure drop, and are we concerned about that?

MR. KYRIAZI: There are a number of things to consider.

One is that all of these stressor levels are, you know, as you increase the CO2, lower

oxygen, and increase temperature, increase pressure, there is no point or like a step for your threshold limit where everybody just quits.

It's very subjective.

So it's difficult to say that anything it -- is this on?

So it's difficult to come up with a limit for everybody for all purposes.

But what I think you are pointing out is that while they could tolerate the four minutes, that we're making them do the same work rate for 12 minutes.

MR. MCKENNA: That's correct.

MR. KYRIAZI: If you think that that would arise more concern, but to me it's a matter of if the person can't tolerate it, then they will have to slow down a little bit.

But also what you wouldn't tolerate may be dependent on your physical condition or what you ate this morning. So it's very subjective.

Some people -- you know, this was in a lab, where if people were told, you know, do it as

long as you can. And in a situation where it was an emergency, I'm certain that they would tolerate it longer.

So what we're trying to do is simply put the limits that no apparatus shall ever exceed these for more than a minute at a time.

And the worst case scenario, I think, would be that an apparatus was 199 millimeters of water pressure at the highest work rate, and it just stayed there for the full 12 minutes.

And it's very difficult -- you can talk to the manufacturers -- to design an apparatus like that.

And usually, the pressure is increasing. And so if it increases -- if it -- if it's subjected to -- whether you're being subjected to 199 millimeters for a minute, the next minute is going to exceed that. Usually the beds start to coagulate, and the pressures go up.

So it would be very difficult, I think, to have an apparatus which was the -- which pushed the limits and just stayed underneath and squeaked

by.

And if even if it did, all that would do -- it's not going to kill anybody. It's just going to -- for people who are severely sensitive to pressure and could not tolerate it, they would just have to work at slightly over level. It's not like it's going to knock them unconscious or anything.

MR. MCKENNA: Just one comment.

That was my point. And are two of the ten people not going to be able to work? And much more than that, because it's for a longer period of time, are we designing a specification where people are going to be able to do high work?

MR. KYRIAZI: Well, as I pointed out in one of the screens, the problem was ... go ahead.

MR. STEIN: I'm Bob Stein. I'm with NIOSH.

The gentleman that asked the question, the high work rate is not designed to elicit the maximum pressure resistance that you saw on the other slide. So it's not set to elicit that

maximum resistance for 12 minutes.

I believe your -- the way you asked the question makes me think that you think the test is specified to elicit the maximum resistance for 12 minutes, and it's not.

It's the work rate and the stressor levels are independent of each other.

If it should happen to elicit that high pressure level for that duration, perhaps people would, you know, will wilt away, as you suggest.

But a lot of apparatus do not reach that, you know, peak pressure at that high work rate.

So it's not designed to, you know, to be a challenge that people can't meet.

MR. KYRIAZI: In addition, if -- in one of the slides, we pointed out that if you designed it to be very, very comfortable at the absolute highest peak flow rate, chances are it's going to be very big and very heavy.

And people won't be able to tolerate just the bulk and the weight of it walking around in normal work rates.

MR. BERNDTSSON: Goran Berndtsson from SEA.

It sounds a little bit like you are writing a standard around equipment instead of writing a standard around the physical requirement.

I mean, I would have thought that you were saying that don't -- you see that after four minutes, two people are falling out, so we can't have 200 millimeter requirement because that is too high. I would have brought it down to 100 and told the manufacturer to go out and make sure they can't meet it; otherwise, you are going the wrong way.

That's my opinion.

MR. KYRIAZI: I don't understand how you can say we are designing around equipment.

This is -- we're designing it around human beings. This is what people can tolerate. So we are saying this is the outside limit.

At any work rate likely to be -- to be -- or an apparatus to be subjected to it, it will not subject the user to higher or outside of these limits.

MR. BERNDTSSON: Excuse me. Maybe. But to me it sounds like we want to meet 103 liters, so we do that for a little bit of time.

We can then justify that that can -- the system required to meet that, but not for too long time. Then we bring it down; then we bring it down; we bring it down.

It sounds a little bit like equipment we have now, how can we get that to be performing at 103 liters and still sustainable.

And then we look on some research on physiology. You should have as low pressure resistance as possible.

MR. KYRIAZI: Say that again.

MR. BERNDTSSON: Physiologically, you should have as low a resistance as possible.

I mean, if there is -- there is a good reason why we have three and a half inch or 76 or 85, 86 millimeter, whatever they call them, on other respirators with a maximum exhalation resistance. And here we are talking about more than twice that much.

MR. KYRIAZI: Well, again, let me point out that if you take an apparatus that were NIOSH approved and it just barely passed the NIOSH test at 51 millimeters, if you took it up to the NFPA, the high work rate, the 103 liters a minute work rate, you would see it would fail. Even our test would be higher than -- or our test limit at 200 liters, it would be to 225.

In fact, many of the apparatus, when you monitor them during the high work rates, they would exceed the pressure limits monitored during the low work rates, during rest, where they are measured now.

And also the 51 millimeters of water pressure is peak. Again, as I pointed out, that that's dry with no CO2.

Many of the apparatus, when you put CO2 and moisture in them, they will exceed that by much.

So the present apparatus are -- you -- I'm sure there are apparatus out there that if you test them at the highest work rate, they would

exceed everybody's stressor level limits.

And we're simply trying to bring human physiology in this and say that we're designing this to enable people to use the apparatus at any -- the likeliest highest work rate, it will not exceed human tolerance limits.

Any other challenges?

MR. HEINS: It's Bodo Heins from Draeger Safety.

I can see that you go more and more to the NFPA 1981 standard, which is for firefighters. And the CBRN standard should not be alone for firefighters.

So in my not being involved in the standard, but that did not became valid. Because I think the requirements have been very hard and strong, and therefore it was stopped and not validated.

MR. FLYNN: Bill Flynn from Bio Marine.

I want to change the subject slightly about the cost for the CBRN testing.

At our last meeting, we mentioned, at

least I mentioned that the cost, A, could be prohibitive based on the size of the market.

And I know you still have updated costing, but do you know when updated costing for this testing will be available to manufacturers?

MR. KOVAC: I'm going to defer to somebody else on that.

Jon.

MR. PALYA: I think probably the best we could tell you at this time is we will address it when we get together in November.

We have an idea of what certain costs are with regard to our -- our testers at Edgewood cost per test.

But until we further define the need for certain requirements and the number of apparatus that are required for each test, it's just a guess at this point.

MR. FLYNN: We have a proposed standard for how many apparatus you are going to require.

As you are going through the benchmark testing, would you then have emerging cross-data

that could then be made public as just emerging data so we would have an idea?

And related to that, do you have an idea when events, benchmark testing for the live agent test will occur?

MR. PALYA: With the -- what we are doing is we're still going through that benchmark testing. And then we still got a lot to go, especially with chemical warfare agents and reagent tests.

The only thing I can say is maybe, as it becomes available, we could just probably put a approximate cost up there.

But as we are -- we are running more with the benchmark testing.

MR. SZALAJDA: And what the -- at least as far as an update with the agent testing, one of the challenges that we had to overcome was the integration of the ABMS into the set up at Edgewood.

And what has been conceptualized is that there's going to be a walk-in hood with the

SMARTMAN that also has the ABMS included inside the walk-in hood.

And we are in the -- Edgewood is currently in the process of getting that scoped out and set up now. And we envision probably between now and the next public meeting, we will have been able to have run some tests.

MR. FLYNN: So it's pretty wide open. I don't think they even have a walk-in hood at this point.

MR. SZALAJDA: It has been ordered.

MR. FLYNN: Okay.

MR. SZALAJDA: It's just not installed, but it's been ordered, and they have to make some laboratory modifications to accommodate the hood.

The ABMSs have been procured. They have them as far as the systems are there.

It's just a question of them doing their due diligence in getting the hood set up and preparing to run the experiments for us.

But we will look at some different options, at least as far as trying to develop some

of the cost data and whether we introduce it through the concept paper out, or if we present it at the public meeting, the next public meeting.

We will have to make a determination on that.

MR. KOVAC: Much of what we do is exploratory in nature. Much of what we do regard as benchmarking, and so costs are going to be derivative from the information that we collect.

And I suspect our intentions are to act with prudence and to act in a way that makes sense for all the stakeholders involved.

We want good product. We want good science in certifying that product. At the same time, we have to balance that against a realistic goal upon a manufacturer for submittal.

So these things all need to be worked out. That's, I think, where we stand except for a lunch break.

MR. SZALAJDA: Okay. Why don't we reconvene at 1 o'clock, and then we will pick up with the guidance documents at that time.

MR. KOVAC: Thank you all for your attention.

(A lunch break was taken.)

MR. SZALAJDA: At least as far as what we are going to cover this afternoon, we have completed discussions on the closed-circuit.

This afternoon, we are going to discuss current concepts that we have for guidance documents for the CBRN respirators.

There's a couple of different products that have been developed which are available on the website, as well as two or three that are available on the website, were made available in the CD that you received coming into the meeting.

You can make -- you can download the guidance document for the SCBA off the website. That is posted.

But, again, for this afternoon, if you have any comments, the same rules apply. Please come up to the microphone and state your name and affiliation for the record, and state your question.

One thing I forgot to mention this morning, I'm not sure if you guys are aware or have heard of NIOSH E-news. It's a monthly newsletter at the NIOSH directorate, the NIOSH division from Washington issues.

That's a synopsis of all of NIOSH's business for the month, which includes not only the activities that we do in Pittsburgh, but also the other NIOSH divisions in Morgantown, Cincinnati, and Spokane.

So it might be worth your interest, if you are not already a member, to get these electronic transmissions automatically.

There's some information on the back table as far as filling out your name and email address, and we can put you on the link to get the e-news automatically.

For the respirator guidance, the docket has been set up. It's -- 052 is the docket number for your comments. It's a little different for this system than it has been for the respirators.

The respirators in general, the docket is

open all the time. And after each public meeting, we ask for specific comments on a particular concept paper and within a 30-day window following the public meeting.

But for the purposes of the guidance document, we are pursuing the development of these as products that will be formally published by NIOSH. And the terminology we use is a NIOSH numbered document.

But these will be a formal publication that will be issued by the institute. And as such, we are in the process right now that we have -- have had internal reviews of the document and are getting to ready to release them for external peer review.

And we felt it was appropriate at this time, prior to starting that external peer review process, to allow the community to have an opportunity to look at the types of information that we are developing. And then relaying that, relay back to us if you think we are on track or if there are additional things that you think we

should be addressing with regard to these types of documents.

And, again, what I would highly recommend, if you are going to make comments to the docket, if you have specific recommendations that you think we should address, if you could, please, you know, include rationale if you have literature or other technical background that you think we should know relative to the implementation of the guidance documents, we would appreciate knowing that.

But for this system or for this process for the guidelines, we are looking at having an open comment period through the 31st of August.

And at that time, the docket will close, and we will review the comments and then make some determinations on incorporating the results and moving -- incorporating the input and moving forward at that time.

And so with that, I would like to introduce Terry Cloonan.

Terry is going to provide an overview of

what we're doing in the area of developing the guidance documents as well as providing some information on the self-contained breathing apparatus.

MR. CLOONAN: Thanks, Jon.

Good afternoon. For those of you who don't recognize me, I am Terry Cloonan. I'm a physical scientist in the National Personal Protective Technology Lab at NIOSH.

And normally I don't go by a script, but today I'm going to go by a script because this is a NIOSH formal external review process forum with the add on of the public comments for these use guides.

I will be your presenter for the next two agenda topics.

The topics are an overview of guidelines for use of NIOSH-approved CBRN respirators and the draft NIOSH CBRN SCBA User's Guide. Please withhold your comments until the dedicated question period.

All CBRN respirator use guides are draft publications being staffed through NPPTL and then

NIOSH, using defined NIOSH internal and external review processes.

The integration of public comment on these guides is a new initiative, and, consequently, the guides referenced in this public meeting are posted on the NPPTL webpage for a period of 49 calendar days.

All public comments received during those 49 days will be accepted, understood, and addressed for consideration of inclusion or deletion based on analysis of provided rationale and scientific methodology.

Submitters of those public comments should provide clear administrative contact information with the public comment and should expect a status on the comment within 30 days of the receipt by NPPTL.

The public comment period for the use guidelines supports the stated mission statement to the front. And this is to prevent work-related injury and illness by ensuring the development, certification, deployment, and use, I say again,

use, of personal protective equipment and integrated clothing ensembles.

Work related injury and illness prevention is achieved by the proper use of NIOSH-approved respirators with other compatible PPE.

Ensuring the proper development of PPE is accomplished by the conduct of open public meetings, formal stakeholder information sessions, and deliberate due diligence of select PPE standards and standards development.

Certification of PPE, specifically respirators, is a paramount function that contributes to the critical use of respirator selection logic and accurate deployment of PPE in support of preventing work-related injury and illness in emergency responses.

Training and assessment of training is vital in determining strengths and areas of improvement related to the efficient use of personal protective equipment.

The use of current PPE continues to

evolve with the dynamic global terrorism threat and advancing CBRN standards development to counter that threat. NIOSH CBRN respirators play a pivotal role in deterring the evolving threat.

The firefighter with turnout gear and SCBA as well as the responder in Level C, B, or A requires respirator use guidelines that will assist in focusing the multitude of types and styles of PPE available today.

CBRN respirators provide that cutting edge response multipliers that contribute to better force protection available to the incident commander who is responsible for preserving the available responder manpower.

Respirator Use Decision logic should not be done in a vacuum. It requires input and collaboration from various sources, such as sampling and monitoring assets, operations sections, logistics sections, exclusion zone controllers, and incident command authorities.

While CBRN respirator certification standards are continuing to be developed by NIOSH,

CBRN respirator use guidelines are now starting as a culmination of CBRN respirator standards development and certification testing outputs.

The first use guideline in a series of NIOSH CBRN respirator guides is the CBRN SCBA User's Guide with its companion Training Aid pamphlet.

Parallel with that guide, the CBRN APR User's Guide is also available. As stated, all three are available in draft and have been on the fast track for expeditious publication.

So what are the guidelines for the use of CBRN Respirators?

The guidelines are published documents free to the public and focused on the end-user. NPPTL intent for publishing CBRN respirator use guidelines is that they will be NIOSH numbered publications designed to provide end-users, supervisors, and administrators recommendations of use based on insight gained from live agent certification observations, end user feedback, observations of homeland security terrorism

readiness exercises, active participation in national SCBA training programs, and peer reviewed recommendations.

The guides will address all field deployed CBRN respirator types. Future opportunities to address other types of respirator use guidelines, besides CBRN response, are to be determined.

The intent for publishing the user guides is to assist responders in determining the who, what, when, where, and how of CBRN respirator decision logic. A thorough read of the guides is expected to allow a user to determine how to attain the best and safest performance from NIOSH-Approved CBRN respirators...how to take that knowledge and train on it, allow acclimatization of responders to increased PPE wear time, and ultimately contribute to a stronger CBRN incident response.

CBRN respirator use is a perishable skill that requires refresher training on a regular basis.

With the given NPPTL intent for use

guides, the term "use" does, in fact, have precedence established in NIOSH federal regulation and selection logic.

The fact that NIOSH is moving forward with guidelines for use of CBRN respirators is a direct result of forward thinking, situational awareness, and proactive vision.

42CFR Part 84 has use precedence located in four locations on the CFR. Specifically, paragraphs 84.2, 84.3, V,b and V,c specify definitions related to respirator use.

Industrial respirator use documents are prevalent and have been available for some time. They are located at the link shown to the front.

CBRN respirator use documents are a much needed addition to the industrial and medical respirator publications currently in existence.

CBRN use guide development.

Five current events have set the pace for the state of NIOSH CBRN Respirator Use Guidelines.

In December 2001, important after use observations were discussed in the New York City

NIOSH RAND public meetings.

NIOSH and RAND followed that event up with three publications that represented a comprehensive assessment of occupational health and safety observations.

Publications that provided insight on structural collapse, safety measures, and PPE use recommendations for terrorist attacks.

Guides focused down at the end-user level were recommended. In support of that recommendation, NPPTL formed a User Guide team in September, 2004 to translate CBRN standards development into guideline documents for CBRN respirator use.

From August of 2004 to June 2005, an NPPTL team developed and wrote two guides and a training aid to support one of the guides, focused at the emergency responder end user and supervisor levels.

Quality of scientific information published in government publications was clarified in a recent NIOSH policy on disclaimers and a

supporting Office of Management and Budget (OMB) communications product policy as recently as May 2, 2005.

Now in support of the OMB guidance and the NIOSH Education and Information Division recommendations, NPPTL provides three draft user guides in conceptual draft format for public comment as of July 14, 15th, and now most recently, the 18th.

Guide Purposes.

There are four: To assist, to educate, to prevent disinformation, and to recommend.

Recommendation guidelines that provide better training through better understanding, better preparedness through better training, and better integration of CBRN respirators used at the lowest respirator level resulting in better incorporated respirator use guidelines that rely on responder review and feedback.

Our purpose is to assist users at all levels in understanding how to identify CBRN respirators, how to integrate cautions and

limitations, and how to maximize understanding of those cautions and limitations in the use of the respirator.

NIOSH user guides are expected to contribute to better training by providing insightful perspectives on how to use CBRN respirators before the incident starts, enroute to the incident, during the incident, and after the incident.

With this type of dynamic purpose, the guides are subject to annual or semiannual revision over time.

CBRN respirators have unique qualities built in. Respirators need to know -- correction.

Responders need to know those unique qualities so they have a better understanding of how the respirator will perform when actually contaminated with live chemical warfare agents or other hazardous substances.

These respirators are intended to be the first line of respiratory protection for emergency responders and other types of workers as situations

dictate.

However, just as with any new respirator technology, CBRN respirators are not the all-inclusive magic bullet. There is no superman respirator for the emergency responders.

NIOSH approved cautions and limitations play vital roles in clarifying and stating the use of the CBRN respirators and thus their limits more so than any industrial caution and limitation that currently exists.

The knowledge of the cautions and limitations coupled with sound incident risk assessment is expected to contribute to the prevention of terrorism workplace illness and injury from exposure to CBRN agents.

Conceptual documents focused on applying the cautions and limitations to everyday respirator use are what the current draft use guides are.

Three concept User Guides are posted in draft format.

They are the CBRN SCBA User's Guide, the CBRN SCBA Training Aid for the SCBA, and draft CBRN

APR User's Guide documents.

These guides are comprehensive technical guides that join NIOSH certification outputs with practical recommendations or available best practices to create a single source reference for how to use a CBRN respirator at the lower -- correction, at the lowest use level, the first responder.

The public comment period, as stated, is 14 July through 1 August. Forty-nine days are used so as to not present a significant delay in the formal NIOSH external review process, which is expected to start shortly after the public comment period.

Proper use, better preparedness, better response, safer emergency workplaces, ultimately leading to possible deterrence of a CBRN attack. This is our charge, and this is our challenge. You know very well what our mission is.

NIOSH CBRN Respirator User Guides focus on available technology in common read-only formats and will have sufficient technical information to

allow accurate PPE decision logic processes.

Proper use of the CBRN respirators will contribute to better preparedness, better product assessment, better response, better future developments, and safer emergency response workplaces.

The use of CBRN respirators may stop, deter, or alter the effective use of CBRN weapons of mass destruction by providing the highest level of respiratory protection possible in a field deployed respirator and prevent the permeation and penetrating effects of chemical warfare agents on respirator air-pressure boundaries or material surfaces.

NPPTL looks forward to your public comments.

This concludes the overview brief. The one after is for me as well. I'll try to keep that brief as well.

Does anyone have any comments? No.

Any questions? I'll take one or two questions.

I know you're not shocked and awed at that. Come on.

All you end users in here and outstanding -- yes, sir.

UNIDENTIFIED MAN: Were they posted yesterday?

MR. CLOONAN: They were posted as of the 14th of July, and we recently reposted the CBRN SCBA users guide training aid on the 18th of July.

So they are relatively recent posts, yes, sir.

And you are the probably at a disadvantage because you may have not have the opportunity to see them, but that's intentional. No, I'm just kidding.

UNIDENTIFIED MAN: (Inaudible)

MR. CLOONAN: We are moving on here.

The next two presentations on use guides will address specific types of CBRN respirators, the SCBA and the APR.

The SCBA under discussion is the open-circuit, pressure demand self-contained

breathing apparatus, commonly known as a SCBA, or BA, for Breathing Apparatus, in international markets.

The SCBA is also marketed under specific manufacturer terms such as "Air Pak," et cetera, et cetera, in US markets.

The APR guide is the tight fitting, full-face, negative pressure air-purifying respirator, also known by NIOSH as the "gas mask."

Both guides complement each other by sharing a similar purpose, intent, and overall format.

Using the CBRN SCBA and APR guides together allows for the translation of technical information contained within the guides to practical end user knowledge and in-use service terminology while providing a technical training format that will increase CBRN respirator capability awareness and prevent disinformation about CBRN respirator performance, use, or misuse.

Chemical, biological, radiological, and nuclear weapons employed in terrorism attacks or

other adversarial events are expected to be unpredictable.

Since the CBRN weapon effects are essentially unpredictable, use of CBRN weapons on an unprepared civilian workforce might well be seen as a lucrative target by a terrorist or other enemies adversarial to the US or US allies and their interests.

OSHA and NIOSH precedence for why a respirator is used and how it is defined exists in the OSHA respirator use statement found in OSHA Document No. 3079, Respiratory Protection, dated 2002, and paragraph 84.2 of the Department of Health and Human Services 42 CFR Part 84.

Emergency responses to CBRN terrorism attacks are not expected to have defined exposure levels that can be negated by work practices and engineering controls.

Therefore, the CBRN SCBA is designed to provide the highest level of respiratory protection and the longest available supplied air service life in chemical warfare agent contamination, unknown

hazards, or oxygen deficient atmospheres.

Specific CBRN PPE emergency response matrix information -- anybody seen that document on the OSHA website? The OSHA NIOSH CBRN PPE selection matrix? Raise your hand? One, two, three. Okay. You have never seen it? It's a pretty significant document. It tells you, if you are a responder, hey, this is the recommended level of protection for this type of agent.

It states the AEGL values. Are you familiar with the AEGL value?

UNIDENTIFIED MAN: Eagle?

MR. CLOONAN: Yes, A-E-G-L.

When you read these documents, you will start to learn significant definitions and acronyms. It's a real challenge.

UNIDENTIFIED MAN: I'm not familiar with that.

MR. CLOONAN: It's a real challenge.

To accomplish the NPPTL use guideline intent, the lab has developed a NIOSH document formally entitled, "Guide to the Technical Use of

Chemical, Biological, Radiological, and Nuclear (CBRN) Open Circuit, Pressure-Demand Self-Contained Breathing Apparatus (SCBA) Respirators Certified Under 42 CFR Part 84."

That's a very long title. So consequently, we have a short title to support that. It's the CBRN SCBA User's Guide.

The long title is intentional and designed to be accurate in reflecting the formal description of a respirator and prevent misinformation by clearly describing the respirator, what protection it is rated at, and the fact that the SCBA is a respirator in accordance with 42 CFR Part 84.

You would be surprised how many responders think an SCBA is a respirator.

This guide is intended to assist emergency responders in determining best in-use practices, transferring those practices into training programs, and serves as a reference that contributes to increasing CBRN weapon defense readiness at the end-user level.

The SCBA guide does these actions by describing user guidance that focuses on technical functions of the SCBA, technical interpretations of service times, and formal NIOSH internal and external review comments.

Currently, the guide is draft for discussion. It has six chapters with six appendices.

Chapters 1, 2 and 3 address significant steps taken by NIOSH in determining the rationale for CBRN SCBA certification standard development, applicable unique CBRN design requirements, and the integration of certification approval factors with production model CBRN safety markings and labels.

Each CBRN SCBA has common NIOSH cautions and limitations, but also has unique manufacturer CBRN markings specific to that manufacturer's specifications.

The guide discusses all the available production model safety markings present in the marketplace and describes those markings in an effort to help the end-user identify CBRN SCBA from

non-CBRN SCBA.

That's an important distinction because if you are an end user, a lot of end users don't know the difference between a NIOSH-approved SCBA and a NIOSH/CBRN-approved SCBA.

So when they read this document, they are going to learn how and they are going to easily recognize a product in the field if in fact they use it the field effectively.

Chapters 4 and 5 are focused on best practices and application of NIOSH cautions and limitations, and I will discuss them further in the next two slides.

Chapter 4: CBRN Respirator Use Life, also coined as CBRN Respirator Use Life, C-R-U-L.

CBRN respirators need easy references to service life of actual in-use time. The C-R-U-L does that. Bear in mind, this is draft. It's all eventually subject to change, but it is a working acronym which may serve its purpose.

Chapter 4 is a pivotal trend setting chapter because it applies and interprets the NIOSH

cautions and limitations for the CBRN SCBA and creates the terminology of CBRN Respirator Use Life, or C-R-U-L.

C-R-U-L is a draft working acronym that is easy to use in describing the in-use service life of a contaminated CBRN respirator.

C-R-U-L applies to contaminates from chemical warfare agents only. It is a time value that is not applicable to TICs, TIMs, biological, or radiological contaminations because it is understood that end users can wash those contaminants off, but cannot necessarily wash off the permeating effects of chemical warfare agents.

CRUL is new because new limitations are in effect for CBRN respirators. These respirators have defined time values, usually in hours, built into the limitations.

For the CBRN SCBA, the limitation label "U," the letter U, is specific to the respirator and states that the SCBA should not be used beyond six hours after initial exposure to chemical warfare agents to avoid possibility of agent

permeation.

The unit of measure for the CBRN SCBA CRUL value is in hours, and this hour value of six is not divided in any shape or form.

And that, of course, is elapsed continuous time, that six hours.

Just as NIOSH industrial respirator use concepts are dependent on specific NIOSH cautions and limitations approved with a class of respirators, CBRN respirator readiness checks focused on before, during, and after actions are depending on NIOSH approved cautions and limitations as well.

Before use operational checks are listed in the guide and serve as a friendly reminder that normal pre-use checks should be done with emphasis on the integration of available quantitative and qualitative CBRN weapon detection, monitoring, and sampling processes vital to determining the start time of a CRUL value.

Specific actions are defined in the section on user actions during an incident

response.

During incident readiness checks describe actions for donning, user seal checks, doffing, escape, component failure, use of a bypass valve for purging contaminants, immediate decontamination actions, and when to start processing contaminated CBRN SCBA hardware systems with or without cylinder for disposal.

A CBRN SCBA has six hours of in-use service life when exposed to confined chemical warfare agents.

In support of this six-hour in-use service life value, cylinder rated service time will have to be understood and breathable air re-supplied to attain the full six hours of expected use.

You can use this document without knowing the product. You have to be a trained user to understand this technical guide.

Once contaminated, CBRN SCBA are in fact single-use respirators.

In the after actions readiness checks

section, the guide addresses unmasking procedures with available detection platforms, system doffing, system decontamination, system handling and disposal.

Lastly, special use topics such as use of CBRN SCBA with Level A and B, protective ensembles, why a CBRN SCBA is recommended over a non-CBRN SCBA, how a CRUL time value is determined when Level A is worn, how protective suit bypass-through devices -- I'll say again -- how protective suite pass-through devices are not CBRN approved as well as RIT PPE cylinders, law enforcement requirements and explosive ordnance disposal/bomb suit interface challenges are also discussed.

When the user of this guide is done reading it, he or she should be able to recognize and discuss the seven distinct traits of a NIOSH-approved CBRN SCBA.

They are listed to your front and essentially consist of four types of adhesive labels, one type of paper insert, the inclusion of the CBRN letters and the official NIOSH Technical

Certification TC-13F approval number, awareness of unique manufacturer markings, and knowing the difference between a NIOSH-Approved SCBA and a NIOSH CBRN-Approved SCBA.

When the first NIOSH CBRN SCBA approval was issued, CBRN SCBAs were expected to be fielded to emergency responders at an accelerated pace.

After all, CBRN SCBA are unique respirators in that the SCBA can perform three different emergency response missions simultaneously and support the accomplishment of a fourth response mission.

The CBRN SCBA can provide protection in structural firefighting, hazardous materials response, and CBRN incident response without exchanging any parts.

It can also support, from a field perspective, which is law enforcement clandestine meth lab insertions when noise and light discipline measures are not required by law enforcement responders.

Observations of homeland security

exercises, SCBA training courses, and municipal SCBA maintenance programs show that both non-CBRN SCBA and CBRN SCBA are in use by emergency responders today.

Fire service use of CBRN SCBA is progressing with entire departments being fully outfitted with CBRN SCBA, other departments with phased purchase programs, and still others with no CBRN SCBA available at all.

Some concerns about the in-use service life of a CBRN SCBA that has been in the field for an extended time have surfaced.

When a used CBRN SCBA has hours logged on as a traditional firefighting SCBA, its air pressure boundaries and materials must maintain NIOSH CBRN performance approval thru strict compliance with the manufacturer's user instructions and applicable quality assurance control measures on parts replacement and serviceability.

A fire hardened SCBA should not lose its CBRN protection over time any more than a non-CBRN

SCBA loses its fire resistance over time, fair wear and tear of a respirator being an exception.

A used or field deployed SCBA, a retrofitted SCBA, that is retrofitted to CBRN protection is required by NIOSH to have a minimum of 400 hours of use time logged before submission to NIOSH for CBRN Retrofit Approval.

The addition of a CBRN retrofit kit to this field-deployed SCBA brings that SCBA up to acceptable minimum NIOSH CBRN standards of performance and readies that respirator for use in a CBRN environment, despite the accumulated effects from over 400 hours of use.

Provided the SCBA is properly maintained and serviced, the CBRN SCBA, is expected to provide the minimum CBRN protection as required by NIOSH for all emergency responders.

If there is continuing doubt over a specific type of CBRN SCBA to protect a responder, perhaps a rotating stockage of CBRN SCBA is an option or the issuance of CBRN SCBA on transports strictly for CBRN response and thus allow dedicated

use of non-CBRN SCBA for traditional responses.

A recent informal assessment of 25 fire department municipalities across the nation showed that less than 25% of them actually have CBRN SCBA on hand.

It also showed that over 40% are projected to receive CBRN SCBA as full or partial purchases through the year 2006.

This means that traditional NFPA NIOSH approved SCBA are currently still widely used by firefighters.

With the recent endorsement by the Department of Homeland Security, CBRN respirators are specified in DHS equipment grant awards and are being purchased by both fire and law enforcement response jurisdictions over time.

CBRN SCBA also have a role in protecting bomb technicians that render safe improvised explosive devices or sophisticated explosive devices. Bomb technicians have special respirator needs specific to the type of bomb suit worn.

CBRN SCBA are not ballistic hardened, and

not all types are compatible with available bomb suit technologies.

All of the mentioned responders have unique use requirements and applicable guidelines that allow future publication of additional NIOSH CBRN respirator use guides tailored to their needs.

In other words, there's the opportunity to develop more guides based upon future observations of end users.

Current use technologies and procedures serve as a foundation of CBRN respirator use guidelines. Recent observations of DHS full-scale terrorism exercises and a special weapons and tactics team SCBA training course show the need for a NIOSH CBRN SCBA User's Guide is paramount now.

Eight generic observations are listed for full scale exercises:

No. 1: Non-CBRN SCBAs are used by federal responders and local responders alike.

CBRN SCBAs are either in short supply, not used at all, or are fully used in those municipalities that can afford to purchase or

procure them.

CBRN and Non-CBRN APR are used by local responders, local versus federal.

CBRN APR are used with training CBRN canisters, case in point, this product, this is a training canister. And some manufacturers have put training labels on the CBRN can to make a distinction between a training can and contingency can for use.

Mil spec NBC respirators, military specification, nuclear, biological, and chemical respirators, are used by follow on first-in federal responders, despite the fact that there are NIOSH CBRN APR approvals currently existing.

Federal responders are true first responders in Saratoga suits with Mil Spec APR. Firefighters in turnout gear and SCBA assess attack victims, triage them, and evacuate them to the decontamination corridor.

Once casualties are evacuated from attack site or in parallel time, federal responders conduct crime scene investigation and contamination

mitigation in Level A and B protection. Crime scene photography is also done in Level A or B protection configurations.

Full Scale response shows no closed-circuit SCBA in use.

Where is Mr. Kovac at? Is he missing this dynamic presentation, Frank?

MR. KOVAC: Not at all.

MR. CLOONAN: I'm just kidding. There he is.

Want to take a break? No, I'm just kidding.

Protecting the interface between a Level B suit hood surface and respirator surfaces are not a priority in training for select federal responders. Chem tape is not used on head respirator interface most likely due to a training decision not to use tape during training exercises to avoid heat stress.

A high percentage of local municipality responders are in Level C with some response teams ramping up for Level B Hazwoper response, but then

standing down.

Full spectrum of available PPE is used in a four-hour federal full-scale exercise.

All of these full-scale exercise observations are transferable into appropriate use guide recommendations for during incident actions, specifically, respirator in-use service life, compatibility with protective suit ensembles, effectiveness of responders while wearing PPE, and most commonly observed PPE breach actions.

Continuing observations.

A non-profit organization of law enforcement responders called the National Tactical Officers Association is training SWAT teams across the nation on how to use SCBA in support of meth lab raids and CBRN responses.

Recent observations show the following:

One: NIOSH Approved Industrial SCBA are, in fact, in use.

NIOSH CBRN SCBAs are not in use.

NFPA compliance is requested by NTOA or SWAT officers on the ground. I say again, NFPA

compliance is not requested by NTOA or SWAT officers on the ground.

NIOSH CBRN approval is recognized as a need, but not requested, because it has NFPA compliance tiered into the SCBA, and that is perceived to contribute to the possible compromise of a SWAT mission or operator.

The SWAT National Tactical Officers Association recommends formal testing on the effects of sniper rounds on SCBA and SCBA cylinders.

Formal testing may prove that ballistic hardened CBRN SCBA are needed by law enforcement.

Formal testing may also show that emergency release buttons or switches are needed on CBRN SCBA to allow compromised cylinders to be ejected in a safe zone or to stop the SCBA from being ejected from the back of a SWAT officer.

Formal testing may also show that current NFPA compliant SCBA or CBRN SCBA are too noisy for law enforcement use and also are to shiny/reflective for use in stealth missions.

Additionally, law enforcement use of CBRN SCBA or non-CBRN SCBA is constrained by the following factors:

Cylinders on SCBA are targets for ballistic round penetration. Just as the SWAT officer can be taken down by a gunshot wound, an SCBA hit by a bullet can catastrophically destruct and cause collateral damage.

Ballistic vests are worn by law officers; However, there is no ballistic protection for SCBA. Ballistic Kevlar cylinder sleeves are possible solutions to harden or protect the compressed air cylinder of a SCBA.

Proper use of the SCBA is not possible if the SCBA is compromised by a gunshot or is too heavy as a result of added ballistic protection panels.

So there is a correlation factor back to a use guide.

SCBA currently have no emergency release buttons or switches built in to allow ejection of the SCBA from the wearer's back allowing the wearer

to use the ground or close by barriers for protection while the SCBA expends its compressed air.

Proper doffing of the CBRN respirator needs addressed by technical requirement standards development and resulting user guidance publication.

Loose cylinders used to refill empty SCBA cylinders can be likewise targeted and catastrophically destructed generating an extremely dangerous user workplace and prevent the proper use of the SCBA and its components.

Proper protection measures of SCBA cylinders need technically addressed to allow safer use of CBRN respirators and provide minimum protection in the case of catastrophic expenditure of high pressure air cylinders.

As you can determine for yourself, the draft NIOSH CBRN SCBA User's guide is a dynamic publication subject to the completion of the formal NIOSH external review process, public comment integration, and final print copy processing.

Please send your professional comments to the NIOSH docket office information provided by Jon Szalajda, Attention NIOSH Docket 052.

Thank you for your attention and support. I will be followed by Mike Bergman to assess the CBRN APR User's Guide.

MR. BERGMAN: Hello. I would like to say it is a great opportunity the present this information in a public forum, and your comments are extremely important to myself as well as the mission of the documents.

Again, the docket closes August 31. And I would like to present the CBRN air-purifying respirator -- we call it the gas mask or a APR -- use guidelines.

For an overview, the statement -- the statement of standard was passed in March 2003. It's a 14-G approval under 42 CFR part 84.

There are a 139 identified CBRN threat -- CBRN canister threat protections. And the APR has a NIOSH assigned protection factor of 50.

There are cautions and limitations

specific to use in CBRN environments, one of those being the CRUL value, as Terry spoke about, for -- which is a time use limitation for chemical warfare agent exposure.

I'm going to be talking about the canister cap, or canister capacity or cap selection.

The provision for canister interchangeability, which a crisis provision, to use a canister from another manufacturer when supplies are limited, there is an escape contingency from IDLH environments, which is based on five-minute gas life tests at a high flow rate. And then I'm going to be discussing industrial use versus CBRN's use of the system.

We have to talk a bit about the OSHA respiratory protection standard in that, for compliance for that standard, there is a requirement for a determination of medical fitness, fit testing, requirements and procedures for cleaning, maintaining, repairing, storing, and also a canister change schedule for gases and vapors.

Bear with me for just a second here.

I would like to summarize a few points here. For CBRN APR use, all of the following conditions must be met:

That is the types of inhalation hazards and concentrations have to be identified.

The CBRN canister is capable of removing the hazard, but the oxygen concentration is not oxygen deficient.

Contaminant concentrations are less than IDLH and less than the APR's maximum use concentration. And there is a canister change schedule established in the case for gases and vapors, and that use complies with all identified NIOSH cautions and limitations.

There is a joint OSHA NIOSH project which is located on the OSHA website, which are interim guidelines for the identification of respirator and protective clothing selection for CBRN environments.

Again, you can find it on the OSHA website by following the emergency response links.

And for blister agents and nerve agents, the PPE selection is given at defined airborne concentrations.

Here we have an example of a CBRN APR canister sticker label. I know you can't read the fine print there, but I did want to show this in that it identifies the NIOSH approval number, the protections, and the cautions and limitations.

Again, the CBRN canister has 139 identified CBRN threats. The canister is tested using 11 test representative agents. There are ten gases and one particulate aerosol.

The challenge concentrations of gases are multiples of IDLH of the test representative agent.

We have to get into a discussion about canister service life here.

In general, service life is the time of use of the canister against a gas vapor before there is a specified breakthrough concentration.

There are a number of factors which affect canister service life. Some of these deal with the absorbent amount and quality,

environmental conditions, such as the temperature and humidity, as well as the work rate of the wearer.

Excuse me just a second here.

Canister capacity. There are six identified levels of canister capacity. And canister capacity relates to the amount of gases or vapors the canister can remove from the contaminated air. The capacity levels are based on NIOSH certification testing.

We can understand canister capacity by reviewing it as a relative capacity compared to the Cap 1 canister at similar exposure concentrations.

For example, the Cap 2 canister has about twice as much capacity for gases and vapors as the Cap 1 canister at similar exposure conditions.

There is an OSHA requirement for a change schedule which specifies that it be based on objective information or data that will ensure that the canisters are changed before the end of their service life.

This applies again to gases and vapors,

not particulates. And where there is no end of service life indicator appropriate, you must have a change schedule.

And, again, CBRN APR are not currently approved with an end-of-service-life indicator.

Canister interchangeability, as I spoke about at the beginning of the presentation, is a provision under a crisis situation with our limited supplies of your particular canister for your particular facepiece.

That is, you can use another manufacturer's canister in this case of restricted supply.

It is possible by the standard requirement of standardized threads and interface connectors on the mask.

The decision to proceed with interchangeability is the responsibility of the incident commander or other commanding authority under crisis conditions.

And when a system is assembled in such a manner, it is not in its NIOSH-approved

configuration. So, again, just to emphasize that this is really a provision in time of crisis.

We have to talk about the difference between CBRN use and industrial use in that the same facepiece part number may be part of different approved respirator configuration.

There can be a CBRN approval, or it can be an industrial approval. The approved configuration will specify if it is a CBRN canister or if it uses an industrial canister, for example, a P-100.

The CBRN canister should not be used for routine industrial use, and the CBRN canisters should remain in their sealed packaging until needed for CBRN response.

And this is possible by making sure to maintain the system in accordance with the manufacturer's maintenance requirements so that that system is always ready if needed for CBRN response, that you can change the industrial canister to a CBRN canister and then proceed.

Terry talked a bit about the CRUL, the

CBRN Respirator Use Life.

And for the CBRN APR, it is an eight-hour use life in the case of chemical warfare agent vapor, or a two-hour use life in the case of chemical warfare agent liquid.

And what we are really talking about here is a system use life, that is the entire system, the facepiece, canister, and all of the accessories.

The CRUL time includes the decontamination time. And at the end of that CRUL time, the entire system gets disposed.

The chemical warfare agents applicable to the CRUL time constraint are nerve agents, G and V agents. I have some examples there. And blister agents, mustard and Lewisite. And I have some examples of that as well.

I'm going to talk just a bit to finish up here about canister change schedule methods.

We have the CRUL time constraints software, which are mathematical models available on the OSHA with website as well as through the

manufacturer's sites.

Manufacturers' test data, and the rules of thumb, which are actually not to be used as a sole method for determining a change schedule, but are a supplemental tool.

So the CRUL value, as I said, it is eight hours for vapor or two hours in the liquid. And, again, this is just chemical warfare agent, nerve agents, and blister agents.

Those eight-hour value and the two-hour value are going to apply, regardless of if there is a longer calculated canister service life. And, again, this CRUL time constraint applies to the entire system, facepiece, accessories, and canister.

Software on the OSHA website, you have two programs. The breakthrough program is more recent and corrects for relative humidity.

Both programs calculate a change schedule only for individual or organic vapors only.

The manufacturers may have their own calculators on their sites, and -- which is

extremely useful in that their CBRN canister may actually be part of their software package. So, again, that is a very useful item.

The manufacturer may have data on a specific chemical itself.

And just to point out the rules of thumb, they are available on the OSHA website. However, again, it is emphasized that they are not to be used as the sole method for developing a change schedule.

And I would like to thank you very much for your time. I look forward to hearing your comments. Again, they are very important that they are submitted to the docket, and thank you very much.

I'll take questions. Should I sit up there?

Any questions or comments?

MR. SZALAJDA: Okay. Thank you.

I hope you guys don't expect to go through the program as quickly tomorrow. But we what we would like to do prior to concluding the

meeting, we have a survey regarding what was discussed at the meeting that we would like to pass out.

The sponsors will pass them out. If you could complete the survey, pass them back to the center. Maybe take about five or ten minutes to complete that now.

(A brief recess was taken.)

MR. SZALAJDA: Did everyone get an opportunity to complete the survey? If not, can you raise your hand if you need one? Okay.

At this point, what we would like to do is open the floor for a few minutes for any public comments based on the material that was presented today.

Andy Capon from the UK indicated some familiarity with what BSI is doing with regard to development of CBRN standards, would like to make a couple of minutes of remarks.

Does anyone else have anything anybody would like to add?

Okay, Andy.

MR. CAPON: At the beginning of the day, Jon said that there was some work going on in Europe in collaboration with what NPPTL were doing with across the water, about what we were doing in Britain and in Europe in particular about creating our own CBRN standard.

Just to put a little bit of meat on that so -- to show that the work that is being done over here in the U.S. is not parochial to the U.S., but is being considered over the water.

About a year ago, the manufacturers association of the UK, what's called PSEMA, the Protective Safety Equipment Manufacturers Association, requested that British Standards, BSI, looked into creating a BSI UK standard for CBRN products.

This was taken up by BSI, and we have been working as a drafting group on two standards which reflect initially self-contained breathing apparatus and also air-purifying respirators.

And the line that we have taken is that there are very well developed standards in Europe,

the CEN standards, for BA and for air-purifying respirators.

And we took the view that we would take those standards as the basis and add to them the CBRN permeation type of testing and requirements and also the filter gas testing requirements that have been developed in the U.S. by NIOSH so that manufacturers who wish to avail themselves in the future of getting a British standard, a BS standard, CBRN standard, won't necessarily have to create absolutely new and different filters because the requirements for filter gas life that are the same will be the same.

You will have to have facepieces that meet the European standards, but as long as you can show that your equipment not only meets the European standards for breathing apparatus or the facemasks, but, in addition, meets your existing requirements for the NIOSH permeation testing, like in SMARTMAN, then effective, you will have the basis of the British standard approved package for CBRN.

The hope is that once this document or documents have been developed, they can form the basis of either the CBRN EN standard, or be submitted to ISO as part of the ISO work in the future to create worldwide CBRN standards.

I hope that was of value to you to understand that what you are doing over here is not parochial, and we are definitely taking it on board and developing it in a more European way, but we do have to use as the basis the fully developed EN standards that we have over there.

Thank you, Jon.

MR. SZALAJDA: Thank you, Andy.

Any other comments at this time?

I think just in summary for what you have heard today and as far as the road going forward following this public meeting and the comment period, there will be a new addition of the closed-circuit concept paper that will be generated and posted.

Additionally, you saw a list of benchmarking testing that still needs to be

accomplished.

I think the one thing of note is that we will be focusing and working on doing the testing with the chemical warfare agents at our partner's laboratories in Edgewood.

Our target date for the next public meeting will be within the first two weeks in November. We are looking at having that in Pittsburgh as well.

We will hopefully be providing some more definition on that in the near future.

But overall, our time frame for implementing the closed-circuit standard is going to be determined in part by the completion of the technical requirements and then making a determination on how the standard will be implemented, whether it is by policy or through rulemaking provisions.

Again, the docket information for receiving your closed-circuit CBA comments.

For the respirator guidelines, again, the disk that was available in the back, two of the

three products are available on the disk. The third you can download from the NPPTL website at this address.

The docket will be open through August 31. And September 1, if you try to go to the website and find this information, it will be gone.

So I encourage you to look at this sooner than later if you are intending on making comments.

But part of our process in following through the procedures that Terry outlined is that we will be moving towards an external peer review process for these guidelines and releasing them early in 2006.

The docket number is 52 for the draft guidance.

And with that, we are going to start at 8:30 tomorrow. The focus of the meeting, again, will be to cover the CBRN PAPR as well as the release of the industrial -- the initial concept of the -- the concept for the industrial PAPR.

There is a -- we have a lot of information to purvey tomorrow, so I would imagine

that the schedule will be pretty full between 8:30 and when we conclude at 3.

Enjoy your extra time today. Downtown Pittsburgh is only an half an hour away down Route 19, which is about six miles. But given the state of transportation in Pittsburgh, we like to talk about distance in terms of time.

But we hope that this location will give you some things to do between tomorrow. Station Square is not too far away. There is also the Pirates. If you are in the mood to watch some bad baseball, the Pirates are in town, so...

Actually, it is, if you haven't been to PNC park, it is a very nice venue for watching a ball game, and there is never trouble getting tickets.

So with that, thank you, and we will see you at 8:30.

(Whereupon, the proceedings in the above matter were concluded at 2:12 p.m.)

CERTIFICATE OF REPORTER

I, Joseph A. Inabnet, do hereby certify that the transcript of the foregoing proceedings was taken by me in Stenotype and thereafter reduced to typewriting under my supervision; that said transcript is a true record of the proceedings; that I am neither counsel for, related to, nor employed by any of the parties to the action in which these proceedings were taken; and further, that I am not a relative or employee of any attorney or counsel employed by the parties thereto, nor financially or otherwise interested in the outcome of the action.

_____
Joseph A. Inabnet
Court Reporter