November 8, 2010

Attached is Transcript
of NRC Public Meeting
held on October 25, 2010

submitted by
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Official Transcript of Proceedings

NUCLEAR REGULATORY COMMISSION

Title: Public Meeting on the Potential Changes to the Nuclear Regulatory Commission's Radiation Protection and Guidance

Docket Number: (n/a)

Location: Silver Spring, Maryland

Date: Monday, October 25, 2010

Work Order No.: NRC-508 Pages 1-238

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UNITED STATES NUCLEAR REGULATORY COMMISSION

(NRC)

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OFFICE OF FEDERAL AND STATE MATERIALS AND ENVIRONMENTAL MANAGEMENT PROGRAMS

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PUBLIC MEETING ON THE POTENTIAL CHANGES TO THE NUCLEAR REGULATORY COMMISSION'S RADIATION PROTECTION AND GUIDANCE

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MONDAY
OCTOBER 25, 2010

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The public meeting convened at 8:30 a.m. in Kennedy Ballroom of the Crowne Plaza Hotel, 8777 Georgia Avenue, Silver Spring, Maryland, Dan Hodgkins, facilitator, presiding.

PRESENT:

FACILITATOR:

DAN HODGKINS, Consultant

PANEL MEMBERS:

RALPH ANDERSEN, Nuclear Energy Institute
ROBERT W. ATCHER, Society of Nuclear Medicine
CHERYL ANN BEEGLE, National Institutes of Health
MICHAEL BOYD, Environmental Protection Agency
STEPHEN BROWNE, Troxler Electronic Laboratories
KEVIN BUNDY, Canadian Nuclear Safety Commission
KIMYATA MORGAN BUTLER, U.S. Nuclear Regulatory Commission
DONALD COOL, U.S. Nuclear Regulatory Commission
WALTER (LEE) COX, Organization of Agreement States
PHILIP GIANUTSOS, Energy Solutions
WILLIE HARRIS, Exelon Nuclear
LARRY HAYNES, Duke Energy

PANEL MEMBERS: (CONT.)

O. ERSKIN HICKMAN, JR., U.S. Nuclear Enrichment Corporation
MAHADEVAPPA MAHESH, Johns Hopkins University School of Medicine/American College of Radiology
STEVE MATTMULLER, Society of Nuclear Medicine
PETER O'CONNELL, Department of Energy
JOEL RABOVSKY, Department of Energy
KATE ROUGHAN, International Source Suppliers and Producers/QSA Global
MICHAEL SNEE, Conference of Radiation Control Program Directors
DUANN THISTLETHWAITE, Triad Isotopes

P R O C E E D I N G S

8:34 a.m.

MR. HODGKINS: Okay, well, good morning, everybody. Thank you, all right. Because this is a participatory meeting, by the way, everybody, and my name is Dan Hodgkins, I'll be your facilitator.

And, just, as a facilitator, important to know, I do not have a background in the Nuclear Regulatory Commission, okay. I have a background in facilitating.

So, important to know in the sense that I will try and moderate this meeting, facilitate this meeting in a way that will keep it going.

And, a couple things to know as ground rules, is just that this is also a webinar. For those folks that are on the webinar, it's sometimes hard to participate in a way that you can see the audience's reaction, so if you could just take a breath in between your comments so that we can have some time to cogitate, think about, and those kind of things.

This particular webinar participatory meeting is not about resolving anything. It's to be heard, and so my job as the facilitator is to make sure that you all get heard in a meaningful way.

And one thing to know is--let's turn off

our cell phones. I didn't really plan that. Perfectly. Okay. One of the things is, because everybody's going to be micced and there's going to be transcripts, a lot of background noise will interfere with that.

So, beepers, phones, those kind of things, if you can turn them off now, I'd really appreciate it. Okay, let me do some introductions as far as who's going to help us here.

Willie will be managing the webinar, and so he might be waving at me a few times to manage that. James is the transcriber, when you talk we want to make sure that we can get your name, all right, so say who you are and then make your comment. At times we forget that. So, I may remind you, James may wave his hand at you, that's what that means.

Everybody will have a microphone, so please use the microphones in order to be heard, okay, because that's the ground Rule here. We really want to be heard. We're going to do some introductions of the panelists.

For the panelists, got to keep it brief. You've got thirty panelists. One minute per panelist would be thirty minutes. But please remember in your introduction that there are webinar participants, can't do any followup with you afterwards, so give

them an idea of what your background is, who you're representing, so that they get a chance to understand who the panelists are and your perspective, okay?

For the audience, too, just make sure that you hold up your hand. We'll also have cards so that if you need me to call on you, hold your card up, tap me on the back, make sure, but then please use the mic.

And we can actually use the mics as a kind of a sign for me to call on you next, okay? Are there any questions, comments, concerns before we get started, then?

I think I've really taken care of most of the housekeeping. For the non-webinar participants, restrooms are outside to the right. We will break for lunch. Lunch is on your own.

And then we'll come back into the room and start all over again. The timing of the, we have a rough draft of the timing. We'll take as long or as little as each area takes, okay, and we've got two days for this discussion, and so hopefully within that two days, you will have enough time.

If there's not, further comment can be made. It's still open, and I think some of those details, Don Cool will take care of. Okay, so, with

that being said, I would like to introduce Mr. Thaggard, will be our first introduction. And, Mr. Thaggard.

MR: THAGGARD: Is this on? Okay. Okay, good morning everybody. My name is Mark Thaggard. I'm the Deputy Director for the Division of intergovernmental liaison and rulemaking at the NRC.

The, the, on behalf of the NRC and the staff, I'd like to welcome you to this, the first of what we plan to have a three facilitated roundtable workshops on the potential changes to the NRC's radiation protection regulations.

The purpose of this meeting is for you to help us understand implication to making changes to the radiation protection standards. It's important to note that we haven't made any definitive decisions right now, whether or not We're going to actually change our regulations.

This is part of the process to help make that decision. We encourage both the panel members as well as members of the audience to be active participants. We really are looking for your, your, your views, your input.

We especially want to know potential impacts, benefits, and burdens to stakeholders if we

were to make any changes to the regulations. We also want to encourage you to submit comments. If you think of something after the workshop, we'll, comment period, is open until sometime I believe in January.

And so, the specific date is in the Federal Register notice, but we encourage you to make comments. If you think of things after the workshop, again, I'd like to welcome you and on behalf of the NRC, I'd like to thank you for taking time out of your busy schedule and, you know, coming to engage with us in what I believe is a very important topic. So, with that.

MR. HODGKINS: Thanks so much. And, one of the other things we'll do is exercise our skill sets with microphone management, okay. And so I'm going to turn it over to Don. Don, will you make the comment from your seat, or will you use the mic? You're going to use that mic? Okay, so everybody, can you give them a quick test on how to use those mics? Has everybody used one before? Push it down, talk?

DR. COOL: Push it down and hopefully it works.

MR. HODGKINS: Yes, it looks--sounds good.

DR. COOL: All right. So, at this moment, just let me add my welcome to each of you in this

process. This is, I would like to emphasize, what mark also said. This is an opportunity to hear from each of you and from each other.

It's not our desire that this be a whole series of one on one discussions where each of you are addressing the NRC.

PARTICIPANT: Don, you're not, you're not coming through.

DR. COOL: Okay. So, folks, you're going to have to swallow for the microphones. Is that a little bit better for the webinar?

PARTICIPANT: It's better. Much better.

DR. COOL: Okay. So, we'll have to be careful of that. You're going to have to lean over, talk about that. What I'm in hopes that each of you will be doing, is giving us your thoughts and views. The operative question today is, why?

We have heard lots of things already in our discussions over the past year about particular view points related to some of these possible changes. What we really need to dig into is the whys that go behind those viewpoints.

What will work, what won't work. What are the issues, what are the implications. Because what we as an NRC staff will need to do is take all of this

information and develop a policy proposal for our commissioners to consider and make some decisions on.

So, this is one of your chances to give us the reasons why we should or shouldn't consider certain directions, so that we can try to write all of that down, assemble it together.

Will everyone agree on a particular direction? No. Not expecting that at all. What I'm in hopes is that we can perhaps see some themes, but that we can really understand the differences within the different types of license uses that we have at the Nuclear Regulatory Commission in the states, and in other activities.

So this is really your opportunity to reflect to each other, and to help us understand in detail so that we can continue this particular process. Thank you, Dan.

MR. HODGKINS: And then, Kim, would, you wanted to make a couple comments as well? You're okay?

DR. BUTLER: I just wanted to say, good morning and thank you for, especially for the panelists, for attending the workshop, and we look forward to your comments.

PARTICIPANT: You're not coming through at all, Kim, We're on the webinar.

DR. BUTLER: I just wanted to welcome everyone to the webinar, and to the conference, especially the panelists, and our attendees. I wanted to encourage, as Don and Mark Thaggard mentioned, active participation this afternoon and this morning and we look forward to your comments.

MR. HODGKINS: And so now we'll do the panelists, all right. And Kate, I saw you warming up there. So you got to speak directly into the microphone, if you will, want to go ahead?

MS. ROUGHAN: Kate Roughan from QSA global, and also representing ISSPA. We're a manufacturer of industrial radiography sources for, excuse me, seal sources and devices for industrial radiography, oil well logging, calibration, and brachytherapy.

We manufacture and distribute sources worldwide so we deal with a lot of different countries' rules. I also represent ISSPA, which is the International Source Suppliers and Producer's Association. Obviously it's an international Committee for manufactures to ensure We're going in the right direction with regulations, insurance, safety and security. Society.

MR. HODGKINS: Excellent job. Thank you so much. Next?

MS. THISTLETHWAITE: Good morning. Duanna Thistlethwaite from Triad Isotopes. Representing medical use licensees from the nuclear pharmacy perspective, I from a commercial nuclear pharmacy background. Started out in low energy and now I'm on the high energy PET side in PET quality.

MR. HODGKINS: Thank you very much.

MR. STAFFORD: Hello. I'm Mike Stafford, Oak Ridge National Lab. I work for UTILIZE Battelle, that's the university of Tennessee, Battelle. And, We're in the, I guess the research end of what's going at ORNL.

We've got a variety of different radiological hazards that we manage. We are under 10 CFR 835 so We're, We're a DOE entity. So We're not necessarily directly affected by this discussion about Rule change.

We're, we do interface a lot with agreement states and other entities that are under part twenty, but we also recognize the inertia of DOE and NRC wanting to stay close together. We've weathered the Amendment change to 835 that brought us into agreement with ICRP 60. So, we've got some experience with that. And, anyway, glad to be here.

MR. HODGKINS: Thanks.

MR. SNEE: Good morning. Mike Snee. I'm representing the conference of radiation control program directors, for my day job over at the, for the state of Ohio, bureau of radiation protection.

MR. MATTMULLER: Good morning. I'm Steve Mattmuller, chief nuclear pharmacist at Kettering Medical Center in Kettering, Ohio, where we also have a cyclotron production center. And my other hat is for the Society of Nuclear Medicine, as one of their representatives.

MR. HODGKINS: Welcome.

MR. HAYNES: Larry Haynes, representing Duke Energy and the power reactor sector. One of three folks here on the panel for that. I'm also a member of the north Carolina radiation protection Commission, and I am the fleet scientific service manager for Duke.

MR. HODGKINS: Thank you so much, welcome.

DR. MAHESH: Good morning. My name is Mahadevappa Mahesh, I'm representing American College of Radiology. American College of Radiology is a professional organization representing more than 36,000 radiologists, radiation oncologists, nuclear medicine physicians, and medical physicists.

My profession is, I'm a medical physicist.

I work as a chief physicist at Johns Hopkins Hospital in Baltimore, Maryland. I'm also the assistant professor of radiology and cardiovascular at Johns Hopkins.

My background is in clinical physics and so I'm heavily involved with the theroscopy and interventional theroscopy at the hospital. These, some of these rules changes are going to directly impact and that's why I'm very much interested. Thank you.

MR. HODGKINS: Thank you so much for your participation today.

MR. GIANUTSOS: Good morning. I'm Phil Gianutsos, representing energy solutions. We're a worldwide company with about 5,000 employees at present. Our primary focus is proper management of hazardous and radioactive materials, protecting people.

I make sure environmental impacts are at a minimum. I personally represent the processing facility that we operate in oak ridge for low-level radioactive waste. We operate under, in a variety of facilities, a handful of different agreement state programs, multiple NRC licenses, with all the nuances that go into the part twenty and agreement state equivalent regulations. So We're very interested in

how this, this proceeds. Go from there.

MR. HODGKINS: Thank you so much.

MR. HARRIS: Good morning. Willie Harris, Director of radiation protection for Exelon nuclear. I'm here representing power reactor sector.

MR. HODGKINS: Thank you.

MR. O'CONNELL: Good morning. I'm Peter O'Connell, Department of Energy, Office of worker health and safety policy. And our Office is responsible for the equivalent of 10 CFR 20. DOE uses 10 CFR 835.

As Mike mentioned, back in 2007, we updated our regulation to follow ICRP 60, the dosimetry terminology and units. We didn't update the dose limits. So, I think we have a lot of lessons learned and growing pains that we could share with you.

MR. HODGKINS: Excellent.

MR. COX: Hello. Lee Cox, state of North Carolina. I'm here representing the organization of agreement states. The states not only regulate radioactive material but we regulate all types of radiation and We're very interested in this discussion. Thank you for allowing us to be here.

MR. HODGKINS: Welcome.

MR. HICKMAN: Good morning, I'm Erskine Hickman. I'm the radiation protection manager at the United States enrichment corporation in Paducah, Kentucky. We have worldwide customers that use our enriched fuel.

Here representing our company and I have a background in power reactors and fuel cycle.

MR. HODGKINS: Welcome.

MR. BUNDY: Good morning. I'm Kevin Bundy. I'm with the Canadian Nuclear Safety Commission. We've introduced the ICRP recommendations in May of 200, so I hope I can offer some experience and some lessons learned.

MR. HODGKINS: Excellent. Wonderful to have you here, welcome.

MR. BROWNE: Good morning. I'm Stephen Browne. I'm with Troxler Electronic Laboratories. I'm the corporate radiation safety officer. I'm representing our company, which manufactures portable nuclear gauges that are distributed around the world, and also customers who use those gauges.

MR. HODGKINS: Thank you. Welcome.

MR. BOYD: I'm Mike Boyd, I'm a senior health physicist for EPA's Office of air and radiation, radiation protection Division. I'm the

Federal guidance team leader and have a lot of interest in what's going on here. Thanks.

MR. HODGKINS: Thank you. Next?

MS. BEEGLE: Hi, I'm Cheryl Beegle. I work at the National institutes of health in Bethesda, Maryland as an administrative supervisor in medical imaging. I've worked for over thirty years in the field of medical imaging, and I'm here basically to represent the medical use provider in their interest in dose exposures. Thank you.

MR. HODGKINS: Thank you.

DR. ATCHER: I'm Robert Atcher. Two corrections to my list on the participants. I'm the past President of the society of nuclear medicine, representing 17,000 physicians, technologists, pharmacists and scientists. The other one is my mail stop is now "T" as in Texas, 004.

I am a radiophamarceutical chemist by training. I'm also the Director of the National isotope development center for the Office of nuclear physics and the Department of energy. I also have a, an appointment at the university of New Mexico in the college of pharmacy as the UNM LNL professor of pharmacy.

MR. HODGKINS: Welcome.

MR. ANDERSEN: Good morning, I'm Ralph Andersen with the nuclear energy institute, representing the nuclear energy sector, fuel cycle facilities, and nuclear power reactors.

MR. HODGKINS: Well, welcome, everybody. I don't see any additional folks here. Now, from the webinar standpoint, everybody heard that, okay, and so I want to commend you all on your microphone skills. Looks pretty good from my perspective, and it sounds like the webinar folks are also pleased with what's going on.

PARTICIPANT: Not exactly, I think the, the sound comes in and out and I think the folks have to get close to the mic to get a good, good pickup.

MR. HODGKINS: Okay, so remember, as Don Cool said, eat your mic. Okay, so here's what We're going to do. We're going to have some presentations, just as far as the issue, an overview of that, and then we'll open it up to the panelists first to have their feedback and discussion.

It doesn't mean that we need to hear from every panelist, but certainly if you have some view or perspective, we do want to hear from you.

We will then open it up to the audience and the webinar participants for their information and

feedback, and then once again, if the panelists would like to, or anybody, really, wants to give some feedback, feel free to do so.

Okay, everybody understands? Any questions as far as the structure? And with that, I'm going to turn it back over for Don Cool to start our presentations.

DR. COOL: So, good morning. Okay, I have, I don't particularly like to be tethered to my chair when I'm talking. I suppose that years ago if they had known such things as ADD or otherwise I would have fitted into the borderline category.

I like to move around. What I want to do in this first little block of discussion is give you all some background on what got us into this, where we are in the process, what sort of information so that we all have a pretty much same basis upon which ti discuss the particular issues that We're going to be discussing today.

So, as this slowly scrolls up, and hopefully the webinar folks will be able to see these slides. ICRP, the international Commission on radiological protection, has for a long time provided various recommendations for radiation protection.

They got started in the medical sector way

back in 1928, so they've been around for a little while. For those of you who have never particularly tried to figure out who ICRP is, they're actually an international charity, non profit organization under the international Congress of radiology.

They got their start on the medical side. An international group of folks from all different countries and disciplines to provide recommendations and radiation protection. There were a whole series of those published over the years.

The ones that are of particular interest to us at this point are the recommendations from 1959 and 1960, ICRP publication two. The recommendations that were updated in 1977, ICRP publication twenty six, and the scientific information that went along with that, that was ICRP publication thirty.

The 1990 recommendation update, which was publication sixty that Pete O'Connell mentioned, from the Department of energy standpoint, and now the most recent update, which was made available in late 2007, ICRP publication 103.

Now, for those of you who are wondering, why do I list all of those different ICRP publications as potentially of interest. Well, in the United States, we have three different generations of

recommendations all active at the same time.

As many of you know, depending on what part of the regulations you're working under, you may be still dealing with the concepts from 1959. You may be dealing with the concepts from 1977, you may be dealing with the updated methodology that was given you by the license conditions from 1990.

So part of the process that we are in now is to try and figure what the appropriate things to do are, and perhaps actually start to catch ourselves up from all of the different generations, okay.

Now, just to give you a very brief overview of publication 103. And my intent today here is not to lecture, but just to make sure that everybody sort of has the same set of understandings.

ICRP and publication 103 consolidated a whole bunch of things that have happened over the years. They updated the science but did not change the basic dose limits.

Nor did they conclude that there was a significant change in the underlying radiation risk detriment that was associated, how much risk there was associated with a given amount of radiation.

They did change the organization of their recommendations, from a process based, you may

remember, practices and interventions, to a situation based, where the recommendations were based on, could you plan for an advance, planned situations.

Essentially everything that we are talking about here today. Existing situations, that which already exist and you have to decide to do something. Mike Boyd and the EPA folks deal with that all the time in the radon program, for example, radon in homes is an existing situation, for example.

And emergency exposure situations, which hopefully never actually occur but where something has happened that you did not plan, that you did not want and you need to do something immediately to provide protection. ICRP stated that their intention was to try and continue to have some stability in their fundamental principles being unchanged, that is that you needed to justify the exposures.

You needed to try and optimize protection, the international word that always get used for, as low as reasonably achievable, keeping doses as low as possible, under the prevailing circumstances, and dose limits.

They did not change the dose limits in 1990. But, in publication 103 from 1990. Let me correct that. What did change, of course, was the dose

limits changed from 1977 to 1990 and that's why those discussions are on the table today.

Now, the long history of part twenty. Short and down to one slide. Most recent Rule making was completed in 1991. It took twelve years to develop that regulation. It was actually started in the late seventies, right after the ICRP publication twenty six came out.

It was finally published in 1991, became effective in 1994. So it's based on ICRP 26 from 1977, with some of the additional information that was available at that time. For example, we knew before the proposed Rule came out that the ICRP was proposing to lower the public dose limit to 100 millirem, one millisievert.

So that was part of the Revision of part twenty. The changes to the occupational dose limits were not available during the development process, and so they were not included when the NRC updated the regulations in 1991.

In addition to that, there are a number of NRC regulations that were not changed at that time. Those regulations which had their own specific dose criteria rather than being cross references to park twenty. Some of those were not updated.

That's why on Wednesday, for example, when we continue discussions more specifically related to the reactor effluence, you'll see that that discussion starts with the basis from 1958 and 1960 ICRP 2. So that's part of the process that We're trying to work our way through.

Many people have said, well, how come the NRC has not long ago updated part twenty? I mean, DOE went through the process, and got 835 on the street just a couple years ago. How come NRC, you have not updated your regulations, because 1990 was quite a while ago.

And the answer is actually quite straightforward. We knew in 2000, 2001 that ICRP was beginning to talk about an update of their recommendations.

The NRC staff actually went to the commissioners and said, we have several options but the staff recommends that we wait to see what ICRP may update and then try to take action at that point rather than initiating a process, getting all done with rulemaking and finding ourselves in the same position that we were in 1991 where we had gone through a long process, expended lots of resources, and there as a new set of recommendations that were

just coming out that might be different.

The Commission actually agrees with us, so we have been watching, interacting with ICRP commenting, but not actually making any changes thus far.

Once ICRP completed their work, the staff did an analysis, went to our commissioners, in December of 2008 and said, Commission, having looked at the updated recommendations, we think there are a number of places that certainly warrant discussion.

We actually recommend to you, Commission, that you allow the staff to begin engaging the stakeholders in developing the technical basis and the regulatory basis that would be necessary to eventually do a proposed Rule.

The Commission spent a little bit of time cogitating on that. They agreed in April of 2009 and we have been in this process since then. So we've already been in this discussion for a fair bit of time, trying to develop some of the materials.

We have benefitted from discussions with many of you in a one on one sort of fashion to try and get an understanding of some of the issues. Our objective was and continues to be the try and explore the implications of greater alignment with the ICRP

recommendations.

There's a couple things that are really important in that phrase, and that wording is copied directly from the commission's direction to the staff. That's why that looks very formal. That's what the staff, Commission told us to do.

It's got to be scientifically justified. There's got to be a basis for making these changes. We're just not going to go off and do a change without any basis at all. Greater alignment. Doesn't mean that the Commission has already decided, We're going to adopt 103.

We're in the process of figuring out what makes sense. Some things probably make sense. Others, perhaps not. Or, in some modified form. So that's what We're looking at.

We have believed and continue to believe that the regulations provide adequate protection. That's our legal basis for all of our regulatory stance. And I know that my lawyer sitting over here in the corner will make sure that I stay on that mantra.

We have adequate protection. But the question is, what are the benefits and the burdens associated with revising that framework? Because you can always do some Revision within that discussion,

have it function better, for international consistency, and there's certainly a lot of discussion going on.

Many of you are in global organizations, you're having to deal with the ICRP's recommendations as implemented in various countries, in the European union and otherwise. And that mismatch, I expect, causes you problems.

Part of what we want to hear is what kind of problems those cause, and to what extent that constitutes a reasonable basis for us to be making some changes to improve the international consistency and alignment of the discussions.

For the past year we've been in what I'd like to terminology phase one. We've been interacting with each of you individually. We're now trying to do at, this set of workshops, where we get all of you together. So, as I mentioned a moment ago, instead of one on one discussions back and forth, all of us can reflect together and build upon the experiences that we have, the Department of energy having implemented publication sixty and having gone through some of those painful processes.

Our friends from the National lab, who get to implement that and can share a little bit of light

on some of the processes they went through, as well as their interactions with the states. My colleague from Canada, the Canadians have implemented the publication sixty recommendations are looking at 103.

We have a lot of experience here to try and draw out and put on the record for today. The comment period for written comments to follow up, this is actually open through the end of January.

I suspect most of you when you leave and you try to find your way back through the construction zone to get to Metro or whatever it is, you'll have some of those a-ha moments, and you'll think of things.

Write it in. The record will stay open. We encourage all of you to continue to provide that information for us.

So, this set of meetings here and in L.A. next week and in Houston the week after, the wide variety of stakeholders, as you can tell from the introductions, and we have that similar diversity all around the room, behind, to give us those viewpoints.

To hear you on the issues, to explore the implications, in great detail. And the inevitable question, so, what are you going to do with all of this? Trying to assemble the viewpoints, we have to

try and develop our basis for a policy issues paper that would go to our commissioners.

The commissioners will, after we've given that to them, about this time next year, give the staff some direction. We agree to do this, or we don't want you to do that, or explore this further.

And then we would start the process of completing that technical basis and actually working on a proposed Rule. There will be opportunity for more public comment, more discussions. As we've already said here a couple times, we do not have a particular proposal on the table.

So, this is not the defend your particular viewpoint time. That time will come, but it's not now. This is the time to say, what will work and will not work in the process.

And so, with that, Dan, I would turn it back to you to see if there are questions in any general discussions or initial thoughts on this process and the background upon which We're doing these discussions before we actually start to work on the particulars of each of the issues. Thank you.

MR. HODGKINS: Okay, so this is--so this is a chance for us to practice a little bit, as far as the panelists, any questions as far as the background

information? None heard.

Anybody from our webinar have any questions, concerns, and how about anybody from the audience, as far as questions and concerns?

Okay, it seems like that was a great introduction, Don, and that everybody is now understanding the background. What we have, we do have one person from the webinar. Is that right?

PARTICIPANT: Yes.

MR. HODGKINS: Okay, so, can we have that question asked? I guess not--

PARTICIPANT: I don't have any questions.

MR. HODGKINS: No questions. Okay. With that, right now we are schedule for a break, a ten minute break. It seems like to me we can go to the first before we go to the break. Is everybody nodding?

Okay, so let's go to the very first one. Don, I had it back to you. I--you were going to use the ten minutes to prepare for the next one, I get it. Technical difficulties here, folks. Hold on. "Your computer might be at risk".

DR. COOL: I'm sure the computer's at risk. They're letting me touch it. All right then. We'll go ahead and move forward into the first of the major issues.

Let me just note as we start this that while we laid out, as Dan said a little bit ago, a rough schedule, we will work through these to the extent that we can have that discussion, but We're not limited by a particular period of time.

But we do hope to really get into some of the details in discussion. So, the first issue that we wanted to talk about here today are the questions of effective dose and the numerical values that get used within the regulations.

So, what is total effective dose? I actually had a call the other day from someone who was asking me some questions to make sure that they had a clear understanding of some of these concepts.

And so I thought perhaps it would be useful to give everyone a very quick tutorial on some of this. Total effective dose equivalent, TEDE. Some of you pronounce it as "Teddy", and I'll do my one little standing joke for the day, no, I don't mean a little fuzzy bear.

But we've all used TEDE, teddy, for a number of years. We've all sort of gotten used to that. By the way, that terminology never shows up in any of the ICRP recommendations. That was a construct that the NRC put in place because like all good

regulatory agencies, you have to know what you're referring to.

And ICRP always wrote out the sentence, the sum of the dose from exposures external to the body and the dose from materials that were taken into the body. So they would have this long sentence.

And, every time you write out a sentence, everyone tries to figure out if you've written it exactly the same. So, like all good regulatory agencies, we coined a terminology. And that's how TEDE came into being.

It is, very simply, the dose from the external exposures reported as the deep dose equivalent, that is, the dose on your badge at the color or whatever it is, the point of highest exposure on the body, summed with the internal exposure as the committed effective dose equivalent, that is, an intake of radioactive material into the body, calculated including all of the distribution and retention in the body for however long it stays in there, up to fifty years.

Now, several years ago, the NRC did amend our regulations to allow the use of effective dose from external sources rather than the deep dose equivalent. Now, you can still use deep dose

equivalent as your method of demonstrating compliance, but you don't have to.

You can use one of several standard formulas that have actually been recognized by the NRC that allows for use of multiple badges and other things to get a more accurate representation of the dose to the body from the external sources.

That's particularly important for some of our friends, like the interventionalists, for using fairly lower energy x-rays and otherwise, and if you have the lead apron, then you're protecting most of the significant parts of the body. So the dose on the collar is not at all a good representation of the actual risk.

So that has become a fair bit of an issue for some of the categories of licensees. And that's already in place now, in the NRC regulations. It's still in the process period of time, where the agreement states have the opportunity to update.

And as I said, you can still use a deep dose equivalent, the badge on the collar, as a demonstration. It's the most conservative approach to demonstrating compliance.

So, what is total effective dose, or effective dose? Well, over the years there have been

some modifications in the tissue weighting factors and radiation weighting factors that We're going to be talking about in a couple minutes.

The ICRP changed the terminology along with some of the details of the calculation, moving from quality factors to biological effectiveness and went from dose equivalent to just saying effective dose. But the underlying concept is still the same.

Those of you who are in the details of dosimetry can give a very long lecture of the details of what the differences are between dose equivalents and the effective dose. I'm not going to try and do that here.

Just recognize that it is still the sum of the external exposures, as an effective dose from a source external to the body, and the committed effective dose from the intake of radioactive materials into the body. But it is a different terminology.

So, for those of you who like nice graphics, you're not going to be able to read all of the details of this, but you can actually go through the process. ICRP now actually has specific voxel phantoms of the male and the female.

They can go through a very detailed

calculation of how the body receives the radioactive material, radioactive material moves through the body and reaches the summation that gets you to the effective dose.

Underlying that are a couple of concepts that are important depending on the kind of licensee that you are. The first is the radiation weighting factor. Different types of radiation have different effectiveness in terms of introducing or inducing health effects within the body.

The basic reference point, photon, gamma, x-RAY, types of energies. Protons, a little bit more effective of a particle, it's much more effective. The significant change that happened here in 2007 with publication 103 is the changes in the neutrons, where they went to a smooth function to do the calculation, rather than a series of individual step changes.

Now for most of you, our licensees, that probably is not something that you're interested in. But some of the folks from DOE and otherwise who do that all the time, that was a pretty big change in the process.

The other thing I'm going to note here because it will come up in some of the discussions that you hear in a minute is when the U.S. National

academy of science's BEIR-VII report came out a couple of years ago.

And in followup discussions that EPA has had with their science advisory Board in developing what they call the blue book, and I hope that Mike will help me out a little bit in this discussion.

They're actually looking at the effectiveness of some of the very low energy photons and electrons, the beta particles, such that for tritium and some other things they may assign a higher effectiveness, which means that they would be more effective and change some of these calculations. That will be important for some of you.

The other factor that goes into this is the tissue weighting factors. These are defined in part twenty today from 1977. They've been updated several times.

The latest update, the big change was that associated with the genetic component, that is dose to the gonads, which is now seen to be a smaller contributor to the overall risk to the human body than previously estimated.

So, all the numbers got reracked a little bit because all the weighting factors have to sum up to one. For some reason, we have to believe that a

whole body is a whole body and it has to be, has to be one.

So there are some changes that are associated with that. Those two things in combination together get you to a new calculation of what each radionuclide would contribute in terms of the exposure.

Those are called dose coefficients. ICRP is now in the process of calculating new dose coefficients. Those dose coefficients are what gets used to calculate the annual limits of intake, draft air concentrations, in part twenty.

So they're in the process of doing those calculations. And we will be taking a look at those, and people say, well, what will the differences be. And unfortunately, I can't tell you today because they're in the process of calculating those still.

I am told by Keith Eckerman down at Oak Ridge National Laboratory that there will not be large changes from the set that was in support of ICRP publication sixty. But there will be some minor modifications.

The first of those sets of values should be available late next year. The other thing that will be important, and again, I think Mike can, Mike Boyd

can help us a little bit in this, is that there will also be a set of calculations that are done specific for the U.S. population.

One of the things to keep in mind is that ICRP is an International organization, is calculating it base don a global average of the different risks in different populations. So an Asian population, a European population, American population, otherwise.

And we know that there are some differences in the underlying cancer risks in an Asian population versus the U.S. population. The EPA is in fact supporting some calculations which are more specific to a U.S. population and therefore will also have some slight differences from that which ICRP puts out.

So, as ICRP prepares this, as I was just noting, they're preparing that information. EPA preparing their information, and there will be some differences. So one of the questions that you will see as we start to go through this discussion, is which should we use and why.

So, as we begin this discussion today, there are several options which the staff put out for initial consideration. One, as with all good regulatory agencies, you can always decide to not make

a change, that nothing in the background or information warrants a particular change.

You could remain as total effective dose equivalent, you could keep all of the numbers from 1977, we could just leave things are.

We could decide to change to the current ICRP terminology, express it as total effective dose. We could perhaps even have some mechanisms where both terms could be recognized.

Now, you're saying well that doesn't seem like a very big change. Well, perhaps it doesn't when We're talking about it here, but when you start to look at all of the records that each of you have to keep, all of the labeling, perhaps all of the posting and other things, changing terminology has some ramifications as it goes through the process that we need to consider the implications of.

There's also, of course, the actual changes to the underlying numeric values. So, there are a set of questions that we want to explore. What are the potential impacts of changing the actual terminology itself, pros and cons and implications associated with that.

The impact specific on records and reports because people have told us that that will be an issue

and we need to explore that. In addition to that we'd like you to consider some of the possible options on the numeric values.

Again, obviously we don't have to change. We can bring in the updated methodology and science, the models and information. Some of that is available now, some of that is not yet available. There are a number of questions associated with that.

What are the foreseen impacts? ICRP is not going to be completed with all the calculations until 2013 to 2014, and we know how schedules can possible slip. So We're interested in what the impacts of those are.

Should we be considering moving forward in an interim basis, taking some of the initial information and subsequent amendments later, as they become available? Should we be looking at the values that the ICRP develops, or should we be using the values that EPA develops?

Today, part twenty is based on the ICRP numbers from 1977, so there are some slight difference form that which is in Federal guidance reports eleven and thirteen, which were done later and had the U.S. specific population. So, if We're looking at consistency, one of the issues is, of course, which

direction to we want to be consistent.

And with that, Dan, as an initial overview and background, let's get into the discussion.

MR. HODGKINS: Thanks so much. Okay, let's take it from the panelists first, and is there any panelists who'd like to jump in with some comments? And, again, please, eat your mic. Yes, go ahead. Peter O'Connell. Remember to say your name first so that the transcriber can get you.

MR. O'CONNELL: Peter O'Connell, DOE. Regarding the deep dose equivalent being the, using it the same as the effective dose equivalent, I think DOE managed to dodge that bullet because it's been DOE's policy for at least ten years, even when we were under the ICRP twenty six and thirty methodology that we always allow the--we didn't always require the highest dosimetry reading, we always allowed our contractors to follow the ANSI standard and do the compartmentalization process.

Regarding the changes to that, back when we put out our notice of proposed rulemaking in 2006, we got some comments saying why didn't you wait for 103 or whatnot. And we didn't want to wait seven, eight years, but we had Keith ran some sample calculations for us comparing the 103 model with the,

what We're using is the ICRP sixty eight, those coefficients, and he gave us the tabulation and we compared it and we found that the difference was, was very very minor. And in fact, we published a paper in, I think it was in the 2006 2007 time frame in radiation protection dosimetry kind of outlying what the differences are and the magnitude.

MR. HODGKINS: Other comments? Michael.

MR. BOYD: This is Mike Boyd from EPA. I just wanted to make a couple of clarifications to what Don said about what We're doing. And We're very predecisional too, this, nothing's been decided about any of this. But we, I want to make a clear distinction between our risk coefficients and our dose coefficients.

The risk coefficients are not tied to the ICRP methodology. So, we are looking at, at the scientific literature for evidence of higher relative biological effectiveness for low energy EBTA emitters and photons, soft x-rays, and things like tritium.

This could be incorporated, I say could, into some future risk coefficient updates, the updates to our current Federal guidance report thirteen, which are cancer risk coefficients.

As far as the dose coefficients, the

internal are now in Federal guidance eleven, and the external were in Federal guidance twelve. The principal difference between our coefficients and the ICRP's, I believe, are primarily related to the Monte Carlo methods used.

And, there are differences, of course, in the average size of the U.S. population versus maybe the standard population that the ICRP has used. So if we go to revising our dose coefficients, I think, we also are not--we don't think we have the time necessarily to wait for a full suite of voxel phantoms for the U.S.

Keith Eckerman at Oak Ridge National Lab has a mathematical Monte Carlo phantoms that work quite well for the U.S. population. So, I think the, the DCFs, if they're changed, will only vary quite subtly for the ICRPs and mostly related to the Monte Carlo calculations based on the size of the U.S. population, and not--another way of saying that is We're not going to tamper with the ICRP definition of effective dose. We will use the W-sub-T's and W-sub-R's that ICRP uses in defining effective dose.

MR. HODGKINS: Thank you. Panelists, comments. Yes?

MR. BUNDY: Kevin Bundy, Canadian Nuclear

Safety Commission. I just offer some comments. Prior to our regulations, regulations in 2000, we did not have effective dose, or, that concept at all. When we did introduce it, I don't recall any issues as far as record keeping and that.

There are, our licensees do have I guess operation terms or operational units and reporting units. Some are, are, use rems, others use millisieverts. They, when they are reported to our National dose registry, which is our official record of, our, for our dose, doses, occupational doses, they are recorded in, in, as effective dose and they're converted either at the licensee stage or by the National dose registry themselves.

We have incorporated the weighting factors, the ICRP 60 weighting factors, and both for the tissue weighting factors and the radiation weighting factors in our regulations. Of course, they are slightly out of date now with the one with three recommendations I guess they'll be changed eventually.

We too event an issue with the RVE of tritium for example. We too are going through that discussion at this time and don't know whether to keep, to, to have a special RVE for tritium or keep it at the weighting factor for practical radiation

protection purposes. Thanks.

MR. HODGKINS: Thank you. Any other comments? Yes, Willie.

MR. HARRIS: Willie Harris. Just a couple comments relative to the change and, and just one factor and science notwithstanding, you know, when you consider the difference between the, the terminology, you know, from the end user perspective, you know, we need to keep in mind the RP technicians and the individuals who We're going to be explaining it to are probably is, you know, the end result going to be irrelevant to them.

You know, TED versus TEDE probably is, you know, not a significant change, so from that perspective when you consider the training costs associated with it and understanding that, you know, I'm not sure, you know, if there's any real significance there to, to make the change.

The science aspects of it, I mean, most of the, the end users and those folks probably will not be specifically concerned with it. But my comment is, is listening to the folks out there, if there's no significant difference in the values and, and we'll wait until the results come out.

And my biggest concern with that is the

cost associated with minor changes to, you know, the computer programs and algorithms that We're going to use to generate, you know, the end resulting for the dose and you're just making sure that the costs is worth those changes.

You know, certainly, you know, all of us in here from a health physics perspective, you know, want the doses as accurate as possible. But, but again, you know, the cost benefit, we just want to make sure we consider that.

I think, Don, you addressed that somewhat under records section, but I think it's even broader than that just from the training and costs associated with computer programs and those types of algorithms necessary to make those changes. Thank you.

MR. HODGKINS: Thank you. Some other comments from our panelists? Yes.

MR. O'CONNELL: Pete O'Connell again, DOE. In recognition of the significant paperwork and whatnot in evaluation for the different models and whatnot, DOE changed the regulation in June 2007 but we gave our contractors three years to implement all the changes.

It took our Office about a year and a half to update, we have a series of guides, technical

standards and handbooks so it took our Office about a year and a half to revise all those documents.

In the process, we, we, we got to write three publications out of it, but we also require our contractors to do a tri-annual audit where all the functional areas of the radiation protection program are covered, so our guidance was, during the next three years, while you're doing your audit, that would be an opportune time to make the changes to those aspects of the program. And it, it seemed to work pretty well.

MR. HODGKINS: Thank you. Anything else from our panelists? Could you raise--yes? Name first.

MR. GIANUTSOS: Phil Gianutsos. Just looking at certainly issue 1.1, adopting the, the terminology and methodology is reasonable, but there are some, some subtle differences that I think have to be carefully examined. And as an example, I'd look at the, the recommendations for skin dose, where currently, we average over ten square centimeters that receive the maximum, ICRP recommends one.

That would have substantial impact for example on our facilities where we deal with discrete fragments and some of the beta emitters, so there's probably some other subtleties there of a similar

nature that need to be examined before wholesale adoption for the methodology.

MR. HODGKINS: Thank you. Robert, did you want to add something?

DR. ATCHER: Robert Atcher, Society of Nuclear Medicine. One of the things, and it turns out it's a personal science issue for me. I have been looking at using alpha emitters for radiation therapy for twenty years or more. And we rarely ever see a weighting factor of twenty in the studies that we do.

And it's now being tested clinically at a number of sites using relatively short lived alpha emitters. And so there's a potential here for us to incorporate some better data than was, has been used historically for a weighting factor for the alpha emitters.

In particular, based on both the clinical studies that we've been doing as well as some of the preclinical studies that have been done, where we have a little bit better dosimetry data than perhaps was true when some of the original weighting factors were done.

MR. HODGKINS: Yes?

MS. THISTLETHWAITE: Thank you. Duann Thistlethwaite. This is just a question on, if the

tissue weighting factors are accepted as being changed, then how would that be coordinated with all the radiopharmaceuticals that are out there and their labeling, to be mislabeled from the FDA standpoint, because they would be all calculated incorrectly.

MR. HODGKINS: Anybody want to field that question? Okay. And actually We're not looking for, you know, solutions, We're looking for issues. So I think we can restate that to say that that's an issue.

Okay. And We're just warming up here, so good point. Anybody else from the panel, then, want to add any further discussion? Any further questions?

So, let's try and as far as the audience, if you would move towards a microphone in order to be heard, and then in the meantime, can we take a caller in from the webinar? Is there a caller there? As far as a response. No?

PARTICIPANT: This is just a--this is Dave Allen. Just a technical, for anybody that's on the telephone, would they please go on mute, We're having a lot of difficulty and a lot of noise.

MR. HODGKINS: Okay. It sounds like there aren't any questions from the audience right here. Microphone please. Thank you so much. And start with your name. Wait a second, I think your microphone is

off. Hold on a minute, it's just in the back, right here. Good?

PARTICIPANT: I'm Carl Paperiello, speaking for myself. I think it's important that whatever happens, there be consistency among all Federal agencies. There can't be an EPA dose and an NRC dose and a DOE dose and right now that is the situation.

Also has to be consistency within the NRC regulations, dose, for different rules based on the same models. I would note that is more important to have consistency within the United States than with the international, and I would believe that part seventy one is probably already tied to whatever international models are being used, because that's a treaty obligation. Thank you.

MR. HODGKINS: Thank you so much for your comments. Anybody else from the audience, then? As far as a comment? Please, microphone.

DR. RABOVSKY: Joel Rabovsky, Department of Energy. I had a couple of questions. One, when talking about the dose conversion factors, also I think an issue would be what the default size of the particles will be.

We in the Department of Energy adopted the default size of five for, five microns, for

occupational use. However, for I think environmental use, and I think, calculations or dose conversion factors develop EPA who use default to one micron.

So I think that's an issue that would have to be addressed. Another issue is just the mic, I just had a question. When you said the size of the population, did you mean the number of people in the U.S., or the actual physical size of the U.S. people?

MR. BOYD: I actually was referring to the physical size, the organ sizes and the distribution. I mean, if you do a Monte Carlo for a typical Asian population versus the typical U.S. population, it would be somewhat different.

MR. HODGKINS: Okay. Thanks for the clarification. Thanks for the question. Is there another question?

DR. RABOVSKY: Well, one more point. I think one issue that came up when we address the conversion, is the issue of operational values versus protection values. All the values that ICRP 103, ICRP 60 are protection values. They're not measurable.

And the measurements really are handled, I guess, through ICRU. For example, when we talk about changes in tissue weighting factors, that's an ICRP quantity. But the actually measurement is still based

on quality factors versus the ICRU.

And, what we noticed was, particularly for neutrons, the operational values began to diverge more from the protection values. Now, ICRP addressed this in ICRP 74, when they did exhaustive calculations to show largely that when they went to ICRP 60, the protection or the operational values were generally conservative.

Not in every case. Some extreme cases, but largely conservative. So I just make the statement that because measurement is such an important part of complying with the new regulations, this would seem to be an issue that, that should be looked at.

MR. HODGKINS: Thank you so much for your comment. Okay, anybody else from the audience would like to make a comment? Up to the mic. If we can take a opportunity as far as webinar participants, then, are there any webinar participants?

I hear that there is one. Can we hear from the webinar participant? Comment. No? Okay. So far, no questions from the webinar. Let's open it up to panelists, audience, webinar participants, then, as far as this issue. Don?

DR. COOL: Yes. I would, now that we've started with this discussion, I'd like to see if we

could engage just a little bit more. We've had a couple people touch on it, in terms of actually the question of changing the terminology.

We had laid three options out on the table. We've talked a little bit about some pros and cons, some implications. What I would be very interested to hear is from the different kinds of licensee. We have training, we have record keeping, we have reporting.

We have use internationally versus nationally. How would you see, for your particular aspects, should we go ahead and make this change, swallow whatever is necessary in terms of impacts, so We're all speaking the same language?

Should we allow the use of either terminology so that people can work their way through the process? I think someone mentioned, I think it was Pete, mentioned the delayed implementation where people have a little bit of time to work through the process. That's certainly a possibility.

What do people actually suggest would work for them and why, on this particular set of issues?

MR. HODGKINS: Panelists first. Go ahead, Peter. You're next.

MR. O'CONNELL: When we first put out our

notice of proposed rulemaking, we identified that, one of the things we were considering was keeping the current terminology but making the changes, and we got numerous comments from the technical people basically saying you don't look foolish, it's not just a different name, it's an actual different physical quantity.

And then from our legal folks, saying you're calling it something but it's, you're really assessing a different value and you can run into like, litigation problems.

MR. HODGKINS: Okay. Next comment? Yes. Name first.

DR. MAHESH: Mahesh from ACR. Personally, I feel with the world being so closed it's better to go towards more uniform definition, going towards the ICR prepublication of this send expressing total effective dose rather than continuing with the TEDE.

MR. HODGKINS: Okay, thank, thank you. Peter, if I could come back to you, just to make sure the record is clear. The DOE 835 now uses effective dose, correct?

MR. O'CONNELL: Yes. And we have the total effective dose is the summation of the effective dose and the committed effective dose.

MR. HODGKINS: And perhaps I'm going to pick on somebody just for a moment, but I wanted to come over to Kevin. In Canada, you're not using effective dose?

MR. BUNDY: Yes, that's correct. But we just called it effective dose, we don't call it total effective dose.

MR. HODGKINS: Phillip?

MR. GIANUTSOS: I'll just add for a--Phil Gianutsos--for a company like ours, where we do move individuals frequently between commercially regulated facilities and Department of energy facilities, the need for consistency is critical.

You'll create a paper keeping nightmare. Software is really the backbone of a lot of the record keeping, and there will be issues with who's software is using which model, which terminology. That, that has to be considered in, in looking at a phase in period. I think that will be very difficult to implement.

MR. HODGKINS: Thank you. Yes?

MS. THISTLETHWAITE: Yes. Duann Thistlethwaite. Actually for I think the greater thing comes back to the definition itself, so that We're all in the same common definition if we want to call it

the effective dose, then are we allowing the DDE as well, or not.

I mean, that's the question to answer, and if we are, then we can just call it effective dose. I really don't like total effective dose because that reminds me of TED, the airline. So.

MR. HODGKINS: Stephen, did you have a comment? No? Kevin? Another comment? No? Okay. Oh, yes. Michael.

MR. STAFFORD: Yes. Mike Stafford, ORNL. Just some of our experiences this past year, you know, We're about wrap up a year of implementing a dosimetry program under part, or ICRP 60.

And our, our external dose values have increased a little bit in some areas of where we have some significant neutron doses, so the, I guess, the outcome in terms of actual collective and individual doses that We're reporting this year are, are really minor.

But, the thing that is significant about this is the tremendous impact it has on your entire dosimetry system, and there's a tremendous amount of administrative effort, a lot of heavy lifting that's far reaching from, you know, internal external dose calculations instrumentation, reporting, training.

We, We're not sure how much effort it took to, to do this, but it's around two and a half person years worth of effort to, to implement some of these changes that had very little effect on our overall dose values that We're reporting.

But it just brought us closer, I guess, to being consistent with the international community. So, so it's a, the technical aspects of this seem to be way overshadowed by the administrative and logistic impacts of doing something like this.

MR. HODGKINS: Thank you. Panelists, anything else from your perspective that you'd like to add to the options, those three questions? Then I'm going to open it up to the audience, as far as, anybody from the audience willing to make another comment?

And, how about from the webinar folks? And, let's just to clarify, maybe, if the webinar folks are, you know, pretty satisfied and not participating in that level, at this point, Willie, can you just give me a hands up when there is a questioner from the webinar that might help the process along a little bit?

And then, Vanessa, for those who are shy in the audience, because you haven't participated a

whole lot, there are cards that you can write your question and then we'll just use those cards instead, okay, to help you out there.

So, with that being said, any other comments or questions? Don?

DR. COOL: Let's see. There we go, okay. So let me pursue a slightly different question within this next, then. As we have done our discussions over the past year, one of the pieces of feedback that we've gotten a lot of is this question of using effective dose from external sources versus the deep dose equivalent.

And much of this came from our various groups in medical, and so I was interested to see what some of you who are representing some of the different medical areas and to pick on my friends from the States just a little bit, on the implications of moving to effective dose and a more consistent application.

If I can put it that way without being prejudiced one direction or other, towards using a effective dose calculation rather than the deep dose equivalent.

And just by way of background, for those of you who may not be familiar, some states do not

recognize the effective dose, one of the effective dose calculations. Most of the states do.

And so I'm looking for different groups views on the impact associated with that. And I would invite my colleagues from the states to talk about the implications to their programs of moving the terminology.

MR. HODGKINS: Okay. Panelists first. Any comment? Yes?

DR. MAHESH: Mahadevappa Mahesh. I wanted to resume my comment for the second, regarding the effective dose calculation. But you're preempting my, to ask it.

In the medical community especially, in the intervention fluoroscopies, and I'm going to repeat this comment again later. The, the utilization of the straightforward badge reading for this annual limited has created a lot of issues with, in the medical community.

By going to this effective dose definition and with an adaptation of the good corruption factor would be a better way.

MR. HODGKINS: Okay. Comments from the Board, from the panelists? Did I see a hand go up? No? No further discussion there? Let's ask from the

audience participation part. Microphone is on.

PARTICIPANT: Ken Conway, Babcock and Wilcox Uranium User's Group. For those who are, could make a significant difference, the use of more elaborate calculational methods that give a true dose are entirely proper. But there large amounts of users, state mandated for heavy duty x-rays, limited exposure to gamma emitters where, quite frankly, there is very little benefit in the calculation and it's adequately, conservatively represented by the straight DDE.

And I don't see why there is a need for a universal application of the more complicated system. Each licensee or user to simply choose the one that best represents their situation. We've deliberately chosen not to use the calculational methods despite occasionally having a situation where it would be somewhat beneficial, simply because of keeping things simple, and We're willing to absorb some extra essentially reported dose for lack of paperwork and a more complicated operations. Thank you.

MR. HODGKINS: Thank you for your comment. Any reaction to that from the panelists? Yes.

MR. O'CONNELL: As far as DOE is concerned, using the compartmentalization process or coming up with an algorithm, that's an option. I mean, you

always have the option that has taken the highest external dosemeter. But most of our sites have, have taken that option, and they feel it's worth the effort.

MR. HODGKINS: Okay. Panelists? All right, back to the audience. Any reaction from the audience? Don? Any other comments?

DR. COOL: Okay. I appreciate that bit of feedback. What I think I'm hearing is that people like the opportunity to use the simple approach but would also like to be able to use the more detailed calculation.

We've had one, one view, which is something that we have heard before, which is that there are certain kinds of uses where the difference between a deep dose equivalent and an effective dose calculation becomes very significant and I think what I'm hearing is that you would like to maintain that ability.

The other thing I think I'm hearing is that there are a lot of administrative materials and a lot of calculational issues that underlie the move to effective dose and updating the calculations.

But that that seems to be something which people would tend to favor, and I would like to see

whether that synopsis seems to be something that most of you support before we move to the details of those calculations, because that's where I want to go next.

MR. HODGKINS: Okay. Just one comment, the webinar folks are saying that it's breaking up a little bit, you're fading. So again, I think We're going to try and turn the mics up a little bit and then speak directly into them because they're fading out a little bit. So, hope that helps the webinar folks.

Any other comments on this issue, then? And, with that being said, having been the practice-- yes? Oh, sorry--

MR. COX: Don, I'll address that for the agreement states. Lee Cox, Organization for Agreement states. As you might aware, the states are always in favor of flexibility, so that would be something that we would support.

MR. HODGKINS: I see a lot of heads nodding. Kate, we haven't heard from you, but your head is nodding.

MS. ROUGHNAN: Well, for, usually the sealed sources, number one, you don't tend to have any internal dose. So We're just use, using the external

does. So there isn't too much of an impact for most of the industrial users.

But we'd be willing, we'd like the flexibility also, though, you know, do the best method for your operation.

MR. HODGKINS: Duann, you want to add?

MS. THISTLETHWAITE: I would agree with that, I think that Mahesh brought it forward first, saying that, you know, there's situations where the calculation would be beneficial to the, to the worker, and would definitely represent what they're getting more than just the, the badge reading from the DDE. So we would agree with that.

MR. HODGKINS: Madesh, did you want to add, since she called your name out?

DR. MAHESH: Just to correct my, it's been spelled, my name is Mahesh. No, the name plate is different. But anyway, I do agree because I want to discuss this in more detail when we come to the second half about the effective dose calculation and the occupational dose limits because I do agree because that has to some extent been unfair in some of the, in our practices especially in interventional fluoroscopies.

Where our state goes uniformly with the

DDE number based on the badge reading outside the apron, which we all know is not the dose what the interventionalists are getting.

Because of that we have a lot of, a lot of the time, heavy stress in monitoring our fluoroscopies and some time you might even have to go to restrict that utilization which has impact on the patient treatment.

MR. HODGKINS: Okay. Yes?

MS. THISTLETHWAITE: I just wanted to comment on something that Michael had said. Basically the administrative part, I don't think it's necessary to change all the terminology on the forms if it becomes to burdensome because you're thinking of NRC form four, form five, all of those that would have to be redone and reissued. So, from a cost standpoint, I don't see that it would be worth it just to change for that sake.

MR. HODGKINS: Thank you. Yes?

MR. COX: Lee Cox again, Organization of Agreement States. Just wanted to make a comment about records, the impact on records. And you didn't really ask this question, but the impact on rulemaking. Just want to compliment the NRC on them being mindful from 1990 to 2007, not making any changes, realizing that

there were going to be significant recommendation from the ICRP.

And as we go forward, I hope that the NRC, and it looks like they are, to be mindful to make substantive changes, if need be, but not piecemeal changes that would require a lot of resources from the states, doing rulemaking, some states have to do a lot of statute changes. So, that would be a major impact to the states.

MR. HODGKINS: Thank you. Panelists? Let's move it to the audience. Any reaction from the audience? Yes?

PARTICIPANT: I'd like to second the, her opinion that essentially the changes in a lot of these--

MR. HODGKINS: Can you speak into the microphone?

PARTICIPANT: Sorry.

MR. HODGKINS: That's okay.

PARTICIPANT: In my view, the changes in these units are fairly mild. The actual numerical totals. I don't believe there is a great benefit in forcing the changes. The third option, of licensee selection in change over time if we wish is entirely appropriate.

It reminds me a great deal of the changeover from solubility classes and internal update in DWY to FNS, article after article in the regulatory publication, and the regulatory publication just makes the routine comment that there are a roughly equivalent and should be used as such, and that's certainly true here, also. Thank you.

MR. HODGKINS: Thank you. Reaction? Comments? Don? Yes.

PARTICIPANT: I'm Mark Smith, with Sterigenics. And I'll speak for the global operations, if you will, because we operate in a half a dozen countries outside the United States.

As it stands, we have multiple record keeping areas in the way we do things in different locations. If we don't expect harmonization between all nations, which I don't expect that to happen at any time in my lifetime, at least having the flexibility to, where, if I can adopt the system that I use in Belgium and use it the same in the United States without having to maintain two systems, makes my life a little bit simpler. So the flexibility option is, would be the one that I would support.

MR. HODGKINS: Thank you. Panel reaction? Audience? Yes? Michael.

MR. BOYD: This is not exactly a reaction but just, just to make a comment about operational quantities versus more individual specific calculations. And, certainly, effective dose is meant to reflect a dose of record to a, you know, to an individual versus the kind of science that we, that I was talking about earlier, where we can actually look at age, gender, and organ specific absorb doses.

But, that doesn't mean that when we do that science, that We're proposing changes to the ICRP definition of effective dose, which is, as I see it, an operational quantity for a referenced individual.

MR. HODGKINS: Can I just ask a clarifying question to our audience member in that exchange that we just had? I think that making life easier, is sort of a comment, but I guess, why would it make your life easier is maybe a follow up question to that?

Or is, as you pointed out, there are scientific impact to that, and I guess as a facilitator, would you want to talk to the scientific impact of that a little, bit, as opposed to making your life just easier?

PARTICIPANT: Well, as, as we had the discussions along, along the lines here is from an operational perspective which is where commercial

business, for profit organizations, and we care about the operational side of it.

From an operational perspective, there's not been anything that I see that makes a big difference in terms of numbers, in terms of impact, other than the model that we use that, the records that we keep.

And for operation numbers on here, I'm seeing if we can follow one model everywhere, that gives us a number that's valuable to us and is appropriate to what We're trying to do with it, than we are scientifically based well enough with that operational number that we can carry through with it without having to have difference in size versus the U.S. population versus China or whatever We're trying to do with it.

Again, it's just one of the, for global operations, its much easier if we can apply the same thing everywhere, and it's a lot easier to explain that than my having to do six different training courses in six different nations to explain how we calculate, calculate the effective dose.

MR. HODGKINS: Excellent. Thank you so much. Anybody else, then, as far as listening to that and the difference--yes, Ralph?

MR. ANDERSEN: Ralph Andersen with NEI. Somewhat in the anticipation of our discussion on Wednesday, but broader than that, I would just recognize that within the same discussion, you have the much larger issue of the regulations that are still based on ICRP publication two, and, and I don't see anywhere on the agenda where you're really going to look at that broader issue.

Except for the very limited context of 10 CFR 835 Appendix I. This also effects many other regulations, particularly that regard public dose. So I would just comment that some of these issues play out much larger where there are in fact significant differences in calculating things using ICRP 2 versus ICRP 60 or ICRP 103.

MR. HODGKINS: Okay. Audience members? Don, did you want to--

DR. COOL: So, let's pick up on that just a little bit, because I think Ralph makes a good point, that we should probably touch on and make sure we all, all understand. Ralph is correct, there are portions of the NRC regulations that go all the way back to 1960 and use whole body dose and organ dose.

And then there is the current part twenty that uses total effective dose equivalent. And then in

fact there is the situation with a number of individual licensees, and I think B&W is probably one of those, some of the others, who by Amendment, have moved to the ICRP 60 methodology and calculation and are actually calculating an effective dose, at least on the internal portion of it.

Because of some of the changes in the dose coefficients that came about in 1990. The Commission clearly recognizes that there are some of these differences and I think an underlying theme that at least some of us might individually wish to be the case would be to update and realign that terminology and calculation approach so that we didn't have multiple different systems that we were having to deal with.

So, part of the questions here, and it's a, it's a, at least two part question, is using the terminology and updating the science, which would take all of the different uses and move it all to a consistent basis across the licensee types.

Now, to get to Ralph's question in particular, there are some portions of the regulations which are still very old, which are not currently under active discussion. That's true.

The staff, when we went to the Commission

in 2008, said we know that they are out there, but we can't eat everything at once. You can't eat a whole elephant in one bite. So, in fact, the staff's recommendation was we explore this issue with you related to part twenty, and the part fifty Appendix I, because there were particular issues associated with the reactor's demonstration of compliance.

But I would come back and ask you all again, putting on your hat for a moment and other regulations that you might have to deal with, because if a policy decision were made to move to the updated methodology and updated dose coefficients.

I think it would be reasonable to say that the Commission would then expect that the staff would be looking to try and move to a consistent underlying regulatory base in other portions of the regulation over some period of time.

The Commission has in fact already asked the staff to look at these issues related to waste disposal.

MR. HODGKINS: Thank you. Okay. Reaction from panelists? Ralph?

MR. ANDERSEN: Yes, Ralph Anderson, NEI. Just to follow up on, on Don's comment. That was one of the things I had in mind is, actually the staff

paper on updating 10 CFR part 61 for low-level waste disposal, which uses ICRP 2 as it's methodology and is primarily implemented by agreement states, because NRC doesn't actually license low-level waste facilities.

That paper goes up this December. Your paper goes up almost a year later. So that's on a separate track, so there is a left hand, right hand problem. Additionally, I just mentioned, as a footnote, that in fact, 10 CFR 20 does use ICRP 2. It requires conformance with the EPA fuel cycle standards, in I believe it's section 1302 of 10 CFR 20, maybe it's 1301, which in fact is also based on ICRP 2.

So, again, my comment is, you can't get away from it by just simply looking at the one other regulation. But I hope, I hope that we'll look for the right time in the program to take on that issue separately and individually because I think it's the larger case of the differences between ICRP 60 and ICRP 103 and ICRP 26.

MR. HODGKINS: So perhaps we should put that in the parking lot for a little bit later discussion and help us keep in mind. Mike?

MR. BOYD: Right. It's probably an opportune time to say that, I've given a little

feedback here, but opportune time to say that EPA is also aware of this patchwork quilt of regulatory bases for our dose, dose assessments.

And We're looking at our regulations almost in parallel with what NRC's doing here, and through the interagency steering Committee on radiation standards, we have a Federal guidance Subcommittee and it is our hope that if everything falls into place over the next, you know, two to five years, that we will have a more consistency and we'll, you know, we'll try not to have these outliers.

But of course, regulatory and rulemaking procedures are very lengthy and tedious processes, and each one has it's own public involvement process. So, it's not guaranteed, but it would certainly be the ideal.

MR. HODGKINS: We have a comment from the audience, and then we'll take one from the panel.

PARTICIPANT: Lynne Fairobent, American Association of Physicists in Medicine. I can not stress strongly enough that this change cannot be an NRC effort alone. We have too many other Federal regulatory agencies that have dose requirements, one that is not even been brought up at this table or in this room today, and I don't believe is present, is

OSHA.

The implications that we move forward whether it's with solely changing NRC regulations and then subsequently requiring the agreement states to follow suit for radioactive materials, is not acceptable.

It does need to be a U.S. policy decision that we move, and we move across the Board, whether it, the source of radiation is radioactive materials or machines that produce radiation.

MR. HODGKINS: Thanks so much for your comment. Do the panelists want to add to that? Please.

MS. BEEGLE: Cheryl Beegle, as to--excuse me--as to medical imaging. I just think in general, you have to look at the terminology being inclusive enough with the move towards exposures of not only occupational workers, but individuals who are undergoing examinations that as we move to electronic medical records and are trying to have in those records information about exposure factors, that if We're not all talking in the same terminology, that information is meaningless.

And yet that is a big push in the medical community, to be able to provide an individual with their lifetime exposures, patient individuals, not

necessarily occupational workers.

MR. HODGKINS: Thank you.

DR. COOL: If we can explore that just a bit more, just for a moment. Because one of the questions I think, and this ties into the operational units versus the record units for regulatory compliance.

And here I'm seeking to understand a little bit more, what kind of dose information you're actually pulling in, because effective dose, as ICRP states it, is a prospective protection quantity and it has built into it all these sort of standard assumptions.

So it really doesn't actually reflect me or you or someone else. So I was curious, what doses you were actually thinking about incorporating into those records, because I would have guessed it would not have been the effective dose.

DR. MAHESH: Following with the same discussion Cheryl mentioned, that's the big question we have in American community right now, what dose information to report. As probably most of you know, excluding the CT community, the state of California passed a regulation now for reporting dose reports.

And I had just a policy for future to

provide dose information for the patients, and in the medical community we are still in confusion, at least in the discussion, which dose descriptors to go, and one of the dose descriptor pushed forward is the effective dose for the patient.

There is a lot of room for discussion for that one, but right now that seem to be the most common dose parameter, but again, there's lot of discussion. But that's where the constant, coming into how we define these things.

Because apparently the medical community is going towards having some sort of patient ghost descriptor in their records, and it's going to go one way or the other and already one of the state has already passed a regulation that CT doses have to be reported to the patient.

Currently they have discussed only for two descriptors, but moving towards more commonality will be the effective dose. We don't know yet. So that's the discussion going on.

MR. HODGKINS: Further discussion? Ralph.

MR. ANDERSEN: Ralph Andersen, Nuclear Energy Institute. Yes, I'd like to really build on it and reinforce that the previous two commenters made. I would direct you to the NRC website, which has got a

nice section on radiation protection that lays out the average exposure.

Remember, the public in the United States. It's interesting, when I look at it, because the, the graphic includes exposure from medical practices. It includes exposure from natural radiation background.

It includes constructs like occupational exposure, and it includes exposure from nuclear facilities. And I would comment that in fact that graph itself attempts to compare and integrate doses from four different methodologies.

So, you know, I, I just comment that this, a major consideration I think in your development of a, of a paper for the Commission needs to take into account this, this issue of communication across a lot of different areas and clarity.

Otherwise, you're going to lose public confidence. I can't stress that enough, and I've not seen that clearly identified as an issue going forward. And that's independent of the patchwork, excuse me, of Federal regulations.

MR. HODGKINS: Thank you.

DR. COOL: And, and your recommendation for that Unit would be?

MR. ANDERSEN: I thought we weren't solving

problems today.

DR. COOL: I'm looking for a view.

MR. ANDERSEN: Well, my simple view is that the Federal Government ought to be using the most updated science and terminology, but I would say that I fully support the comments that have been there for flexibility at the level of states implementing, and of licensees implementing.

And, we've, we've done that often, in a lot of different ways. We can use alternatives. Your fundamental concern is, are we protecting public health and safety at the levels you've defined. So, as long as we get there in a way that satisfies that requirement, I think that's proper.

But as far as what you're front line interpretations and statements and definitions of the science and the methodology, I think you ought to be on the most current page at all times.

MR. HODGKINS: Cheryl?

MS. BEEGLE: As an imaging professional, I think it's important from the patient perspective as well as the worker's perspective we have many workers who don't understand occupational exposures, be they nurses in an ICU versus even x-RAY technologists who may not appreciate what a PET pharmaceutical gives in

terms of occupational exposure to them when using it.

But daily, we have patients who ask us what was my exposure during my PET CT scan. And every vendor out there calculates the CT exposure index differently. And thereby, if you can get an approximately for your iPhone to calculate your radiation exposure, I think we all need to be on the same page there.

Because, in my work at the NIH we have patients who come from all over the world as, the same at Hopkins, in various institutions around the country. And so to say We're only going to pay attention to how it's done in the U.S. is, you know, sort of narrow.

And to say that We're going to give too much flexibility when people do routinely go between states to seek treatment, I don't know how much different we can have one state be from another state, either.

MR. COX: I wanna--Lee Cox, organization of Agreement states. I just want to piggyback on what Lynne said. If you poll all of the agreement states on this issue, as, as we have done, the major concern is dual regulation. And, and one of the things is, overlap and agency jurisdiction.

An example would be in a non-agreement state hospital where you have the NRC having jurisdiction over the nuclear medicine Department, and then either OSHA as Lynne pointed out, or the agreement state or the state agency having jurisdiction over the x-RAY Department.

How do you solve that when you've got, you're using different terminology in the same facility with different departments under different jurisdictions?

MR. HODGKINS: Thank you, Lee.

DR. COOL: Thank you. I think maybe now I a good moment to note that in the process of trying to convene this group today, we had invited OSHA to participate and in fact until Friday of last week I thought we had our OSHA participant at the table.

Unfortunately, she is not able to be with us, but they are aware of the discussions. They are as I think Mike Boyd noted a little bit ago, a member of the interagency steering Committee on radiation standards Federal guidance group, and quite interested in the discussion.

Some of you may recall that they actually had a notice asking for input a couple of years ago on whether they should update the methodology and there

was a lot of comment received. We've been talking some with them about what they got.

And talking Friday afternoon with her, what she noted was with the change of Administration, that rulemaking was put on hold. It doesn't mean it's off, and they're quite interested in the discussion, so my understanding of that is that there is a recognition of this issue of needing to update.

I, of course, cannot promise what OSHA's regulatory calendar and resources will look like, but what I can say is that myself and Mike, working through the interagency steering Committee would be looking to try and see what could be done to move all of the agencies together.

But this is very good feedback on part of that process.

MR. HODGKINS: Other items, and is there anything else related to the numeric values or have we exhausted this? Mike?

MR. BOYD: The difference would be trivial, I agree, but I just wanted to get into the public record that if we do the new science we would be incorporating the new ICRP 107 decay date, at which, for a few radionuclides, might make a significant impact, but overall not.

MR. HODGKINS: Was there a--yes, in the back of the room? Mic should be on.

PARTICIPANT: Hi, I'm Frank Congel, representing Argonne National Lab and I'm very much enjoying this dialogue. I was one of the guys who's been around for a long time, and instituted some things that ICRP one. You might not know, I'm 120 years old.

But, what I have is a basis for recommendations here as result of scars, of trying to explain to the general public over the years all this patchwork. And here's an opportunity to do something, and I just have a couple of suggestions.

One of them is, recognizing We're not going to get perfect science out of regulation. Recognize that if regulation is going to have to represent compromise, represent, in regulation, opportunities to do the best science for the wide range of licensees over which they have, over which the NRC has authorities.

It's easy to say, but not very easy to do, and each one of us, from what I've seen, including myself, wants to do the best technical job forward. You can't do that in a regulation.

Like you talked about, you've got one of

the papers up to 2020, 2020, before auditing ICRP 103, those factors become available. Should think of having a separate reference for these, a best practices kind of a statement.

And something that would perhaps, at roundtables like this, discuss what is the best for each one of the technologies, put it in a regulatory form, but allow the groups to do the best job they can, not get into a box of, this is the right dose, but it's not consistent with the regulation, therefore I have to cite something.

I don't want to ramble on, but I'm just listening to this it really is the same discussion that resulted in ten, eleven years worth of interactions to get the, the part twenty that was finally adopted in 1994. I had a Pinocchio nose all the way through the eighties, telling people that, six month we'll have part twenty. Date it. Well, I don't know how many times I said six months, but it was probably like six seven years.

Why did it happen? Because of the very issues around here. When the ICRP 60 came out, we were that close to implementing the new part twenty. They said, you ought to change that. Well, in the text that I read, it said we didn't change it because We're

already past the comment period on the, the version that was out there.

There was more to it than that. The reality was that there wasn't a significant enough change at sixty to justify reopening it. And that underlies some of the discussion I hear around here, significance.

A discussion we have at a technical meeting is one thing. A discussion for regulations is something else. Significance has to underlie it all. Otherwise, you have to make the regulation a living document, which is extraordinary difficult.

Anyway, I, I'm rambling on some, but I really think regulation's got to represent a bigger overview. It has to represent some kind of a compromise while recognizing that the science is advancing. It's advancing on a daily basis. Somehow you got to meld the two.

MR. HODGKINS: Thank you so much. And just as a facilitator's note, this is not the last opportunity you get to talk, so feel free at any point, you know, there's going to be more discussions.

But, you know, you don't have to get everything in right now, one time, in front of the mic, that there'll be further discussion as we go

through, and reminders maybe of previous discussions would be, you know, appropriate as well.

Okay. Anybody else want to comment on the last items? Yes, Peter?

MR. O'CONNELL: Peter O'Connell, DOE. The last couple of comments, I've heard a couple of terms, people saying that they thought the resulting values were going to be relatively insignificant. DOE, we agree for external exposures, we found that the differences were very insignificant.

For our collective dose, we found then to be relatively insignificant. But in the DOE environment, when we have an, unlike NRC licensees, when we have a significant exposure situation, it inevitably is an internal intake or uptake, and it's typically a transuranic.

And we found the differences were a factor four to ten different, and we, we consider those to be fairly significant changes on a individual basis.

MR. HODGKINS: Thank you. Further comment? From the audience? Anybody from the webinar? Just one last time before we--yes, I think there--is there one comment from the webinar? Take it away, webinar people. We're listening.

PARTICIPANT: Can we just disconnect

everybody off this webinar and dial back in?

MR. HODGKINS: Not working. Sorry folks, we'll try and--We're going to be taking a break here. We have a ten minute break. In that ten minute break, we'll try and work on some of these technical difficulties, and then go to the second issue, all right? So, what time you got on your watch? It is 10:25. Take ten minutes. Break will start back in the room at that time. Thank you so much, and coffee is in the back of the room, water, refreshments.

(Whereupon, the above entitled matter under investigation went off the record at 10:25 a.m. and returned at 10:41 a.m.)

MR. HODGKINS: Okay. We're going to get started again. We're going to take on the next issue of occupational dose limits. Kim, who is actually help managing the webinar and some of the logistics in the room, who was supposed to be doing this particular portion is going to turn it back over to don to take over as far as the occupational dose limits.

Now, as far as the last one is a good exercise on how we want to run this seminar, and so I'll ask you to keep, let's try and keep that going. A little few, fewer spaces because you're comfortable with each other, and where you were shy in the

beginning, you're feeling a little bit better.

Kate, no problem calling on you like I did because I hear you're--all right, so if your head starts nodding guys, and folks, I'm going to start calling on you, okay, because that means something is going on there.

Same thing with side conversations. Those are probably the best conversations. Most interesting, anyhow. Regardless what the topic is. So I will be calling on you if there is some issue, so that we really can get everybody's input on that. Okay? Those are the ground rules. Thanks so much, and I'll turn it back over to Don.

DR. COOL: Okay. So, we've had a good discussion on some of the underlying technical things that go into calculating doses and how we would report doses. Where we want to move now is the first of several issues related to the fundamental radiation protection principles.

This is the one that has over the course of the discussion, seemed to energize people a lot, maybe almost to the point of saying this is the 800 lb gorilla in the middle of the room. The question of whether or not there should be changes to the occupational dose limits.

So, current NRC regulation as I'm sure all of you are aware, five rem, fifty millisieverts per year, based on the recommendations available in 1977. Based on a radiation risk relationship of one time sten to the minus four cancer fatality per rem.

Now, let me stop right there for a moment. I may get out of sequence a moment on my slides, but to note that most of you look at that number and go, Don, you had a typo. Because most of you are used to talking about a radiation risk per rem relationship of five times ten to the minus four, which is what everyone has used since about 1990.

Because in fact, over time, our knowledge of the science has changed and our understanding of what the risk of a Unit of radiation exposure was changed. Now, that has not changed in a lot time, but I think perhaps we have forgotten the fact that the relationship which underlies the current regulation is different from that which we are all normally using today.

So, I just point that out to you as we continue the discussions. One of the other things that is important that most people, I don't think, have probably ever bumped into, is that there is a provision called planned special exposure which

actually allows a licensee to apply, they have to do it ahead of time, for a specific permission to use an additional five rem for a particular unique circumstance.

Now until a few weeks ago, I had never heard of anyone who had actually used that provision. But I actually talked with someone down in Texas a couple weeks ago who actually used that provision in a series of source recoveries.

So, I have to stand amended from what I had been saying all along, that I don't think anyone has used this. In fact, I think people have used it at least once or twice. So that is out there.

So, the dose limit applies to the total effective dose equivalent from all of the sources under the licensee's control. That's particularly important statement for some of our medical and other types of licensees, because that means that individuals who are occupationally exposed working in NRC regulated activities, with materials, who may also get exposure from the x-RAY, the fluoroscopy, the CT, those other kinds of modalities which are not directly under the NRC's regulatory jurisdiction.

All of that exposure has to be combined in terms of demonstrating compliance with the limit. So

there is that sort of fuzzy area where you're working with both kinds of materials, both byproduct materials and machine produced radiation, where you have to combine the results.

Now, the other thing that's important and, for BA, perhaps another interesting discussion, there are certain kinds of licensees that are required to report their occupational doses to the NRC, and it becomes part of our radiation exposure database.

The reactors, spent fuel storage installations, fuel cycle facilities, industrial radiography. That data helps us understand, for those kinds of licensees, where individual exposures are, what the net exposures are in some of those populations.

There's two problems with that. One is that if you're a licensee in one of the agreement states, the agreement state will probably have your data, but that means I have thirty eight different sets of data to try and mine out there to try and combine together that present some interesting logistical issues.

But maybe more important from a standpoint of what We're trying to do here, which is understand the impacts of possible changes, there are some

significant classes of licensees for whom we have no data, because there's no requirement to report occupational exposures.

That includes all of the medical modalities. So, a part of what you're going to see me asking today are, what some of the exposures are in some of those communities, because we don't have the data to help us understand the impacts.

So in addition, as you will see in the questions in a little bit, not only is the question what are the impacts and what's going to happen under different scenarios, but should the Commission consider making more uniform the requirement to report the individual occupation of dosers into the database, so that there's something more akin to a National database that allows everyone to be able to understand the impacts associated with various discussions.

So, what are the international recommendations now? These have not change din a while but they are different than what happens in the United States. The ICRP recommendation, ten rem, over five years, with a maximum of five in any year.

I'm sticking with the U.S. units here rather than the international units. We can be bilingual for my Canadian colleagues and otherwise.

ICRP made that change in 1990. It has been adopted throughout the rest of the world.

I will tell you that, in fact, the United States is the only country that I know of at this point that still has a straight five rem dose limit. Everyone else has something else. Some of them have adopted the ten rem over five years, maximum of five in any year.

Some have in fact adopted a simple two rem per year, so as not to have to deal with the issue of averaging. I've already talked about that slide. I got ahead of myself. So, what are the options, at least for the starting point of this discussion?

First, we could decide not to change the dose limit at all. You could allow it to remain at the five rem, fifty millisievert per year level. One of the things we have heard from a number of people is, don't change the limit. I haven't heard a lot of why's, I've just heard don't change the limit.

One of the things to note that some people have talked about, particularly within the staff, well, you have an ICRP recommendation that was ten over five with a maximum of five in any year. Our limit is five, it corresponds to the maximum, why should we bother changing, you can still say there's

some alignment, okay? We'll talk about that.

The second is, second major option, of course, is to move to alignment with the international recommendations, adopt a ten rem over five years, leave the maximum of five in any one year so that you have an alignment. That's what many countries have.

We could move to a straight two rem, twenty millisievert per year dose limit for the basic occupational exposure. I'm sure there are some other possibilities, but those are the ones that seem to most directly align with the various international activities that many of you have to deal with when you're working in other countries.

So, a series of questions. What are the possible impacts for assessing and retaining dose histories and things if you move to a multi year average?

Some of us have been around long enough that we remember the time when part twenty's limit was five n minus eighteen, where n was the individual's age in years and you had to keep a dose record and a different form of the accumulative dose history so you knew how much dose the individual could get per year.

A lot of record keeping. A lot of people who were really happy when that went away with the

Revision of part twenty in 1991. Moving to a ten rem over five years would reintroduce, at least to some extent, the question of retaining some dose history, so as to understand where the individual was.

Now, with that, of course, comes perhaps the flexibility that you have which you wouldn't have if it was a straight two rem per year. So there are some pros and cons. So, what are the implications associated with that?

The most obvious question, of course, what is the impact if in fact the dose limit were to come down, either to the average or to two straight--two rem per year period value. How many individuals are exceeding it now?

What are the impacts associated with getting those individuals below the new limit? How does that work in terms of taking care of your operations, doing the radiography, delivering the medical care. The special, the specialties in the reactors who have to go from site to site.

Some of those sorts of things. What is the information that you can bring to us to help us understand what the actual distributions of doses are in some of the different kinds of communities, particularly in some of the medical communities and

otherwise, where we in fact don't have the data today and We're looking to try and build the record.

And if you can share that that with us today, or if you can get back to us with information that would help support our record. And the one that has been raise any number of times, because we have been listening. There have been a number of people that said, well, you're going to impact patient care.

Okay, very nice statement. What we need to do is to try and dig a little bit deeper into the whys underneath that, what the actual implications are in different kinds of facilities and reflecting back on the discussion that we had in the last little while, the extent to which that impact is or is not mitigated, if it's a consistent use of an actual calculated effective dose rather than a deep dose equivalent.

As I will be very honest with you, in the discussions over the last year, we've had a number of people say it's going to be a big impact, fluoroscopy and others just can't live with that. And I've had other people from the same community who have said if you allow me to do the effective dose calculation, it won't be an impact.

So I, we need to explore that a little bit

more. And then, the question that actually wasn't in the Federal register, which I'd like for people to discuss, is whether or not, as I mentioned a little bit earlier, we should require more consistent reporting of individual occupational doses into the REIRS database so that we have that information, can use that to understand the trends and activities.

And I will tell you, there are obviously some pros and cons, I would like to hear some of those impacts that are associated with you. Many countries, as I think our Canadian colleague would reflect, have National registries where all of this information is reported.

And I think that takes us to the opening of the discussion, so I'm going to move this back to the options.

MR. HODGKINS: Thanks, Don. Just some housekeeping notes. Your microphones have been moved closer to you so that you can actually almost touch them to your mouth. Because the webinar folks are having a hard time hearing still.

Second thing, for the webinar participants, you had been multitasking, and someone had everybody listening to their phone ringing. So if you will please now disengage from the webinar and

reconnect, because we haven't been able to manage that, will you please do so now, and we can then listen to you probably more effectively, and questions.

Okay, so, with that being said, ground rules are, we'll listen to the panelists, the audience, and webinar participants once again. It may be restricted for webinar participants, just to have you do the write in questions. Okay?

All nods from on are game, any side conversations. This will get interesting. Anybody from the panel want to start the discussion? Michael? And name, first.

MR. SNEE: Mike Snee, from CRCPD. Just for the licensees in the room, a little bit about how the rulemaking process works. Normally, NRC would pass the Federal regulations, and once they become effective, then agreement states have a period of time, and it's normally three years, to follow up with their own rulemaking in their particular state.

With regulations like We're discussing here, the NRC always assigns what they call a compatibility number or letter to each regulation. These would have a very high compatibility, meaning the states would have to adopt essentially the same

regulations, so states will have very little leeway on whatever the Federal regulations are for their own regulations.

Having said that, states have some concerns that we've heard from some of our licensees, particularly in the medical community, which was touched on of users that use radiation generating equipment that the NRC does not regulate and whether they will be able to meet some of these limits without impacting medical care.

It's been out there, Dr. Cool said, he's heard it before, he's heard both sides. It's, it's critical that those areas communicate their concerns to the NRC now. You can't wait until your regulator, which will be the state in these cases, go to do their regulations, because the states have to adopt the Federal regulations.

As regulators, we do not want to impact medical care. That is very bad. We don't, we don't want to be in that position, and as states, we also don't want to be in a position where we have to, feel we have to pass dual regulations for those of our licensees or registrants, whatever the case may be, who are outside of NRC regulations, so that we do not impact medical care.

MR. HODGKINS: Michael, a clarifying point. As far as participation means participation in this webinar, is that correct? I mean, this is the voice that you want them to have?

MR. SNEE: In this webinar, any public meetings, writing into the NRC when they have, in the Federal register, communicate when the NRC is doing their rulemaking on this, because when it gets down to the state level, states have very little leeway in what we can do with these regulations.

If there's a high compatibility, which this will be a very high compatibility.

MR. HODGKINS: And so that comment period is ending in January 31st, is from what I understand. So again, especially to those folks who are on the webinar, we need to hear from you, writing some note, especially since we've had some technical difficulty with this.

Panel discussion, reaction, comment. Yes?

MS. THISTLETHWAITE: Good morning, Duann Thistlethwaite. Speaking on behalf of myself and the radiophamarceutical side from the PET industry. If we do not go with number one, 2A, no change, you could actually shut down the PET industry.

I've been on the side of radiation safety,

was a radiation safety officer for PET radiophamarceutical companies and I don't see the benefit of changing to two rem per year. I know that it's accepted internationally, but when, not this company, but my former companies were international, and we would go in and work on cyclotrons, we would wear our badges, but the people in the international companies would not wear their badges going in to work on cyclotrons.

So, that's how they're able to stay below the levels. In that instance, you can keep that record or take it off. So, actually it's very important to make sure that we keep our levels at the current five rem per year in order to continue in the PET industry and to make sure that our workers are safe.

We have lower limits that are much less than this, and we keep them on that track all the time. With this flexibility, We're not able, we are able to call in for planned special exposures if we need to, so we appreciate that.

If we were to go lower, I'm not sure if that would suffice, of the planned special exposures of how to do it and especially over, I understand, the one per ten years, and then averaging it out. That came about right before I got into the nuclear

industry.

But, I don't like that part about keeping the historical records from radiation safety standpoint, that was very difficult over averaging so many years and the graphs and the data have become too cumbersome.

So, I would urge us to get our house in order and stick with the five rem and not be concerned with what they're doing in Belgium or in South America and keep it at the current level.

MR. HODGKINS: Yes, Willie?

MR. HARRIS: Willie Harris, just make a, make a couple comments. And I think, if you look where we are right now in the power reactor section, you know, and the majority of us would support two alpha, and I say that with, if you look at a couple of the options that are out there.

And, specifically in the power reactor section, most of us have adopted, I know We're not to dose constraints yet, so that's probably a different topic in and of itself, especially when you look at how the international community uses an understands dose constraints.

But, similar to that, most of us have adopted a lower Guideline for our operations anyways,

typically around two rem per year, you know, to exceed that requires a series of increased approvals, you know, for example, to go above three rem per year for a licensee, typically it requires like your site vice President to approve that extension.

So, in general, we don't do that to often. If you look at the data throughout the industry right now, We're roughly running about eighty three individuals who get about two rem per year, or, greater than two rem per year.

You know, relative to the number of workers we have, it's a small percentage, and we continue to drive that number down. You know, right now, you know, through our own, you know, course of actions that were taken throughout the industry.

But the concern becomes if we set a hard limit of two rem per year, you know, what probably many of us are going to do is set a further reduction in the, in the administrative Guideline that we use down to around one rem per year.

Typically, because we like to have that margin of safety in our plant operations. The impact of that is, again, going to be on a lot of some of our specialty workers, you know, and how We're going to go through and, you know, actually work through those

issues as some of those, especially welders, and if we could keep the doses down to meet those, that limit.

And I say that, because when you look at some of those numbers, it increases, you know, quite significantly between the one to two rem. However, but in general, if you look at the overall worker dose at a nuclear power plant, it's running, you know, somewhere around, you know, 183 millirem per person.

So, from that perspective we keep it significantly low. So, I guess to summarize it, when you look at, you know, where we are in the power reactors in general, you know, we are close to the two rem per year, you know, the most of the changes, you know, that would take to get that, you know, the concern would be just from where we would drive our own administrative Guidelines to get to a two rem per year limit and the associated costs, you know, with that, given that most of us are currently driving to get less than two rem per year anyways.

But to make a regulatory limit associated with, you know, the two rem, you know, the implications it would take just based on where we would drive our operations.

MR. HODGKINS: Thank you. Now, as a point of clarification, because I heard two points there, as

far as that goes, is that an application or, are you guys in disagreement with the level of doses? I mean, is there further clarification that needs to be had there, as far as that, you guys are in agreement, then?

MS. THISTLETHWAITE: I'm sorry, I think we said the same thing, I want to go with five.

MR. HODGKINS: Okay. Okay. As far as, then, as far as your comment then, as far as closing down the industry, the specifics of that?

MS. THISTLETHWAITE: In, in that, basically, there are thousands of PET doses per day. They go on in the country, and so I didn't want there to be any undue burden on the PET industry to make sure that you're trying to meet an administrative level of two rem per year.

Obviously it would be hard to reach that in the first couple of days or months of the year, but it could be to the point where you weren't able to run the cyclotrons and then you wouldn't be able to get to those patients.

And I think we all feel that it's very important to stage and restage cancer and diagnose that and if we, if that option is off the table, then you take away a whole modality for patients.

Maybe I was a little drastic in my statement, but I'm very fervent in believing that, that five should be where we stay. Because I fear that, then they'll keep on going with other things, and we don't want to go down that road.

MR. HODGKINS: And, I don't think it's the drasticness of your comment, I think it's just the detail we need, too, because I think that needs to go on the, on the discussion.

MS. THISTLETHWAITE: Okay.

MR. HODGKINS: All right, as the facilitator.

MS. THISTLETHWAITE: Okay. I could probably give you numbers and data and things like that. I, I don't deal with that in my current role in this company that I'm with, but I did in my last company.

Unfortunately, those numbers are still with that last company, but off the top of my head, yes, probably 85% of the cyclotron workers would have been over the two rem per year.

MR. HODGKINS: Thanks so much for the clarification. Yes, and you want to clarify further, Willie?

MR. HARRIS: I'm sorry, I thought you were asking us a question. I don't think it's as drastic in

the power reactor that, you know, I'm not concerned with, you know, if we made the limit two rem per year, my gut tells me, you know, we'll figure it out. You know, we'll have to.

But, you know, again, I just wanted to make, you know, the clarifying point that, in general, you know, most of us are meeting a two rem administrative Guideline with a few exceptions. So, you know, there really becomes more of a, you know, the administrative actions with, with reducing the actual hard limit down to two, and the, and the potentional, you know, slippery slope we may get into. Just knowing how we tend to operate, because we would set a one rem per year limit.

MR. HODGKINS: Right. Yes?

MR. HAYNES: Larry Haynes. I'd like to just add to what Willie had said, you know, as far as the ability to operate within a strict limit of two rem per year is probably not as difficult for the power reactor as it may be for some areas.

But one concern too with especially workers may be that, and our concern is, we would drive collective exposure up. You know, we may end up with, instead of two guys that can do a special job, you have to have four now because we limit the

exposure for those folks. That, that could be a concern. And I think it's important to point out the ALARA aspects of the programs now. We operate well below the five rem a year limit, and the ALARA programs have the capability to do what we have in mind here from an alignment standpoint without actually changing the limit and some regulatory control from the ALARA standpoint may be of a--

MR. HODGKINS: Yes?

DR. MAHESH: Mahesh from, I'm speaking on behalf of ACR. ACR stanchly support the patient safety and also personal safety. However, there's a lack of scientific data showing reduced ICRP recommended levels are any safer for the U.S. citizen.

Having said that, ACR also goes to the point telling, like, if NRC goes to the extent of moving from five r to two r, it is definitely required that they mandate that the most appropriate correction factor for this badge reading to be adapted in the state regulations.

Otherwise, none of the interventional procedures has to be limited because the two r limit and if the state allows to use the deep dose equivalent number of badge reading, a lot of the medical facilities will have very difficulty in

meeting that limitation.

For a, citing a personal experience in our state, the state of Maryland has a five r limit, as to, they take the badge reading as the whole body reading. And a few years back the state of Maryland had a task group to look into this NCRP report 122 about calculating the effective dose correctly.

And as part of the task group member, we recommended that the state allows the correction factor of at least some correction factor to evaluate this interventional fluoroscopy and medical professionals. However, up to this date, the state has, has kept it on the books to keep it permission on a case by case basis.

However, to my knowledge they have not given any permission to anybody which has put undue stress on the medical community, especially in a big academic teaching hospital when we have a limited time frame and the physicians come for training and if their badge reading are exceeding to closer towards five rem, we have to some extent, some time we have everyone pull that people out of this training program.

And that aspect of the NRC most towards, are towards two rem per year, we'll be facing large

difficulty. If at all, if they had to move to two rem per year to match the international limitation, then NRC has to make sure that the correct, appropriate correction factors are provided and that it's mandate to each of the states to utilize for evaluating this medical professional.

Also from my colleague outside the U.S., in some of the countries, the badge, they wear the badge underneath the apron, and in those instances, two rem is not difficult to meet, but as here, we, as, as needed, we wear the badge, we require the persons to wear the badge outside the apron to evaluate the radiation exposure but the noncovered part of the body, that's where the difficulty comes in the picture.

MR. HODGKINS: Thank you. I think, Kevin first.

MR. BUNDY: Yes, Kevin Bundy. I can offer some insight on to this. When we first started consulting on the new regulations, on the new ICRP recommendations, we did propose a twenty millisievert annual dose limit.

We had big pushback from two sectors, the uranium mine sectors, who were at that time looking at mining the high grade uranium mines in northern

Saskatchewan, and they did not feel they could meet that, the twenty millisievert limit.

And from power reactor group. As it turned out, the uranium mines did not have the high exposures they were experience, where they were expecting, and so they were not an issue. The reactor group, our operating exposures are, as mentioned earlier, very, generally below two millisieverts, or, sorry, twenty, two rem.

But, that's an operating, under operating circumstances, when they go through refurbishment, which we now have a number of reactors doing that, we are indeed having workers exceed twenty millisievert a year.

We have the five year averaging. We have it as a five year block, so everybody's exposures work up over those five years, and at the end of the five years, it goes back to zero again.

We chose that over a rolling five years form, probably, mostly because of the Administration simplicity of it, of the block. As it turns out, the only groups that have exceeded the five year block are industrial radiographers and it's probably due, due to poor administrative practices on their part more than anything else.

I have a few other comments but I guess I'll wait and see what the response to those are.

MR. HODGKINS: Okay. Michael?

MR. BOYD: Just taking off my EPA hat for a minute to make a general comment, just wanted to point out that x-rays and machine produced radiation is regulated by OSHA and the states, not NRC, so unfortunately, the problem with the, the fluoroscopists would be not addressed by the NRC regulations, as I understand it.

And correct me if I'm wrong, Don, but I believe the NRC is in line with the NCRPs recommendations for weighting badges, so that you don't use the lapel badges that those of record, whereas OSHA says that you must. So there's a real problem that can't be addressed through this rulemaking.

DR. COOL: In part, to try and clarify a little bit more. The NRC allows a licensee to do a calculation which would be multiple badge and there's actually several different methodologies that are recognized licensees can use. It was actually fairly recently a regulatory guide that was put out that updated and put all of those together in one place for licensees to use.

It's not mandated that they do that calculation. They can use the single badge collar, the deep dose equivalent, as the most conservative estimate, or they can choose to do the more sophisticated calculation.

With respect to the degree to which this impacts the fluoroscopy and the x-RAY uses, it's a bit mixed. It's true that the NRC jurisdiction itself does not extend to the machine produced radiations.

Our jurisdiction would extend to any of those exposures to the extent that the individual receiving the occupational dose worked with both materials and machine produced radiation, because then the demonstration of compliance would have to be to the summation.

But where it trips over this, and why we are trying to really engage this in discussion, is as, Michael Snee just pointed out, the states do regulate the machine produced radiations. Thirty eight out of the fifty states are agreement states.

Under adequacy and compatibility, they will need to look to align their occupational exposure dose limits. As I understand it, look to Mike and Lee to confirm this for me, the states have previously indicated that they will do that alignment and apply

it across the Board.

They will not have different limits in the machine produced side form the byproduct materials side. My understanding is that the CRCPD, as they would start to prepare revised state regulations, would move and place that new limit, if there was a reduction in the dose limit, in the CRCPD state suggested regulations.

Which means that it would then in fact be applied to the machine produced radiations. And we have a very interesting additional complication here, which I think we ought to explore a little bit more, both in the meeting and afterwards, about the cyclotrons.

Because I suspect that what you're telling me is there's both cyclotron dose from the machine is running and there is the dose received when you go in and extract the targets and other things, which would be exposure to the materials, and then that would be NRC regulated activities.

So I hope I've clarified that a little bit, and I'd like us to really continue to dig into those details and maybe first to look to Mike and Lee to confirm what I've said about where the states would be in this activity.

MR. SNEE: Mike Snee, CRCPD. You're correct. States will adopt these regulations, which they'll have to, and normally, when CRCPD does their suggested state regulations, they also do the same as the agreement states would.

I'd like to point out though that the current suggested state regulations allows for the use of dual dosimeters, one underneath and one on top of lead aprons, which then a calculation is done for deep dose equivalent, and I think CRCPD would probably very much like to keep that flexibility in their suggested state regulations and have it apply to these users, if these regulations go into effect.

MR. COX: That, that's correct. You coined it pretty, pretty accurately, that the, most states in their regulations, would regulate x-RAY and radioactive material with the same dose limits.

MR. SNEE: One, one more thing. I'm sorry. Mike Snee, CRCPD. CRCPD suggested state regulations are just that, they're suggestions. No state is obligated to follow any of those. Although agreement states are obligated to adopt Federal regulations depending on the compatibility that's assigned to them.

DR. MAHESH: I'd like to clarify that

aspect of it, at least highlight that aspect. I understand CRCPD has in their book about the suggested correction factor. However, state don't do that, they don't, and we have an issue now in state of Maryland.

They have it on the books, but they are not providing any time to use the correction factor, and sometime it's hard because I also sit on the addition control advisory Board for my state of Maryland. It's very difficult to convey at least bring them and we are, we brought them to that clinic to explain why it's needed.

But someone that is admit outside, it's like, no need to go below, below five r, so everybody should be complied with the five r. And I have been trying to tell at least the standard discussion at least to have the debate going, telling like, the state can do, need to do like a carrot and stick approach.

They need to provide discussion factor, and then they can restrict in this one.

However, some state regulations they just go to the state and that's implies sometime we can really, we can foresee some places they don't even wear the badges because they're afraid that they might reach their five r limit in their annual period and

they might be pulled out of the service.

And that's what we are worried about, even at five r. So if this NRC goes to two r, and then it only provides with a suggested recommendation for the correction factor, and we can foresee a situation where none of the, especially the interventional fluoroscopy procedures, can be really impacted and that'll be impact on the patient safety also.

MR. HODGKINS: Peter?

MR. O'CONNELL: Pete O'Connell, DOE. DOE likely can live with any of these options. We saw a while ago, the NRC was considering this, and so if you look, every six months we have to update in the Federal register our regulatory agenda.

So if you look at our regulatory agenda, We're considering the same options right now. Back in 2007, when we amended 835, we chose option 2A. We didn't change, make it into changes. At the time, the primary reason we amended 835 2007 was for the internal dosimetry aspects.

And we didn't see that, basically we saw that this is just being a roadblock, that this might just give some of the, some people the opportunity to derail our attempts to adopt ICRP 60 internal dosimetry methods.

Option 2C, if you look at DOE for the last five years or so, you can count on your fingers the number of people who have gone over two rem in any year. So we could probably live with 2C. 2B, right now, if I was a DOE worker and I got a six rem exposure, DOE would, contractors would give me another job for the next couple of months, and then January first, I'd start fresh for next year.

We're, We're considering what would happen if, reforms to the new system, and I've got eleven at rem exposure today, how does that impact my livelihood for the next five years. So I think that's something that we have to work out.

MR. HODGKINS: Yes?

MR. STAFFORD: Pete, on the, on the contractor side for DOE, as far as living with these, you know, I agree, our doses generally run, you know, well below two rem. You know, we, we operate that level. But there's a lot, there's a cost associated with that, the cost of business, the cost of doing nuclear business, that We're willing to tolerate, you know, as DOE contractors.

And, one of the things that is tough for us is managing internal doses. That's the, that's the wild card in our business, and often, you know, we

have to, we have to have bioassay frequencies where we can demonstrate compliance with, with the limit.

And, instead of having frequencies where we assure that we stay under five rem, if you lower that down to two rem, that could have some pretty significant impacts. I was looking at some data where something like plutonium 238, we would have to have a bioassay frequency of around fourteen days to be able to demonstrate compliance with the two rem standard.

So, and some other things, thorium and some, some things like that, as long as We're using urinalysis and then of course we can resort to fecal analysis and that would give us better, better data. So, so there are, there are some impacts. They're all going to increase costs and, and, and could affect the workers as well, like you mentioned.

MR. HODGKINS: Karen? Yes.

MS. ROUGHNAN: Kate Roughnan, QSA Global, speaking on behalf of industrial radiography. The vast majority of radiography licensees are well below the two rem. But there are some specific activities that are done that are critical to the infrastructure of the United States, such as taking x-rays of pipe and gas, oil and gas pipeline and a lot of work in the reactors.

The, they're not getting the exposure from the, the radiography, but they have to go into hot areas and reactors to radiograph pipes and they receive quite a bit of dose from that. So there's two critical areas that still, you need to perform the radiography.

But in those cases or those applications, they will exceed the two rem. So it's just part, part of doing the job, and if they have to hit the hard dose of two rem, then those critical jobs will not be completed.

MR. HODGKINS: Mahesh? Or, sorry. Go ahead.

DR. MAHESH: With the DOE and the other speakers recommending telling like if somebody exceed this limit they can bring in a different workers and complete the job, but with the interventional fluoroscopy, everything, the, if an experienced cardiologist or a radiologist is about to come to a limit of this one and if a patient comes in with the critical condition, the experience factor doesn't make a difference.

You cannot just pull somebody out and bring in a fellow or a resident to complete the job. So, that impact is going to be really serial in the medical community.

MS. THISTLETHWAITE: I'll just echo Mahesh on that, that the medical workers are highly specialized workers and when they come in to operate cyclotrons or to draw doses as a pharmacist or a nuclear medicine technologist who's also administering doses, that you have to be highly trained.

Also, the PET industry is switching now from compounding to manufacturing, so it will fall under the guise of the FDA, so we all have to follow CGMPs and those rules will become effective next December. So, there's even more regulations on who can go in and draw doses and work in things. So, I would just stress again, to, let's pick 2A and move on.

MR. HODGKINS: Ralph?

MR. ANDERSEN: Yes, Ralph Andersen with Nuclear Energy Institute. I'd like to make a couple of comments. One is, although I don't think it was intended that way, just wanted to lay to rest the idea that in nuclear power plants that we just go get somebody else and put them in to complete the job.

These are highly specialized workers, highly qualified, it takes many, many years to attain the level of qualification that they need to do, for instance, certified welding. So, it, the same challenge, is what I'm saying.

We, we actually have the same issue. It just may not be as apparent. Secondly, a number of our workers, particularly the workers that tend to get the higher doses, although still less than two rem a year, are workers that work at different facilities during the course of the year.

So, we have not for many years worked to regulatory limits. Our workers have all been so far below regulatory limits that we work entirely in ALARA space. Introducing the idea of needing to do forward planning over one year or even five years in trying to anticipate the types of things that might come up in the future at different facilities under different licensee programs would be exceedingly challenging.

And, and I remember from a previous lifetime of mine that, to a lesser extent, that could also occur within the medical area, where you do have a certain amount of transients that, folks working between different facilities and the like.

And certainly, you're not able to anticipate, gee, I wonder what the medical crisis is going to be next week that I'm going to have to run in and do a procedure. So, I think those types of issues need to be looked at because they will introduce unintended consequences.

And, and one comment I would make, Don, is whatever input you get through the meetings, I think you need to leave a, a category just called unintended consequences that we can't fully anticipate now, because it would change our decision making process if We're having to weigh non-compliance with regulatory limits against the other types of decisions that we make.

A good example would be discretionary work, or even the approach that people might use in medical procedures or in other things where there are alternatives available to them and those alternatives could become driven by considerations of not approaching your exceeding the occupational dose limit.

Whereas, currently, they're focused much more on efficacy of procedures and, and getting particular work done that you want to get done.

Finally, I, I would just offer the comment that when you go back and look at ICRP 60 and when you think back through the discussions that occurred in changing the five rem a year limit to the ten rems in five years, I think it's important that NRC revisit in it's considerations the scientific basis for that.

It wasn't just divide the limit by 2.5.

The consideration really was, as I recall, and I was involve din some of those discussions, was managing lifetime risk. Strangely enough, risk doesn't occur in one year or even five year increments.

Secondly, two come up with a scheme that would tend to distribute dose over a lifetime rather than allowing all of the dose to occur very early in a person's career, which is why we sort of strayed away from age based controls.

And then, finally, there was the issue of work equity, which ultimately led to the ten rem in five years as a function of making sure that people did not become unable to be employed because it was well understood that the risks of putting somebody into the unemployment ranks, the health risks associated with that are fantastically higher than the minuscule risks associated with the different between two rem a year and five rem a year.

So there were a lot of factors that went into that. I suggest that NRC in it's deliberations should revisit some of that basis, look at the actual performance of, in terms of, real exposures that people are really receiving, and inform their decision also from a true scientific basis, not just from a multiple of 2.5.

MR. HODGKINS: Thank you. Let's go around the room. How about, let's just go right around. Round robin, here.

DR. ATCHER: Robert Atchers, society of nuclear medicine. I want to reinforce a couple of the things that were said by Duann and by Mahesh. First and foremost is that most of the organizations I've worked with, which are numerous over my career, always have an ALARA program, and that ALARA program operates at a level, trigger points far below what the occupational limit is.

And so, by lowering the occupational limit, you also lower, necessarily, what the trigger points are going to be for, starting to have some sort of intervention.

And, and, I want to reiterate again, the scientific basis for going from five to two is really not, not present as far as my interactions with both medical physics and the health physics communities. It's invisible to us.

More importantly, from the standpoint of patient care, in the current environment, there is absolutely no way that we are going to be able to generate anymore reimbursement in order to hire more people to be able to serve the same number of patients

that we do now if we lower the dose limits and actually end up having to hire more radiopharmacists, support personnel for the production of radiopharmaceuticals.

As well as it was mentioned briefly, the nuclear medicine technologists who hand the patients who receive positron emitters, who get a, a higher dose than those who get single photon emitters.

And so, the, the bottom line from my standpoint here is that we, there's a potential here to substantially increase the cost of us doing business without any demonstrative benefit to, to what We're, what We're proposing to do here.

So, we would support maintaining no change at all in the occupational limit.

MR. HODGKINS: Thank you. Cheryl?

MS. BEEGLE: Again, as a nuclear medicine imaging technologist, I can say at times I am PET registered and I imaged alone for a number of years. And as our PET work increased in my current position, I was able to bring in more technologists.

However, we did hit limits when we were limited to the number of bodies that we could rotate through to do the work. I'm sure that, as Mahesh said with the cardiologist and the interventional

physicians, it's the same deal. Not only are you looking at training, missed training opportunities for physicians and technologists, but also the numbers of physicians in this country who are qualified to do some of those procedures.

And in this country, I would say that, though I don't have the scientist's background evidence to back this up, that we perhaps perform more procedures in this country than they do in other countries, and therefore our access to this type of care is also increased.

When you look at the number of coronary artery angiograms and stent placements and just CTA work, interventional work, We're doing it for a, a number of procedures that we never even thought about twenty, thirty years ago.

On a second point, I'd like to say that I would appreciate, as an individual, to have my records entered into a National database from an exposure standpoint, because over my career, I have worked in numerous locations and in this economy, I know of many techs who've worked in numerous locations.

And, I can say personally, I don't always get my records from some of those locations, and therefore having them in a database, whether they were

all aligned properly and counted the same way, I really don't care. Just be nice to go to someplace and then I could figure it out. So, I would vote also for no change.

MR. HODGKINS: Thank you. Michael?

MR. BOYD: Well, being EPA, I have to take a bit of a contrary point of view. I think it's important to look at the evidence of radiogenic cancer risk from doses, which, whether or not you subscribe to the linear threshold hypothesis or not, are fairly well established at doses around ten rem, 100 millisieverts or higher.

I think it's worth keeping in mind, you know, the acceptable risk to the workers, the fact that, as Don pointed out, the estimates now have increased fivefold from when the regulation was written. I, I do perfectly appreciate the ALARA aspects of regulating to a safe level below the, the legal limit.

But I think my, at least my personal opinion, not speaking for the agency here, would be that a more relaxed interpretation of either a rolling average or a fixed five year average could somewhat relax those ALARA goals, so that it wouldn't be as burdensome.

So, I'm not speaking for the agency, I think my personal preference would be 2B.

MR. HODGKINS: Thank you.

DR. COOL: Mike, can I follow up with that just a little bit? Because I thought I knew what you were saying until you said it would relax the ALARA goals.

MR. BOYD: I--

DR. COOL: Because that sounds opposite of what I thought would happen, so can you help me a little bit?

MR. BOYD: Well--what I was thinking was, I think Willie said, you know, if you set it at two, then We're going to have to operate to one. And I was saying, well, if you really set it to a rolling average or a fixed five year average of ten, then maybe you can operate to 1.8 or 2.4 if you, in any given year, something that would allow you a little less restrictiveness as long as you were monitoring doses.

But, I mean, I know that gets complex, but I was speaking to the point of, if you set it at two, it means you really set it at one, and I don't think that necessarily has to be the case.

DR. COOL: Okay. All right. So, the point

here is that a fixed limit at two would require ALARA levels to be set one place. Your suggesting is that a rolling average, ten over five years, or fixed five years, depending on how you did it, might allow people to set at a different value.

And, just to finish that little soliloquy, where we are today results in people setting yet a different place. And We're going to have the opportunity to talk about constraints in ALARA a great deal in one of the other issues. So we'll get a chance to come back to that, but let's continue now. Thank you, Mike.

MR. HODGKINS: Okay. Stephen?

MR. BROWNE: Yes. Stephen Browne, with Troxler. And I'm speaking from the standpoint of portable gauge users, using sealed sources and devices. And, our doses are very low, so really, none of these options would have a significant impact from that standpoint.

But one of the things that I have been thinking about, with regard to lowering the limit to, to any of those options, would be, how that would effect potentially the threshold for monitoring right now that's set at 10% of the annual limit of 500.

And, and if that same philosophy

continued, then it would drop down to, potentially, 200 millirem. And, and that, that I think would have potentially an impact on, on potentially some of our customers, or some of our users.

Maybe a lot of people who would otherwise be able to exempt themselves from monitoring or not be as concerned about even reporting, if you're below the threshold for monitoring, you may do monitoring, but you wouldn't necessarily be subject to, you know, submitting reports and things like that.

So, I would, I would be concerned about how, what the cost kind of impact of that would be to people who are receiving such small doses that they really, that the risk is very, very small.

MR. HODGKINS: Thank you.

MR. BUNDY: Yes. Kevin Bundy. I guess, the point, the one person here who does, who does not get a vote, but I'd like to just support Mike's comment about the lowest dose that we see. Radiation effects is about 100 millisieverts, then if it's LNT, then maybe the effects are being lost in the background.

But, still, 100 millisieverts, fifty millisieverts, is only half of that. So we do appreciate the ALARA considerations and the, at least in Canada, the five year block for averaging the

dosing of the twenty.

One comment with record keeping, we do have the National, the National dose registry, and when that was first, it was actually first created for epidemiological purposes, not for regulatory purposes.

But with our new regulations, we had it adopted for regulatory purposes so we can indeed monitor individual exposures and licensees themselves can go on, can request doses on an individual basis.

MR. HODGKINS: Thank you.

MR. HICKMAN: I've sat here--excuse me--eerily quiet this morning because as, Stephen, this, this doesn't really affect our operation. Our doses through the years are below the threshold for monitoring. So we could adopt any of these options and have little to no impact, you know, on our business.

Had a unique situation arise in the last couple of years with our international customers. They have suggested that we lower our limits to the ICRP limits, to fall in line with the rest of the international community.

Again, that would have no impact on us because our maximum exposed person over the last ten years has been about 400 millirem. The administrative burden of all the procedure changes, the training of

all the site personnel, would be the largest impact for us. Thank you.

MR. HODGKINS: Thank you. Lee?

MR. COX: Lee Cox, Agreement States. The majority of our licensees and registrants probably would not have a problem maintaining the two rem limit, if that were the option. Having said that, everyone that I've talked to and, and most of the licensees that I've spoken with in the states would be voting for 2A, no change.

The licensees that have spoken, or, the group, the regulated community that's spoken the loudest are the interventional radiologists and the industrial radiographers, and now add PET to that.

However, in North Carolina, we've, we've seen issues with extremity doses for PET, but not whole body. But, anyway. Just wanted to read a couple of things that, that I've gotten comment on those. And I didn't check these numbers, this came from a industrial radiographer out of Louisiana.

Said that with a two rem per year, you're looking at only 167 millirem per month with a radiographer working five days a week, it would limit them to eight millirem per day. They would have, they estimated they would have personnel out of work three

months, with three months left in the year.

Some other, I heard, unintentional consequences, wanted to address that. One of those would be medical event. If these limits changed, would we also expect the definition of a medical event to, to go down as much.

Also, the declared pregnant worker limits, would they also go down by as much, and would we be discriminating against a certain individual not being able to work in the radiation field by doing that, that may be an unintended consequence.

And, it's a comment on the National dose database. I don't know how we would accomplish that since there's not one agency that regulates x-RAY, all types of radiation such as x-RAY, radioactive material. It's not the NRC, so.

MR. HODGKINS: Thank you. Peter?

MR. O'CONNELL: Peter O'Connell, DOE. This is deja vu all over again. In 2006, we had public meetings, and like we said at the time, these options were on the Board for us, and a lot of the same arguments or discussions were held.

Discussions were that 10 CFR 835 already had ALARA provisions in it, this would result in a significant increase in record keeping. Contractors,

all the DOE contractors already use administrative control levels well below the five rem, requiring DOE approval if they were to exceed those administrative control levels.

Very few people would be effected, because very few people go over two rem, yet we would adversely or potentially adversely impact the operational flexibility of the DOE facility. And so the net result was, we concluded that 2B and 2C really had no significant increase in protecting the workers health or safety.

MR. HODGKINS: Willie?

MR. HARRIS: Willie Harris. Again, just act with the comments earlier. I think, for the majority of us in the power reactors, recognizing that one of the, the key things was to get, you know, better alignment with international regulations that are out there.

Many of us in fact right now, I know We're not to the constraints yet, but what, would vote for two alpha, you know, keeping the limits the same. But in part making use of the fact the at many of us have implemented those administrative Guidelines that are, in assess the two rem per year.

And then implementing the appropriate

actions, you know, for works that would go over that two rem per year. I think that does get some degree of alignment with the international communities, especially when you consider the definition, or how constraints are used in the international communities.

The concern would be, you know, if you consider the typical year for a power reactor, you basically have two seasons. You have outage season, and then you have non outage season. Outage season tends to be depending on where you are in the spring and in the fall. The spring plants are going to have it really good. The fall plants are going to have issues.

You know, as Ralph said, you just don't go out and get a nuclear certified welder, you know, to come into your plant. You know, those, those people are highly trained and experienced, and the impact it could have on those fall outages, many of us are worried about that and as Larry also mentioned, then, the, the potential to increase, you know, the collective radiation dose.

And, you know, while, when you read NCRP documents, you know, collective radiation dose doesn't really have a significant merit in, in those documents, at least in the United States. You know, a

lot of individual doses, one of the things We're concerned with, but the overall collective dose for a facility is one of our measures of excellence.

And the impact it would potentially have on that as a result of, you know, having the, the, the potentially, you know, make decisions relative to work that's conducted or do we look to have four workers versus two, can we even get the four workers.

So there is a potential for that, that, quite frankly most of us don't see a significant gain in the, in the overall safety for the workers to change the limit. You know, so having said that, I think, you know, two alpha would be the, the option that we would look for, and then look to consider some, some discussion around constraints or the administrative Guidelines.

MR. HODGKINS: If this was a vote.

MR. HARRIS: If this was a vote, yes. Recognizing that it's not necessarily a democracy.

MR. HODGKINS: Phil?

MR. GIANUTSOS: From the waste standpoint, we operate under a, a similar set of administrative controls that we've, we've heard a pretty small fraction of the regulatory limit. Interestingly over the last five years or so, the amount of activity

we've actually handled has increased by factor of four or five. I think to some extent, that's the result of many facilities attempting to manage their occupational exposure by sending the higher activity projects to us to handle.

Our occupational exposure remains flat, but we are running at the point where additional improvements will have additional capital costs associated with them. We've looked at the NRC's original recommendations, or starting point of $2,000 per man-rem.

We've raised that up several times, just for planning purposes, as our specialists become basically consumables. Like the specialty welder, we've got specialty furnace operators, incinerator operators, maintenance personnel, that we have to manage.

And similar to the fall outages, if you came up with a damaged source at the end of the year, or you have a hot cell recovery that needs to be done at the end of the year, there may not be personnel available within that, that envelope to do the work in a timely manner.

You know, these, these improvements, if we want to call them that, the reduction in dose would,

would only come at specific cost. And I think you've already answered the question, are there any peer reviewed robust statistics that say the current occupational exposure limits are not sufficiently protective.

I don't see any. If there aren't any, then we really have to look at what costs We're willing to absorb to just push that limit down artificially. So.

MR. HODGKINS: Thank you, Phillip. Mahesh?

DR. MAHESH: Regarding this, one, Michael mentioned about the two r, enacted. There are some evidence about this hundred millisievert, like, ten rem, as one of those biological effect in terms of the you adopt linear non threshold policies.

Even at 100 millisievert is a lot of controversy with regarding to the actual data available. One of the data which I had looked at our group has looked in, is like, in addition, biology if really has to see any chromosomal aberration at the blood level, a person has to be exposed more than 250 millisievert dose.

So, in that aspect, five rem seems to be quite a conservative limit. And as of now we don't have any evidence telling us scientific papers indicating by going from five rem to two rem, We're

going to be having any significant implementing the pair, in the safety of the population.

So, there's no scientific evidence that you're going to be doing, improving the safety for the population by going from five r to two r. On the other hand, from the medical community, it's going to be a major impact.

Just to reiterate the point, in the U.S. as of this NCRP report 160, there are more than 400 million x-RAY procedures done in the U.S. as of 2006, out of which nearly 62 million were CT, 17 millions were nuclear medicine, 16 were interventional procedures.

The net, the, looking at the global also, the, the country which has the highest healthcare facility has lot more diagnostic frequencies done, compared to the other countries. So in that aspect, by changing to a low limit, you're going to be impacting lot of the training facilities and training groups and interventional fluoroscopy to, and also the PET and nuclear medicine be, people.

MR. HODGKINS: Thank you. Larry?

MR. HAYNES: I don't think I have a lot to add to the power reactor perspective. But I do have concerns, what I've heard one time today, and then

I've heard numerous times in the past about a lot of the Europeans and other, international aspects of folks not wearing a dosimeter because they're concerned about running up against the limit.

And, you know, there's an ethics piece of that and we talk about nuclear safety culture, and are we going to drive, if we artificially constrain our doses, are we going to drive folks into ethical positions that really is not somewhere we need to go or want to go.

And, operate in a safe manner, there are ALARA programs that demonstrate that we can do that already. And there are only a subset of folks that are running near the five rem a year limit anyway, so in consideration for the safety, from a medical standpoint, I, I know, I don't' want to have to have my doctors go change out in the middle of the procedure because he's up against the limit.

So, we need the flexibility built into a process that's protective of the whole population and take consideration in for the individuals that are in positions that we need to consider those special cases.

MR. HODGKINS: Thank you. Steve?

MR. MATTMULLER: Hi, Steve Mattmuller. I

suppose in full disclosure, I should also say that I am a part time employee of the NRC. I serve on their advisory Committee for medical isotopes. But, I'm not wearing that hat today.

This is Steve Mattmuller as a PET pharmacist, who operates a cyclotron at Kettering Medical Center in Kettering, Ohio, who I should point out, we are just as big as that other Kettering you may have heard about in New York City, they just have a better marketing Department than us.

And also, a commend to those of you out there in webinar land, you have my sympathy. I have tried to participate at a meeting like this and it's very challenging. You do have the upside that you can take as many and as long coffee breaks as you want to.

The first thing that strikes me is, why I'm here, or why We're all here. And I was, and someone brought up the gorilla in the corner, and I would suggest a real gorilla is how much faith and strength we put into the LNT model, because that's what's driving these newer, lower limits.

And, I know this isn't the place to raise these concerns, but since, fortunately, since someone else mentioned LNT, I felt comfortable to do that. And, and also, from our perspective, the, the health

physics society has a position statement that I'll read from their website.

There is substantial and convincing scientific evidence for health risk following high dose exposures. However, below five to ten rem, which includes occupational and environmental exposures, risks of health effects are either to small to be observed or are nonexistent.

So, I really struggle, if I am, if I do have my regulatory hat on for the NRC when I work for them, how to justify from going from five down to two on an annual basis, especially from a cost benefit ratio.

The other point I'd like to make is, is, looking at the participants here, and I'm going to take a wild stab that most of you have no idea what a PET cyclotron facility looks like or how it operates. But, on a daily basis, We're producing iridium, a medical isotope, florian F18, has a 110 minute half life.

And so we have to produce it, we have to do our radiochemisty to produce our radiophamarceutical flourodioxyglucose, or as we always call it, FDG. And then we have to dispense it, package it up, and ship it to local medical

facilities.

And, and so, mind you, We're doing this all with the time constraint of a 110 minute half life. So, time is of the essence, and so there are about, and Duann can correct me, I want to believe, about 125 large commercial PET facilities around the U.S..

And there's only about three or four people per site, so if we run into an occupational limit and have to stop working, there's really not anyone else who can step up and replace that individual.

The other concerns we have, being medical and the power plant people can appreciate this, maybe, to them the NRC is a big deal. To us, the FDA is an even bigger deal. And, and so, trying to follow the CGMP recalculations that are coming out is a huge cost issue for us also.

And, and just to complete our triad, we have to worry about CMS, and which, they set our reimbursement rate. And, and We're basically powerless. We have no ability to raise revenue, as opposed to a power plant. We can't go to a Commission to charge customers more for the electricity we generate, or would generate.

From our perspective, or from our environment, we have no ability to raise revenue. I mean, it's, it's totally based on what CMS is willing to pay. Or, to reimburse us at, which, if you follow this little issue called health care debate in the U.S., you'd know it gets less and less for us each year.

So, our concern is keeping this important medical isotope available, because it's not just used as diagnosis, it's also used in monitoring therapy in our patients.

And if you want or need a little additional perspective on medical isotope shortage, we happen to have an expert with us here from Canada, in that we just came through a horrible debilitating medical isotope shortage with molybdenum 99, which is the parent medical isotope for technetium 99 that we use in the other side of nuclear medicine, not the PET side.

So, all that, to say, 2A is critical for us. It's, to go beyond that would have a big impact on us, to where we, people would close shops. Because we have none to very limited ability to respond from a revenue enhancement perspective, to cover the additional cost, to cover employees, to find, well,

one, just to find the additional employees and then to be able to afford those additional employees. Thank you.

MR. HODGKINS: Thank you, Steve. Mike, did you want to sum up a little bit?

MR. SNEE: Yes, thank you. Mike Snee, CRCPD. I'd like to once again reemphasize what I said earlier. I've been a regulator now for fourteen years, which I think qualifies me to say that you do not want regulators writing regulations that effect your industry without your input.

And, to get RC's credit, they are certainly asking for your input, so please give it to them. But I would also like to make a few comments on the very last question in this section, if that's, if it's the time, concerning occupational dose reports.

And the question was, should NRC consider requiring all types of licensees R01 report occupational exposures. The NRC in the regulations require certain licensee types to report those to the NRC. When Ohio became an agreement state and we took over regulatory authority from the NRC in 1999, our regulations also required that.

And, for about five years, we were getting these reports in, which went into a file cabinet. We

did nothing with them, we didn't feel we needed to. Most of these licensees, we inspected on a very frequent basis, one to two years. We're talking industrial radiographers and so forth.

So, we felt we had a good handle on what doses they were receiving. The NRC never asked us for those reports. Not sure what the NRC does with the reports they got. If, if they are tracking them and something good is being done with those reports, that's fine.

But, after about five years, we changed our regulations and we no longer require our licensees to give us that information. That's one of the regulations that agreement states do not have to adopt. And, we do not collect that. We haven't collected that for a number of years.

And, being from a state that brought you Joe the Plumber, you may remember that certain fellow state of Ohio employees decided to check on a member of the public and get into his personal information. Since that time, we, in Ohio, as a Government employee, are under extremely strict requirements concerning personal information and what we collect for whatever reason.

And unless we have a very good reason to

collect it, we don't collect it, and I, and dose information on individuals would certainly be part of that. I would not want to get that into my Office right now.

And considering that the vast majority of radioactive material licensees are not regulated by the NRC, but by agreement states, who is going to collect this information and, as the NRC calculation tell you, the agreement states have had a number of conversations with the NRC on other topics that we won't discuss today about, for a lack of better term, states consider unfunded mandates to the states.

Because the states are required to get this information from their licensees and then do something with it, so, unless there is a very specific reason for this, and there's a very secure way of storing it, I don't know where We're going with that particular.

MR. HODGKINS: Thank you, Michael. And, Mr. Stafford?

MR. STAFFORD: Just to follow up on that last comment with Mike, we, it would be, it would be good if we had some way of managing dose information without linking it to a social security number, you know, you're taking privacy act information and you're

converting it into protected PIIs, so.

Just, in general, in terms of where, where I, some observations, I guess Don had a early, one of his early slides, he said, you know, what are the implications as appropriate in scientifically justified and in greater alignment with ICRP 103.

And I, I think, if it was clear, if there were clear scientific justification for reducing our dose standard, I don't think anybody in here would really argue with that.

You know, we'd try to figure out how we could get there from here, but, you know, the scientific justification doesn't seem to be there, I guess, to really motivate us.

Some of the other things that I see in, it would increase monitoring requirements across the Board and add some complication there. Basic, like I mentioned before, bioassay frequencies are problematic for places that have internal dose issues for some isotopes that have technology shortfall in how easily they're detected.

Unintended consequences to the workers, I mean, it's a pretty creative industry out there, and, and I'm afraid the workers could get the short end of it in terms of have to manage dose and shifting people

around.

The, and I guess, all in all, it, we could cope with it, but it would be an increased cost of doing business and those costs would have to be absorbed somewhere, and, you know, in the DOE community, you know, we operate at fairly low doses, but it comes with a price. It comes with a cost.

And, and, We're getting pressure to be creative and look for ways of reducing our costs of doing business so that we can stay competitive. So there's inertia in, in both directions here.

MR. HODGKINS: Thank you. Duann?

MS. THISTLETHWAITE: Thank you. Just to reiterate, I would be in opposition of going to anything besides five rem at this point. Basically we want to continue the nuclear medicine studies that we have in order to keep healthcare costs down and improve patient outcomes, instead of doing unnecessary surgeries and things that would have to come about if there were no nuclear medicine studies.

We do monitor our occupational workers, we follow ALARA, and there's no added benefit from going from five to two, so please keep it at five.

MR. HODGKINS: Last, but not least, Kate.

MS. ROUGHNAN: Kate Roughnan, QSA Global.

I'm going to have two separate comments, one from the manufacturer and distributor standpoint and one from the industrial radiography.

In the U.S., the industrial radiography that's performed is very production oriented, so it's a very quick type of exposure, sometimes the source is only exposed for several seconds, which makes it very difficult for the operator to get out of the radiation area.

So, that's one of the factors that results in their high dose. They use higher activity sources than most of the other countries. They, most countries use about fifty curies of iridium, the U.S. uses about 100 curies and more.

And, I echo the comment that other people have made about operators in different countries not wearing their badges. We do have evidence of that, we do know that happens and that may be one of the factors why they can meet the two rem on an annual basis.

Speaking from the manufacturer and distributor standpoint, We're a commercial facility. WE'RE out there to make money. So if there's an opportunity out there to have a different type of isotope for a different application, We're going to go

after it.

And if We're constrained to less than two rem in a year, where implementing this application of this new isotope may cause us to go over it, that limits our commercial opportunities. We do maintain a very robust ALARA program. We, We're very well, a little bit below the two rem and it takes a lot of effort to do that, but we'll continue to do that even though we have the five rem annual limit.

But if we went to a five rem--excuse me, a two rem annual limit, it would limit the commercial opportunities in the future.

MR. HODGKINS: Thank you. And with that, here's the thing. We're, it's 12:05, agenda said twelve o'clock, break for lunch. You guys were five minutes late to break, so We're right on time.

All right, but here's the thing. We are going to take an hour and a half off for lunch. It said hour and fifteen minutes, but it seems like there are places that are close, including in the hotel itself, so feel free. Lunch is on your own.

We will start promptly then, twelve--one thirty. Okay? One thirty, be back in the room a little early so you can be in your place and hopefully that little wiggle room will make you wiggle right to your

seat right away. Okay? We'll see you all at one thirty, and then we'll start with the rest of the discussion on this particular one because We're going to go over. Thank you very much.

(Whereupon, the above entitled matter under investigation went off the record at 12:06 p.m. and returned at 1:31 p.m.)

MR. HODGKINS: Okay. And so, where we were from the last time when we broke was we just sort of finished up with the panelists. So, Don, want to talk a little bit how we'll proceed, then, from there?

DR. COOL: On the webinar, please mute your phones at the moment. We're getting some interesting discussions which I'm not sure you actually wanted to have. This is one of those classic open mic moments.

For somebody out there, We're listening. So if you can mute your, your phones, that would be good. We might be interested in what you're saying but it is in fact just a wee bit distracting. All right.

Now that I've got a microphone that is actually working, that's a good thing, what I want to suggest to you first is organizationally, for purposes of the logistics of this meeting, I would like to offer this proposal, see if you are comfortable with it.

We are quite a bit ahead of the draft agenda which we had originally laid out for today. I think we still have some discussion that needs to occur around the occupational dose limits, because we haven't had any opportunity for people in the audience to provide any views, which are either supportive of some of the things that have been here at the table or countermanded.

And there are a few things where from the NRC staff's perspective like to go in and check a little bit more on some of the questions to make sure that we've, we clearly understand what those are. But that certainly is not going to take nearly all of the afternoon.

So, with all of your agreement when that is completed, however long that takes, we will move onto the third issue, which is the doses to special populations. And in fact, a couple of you have already raised some of those issues and we'll work our way through that discussion this afternoon.

What I would suggest to you is that even if we have managed to finish that by the middle of the afternoon or so, that we break the meeting for today at that time.

Because I think the discussion on ALARA

planning and constraints and planning values, which many of you have already raised in the limit discussion this morning, will also warrant a significant discussion that we ought not to just get started on and feel like we were trying to rush to a conclusion or otherwise.

And using a, a cooking analogy, and I am not a chef, but I think perhaps that would also be a good point to let you go off and let all of the ideas of the day simmer together so that we can come back and discuss the ALARA planning constraints and additional issues that may have come up overnight and be able to allow back whatever time is needed for tomorrow.

So, if I can just sort of look for noddings, if people are generally comfortable with organizing our time this afternoon and tomorrow in that way--

MR. HODGKINS: This would be yes.

DR. COOL: I think this would be yes.

MR. HODGKINS: Yes, there you go. I see some nods and it's not sleep.

DR. COOL: Well, being after lunch, we do have to check that.

MR. HODGKINS: Yes.

DR. COOL: And we do, do have to make sure that we keep you sufficiently engaged that you don't nod off, it's not good for the microphones if you bang into them when going to sleep. So, I think that's acceptable. That being the case--

MR. HODGKINS: We'll--

DR. COOL: I think we finished around the table--

MR. HODGKINS: How about this, let's just see, is there any other issue or comments that the table wants to make to do a, a icebreaker, you know, as far as--or is the audience ready to participate? You guys want to react to what was said prior to our break? Anybody? Microphone, please.

PARTICIPANT: Kenneth Conway, Babcock and Wilcox. About the medical. I used to be an RSO at University of Michigan, and I do very well remember that most of the cardiac surgeons pressed each and every of them, all the limits.

I also remember that the more operations a given surgeon made, the greater their success rate, or, rather, the lower the death rate. And, there's been articles, which is of interest to, particularly the patient. Probably to the doctor.

And there's been a number of articles in

the common media about this very fact, and various hospital ratings, et cetera. So, if the dose limits impact the ability to do a lot of operations, you think the converse would also be true.

There was a comment about reducing the limit, will increase, also reduce the action level for individuals requiring monitoring. I'd expect that, I don't believe it would be 200, most people calculate up to something like three quarters or half of the given limit to start monitoring, just in case you have someone go over your practice or your expected limit.

So, I would, for instance, in my facility, it's around 350. For a 500, I would expect to do around 150 for a 200 so the population of monitored individuals is likely to expand considerably with associated costs, paper, records, et cetera.

And the last is, I truly do not see why compatibility with dose limits between us and the international community is needful, as long as its compatibility with how the doses are calculated. They can accept our numbers in good faith to allow us to work in their, their facilities, then that should be all they need, the numbers, the dose report on the individuals either low enough to allow the work in France or some other country, or it is not.

The fact that he got the one rem in a country with a five r limit, should be irrelevant to them. What should be relevant is the one rem that's on his report for the year. Thank you.

MR. HODGKINS: Thank you. Audience, anybody from the panel want to react or add to that comment, echo it? How about from the audience, anybody else? Yes, can you make sure you get in the microphone and speak directly into it?

PARTICIPANT: I'm Carl Paperiello. I guess I would reluctantly endorse 2B. Primarily for consistency with international standards. If I reflect on the nuclear industry as it now exists in the United States and I'm thinking of power and a fuel cycle, 2A plus ALARA has resulted in the risk, the doses are too big.

However, We're out of whack with the rest of the world. As other nations move into nuclear power, it is the interest of the united states Government that they have rigorous regulatory regimes that follow international standards, the guidance of IAEA.

Here is a major area where the United States is out of whack, and if we as the power we are, are out of whack, that's not a particularly good

example to the countries that are moving into the nuclear power area.

So you got to weigh the offset, the up and down side. Because this Rule, I view, in my view, but I don't know a lot about the medical areas, much as I know the nuclear power area and the fuel cycle area, it's going to have an impact on medicine, and those things are going to have to be weighed in the whole thing.

A reflection on 2C. We have a rather rigorous enforcement of our rules in this country, particularly for material licensees. I know from talking to regulators and particularly in the European Union, maybe in well past 9/11, they've gotten more rigorous.

But they are not as rigorous in the United States, and I had a regulator from a country that has a two rem standard tell me, when I asked them, you know, what dose does the doctors get, and they said, well, we don't know. They generally don't wear their badge.

MR. HODGKINS: Thank you. Okay, anybody else from the audience? Do we--oh, one over here. Thank you.

PARTICIPANT: I'm Jeff Foster from

Constellation. From a utility perspective, I am certain that if the limits are reduced, we would in turn have an administrative limit that's either ten or twenty percent below that.

That is something that would, in turn, make it, make the sites less flexible for managing them, and it would also put some workers in a position where they wouldn't be able to be employed the entire year.

I heard a lot of other arguments also. The one thing I haven't heard is a compelling reason to reduce the limit. I have heard a lot of impacts as a result of it.

MR. HODGKINS: Thank you. Comment from the panelists? We have microphone two. Are you going to go to the microphone?

PARTICIPANT: Actually I was.

MR. HODGKINS: All right, speak in.

PARTICIPANT: Okay. I made a few notes over lunch. It's kind of chicken scratch, I hope this makes sense.

MR. HODGKINS: Name, please?

PARTICIPANT: And you are--sorry, I'm Julie Clements. I work for the Army Corps of Engineers. And, as you pointed out this morning, We're not necessarily

here to answer all these questions, but, you know, to solicit input and perspectives, so I wanted to offer our perspective, USAS'.

Those of you who are familiar with USAS, we are an NRC licensee. We have a number of NRC licenses for both sealed and unsealed sources, but we also do a lot of environmental restoration work.

And, we work on a whole number of sites. We work on sites that are on the NPL, that are not on the NPL. We work on sites that are currently or formerly licensed by the NRC or an agreement state. We work on DOE reservations.

Some of our job sites are none of the above, and we just have to follow OSHA's regulations, 29 CFR. We also do work outside the continental United States, and we have Army reactors that the NRC doesn't regulate but that we issue permits for ourselves, out of the Army reactor Office.

So, Lee, you mentioned this morning in the medical field that you have to deal with overlapping regulatory regimes and, you know, so do we. So with regard to issue one, I think it's, it's difficult, having all these different regulatory regimes, but changing now all of our forms, our guidance, our internal regulations, that would be an administrative

burden that we would have to consider.

And, regarding the issue two, I think as an agency, we would support 2A. Although, neither USAS nor it's contractors generally approach five rem per year, it's always possible. You know, we never know what kind of a job We're going to be working on next, so 2A would give us the greatest flexibility. Thank you.

MR. HODGKINS: Thank you very much. From our audience, any other reactions, comments? Yes?

PARTICIPANT: This is from a, from a--I'm Mark Smith with Sterigenics. And, strictly from the science end of things, we were talking here earlier about the, the models and the risk levels and as, if we start figuring in, as you would, as a real scientist, figuring out the uncertainties associated with models, with the risk factors, with the dose measurement on that.

It, it, do we really have a good technical basis that says five rems different than two rem? To me, I don't believe that there's a significant difference.

MR. HODGKINS: Okay. Yes? Steve.

MR. MATTMULLER: Yes. Steve Mattmuller. There was statement made earlier that no other, that

there's unanimity with the international community, and I want to say, after lunch, we were talking, but I believe the french have disagreed with--that, the french disagree with, at least I know for sure, the LNT model and I'm not sure if they've adopted occupational limits. But at some point, the french are pushing back on this.

MR. HODGKINS: Okay. Anybody want to react to that?

DR. COOL: Just a note to clarify some of that, I'll give you a reaction to that. You're correct, the French academy of science has raised questions about the LNT model as the model most representative of the model. The french regulatory authority still uses that model for the basis of regulation. And the french regulatory authority has moved to a straight flat two rem per year.

MR. HODGKINS: All right. Audience participation?

PARTICIPANT: Yes, I'm Tim Taulbee, I'm the radiation protection manger for USEC's porch facility, uranium enrichment. Not speaking on behalf of the fuel cycle nor as a health physicist, I agree with the scientific approach but in our industry, what I consider the operational health physics.

I've worked a great deal with the Department of energy as well. We've been on both sides of the regulatory ledger, and we have to factor in the human factor, that when we have workers and We're represented at our site by the USW, there are very large National, international union, they get this information and they understand it and some of our arguments today, and I agree with them.

But what we have to factor in when we tell them that we don't have enough workers, their response is, go get more workers, train more workers, more worker training programs, more money for worker training programs.

Matter of fact, the USW has a very large training contingency that they provide a lot of training to get workers into our industry and that has been the response to many of the situations that we've presented them with as far as ALARA, controlling certain things that the gaseous diffusion plants is.

And, Pete's nodding his head. You guys need to go get more workers. And of course, they don't necessarily think that they ought to have a reduction in salary or hours work, that we should move them to non exposure positions, and in turn, bring in more new workers, and they claim that would be much better for

the industry.

So, this is a factor that We're going to face when we don't embrace this, or we don't act upon this, and that's just my advice after twenty one years of negotiating contracts and disputes.

MR. HODGKINS: Thank you very much. Yes? Duann?

MS. THISTLETHWAITE: Hi, Duann Thistlethwaite. Just to respond to that, actually. I'm from Pennsylvania, and Pennsylvania is, has a lot of union workers, actually. So we do deal with union workers.

In my past experiences, have had union workers, and my brother in law actually is a mine worker, so safety of personnel is first and foremost, you know, personally and in my professional life as well.

And I don't think that lowering this level will make it any safer for workers because there's not any scientific basis for that, and I think that's first and foremost, most important, to the workers and to all union negotiators to make sure that safety is first, and I don't believe that lowering the number would help that in any way.

DR. COOL: So, let me play Devil's Advocate

for a moment. Not because I'm disagreeing with you, or otherwise, but I have had people say to me from other countries, that they get challenged all the time as to why their number is different from an international standard.

And so, I wonder, to you and some of the others for the unions, do you get challengers, or would you anticipate challenges from the workforce when they look at what happens in the United States, they see a result here which today would suggest that the limit stays the same, and they ask you, why the rest of the world did this, why are you not protecting me as well as everyone else in the world believes should be protected? How would you answer that question?

MR. HODGKINS: Several people.

MR. MATTMULLER: Steve Mattmuller. I, I think it's, we could say, we are protecting our workers, as well as yours. You just arbitrarily lowered the number that you're worried about, but you've not shown any benefit.

And, this was a question I had for the NRC staff. I mean, we've been saying there's no scientific validity behind lowering this. Are you aware, besides just the international Committee, picking a lower

number and saying this is safer because two is less than five?

That this would be a cost effective reason to go through this expensive process, for all of this?

DR. COOL: I will give you a short answer and then we'll come, come back, back to the other one. And first the bureaucratic answer, which is, the staff hasn't made any decision or judgement on it. SO make sure that my, my lawyer, he's nodding his head up and down at me.

ICRP would suggest to you, and someone earlier was describing it in a little more detail, We're, some of the things that ICRP was saying was that the limit has to represent in the end the boundary of what they consider to be an acceptable or an unacceptable area.

And they reached the conclusion that five rem, every single year, would be an area that was really not acceptable. And therefore, for long-term exposure, lifetime exposures, where they believe the acceptable range was on the order of 100 rem, with an average worker lifetime, that it really needed to average more like two rem per year or to respect that lifetime average.

But recognizing that there could be some

variations, because it wasn't very sensitive in that area, there could be fluctuations up and down, and that's why they came to the recommendation that they did, and I'm simplifying the discussion, of two rem per year average, maximum of five in any year, such that the expectation of a lifetime for a worker would be not more than about 100 rem.

So, does the NRC staff agree, disagree with that? We have that as a point of reference. We have other international organizations that have adopted this, many of whom unfortunately do not have their own statement of considerations, which is the typical expectation of what we have to do here.

So, you don't see some of that, but that's the underlying basis that was used, the change in the risk coefficient, a desire to provide an overall level of lifetime protection of about 100 rem for an individual, trying to make sure that it was not inequitably distributed over a couple of years and providing that sort of average with a bit of flexibility.

Having said that, part of the reason that you see the options here that we have are the flexibility could take several different forms. Part of what We're trying to help have you all understand

with us, help us understand, is the implications of various ways to express that.

And perhaps, as I think most of you are suggesting, the limit, capital L, quotes around it, is not the way you would have it done. Some of you have suggested that there are other mechanisms and We're going to explore that in detail tomorrow.

And I'm looking forward to that discussion, but I don't want us to jump to that discussion yet. So, a little bit of recap. Doesn't exactly answer your question.

MR. BOYD: Oh, sorry. Mike Boyd, EPA. I just wanted to address something I've heard several times around the table, and in the room, that suggests that there, the absence of a benefit from going to five rem to two rem is because there's absence of evidence of harm.

I will concede that there is no way, because of the weakness of the epidemiological studies, to resolve the dose response curve conclusively at low doses. But you don't have to worry about LNT, take LNT off the table, throw it out the window.

For this discussion, We're talking about doses where there's observable points on a dose

response curve based on the Japanese cohorts, the Russian cohorts, the uranium mining cohorts, numerous medical cohorts. I think if you go with a risk of 5% per sievert, even with a band of uncertainty, you have to acknowledge that any reduction of dose, cumulative dose, is going to have an inherent benefit.

MS. THISTLETHWAITE: Thank you. I was just looking back at the, the number two and just wanted to make sure that I have this straight so that if they, if you're saying like the average of two per year, and the five rem in any one year, so that would only leave you five rem over the remaining four years, which would far exceed the average of two, it would give you to 1.25 per year, if you did a summation over that.

But I just wanted to, to say again, that I don't, I don't think that We're saying that We're putting our personnel at risk by continuing at the five rem per year. I think the point is, that it doesn't give any more benefit to the worker to go to two rem per year, and then have the ethical question of, are they wearing their badges or not, which leads to a whole other realm.

I think that having the five rem per year, continuing our safety work environment of wearing your badges, making sure things are going, working with

ALARA to keep doses as low as possible, is where we should remain in order to keep the medical licensees functioning.

If not, I don't think it, you can compare apples to apples with the medical licensees in the U.S. compared to internationally, based on the number of doses that are there. Plus they do a lot of bulk doses instead of Unit doses. So there's a whole other realm of things that are going on.

MR. HODGKINS: Yes, Pete.

MR. O'CONNELL: Pete O'Connell, DOE. In response to Don's previous question, as far as regulators, have we experienced a lot of input from unions requesting a lower dose values? 2006, in our notice of proposed rulemaking, and in the final Rule, 2007, and DOE's a pretty heavily unionized organization, we didn't really get much feedback from the union requesting that we lower the dose limits.

MR. HODGKINS: Thank you. Robert, did you want to add something? No? Oh, in the back?

MR. GIANUTSOS: Phil Gianutsos with Energy Solutions. I just want to make a, an observation. You reference the, the end point really being a lifetime limit rather than an, an, an annual limit.

Looking just at our facility, looking over

ten years of REIRS reports, which we don't send you, by the way, we've seen, looking at the categories of exposure, that the higher categories are, well, the dose is inversely proportional to age.

As our workforce is progressing through the facility, it's generally the incoming personnel, the younger personnel, that are doing some of the more difficult jobs. At 57, I can't imagine putting on an airpack and doing some high rad entries like I did in my twenties.

I'm sure it's the same for a lot of them, they move through the facility, they move through the system, or they move onto other activities. So, effectively, you get the same endpoint. I'd encourage you to look at the REIRS data and see if that holds up for other facilities as well.

And if it's a lifetime dose that we're really looking at, then let's look at it that way. Not, not try to artificially constrain it. We'll deal with that one later, too.

MR. HODGKINS: Okay, we'll take it from the audience, then. Mic two? Say your name.

PARTICIPANT: Neil Coleman, I'm with the ACRS staff. Just a couple of thoughts I'd offer. The scientific evidence tells us that the, the value of

the limit is much less important than dose rate. Dose rate is a key thing from the research that's been done.

I wanted to also mention before we start talking about ICRP as being a gold plated source of scientific information, and I've not heard this brought up in this meeting so far, look at where they are going. Look at what they have telegraphed, they are doing.

They have not imposed standards for these yet, but they have described a desire to develop standards for plants and animals, pine trees and frogs. This is not risk informed, and a change, in my personal opinion, from five rem to two rem is not risk informed either. That's all.

MR. HODGKINS: Thank you. Okay, how about--now, are we in any way, shape, or form, ready to take any comments from the webinar participants, or are there none? Willie, do you know if there are any, web participants? They have no questions? Okay, good. Anybody else, then? Yes, Ralph?

MR. ANDERSEN: Ralph Andersen, NEI. Picking up on the last commenter's point, is there a part of your outreach for stakeholder input aimed at getting feedback regarding the ICRP direction in protection of

nonhuman species?

DR. COOL: We can certainly add that to the list of things we touch on under other issues tomorrow. It wasn't something that we had preprepared, but I can certainly describe our understanding of what's going on and we can have some discussion around that. But let's just add that to the list tomorrow for other issues.

MR. HODGKINS: Thank you. Any other points, or, from the audience, yes?

PARTICIPANT: Hi, Steve Hand, University of Maryland. My boss is supposed to be here, but she isn't, but I, and I volunteered not to sit in her spot, so. I guess I had a different question, sort of altogether, and that was, if we're looking to move from five to two, how do you think the general public would perceive that?

In other words, if everything's kind of okay now, maybe not okay now, from the public's perspective, if we go to two, does that tell them what's wrong? So, want to get your answer to that.

DR. COOL: That's an interesting question. Let me hold up a mirror, because it's not so much what I personally might think about it, but what some of you would think about that question and perception

from some of your stakeholders.

MS. THISTLETHWAITE: I think they'd say, my God, what have you been exposing me to for the last ten years.

MR. HODGKINS: Any other reactions? We have one from the audience.

PARTICIPANT: Scott Davidson, with New World Environmental. Just want to ask, what happens with everything else that comes out as a pronouncement of new risk? It could be Avandia, or, sorry, if you manufacture it. It could be Vioxx.

It could be any of these things that are pronounced as now being bad that once were good. How does the public react to this? It's going to be the same thing as it is for any industry with new information about risk.

That's all it is. It's, it's new information. People will assimilate it the same way they do with all these other things that become new. Some outrage, some shock, some lawsuits. You know, I mean, you're seeing it--

Well, I'm not just saying, you know, you get it all the time with these other things, but there, the different is you get real evidence of harm. You get people have heart attacks and die, you have

other things that are manifested, you know, three babies die or seven heart attacks with this arthritis drug.

We don't see it, so there's no burden--you know what I'm saying, there's no proof that's being shown so it doesn't have the same merit, but there's outrage and you'll have to deal with that just the same.

MR. HODGKINS: Thank you. Any other reaction to that statement, comment? Marketing people who want to say something about that? All right, do we have one person on the webinar, then, that would like to comment?

DR. COOL: I think we need to take a moment to have the webinar folks unmuted, because in fact I think we can't hear them unless Kim does some magic over in the corner. So, are they unmuted, now, Kim? Okay, so now you can ask the question.

MR. HODGKINS: Okay, from our webinar participants, is there a comment, question, concern that you would like to voice?

PARTICIPANT: With regard to a statement made by the PET guy this morning, you didn't take questions after that from the webinar participants. So I would like to make a comment about that, if I may.

My name is Janet Westbrook, and it seems to me, if the NRC wants to get people behind this Initiative they may have to sweeten the pot. They may have to offer a one time subsidy to companies like the PET people or a one time tax break to other, largest entities in order to get them to fund the switchover. I suggest that, if money talks, maybe that's the way you're gonna--moving.

MR. HODGKINS: Thank you. Is there another participant?

PARTICIPANT: Hi, this is Cindy Bloom, and we were also talking just now about the effect of reducing the limit, and I think what we want to tell people is that ICRP's goal is to assure that the lifetime risk is kept low.

It's not that the risk in any one near is significant from getting the exposed to the current limits, it's just that you want to assure that over the lifetime that those risks are low. And we also have the opposite faction, that, that says that a lot, I mean, that, hormesis is alive and well down at the levels that we're talking about, so I think, it's a matter of standardization more than it is risk that we're trying to control, we're trying to standardize the rules.

MR. HODGKINS: Thank you. We're having a little difficulty hearing your comments in the auditorium, and we're trying to adjust that. But if there's anybody else on the webinar who would like to be recorded with a question, if you would speak up now?

Any other questions on the webinar? Okay. If--

DR. COOL: If you would like to request--sorry, Dan--for the individual who spoke first, from the webinar, who I think was speaking on a speakerphone, because we had a lot of echo here in the room, I don't know whether you can take it off of speakerphone, which might help us here.

But I would ask that in any case, that you send us that information so that we can capture it, because I have to admit it was very difficult for me to try and follow your discussion. I believe you were talking about some financial compensation or tax incentives that would be necessary in order to enable licensees to implement changes.

But I'm not sure that I completely understood the thrust of your comment. Is it possible for you to take it off of your speakerphone and give us a brief synopsis?

PARTICIPANT: Hi, can you hear me?

MR. HODGKINS: We're trying to.

PARTICIPANT: Can you hear me?

MR. HODGKINS: That's better. Yes.

PARTICIPANT: Okay. Think I'm going to hold the phone up to my ear for two hours straight instead of listening to speakerphone. I didn't realize you could not hear me. My name is Janet, and I just was commenting on the fact that as we all know, titrating the new--costly.

So, if you want to reduce resistance to migrating to the new review, and I don't--educate the migration, but let's just say, if NRC regards this as a done deal, people will make up their minds to do this.

Then, the NRC, the Government, could motivate people by, as I mentioned, either giving a direct subsidy in the case of, as the PET guy said, the revenue limited companies, or by giving tax breaks to entities like power plants.

This would be a one time thing. There shouldn't be, say, alarm about setting precedents. So that would, I guess, thank you.

DR. COOL: Okay, thank you. I would ask that you email to us the comment because we're still,

the technology is failing us in terms of actually really being able to understand exactly what you said. So, if you could email us that material, that would help us to get it into the record. Thank you.

PARTICIPANT: What is the email address?

MR. HODGKINS: It's 2:09. Do we want to go on, take a break, and then go on to the third, or--

DR. COOL: I think I, with your permission, there's a couple things that I want to check a little bit on that people have, have asked. Because, now I'm going to view my role as trying to make sure that what we've captured on the record can help us to the extent it can.

And the first thing I'd like to ask, at several points this morning, several of you have talked about how important it was for you as global companies to have consistency with what you do here and what you need to do other places and the regulations that are in other places.

So if I take that as a data point, and then I take the discussion where, that we've had here, where the general view rom folks as far as the limit is concerned is, there's no need to change the limit, as in, keep different from how other countries do it.

That would seem to introduce an

inconsistency, when you had said that consistency was important to you. So my specific question, and I don't know whether some of you can answer it now, or whether you would like to go off and reflect and send it to me, is, for your particular businesses, your particular business activities, a difference in the dose limit that you operate on here versus what you may be operating with in another country, whether you're working in Canada, whether you're over in France or someplace else, whether you have individuals who are coming in from other countries who are working under the system here versus otherwise.

How does that consistency or lack of consistency contribute either an issue in your business, or any other impacts that are associated with them? Because those two things just don't' seem to line up for me. Can you help me out on that?

PARTICIPANT: Mark Smith, with Sterigenics. Since that was the one that I brought up, I thought I should address it. And, it doesn't, schizophrenia kind of helps, but it's not required to be able to have this--the, the issue that we have, internationally, is not on the limit, because in all of our operations, now I'm speaking strictly from my industry and not necessarily for any others.

But all of our doses are well below the two rem. So, the limit for us is irrelevant. How the dose is calculated is critically important because we've got three different models we use in three different countries, et cetera, et cetera.

That gives complications. As far as this is concerned, that's just where I change the number from red to black on my spreadsheet, that's just, put a two instead of a five, and we never encounter that so it's not an issue.

MR. HODGKINS: Okay. Let's start with the panelists. Ralph, you were first.

MR. ANDERSEN: Ralph Andersen, NEI. Within the nuclear energy sector, most specifically the nuclear power plants, the limit is not so much the issue, again, as the previous commenter stated, it's the methodology.

Considering transport ability of equipment and designs and so forth, like instrumentation, all, ranging all the way up to reactor designs. The differences in methodology are what require companies to maintain two sets of analyses, one for the United States and one for everybody else.

It's not the occupational dose limit. Now, there might be a different discussion in terms of

other acceptance criteria that are used that might have to do with public dose, but that would be a separate discussion.

But we're not, we don't see a conflict between saying doses should be calculated the same and reserving the right among countries to decide what the particular dose limit would be employed in occupational space.

MR. HODGKINS: Thank you.

DR. MAHESH: Mahadevappa Mahesh. Regarding the, I'm speaking on behalf of the ACR, ACR to agree that we need to go more towards in line with the international limits. However, I also want to make a strong point that, that, if, if the NRC go with the two r, then there has to be a strict mandate of how the fact is used for reporting or regulating radiation by just for the international fluoroscopies is uniformly done across all the state regulations.

That's one thing. Second thing is like, regarding this two r, with respect to the medical community, as we all know, the U.S. and the western all the countries have the most highly utilized diagnostic procedures and medical procedures.

And, there are a number of survey recently done by the IAEA among the international cardiology

groups across, in different countries. One of the problems, some observed in these surveys was lot of this country, they didn't have a uniform regulation and monitoring policies for the cardiologists and physicians.

So we don't have good data to show that they're all complying with this, whether they're having any difficulty with that two rem. The other thing is also, some of these country has this positioning of the monitor badges is also an issue.

Some of them mandate to wear underneath the apron, in which case two rem for them is not a big deal. Whereas here, we require to wear the badges outside the apron in the medical community, and utilizing that as a strict limitation will be a major impact.

MR. HODGKINS: Thank you. Any other reaction? Panelists? And all of you sitting out there in the audience, you came here for a reason, we haven't heard from--oh, sorry. Kate.

MS. ROUGHNAN: Sorry. Kate Roughnan, QSA Global. We are a global company, and many of our customers are, also, and I think the difference is, is that the, the, the type of work that's done in the United States is a much more, again, we tend to use

higher activity sources because we have a higher production level that needs to be met for the radiography customers themselves, the, the, the largest utilities and things like that.

In most of the other countries, they do use lower activity sources, so they can get the dose down, and again, just based on practices that we are familiar with in the other countries, the regulators are not quite as--I don't want to use the word harsh, but they're not quite on top of the users as they are in the United States.

If a user in the United States would exceed the two rem, if it went to an annual limit, there's typically very significant consequences. In other countries, we don't see that as much. So that's a big difference.

From a global perspective, we, we like the consistency and the harmonization but from a practical perspective it's just the practices are so different in the, in the different countries, I don't know if it can be actually applied.

MR. HODGKINS: Thank you. All right, come on, audience members. You're here for a reason. You didn't get invited necessarily to be around the table, we're inviting you to be around the table

metaphorically.

Any comments? Questions? Concerns, before we move on? Okay--

DR. COOL: If not, let me as a second question, then, and unfortunately I'm going to pick a little bit on Duann. And you can come back and tell me, we can do this offline with, with, with more detail. Because I have to admit that today is the first time I have heard about significant numbers of individuals in the PET area over two rem.

Now, that part of that, I suspect, is simply because we don't have occupational exposure information, so it's the first I've heard of it. Very interesting, what I wanted to see if you could give me just a little, give everyone a little bit more information on was, which groups within that.

Because my very simplified understanding, you've got the people who will run the cyclotron. You've got the people who will take the targets and do the extraction of the fluorine or whatever PET isotope it is and do the compounding necessary to make the-- and I don't have the initials--FDG.

And then you have the techs who will actually administer the material to the patient, and you may have some new exposure to CT technologists who

have never before been working on positioning and dealing with individuals headed into a CT Unit who had an onboard dose.

Can you help me understand which or all or some of those groups, just so that we all can have a better understanding of where the real impacts are?

MS. THISTLETHWAITE: I'll try my best. I was looking on my blackberry to see if I'd gotten some of the hard numbers back, but I haven't gotten them yet today, so I apologize for that.

DR. COOL: That's okay, we can follow up.

MS. THISTLETHWAITE: Some of this was actually based on historical experiences that I've had. We've done a lot with my current company to try to bring down dose as much as possible. With the personnel, as far as whole body dose, and then also, what hasn't been brought up here was extremity dose.

So that's, I'll pose that question back with, to you, and I'll try to answer this one. But, with the international numbers coming down on whole body and extremity, extremity next on the list. And so the other thing is, on extremity dose for PET, we've done a lot with extending the distance between our personnel and the source of the radiation with hot cells, manipulator arms, et cetera.

We haven't come up with a tungsten suit that you can wear yet to go into the cyclotron area, so even a little lead apron wouldn't do anything except, you know, maybe hurt, hurt your back a little bit.

But other than that, I think a lot of the people who get the dose, there's a lot more on cyclotron operators and such, but there's also on the people who handle the doses, packing the doses, getting those ready to go out.

The nuclear medicine technologists would get a dose. There's a movement now, I won't use the vendor, but of moving from Unit doses to carts with more a multi dose vial that's going out, and saying that they're decreasing doses, about 30% decrease in dose by using that apparatus.

But you still have to feed the tubing through and that sort of thing. SO, I think that it's probably, the short answer kuh is, it's across the Board to all the representatives of, in PET that are working with it, from the cyclotron operator to the chemist to the pharmacist, to the nuclear medicine technologist.

Again, I can probably get the numbers from you--it's not that everybody is at four and a half

rem, I don't want to make it seem that way. But there are a lot of people that are over two rem, and if, if you went to the two rem per year, we don't have instances where you can do a planned special exposure, you know, as it's happening, so to speak.

So, as you're having to go in and, if a line comes loose on a cyclotron and fix that in order to get things going for the 100 patients that you have that day. You wouldn't have that opportunity.

Those are rarities, we try to keep it with our preventative maintenance plans, and such, that are there to keep those down, and when cyclotrons, you had asked the question earlier, about, do you go in when the cyclotron is running. No we don't go in when the cyclotron is running--

DR. COOL: Well, that's good.

MS. THISTLETHWAITE: --the cyclotrons, a lot of them are self shielded, but some of them are not, so there's a maze that would be there to keep that dose down. So there are ALARA concepts that are in place. I'm just fearful that bringing it down to, you know, less than half of what it is now, to me, it's just kind of cherry picking an international regulation and saying, yes, we want to go with this.

There's lots of international regulations

and things that we don't follow in the United States and just because they're doing this across the pond doesn't make it the absolute, it's, somebody said, the gold standard there. So, I don't see us all running out to get euros in our wallets, so I don't think that this necessarily would have to go with that because it's an international.

DR. COOL: Thank you. That, that, that is helpful and I would very much invite you to follow up with us afterwards when, if some of your colleagues can, can come through in the meeting, after the meeting, and that's perfectly fine. That's part of the reason that we've extended the comment period, so that you can go back and gather some information.

I want to come back to the extremity dose in just a minute, but--

DR. MAHESH: One quick comment, one quick comment to this one. It will be very interesting to see how the ICRP will approach in few years from now when the global utilization of medical procedure increases across Asia and everywhere, because recently I was an international programmer as part of the IAEA teaching interventional cardiologists in developing countries.

And I was astonished to see the number of

interventional procedures increasing at exploding in Asia, especially Asia and china and India and Vietnam and other places. And now there, the regulators are having lot of trouble because lot of these places, private companies are doing these things, which regulators do not have so much stronger connection yet.

So, it will be very interesting to see how the ICRP looks in a few years from now, because when they really get some more data and more and more procedures are done in the medical community.

DR. COOL: It will indeed. I'd like to come back because Duann asked a question about extremity, which actually, with your permission, leads me to the third question that I was going to--

MR. HODGKINS: There was some reaction over here, though. Cheryl?

DR. COOL: I, I, I apologize. Cheryl?

MS. BEEGLE: It's okay. To go on with what Duann was saying, you would think that the highest exposures would occur in the cyclotron area, when you're talking about PET imaging, and not to say that they don't, or in the pharmacy areas that are preparing the chemistry and performing the chemistry to get to the FDG dose.

But from a technologist standpoint, there isn't a tungsten suit for a technologist. And as I tell my technologists, and when I've taught about this across the country, you do not hug your patients. You talk to them before you administer the dose and you get out of the way.

Because there's no tungsten shield you can put upon the patient, who then becomes a source in and of themselves, totally unshielded. So, depending upon your demographic of patients that you might be dealing with in the medical community, if there are more infirmed as opposed to say an outpatient population, you may have to spend more time with them in order to accomplish the imaging study.

You get a tremendous amount of exposure during the course of the imaging site if you have to be with that individual. There are zones, as all you health physicists know around the equipment that are safer than other areas to be in, in order to protect yourself if you have to be near the patient.

But it's, it's critical to realize that even though we're the furthest removed from the cyclotron, we also get a tremendous amount of exposure. Also, if, if you're in a, a demographic area where you're either just starting up PET or you're new

to PET and that, you have one dedicated tec who is maybe going in and out of the hot lab and getting the dose, maybe they don't have a centralized radiopharmacy or a radiopharmacist dispensing.

They're getting the dose, they're administering the dose, they're performing the study. As they build that practice up from doing one patient a day to eight or ten or twenty a day, until they get other staff on site who are trained, their exposures are, can be, as high as three times what they would get doing basic nuclear medicine imaging.

Their extremities exposures are huge because of their hand contact, and as much as you want to put everything inside of a tungsten shield, you cannot shield everything. So. It's a, it's a consideration.

DR. COOL: Thank you. Okay, if I can then come back briefly to the extremity dose issue. I'm sorry?

MR. MATTMULLER: Hi, Steve Mattmuller. If I could jump in a little bit before we get there. Just to help clarify on the cyclotron issues, this is a high energy particle physics machine that we use to produce radioactive material.

And, several years before I got involved

in this, there were popular bumper stickers that, for public meetings, that stuff happens. And I always thought that was rude and crude until I got involved with the cyclotron, and believe me, stuff happens.

And when it happens, you have to fix it right then and there, and so there's, I know, there's like, planned special exposures. Well, this is like an emergency exposure and there, and there's no way regulation could be ever developed to handle a situation like this.

And, and sometimes it, if you're lucky, it's solved within a few hours, and sometimes it goes for two, three, four days, depending on if you have to get parts. Another issue involves our research protocols.

For FDG, or, to back up a bit, we operate the cyclotron to produce the radioactive material. It's then, our targets are bombarded to produce, and they are unloaded automatically, so we don't have any physical involvement with the target. And it delivers the fluoride to our automated synthesis boxes that carry out the synthesis of converting the fluoride to FDG.

But when you get involved with research, a lot of that involves manual chemistry, as far as

you're working in a hot cell and the target gets unloaded to vial A and you pick it up with manipulators, hopefully, and put it on a hot plate and add a compound.

And, and do basic chemistry with it in that regard. And there isn't an automated synthesis system that you can rely on behind four inches of lead. So, the limits can seriously effect our research capabilities in that the research chemists typically get a lot more because of the manual chemistry they have to do.

And, and the third point is in regards to our technologists, in that over the years, we have seen the severity of our patients increase, or their, their wellness decrease, I should say. And so, our patients are getting, are taking longer to handle, as far as positioning on the gantry before their study is started, or even just--it's requiring more technologist time with the patient to get the study done.

And, and so that is increasing. We're, the exposure to our, to our technologists in the imaging suite. Thank you.

MR. HODGKINS: Any more? Any other comments?

DR. COOL: Briefly then, for the third, third question, extremities. My understanding of the ICRP's recommendation is that they didn't change the recommendations for extremities, which in fact means that at the moment the NRC requirements and the international requirements align in that area.

So, that's perhaps helpful in a reflection. But it brings up a different issue, which our interventionalists probably are aware of, but which I wanted to let everyone be aware of and at least reflect on a bit, that, which is the eye dose limit.

Because the ICRP is now in the process, as are some others, of looking at the values for limit for the eye dose. Because there is a considerable body of evidence as I understand it that suggests that those effects occur at much lower levels than previously thought, and that the effect may be more of a stochastic induction of opacity than a deterministic cataract or no cataract issue.

So while there are no new ICRP recommendations at this moment, I think it can be anticipated that there may be some, during this coming year. In fact, it may be that the ICRP, whose main Commission is meeting this week, will have some

recommendations.

And so I want to alert you to that discussion because that may also have some impacts for certain kinds of uses where there is a potential for a significant eye dose component.

And I would let anybody reflect on that if they wanted to but I can't provide any more specifics because I don't have them and I don't think Vince or any of the other folks that I've, we've got here have more detailed information.

PARTICIPANT: Good afternoon. Vince Holahan. I'm from NRC. What Don is bringing up is over about the last four or five years, the scientific community has been looking at cataracts. Primarily, among Hiroshima and Nagasaki as well as the liquidators from Chernobyl.

And, the information that is coming out is that the threshold for this deterministic effect is something other than two or three sievert, that it might be something on the order of about maybe half a sievert.

Based on that, the international Committee is looking at some of the science, and the question is going to be, should they change the recommendations, and if such, we would then be looking at our

lenticular dose limit and maybe reducing that down to something like five rem a year.

As Don had mentioned, ICRP should have something out at the end of the year. Chris Clement mentioned something that, along that lines to us several months ago. Chris is the Secretary for ICRP, so hopefully we'll have some additional information in the next couple of months.

MR. HODGKINS: Thank you. All right, any other comments, concerns, questions, reactions? From the audience? From the panelists? So we're ready to move on. We're ready to move onto a fifteen minute break. You had a practice at what fifteen minutes was this morning, let's see if the practice helped you at all refine your game. So we'll take a fifteen minute break and be back in at 2:45. Thank you very much.

(Whereupon, the above entitled matter under investigation went off the record at 2:32 p.m. and returned at 2:46 p.m.)

MR. HODGKINS: Okay. We'll start with the next dose to special populations discussion, and then we'll open it up to the panelists. You ready to go, Don?

DR. COOL: Okay. Welcome back, everyone. And, let me first say thank you for the wide ranging

discussion that we had on the limits, it was very useful. I think we will have some similar interesting discussions in this last block of the afternoon on special populations.

So, what do I mean by special populations? There is actually two different things that I want to briefly sort of set up in this discussion, and then we'll see how people want to discuss it.

The first one is the dose to the embryo fetus declared pregnant woman. So, we are again in the occupational exposure area. As you know, the part twenty regulations have a limit for the dose for the embryo fetus, which is applied when the lady has formally declared her pregnancy.

Now, we are not going to get into a discussion about the legal underpinnings. There is a very carefully established case law, happened long ago, about the voluntary nature of the declaration and when these limits apply.

And, we are not suggesting from NRC staff perspective that we're going to go back and ask anybody to reconsider that court and case law, which is much larger than the radiation protection area.

But given that constraint, if you will, that boundary, the discussion really comes down to the

question, again, of what kind of limit might be applied. The NRC requirements today, 500 millirem, five millisievert, over the gestation period.

If the individual declares her pregnancy, then you have to go back and assess the dose that has already been received from an estimated date of conception, and control the exposure so as not to exceed the limit during the remaining gestation period.

An additional proviso of a fifty millirem value if you're in a circumstance where the individual may in fact have already gotten an exposure to the embryo fetus that she's carrying that was already greater than 500 millirem. So, that's the basic regulation that we have in place today.

Now, the ICRP over time, and this is a little bit more recent than the 1990 recommendations, in fact. First they've had the general statement for a fair while that protection should be roughly equivalent, generally equivalent, to that provided to a member of the public.

Meaning, translated roughly, recommendation of about 100 millirem for an embryo fetus. Now, the ICRP added just a bit of specificity there, in attempt actually to simplify things, I

believe. Not speaking for them directly.

By saying that it should be 100 millirem after the notification of pregnancy. Now, this sort of makes the assumption, I think, that the individual has notified relatively early on in the term of her pregnancy.

We all know that might or might not be the case. Now, the ICRP recommendations have been adopted in at least some countries, but there is a much greater variation and that which is out there right now. I believe Canada is at 400 millirem, four millisieverts, right now.

So there is more variation internationally about what goes on there. The international basic safety standards of the IAEA which are currently being updated, would use the 100 millirem value, moving forward.

So, in addition to that, you have a broader question on public exposure. So I want to tee up this, this second issue because you have the general recommendation that the dose limit to the members of the public should be 100 millirem. That is what the NRC regulations also say today.

Now, there are provisions in both the ICRP recommendations and the current NRC regulations that

allow for an exception up to 500 millirem. In the NRC's regulations, it's upon prior application specific approval of the circumstance limited duration over which that alternative limit might become available.

ICRP has similar sorts of wording. Part of the issue becomes, and looking back at the embryo fetus recommendation and other things that ICRP has said now that there is no caveat or restriction associated with who might be that member of the public.

In fact, ICRP has said a couple of times that more sensitive individuals, the embryo fetus, a nursing infant, so this might apply to a nursing mother, young children, should generally not be allowed to get this higher dose, or this exceptional dose, over short circumstances, that would be more acceptable for an adult.

So, the options that we would like to talk about today, and these are in two parts, so first we will talk about the embryo fetus for occupational exposure. Again, there's always the first option, which is we don't have to change anything.

And, as we have done this discussion, there has been some, I don't want to really say

ambivalence toward it, but there hasn't been a clear view that's been expressed to us from different groups because there are in fact some pros and cons.

The current NRC regulation could in fact be more restrictive in certain circumstances where the individual chooses to declare later on in their pregnancy because you have to back and assess the dose. And if the individual waits until pretty late, then the ICRP recommendation has some different connotations.

If she declares early, it means there's more protection provided, makes it more difficult for a licensee to go back and demonstrate the compliance. The second alternative is to go ahead and make the Rule, what sounds simpler, and just say when she declares, it's 100 millirem after the date of declaration.

Very simple. You don't have to go back and do any retrospective analysis or anything, so perhaps a little bit simpler for an implement from that standpoint. Or, there could be some other change, recognizing that we currently allow a fifty millirem value as an add on if the individual had already received exposure.

There could be that, or some other value

that could be used. And so the questions we want you to think about when we go into this discussion, significant impacts if we change that limit for the embryo fetus, and particularly things related to operational or other issues.

The anticipated implementation impacts on the record keeping, record keeping and assessment with the ICRP recommendation adoption. And one that we heard several times, and I think people have alluded to it once or twice in other discussions this morning, which is the extent to which you have now gotten to a point where the technology makes it difficult or impossible to actually measure those sorts of incremental dose rates that would allow you to demonstrate compliance with the limits, so we're looking for information on that.

And, this is another one of those places where we don't have very much information about what's actually going on out there and your experience with individuals who have declared their pregnancy and issues that you've had in implementing the current Rule.

And I think perhaps, Dan, it would be better if we discussed that before we came back to the options for public exposure rather than getting

everyone confused.

MR. HODGKINS: Okay, terrific. So, this is where our panelists take over the discussion. And then, is there any reaction, information that anybody around the table would like to share as far as the options for embryo fetus? Yes, Pete?

MR. O'CONNELL: Peter O'Connell, Department of Energy. I just give you an update of, I guess, where DOE stands on this. Our regulations, occupational radiation protection for the embryo fetus of the declared pregnant worker, they're a little different than NRC's current regulations.

We had the declaration in writing of, of declared pregnancy. We use the 500 millirem for the gestation period. But we also have a provision in there to uniform dose rate over the entire pregnancy, so. That was in consideration that there are certain periods in a pregnancy where the embryo fetus is more radiosensitive.

So, to avoid putting to much exposure during that time period, we have a requirement for a uniform dose rate over the pregnancy, after the declaration. And we don't have the fifty millirem. If they've already exceeded the 500 millirem.

What we have is, they have to be

reassigned another job where additional exposure is unlikely. And we do have, what, the radiation exposure monitoring system, where we do have pretty detailed information on numbers of declared pregnant workers and what their exposure rates were, dose rates were, over time.

I asked them for some information a couple of weeks ago, they said in the last five or six years, we've had in the neighborhood of fifty to sixty declared pregnant workers. And they sent me a summary of their exposures, and they had, two of those individuals had doses of over 100 millirem over that time period.

MR. HODGKINS: Thank you. Panelists? Mr. Hickman?

MR. HICKMAN: Erskine HIckman, United States Enrichment Corporation. As Frank Congel mentioned this morning, you know, some of us were involved in the new part twenty revisions years ago, and one of the things that I specifically remembered was that we were trying our best not to limit the employability of people.

The subject here is a special populations, special populations being health physics technicians. Through the years, my staff has become--I hire a

percentage of female technicians. Obviously the health physics technicians are one of the groups that get most of the exposure.

And if we change to option 3B there, limiting the, the dose to 100 millirem, that would impact some of the female health physics technicians. We would have to make some arrangements there to accommodate that.

MR. HODGKINS: Thank you. Duann?

MS. THISTLETHWAITE: Duann Thistlethwaite. I just wanted to add on to that. We actually are a special population as well, we female nuclear pharmacist. A female pharmacist, to be more precise, because when I was in pharmacy school, it was about sixty forty, or sixty five thirty five, and now it's about seventy five twenty five as far as female to male pharmacists go.

So, we're taking over in that realm. But in that, we have worked, the whole time I've been in nuclear pharmacy, under the 500 millirem per year, and with extra ALARA considerations there. It seems to, to work. There's also internal policies, in all my experiences, that limit the duties of the worker as it's going on.

Not lifting over a certain amount, not

doing more hazardous duty like iodine capsule preparation, and that sort of thing. Staying away from those, especially in the first trimester.

So I feel that the 500 millirem meets that and actually going to what the member of the public would be, would be overreaching, because that would be just a general member of the public, you know, walking by the outside of the facility or something, not inside.

Even if you're pulled from some duties, the chance of you experiencing certain dose rates inside in the unrestricted area or the restricted area, that would mean you'd have be in the unrestricted area for the entire time, which could put a burden on the staff if you had all declared pregnant workers in one facility with, you know, 75% of your staff being female.

MR. HODGKINS: Thank you. Any other comment? Yes, Phillip.

MR. GIANUTSOS: We operate a couple of facilities, and for, for the facility where external gamma exposure is the primary consideration, it's really not a problem. We do relocate or retask the individuals.

The 500 millirem limit is never even

remotely approached. For our uranium fabrication facility, however, that, that's a little more difficult with bioassay frequency and so on. We found that it's just easier to completely relocate them, so they're outside the restricted area, working in, completely retasked for that type of facility. I'm sure it's the same for, for other uranium.

MR. HODGKINS: Anyone else from the panel? Yes, Kevin?

MR. BUNDY: Yes, Kevin Bundy. I just maybe try to give, explain the logic of how we got to the 400 millirem. We originally came out with just shortly after ICRP 60 was released, we came out with a proposal to drop the pregnant dose worker limit to two millisieverts, or 200 millirem.

That was based on what I would consider maybe a misinterpretation of the ICRP at the time, where we saw it as one millisievert from internal and one millisievert as external, but the draft was the regulation at the time that's what they came up with two.

We went through a consultation process on that and we found large opposition to that number from actually women in the workforce. They felt they would be discriminated against because at that time it would

be difficult to measure the dose at that level and guarantee that they did not exceed that level.

So they thought they might, so they were worried that they might not even be hired for the positions. So in that case we decided to double that dose from two to four millisieverts, or 400 millirem and that's where it's been since then.

We've also had a, we, our provinces and our Federal agencies have also since adopted that 400 millirem limit for pregnant workers.

DR. COOL: Kevin, if I could follow up on that. Is CNSC considering any changes to that right now, in light of ICRP 103?

MR. BUNDY: No, not at all, not at this time.

MR. HODGKINS: Okay. Any other panelists? Representing any other point of view on the panel? Yes, Michael?

MR. STAFFORD: Mike Stafford, ORNL. Right now, HP technicians, it's a very competitive market. And I know a lot of places like us, when we make decisions about promoting someone say from a junior technician to a senior technician, you know, we follow the ANSE Guidelines on that.

And it's very specific in terms of years

of experience. And if you take someone out of their job for a particular amount of time due to a pregnancy, then you could jeopardize their opportunity for advancement, and lowering the dose standard actually jeopardizes that to the worker. So there's unintended consequences to he, to the female workers.

MR. HODGKINS: Okay. Thank you. Panelists? Yes.

MR. MATTMULLER: Hi, Steve Mattmuller. I guess, we've heard a lot about what the consequences will be if you did lower it, and I agree there would be some, would be consequences for the female staff members.

But I guess I want to back up to why, because I struggle with the ICRP recommendation of 100 millirem and maybe the health physicists in this group can help me out here, but wouldn't that not be equivalent, that if you had a, I mean, is this not the same, if you lived in Miami, and then decided to relocate to the Denver, Colorado area that your natural background radiation would go up by about 100 millirems, or close to it?

And, so I struggle with this low, low number. I think it's, I think they've drawn the line in the sand far too low where it's, it's become an

arbitrary number just because of natural background variations just within the U.S.

And I know, overseas in areas of India and Iran, there are areas much, much greater than this, actually, in rems, versus 100 millirems. That, this just really seems to be completely arbitrary and, and substantial consequences of trying to actually measure it and monitor it and regulate it.

MR. HODGKINS: Okay. Any reaction to that? Kate?

MS. ROUGHNAN: Kate Roughnan, QSA Global. To go down to the 100 millirem for declared pregnant woman, she has been trained in radiation safety, she understands the risk, whereas the general public, who has a limit of 100 millirem, has not had that same training.

So, she's making decision to proceed knowing what she knows and based on the training from the licensee to go ahead and exceed 100 millirem, up to 500 millirem, whatever the regulation is, and that's a decision, she's probably comfortable with that.

MR. HODGKINS: Thank you. Kate, that clarification. Okay, anybody else from the panel interested in commenting? Okay, we then move to the

audience, as far as some comments from the audience regarding this particular question.

Is there anybody from the audience? Is there anybody from the webinar that would be interested in commenting at this point? You'll have to take your phone off mute.

DR. COOL: Do we have to unmute them here? I don't see Kim actually at the moment.

MR. HODGKINS: Okay. So let's go back to the audience before we get to the webinar participants. No reaction from the audience? Oh, there we go. Thank you.

PARTICIPANT: Just one brief note. In ten years, we've had one DPW above 100 millirem, and largely the others have managed to transfer to non-rad jobs, typically because this was of planned pregnancies. That's it.

MR. HODGKINS: Okay. Thank you. Any other comment from the audience? Yes. Oh, Stephen, you're not the audience, you're the panel. From our panelists?

MR. BROWNE: Well, sort of an observation just that in, in, the ICRP reduced the, their occupational limits from the five to the two, effectively, but here, it was just a factor of two and

a half.

Here, they've gone down percentage wise much further, so it seems more of a philosophical basis for saying that the embryo fetus should be treated as a member of the public, as opposed to reducing the limit based on risk, and I'm wondering if, you know, that's really justified on a risk informed basis, which is what our, I think the goal of the NRC is to have risk informed regulations.

MR. HODGKINS: Comments? Reactions? Ideas? From the--yes, Pete?

MR. O'CONNELL: Pete O'Connell, DOE. And just playing the devil's advocate, in response to Steve, and Steve's comment, about how you're significantly reducing exposures and now you're at 100.

I guess you should anticipate that you're going to get caught in saying that you're increasing the exposures, because of a, particularly pregnant worker and they've already have 700 millirem, under DOE, you wouldn't allow any extra exposure, under NRC you'd be allowed fifty millirem. But now, you're actually doubling that and allowing an extra 100 millirem exposure.

PARTICIPANT: You might want to take a look

at ICRP 84, issued after Chernobyl incident, because of a massive number of abortions in Europe due to fear of, well, Chernobyl. They're quite explicit in the logic of the various doses and the increase in risk with dose.

Very simple and straightforward charts. It's also very handy in a DPW briefing. I highly recommend it.

MR. HODGKINS: Any other reaction comment from the panelists, from the audience? We do have one person that wrote in from our webinar. Could, and I can't read what this says. Landavose?

DR. COOL: Landauer, I think.

MR. HODGKINS: Landauer or own credit dosimetry calibration laboratory provide information about declared pregnant workers friends? And so that comment has been duly noted and for sure I'll hand this over because I didn't read it so well.

DR. COOL: We would invite in fact those of you who may have some information in your particular facilities or areas with a little bit of experience to help us know.

One of the questions that we had was, what are you seeing in your particular facility or areas? How many individuals declare their pregnancy, what

kind of doses they receive.

We had one a moment or two ago where we talked about there being seventy eight or so individuals, only two of which had even exceeded 100 millirem. It would be interesting to see, and I think this was a sort of veiled request to see if the dosimetry processors would be willing to give some completely blinded information from dosimeters that they receive with regards to what might be declared pregnant female exposures.

MR. HODGKINS: Walt Lee?

MR. COX: One thing, the NRC should probably consider, if we look back at the question that was raised earlier about going from five to two, for the occupational worker.

When we go, if we go from 500 to 100 millirem for the declared pregnant worker, are they going to say, well, what's wrong? You know, I used to be, be able to get 500 millirem so what are you telling me, what are you telling all of those people that you held to 500 millirem, and it's a very sensitive issue when you bring in embryo fetus.

So, lot of lawsuits, I would imagine, or a lot of questions as to why were we able to receive 500 at one point and now it's down to 100 millirem? And

that, you know, what's, what's, what's wrong. So, just consider that.

MR. HODGKINS: I think for the purposes of this discussion though it is really the question why, as we started this morning, as far as with all these questions, but certainly some are more sensitive than others. Yes? Larry?

MR. HAYNES: Just some perspective. When we first started talking about this, I looked at our utility for the number of declared workers and there were, there were a handful. And, it's fairly easily, easy to manage when you've got just a few female technicians and with the aging workforce issue it's not been as big a issue in the past.

We can, we can accommodate by moving folks to lower dose type jobs. If we do go to 100 millirem, and as we replace our aging workforce with young workforce and, and nuclear utilities are similar to what I heard from the pharmaceuticals, there's more and more women in that, in those work positions.

It becomes more difficult to accommodate moving folks around. You know, the, the issue obviously resolves itself in about nine months, but still you have to deal with, with that as, as you work through it.

So, I, I can see it as standpoint of, you could get through to a position where you had difficulty staffing certain positions. Because of the extra limitation of 100 millirem.

MR. HODGKINS: Okay. Audience? Did you want to say something, back in the corner?

PARTICIPANT: You're talking about four-- sorry. You're talking about 4% of the working lifetime or something like that, if a woman has--

MR. HODGKINS: Can you use the mic?

PARTICIPANT: Sorry. Scott Davis. And if you have, a woman has two children, that's two years out of a working lifetime. Not, not to say that it's not important to protect the embryo fetus, but we're talking about a very low portion, and we're comparing it to a public dose limit where public limits are for populations with thousands or hundreds of thousands of people.

We're talking about a true special cohort where, again, the, you know, the mother chooses to elect the protection. How many of these embryo fetuses do we have unrecorded doses on because they chose not to declare? Probably many, probably just as many as those who declare.

So, it's a, it's, you know, I, I don't

tihnk, I don't think it really warrants any additional thing, personally. I think it's a personal decision for the woman, and I don't think you can compare the individual to the population dose limit for the reason of being, tens of thousands versus not that many.

You know, and I'm saying, a facility has a public dose limit that impacts a population. That's, that's the 100 millirem, that's what I'm talking about.

MR. HODGKINS: Thank you. Appreciate it. Anybody else from the audience? Are we ready to move on?

DR. COOL: So, if I could offer a reflection, just for a moment, I think what I'm hearing many of you suggest is that you don't quite agree with what I think was the ICRP's premise, that the embryo fetus distinct from the mother should be provided protection as any other member of the public.

And instead, you're looking at this more strictly form the standpoint of the mother as an occupational individual with choices and therefore selecting a higher value. Is that the logic that you're can--I'm seeing several noddings of heads.

But I think it's important to try and differentiate the basis for protection of someone, and

I've now forgotten who it was, asked the question, is the basis for the protection, protection of a member of the public, or is the basis of protection some selected value in occupational exposure where the premise of training and risk assumption takes hold?

I'm seeing nodding of heads, that that's the view that you're taking. Recognizing what ICRP said. Kate?

MS. ROUGHNAN: Kate Roughnan, QSA Global. I would agree with you. I think it's again, the occupationally exposed woman has had the training and the risk information and she can make that decision, as she does in other decisions in, in bearing a child.

DR. COOL: Pete.

MR. O'CONNELL: Pete O'Connell, DOE. I thought more in line that the argument was more that similar to the five rem versus the two rem, that 500 millirem for entire gestation versus 100 millirem after the declaration, can you scientifically show that, you know, one is more protective than the other?

MR. HODGKINS: Thank you. Microphone.

PARTICIPANT: Roger Pedersen, NRC. I'd like to add to Don's wrap up a little bit. I believe I heard at least an implication that a lower dose limit for the embryo fetus might actually be less

protective, and that declared pregnant woman may delay the declaration or maybe even not declare at all, because of a fear of being too restrictive at a lower dose.

I didn't hear those words exactly, but I thought I heard that kind of as a thread through some of the comments, so we need to capture that as a comment, as well.

DR. COOL: And, just for the record, because the transcript can't see the nodding of heads, there were, again, several nodding of heads in the up and down direction. Have to quantify this.

MR. HODGKINS: Any other comment, then, from the panelists? From the audience? Not stepping up to the microphone. Okay, are we ready to move on?

DR. COOL: So, if we could wrap that up, then, let me encourage you that if you have some information available on number of individuals, kinds of exposures being seen under these current limits and could provide that to us after the fact to help us develop the basis, that would be very very useful.

So, let's go on to the second subject, which is the options for whether or not there should be any changes for the public exposure limits themselves. Starting from the standpoint that the

basic public dose limit is 100 millirem, the NRC requirements are the same as the international recommendations, the same as the international basic safety standards.

So, there's a consistency at that point, but recognizing that we have a provision that would allow for a greater dose under certain limited circumstances, and the question really becomes, given the ICRP's recommendations that children, the embryo fetus, should be provided protection and should not be allowed to receive doses greater than 100 millirem, should the NRC consider restricting the application of this exception to adults, in some manner?

And there are of course several possible options. We don't have to do anything. The regulation as we have it today is available only upon application to the NRC and specific approval in advance, and quite frankly, I don't know of anyone who has ever actually asked for that.

We could change the applicability in the regulation to say that it can only be applied when sensitive populations are not the individuals who would be most likely to be receiving the exposure.

Or, and this is a little bit different option than some of the other ones, we could say that

we recognize that this issue is out there, but since this is only available upon application, there could be additional guidance that is brought forward about when this would be considered and what arguments would need to be made in order for there to be a consideration of approval.

And I will note this for background because I'm sure some of the medical people will bring it up. The corollary to this is of course patient release, and the doses received by individuals as a result of medical exposure and a patient exposing someone else.

In which case, the requirements in our medical regulations do allow for an amount of exposure from an individual who's received radioactive material, the iodines are the ones that usually deliver the most.

There has to be specific instructions and information provided if that exposure is going to be over 100 millirem. It's not allowed to go over 500 millirem, and in fact, there is specific additional guidance that additional efforts have to be made to reduce the exposure if young children are present in the home, and therefore the individuals most likely to be exposed.

So, there is that bit to a model which is already in place. And so, I open this up, Dan, for discussions of possibilities, whether this is something that the agency needs to consider, whether this is something that the agency doesn't need to consider, and why.

MR. HODGKINS: And let's open it up to the panelists first. Panelists, any reaction? Phillip.

MR. GIANUTSOS: Part of this issue is going to depend on what you require of the licensee to demonstrate compliance. If you have explicit occupancy factors approved, that, that makes it one, one model.

There are other situations, for example, one license I'm aware of has a 500 millirem per year annual limit at the exterior of the facility, that has an implicit 20% occupancy factor, but it is not laid out in any, any detail.

If there is an operating facility within an occupied building, it presents much more problems of course than a facility located out in the, in a more rural area, such as we're operating. That makes it much more difficult. And, as far as nobody applying for it, I'd, I'd suggest polling some of the agreement states to determine if that's really the case. So.

MR. HODGKINS: Thank you. Anyone else from

the panel wishing to discuss this? Cheryl?

MS. BEEGLE: We've had some discussion at various places I've worked where they wanted to keep populations of patients separate from other populations of patients based on their dosing with radiopharmaceuticals, in particular, PET patients.

And yet, they can leave the Department and go sit in the cafeteria and you can sit next to them and there's no restriction. So, I agree, you have to sort of have an idea about what is going to be asked of the licensee to monitor this.

Because I hear everything from, oh, it's a short lived isotope, it's going to go away in a matter of minutes, to the fact that they bring their young children and they're sitting on their lap, and receiving all the bladder uptake.

So, you know, it's kind of all over the place and I think it does need to be addressed because the public exposure isn't something they're always aware of, to even ask for the exception.

MR. HODGKINS: Thank you. Duann?

MS. THISTLETHWAITE: Yes. Duann Thistlethwaite. I, I see this as more of an educational opportunity for the NRC to educate the public on the hazards of radiation exposure and the

different levels that you can, you can get. Instead of putting the burden on the licensee to prove that they have not exposed the busload of children that drove by the nuclear pharmacy that's in the shopping center.

So, I, I see it more of a, a demonstration for sharing that public education of saying, these are the risks of radiation exposure, if you, if you've undergone these types of scans, this is the type of exposure that you would get off, or give off as your going about your business as you've been released from the hospital, which, I think, I know that's another thing with Senator Markey.

But as they continue to be released from the hospital, so I think it's more just an opportunity to educate rather than a regulatory Rule that needs to be put in place.

MR. HODGKINS: Thank you. Michael?

MR. STAFFORD: You know, one thing that I've noticed too is often, patients don't realize they've been administered a radiophamarceutical and they'll, they'll come to the lab and you know, maybe set off some kind of a monitor alarm and then start backtracking.

And then, you know, they say well, yes, I was given something called cardiolite or, you know, or

something like that, and they didn't, you know, so their doctor really didn't tell them that they had an Administration that was going to, you know, have these kind of implications. So, having that kind of disclosure, you know, could help, you know, in a lot of different directions.

MR. HODGKINS: Excellent. Anybody from over on this side? Yes, Michael.

MR. BOYD: Mike Boyd, EPA. I just wanted to make a comment about the, the issue of how you enforce the, the current public dose limit. And I know just for making it approachable, NRC has traditionally set this as a facility limit, whereas the ICRP recommendation is that it's the public dose limit from all sources of exposure.

Now, if you enforce that limit as the dose limit divided by, what, 8,760 hours to some levelized chronic dose rate, you can't be two places at once, so you're fine. But if you look at a scenario where you're trying to assure that any member of the public doesn't get a millisievert.

And you start factoring in, you know, the odd person who drives behind the low-level waste truck all the way from New York to florida, and then, you know, spends his life living next to a licensed

facility.

You begin to see the difficulties, from a regulator's standpoint about understanding what you mean by that, so I, I perfectly understand why it's in the regulations as a facility limit, but I think it's worth discussing, maybe what that means in terms of enforcement.

MR. HODGKINS: Okay. Comments from the panelists? Let's open it up to the audience. Anybody want to respond then from the audience? We'll take it a section at a time. No? Thinking of who you're representing, any ideas, comments, concerns? Yes, Kevin?

MR. BUNDY: I actually maybe ha da little bit of help. We, we had the half a rem limit for members of the public prior to the new regulations, so we did drop it to one millisievert. And, as far as I aware, we haven't had too many problems meeting that for members of the public outside the facilities.

Where we do get issues is where that one, we have a category for workers called nuclear energy workers, and if you're expected to exceed the member of the public as, at a nuclear facility, than you have to be declared a nuclear energy worker, in which case the occupational dose limits come into effect.

A lot of licensees, they don't want to designate their workers as NEWs, they try to keep them at the public, at the public dose limit, I can occasionally get one of their workers will exceed that one millisievert, and there's, then there has to be an investigation on it.

And, and most of the time what they end up doing is declaring the worker as a, as an NEW. But that's still pretty rare, it doesn't happen too often. Doses from facilities, we do require licensees to derive, have derived release limits, which essentially a, a modeling of the pathway from knowing what the effluent is that comes out of the facility and tracking that through the environment using, using a standard procedure.

And, and based on that they can calculate the eiother the real closest person, the closest person to the facility or even a hypothetical person sitting on the, on the, on the fence post.

And, using those procedures, the highest doses we generally see are about 100 microsieverts per year, which is pretty, which is like one tenth, one tenth of the limit. And even in that case, the reason why it's that high is probably because they just very conservative assumptions in doing that calculation.

DR. COOL: So, to clarify and make sure that the record is clear. For the Canadian regulations now, you're limit for the members of the public is one millisievert. Do you have a provision where they could go tot five millisievert under certain circumstances, or is there no other provisions, it's just the single value?

MR. BUNDY: There is no, there is no provision for that, as far as I'm aware and I can't think of anything on it. But it, but so far, ten years, it hasn't been an issue.

DR. COOL: Okay. And to look around the room for people both on the panel and in the audience, for your facilities and activities, has there ever been a circumstance where you have needed to apply or use a dose limit for a member of the public, anything other than the 100 millirem, one millisievert level? Let's keep patient release off the table for the moment. I'm actually not seeing any, which is interesting, an interesting piece of information. Okay.

MR. HODGKINS: Pete?

MR. O'CONNELL: Pete O'Connell, DOE. I've, it kind of leads into the question I was going to ask you, Don, okay. DOE, we don't have the alternative 500

millirem to member of the public.

We just use the hundred, so do you have any details on, you know, across the Board at NRC, how often do you invoke that 500 millirem? And if, you know, to do away with that, would that really impact a lot of your licensees?

DR. COOL: Well that's actually an interesting question, because what I think I'm seeing is that there hasn't even been any use of that value. So, in fact, one of the other things coming out of this might be, well, NRC, no one's ever used it, everyone's able to live comfortably within the limit for members of the public, why continue to carry this regulation. And I think that's going to get some reaction.

MS. THISTLETHWAITE: This is just a point of clarification. In my experiences, we've had the 100 millirem per year as the limit, btu that's also at times been a calculated number using occupancy factors and things like that, so. We have had to calculate, rather than just taking a straight reading off of an exterior badge, so.

DR. COOL: Further comment?

MR. MATTMULLER: Hi. Steve Mattmuller again. In the medical community for therapy of our

patients, this is a limit that comes into play in a very, very big way for us.

And in fact, right now, We're getting pushed back from, from certain individuals and groups who think we're doing a terrible disservice by allowing our patients to be released under these limits now.

And, so, if there were to be any change from a practical perspective of this being lowered, it would severely effect our medical field in that probably we'd have to keep all of our patients in the hospital until they decayed the background, to be in compliance with this.

And, and, and in, in our current situation in dealing, or trying to deal with these individuals who are pushing against us now, it's, it's, it's very frustrating in that, they have no evidence as far as this current level is harmful and that, and, and so, it's like why do we have to go to a lower limit if there's no evidence of harm now, which gets back to the why.

And, and so, we would, this could shut us down completely if, if this were to be, become the new limit in the regulations.

MR. HODGKINS: Yes? Pete?

MR. O'CONNELL: It's just a followup question. Now, Steve, are you saying that you're using the 500 now, and lowering it to 100?

MR. MATTMULLER: We do use the 500. In regards to how calculating release criteria for our patients, get treated now with iodine 131, oral solution or capsules of iodine. Their release is based on if we give you this amount and if you behave this way and do this then the exposure to someone will be udner 500.

And, and, and then it goes on, and, well, in addition to that it says if you could possibly give anyone greater than 100 millirem then we have to give you these written instructions to make sure you do comply with this, yes.

So, we are fully aware and trying to operate under this current limit now, and would like to stay right there because we think it's very manageable and we think it's very safe, first and foremost, it's very safe.

But we are experiencing strong pushback now from certain groups around the country now to even become what we think is an irrational pushback to a lower limit.

DR. COOL: Kevin?

MR. BUNDY: I guess maybe add to that the Canadian regulations actually exempt patients with radionuclides from the regulations so long as the hospital does give them instructions on how to avoid exposures to other members of the family and that.

The right now come into a problem with veterinarians with giving injections to cats and of course wanting to release them, which, quite, quite haven't solved that issue yet.

DR. COOL: And I think perhaps we should make sure that we're, we're clear here about how the present NRC regulations are constructed. The release of patients and the criteria that are associated with that are separate from the basic requirements related to public exposure.

The requirement in part twenty actually says this limit except for, and one of the things that is specific exception is the release of patients under part 35, which is what Mr. Mattmuller was, was talking about, was the criteria that are in party thirty five, specific for release of patients administered radioisotopes.

MR. HODGKINS: Did you want to say something? Okay. Anybody else from the panel? From the audience, please.

PARTICIPANT: Yes, my name's William Smith with Southern Nuclear Company, and they have three nuclear power sites and at one of the sites, they're actually building a new plant that's been licensed under the new process.

And the 100 millirem for public workers, you know, that's easily met for the construction workers at that site. But having that option for, you know, being able to go to 500 millirem for some of the other sites probably would be pretty important.

They may not have the same setup and location that we have. So, leaving it the same would be important for the generation of plants that are being built now.

MR. HODGKINS: Okay. Anything else from our audience? Michael.

MR. BOYD: Thank you. This is just a, a personal comment. I think, I think most of us would agree, or many of us, at least, that the, you know, the five millisieverts is a pretty good number for care givers and adult family members and, and maybe even higher in special circumstances.

I guess, it's really not so much a regulatory, a regulation itself issue, but it's the kind of guidance you would issue around your

regulations that might help prevent inadvertent exposures.

I mean, I, I guess I worry about, or, or, not really worry, but I, I could envision a case where, you know, someone comes out of a hospital following thyroid ablation, and sits down beside you on the Metro and you have no idea of knowing you're being irradiated for the whole length of the red line or something.

So, there ought to just be some general guidance that would take into account the inadvertent exposures.

MR. HODGKINS: Okay. Anyone else from our audience or panel regarding this aspect of our discussion? Kate.

MS. ROUGHNAN: Kate Roughnan, QSA Global. I think the 500 millirem was retained in the regs as an option because some of the facilities were already in place, and when they were designed and built, the exposure to a member of the general public could exceed the hundred millirem, and could go up to the 500 millirem.

So, I believe the 500 millirem was retained so that existing facilities could still comply with the regulations. So there may not been

exemptions given out, they may have just been continued operations basically.

MR. HODGKINS: Duann?

MS. THISTLETHWAITE: Duann Thistlethwaite, Triad Isotopes. There are things in place actually for patients being released with radiopharmaceuticals to say, I've undergone a scan, this has happened, because several bridges and tunnels and things like that have radiation monitors.

And so patients are given those type of cards to take with them. It's not a letter that they could wear on their shirt, but it is something that they would take with them to say that they've undergone a scan.

And if, if we have workers, actually, in the nuclear medicine departments, we've have instructions for them, if they've undergone a nuclear medicine procedure to let us know back at headquarters or at the sites that they've undergone those, because we also have monitors going in and out of our facilities so that they don't make those go off.

MR. HODGKINS: Thank you. Yes, Larry?

MR. HAYNES: Just along the same lines as that, and just to comment. For nuclear power plants, we operate under part fifty, Appendix I. And, the

ALARA objectives are fractions of the, the limits.

So, it's typically is not an issue for nuclear power plants, for effluents and exposure to the public. The interesting thing though from a radiophamarceutical standpoint, is we have border monitors as well, and a worker that would go have a thallium 201 stress test, it'll take 45 days to two months for that person to be able to clear our monitors.

So, you'll never solve that. That's just, it's going to be the issue. But there is an impact from all the tests that are being, being done. Even the tech-99 metastable work can take a few weeks.

MR. HODGKINS: Okay. WE'LL go ahead and give you one more opportunity for any comment, or we'll close this discussion. Anybody? Okay. We're going to break for the day, but before that, let's just do a little evaluation of the process.

Panelists, is this comfortable for you, could we do anything different to make it a little bit more comfortable, easier, any comments? Questions? Concerns?

Audience? Okay. Any problems, concerns, as far as the process? Does it make sense? Are you comfortable? You'll be back tomorrow, right? Okay.

We have lots of work to do as far as the webinar participants. We'll be working on that. Other than that, I'm going to turn it back over to you then, as far as some closing remarks.

DR. COOL: Okay. Thank you very much, I very much appreciate the great discussions we've had today. We've dug into the issues, we've answered at least a few of the whys.

You all have the notebook now, which can help reinforce what hopefully you read in the Federal register and other information ahead of time. We all know you all read the Federal Register religiously.

Okay. That's what I thought. Okay, but let me encourage you tonight to reflect on the discussion that we had today about the dose limits, because what We're going to dig into tomorrow is the other half of that, which a number of you alluded to, which is the ALARA radiation protection component.

The use of planning values, what ICRP has now termed constraints. Because I think in tomorrow's discussion, we will revisit some of the things that we talked about in limits and hopefully be able to engage in a good discussion about some of the correlated implications about how to construct a program.

I'd like you to think about that both from

the possibilities of how it would work in your programs and the extent to which it could be argued that it does or does not help international alignment, and does or does not help increase or improve protection.

Because as with everything else, there's going to have to be an argument put in place, if you're going to do something, that there is a basis for it. And with that, thank you very much. I wish you a very restful evening. Drive safely out on the D.C. roads, and we'll see you tomorrow morning.

(Off the record.)