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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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TUESDAY
OCTOBER 26, 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.

PANEL MEMBERS PRESENT:
ELLEN 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/Conference of Radiation Control Program Directors
PHILIP GIANUTSOS, Energy Solutions
WILLIE HARRIS, Exelon Nuclear
LARRY HAYNES, Duke Energy
O. ERSKIN HICKMAN, JR., U.S. Nuclear Enrichment Corporation
GEORGE MARSHALL, American Portable Nuclear Gauge

Association
STEVE MATTMULLER, Society of Nuclear Medicine
JOEL RABOVSKY, Department of Energy
KATE ROUGHAN, International Source Suppliers and Producers/QSA Global
DUANN THISTLETHWAITE, Triad Isotopes

FACILITATOR:

DAN HODGKINS, Consultant

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

8:32 a.m.

FACILITATOR HODGKINS: Okay. Good morning everybody. I think we are ready to start. Just some housekeeping because I think there are some new participants.

This is going to be somewhat informal, but using a formal process as far as we'll take questions and comments from our panelists first, then into the audience.

And today instead of frustrating the webinar participants by trying to do an audio question, we're asking everybody on the webinar to type their questions in. And then we will ask those questions or discuss those comments through the different speakers.

And so hopefully, the webinar participants will hear their comments at some point in the process as we move forward.

A couple other housekeeping issues. Bathrooms are out and to the right - oh, my God. It's my phone. And just another reminder, lots of background noise will interfere with the speakers.

So, we ask that you please turn off your pagers, phones, those kind of things and so as not to interfere. Background noises, side conversations make

it real difficult for the webinar participants and there was lots of that yesterday.

The other thing is if you have a microphone beside you, please talk into the microphone. You can't use the microphone by the side.

Did you want to say something, Don?

DR. COOL: It turns out that these are very directional. And what I am told by the folks here in - the AV people, is you need to not only be close to it, you need to be directly in front of it. Being off to the side makes a world of difference.

So, it isn't the fact that you're leaning over towards it. Get the thing aimed right at you.

FACILITATOR HODGKINS: So, practice a little bit and make sure it's in front of you. And I think we have one free mic that we can use in case there isn't something close to you and if you're more comfortable using that.

Same thing with the microphones for our audience participants. Just make sure that you speak into the microphone.

You did a great job yesterday. You did a better job than our panelists did. Yeah, let's hear it for the participants. And make sure that you do that once again.

With that, I think we'll turn it over to Don to kind of give us a review of today.

DR. COOL: Okay, and good morning.

(All respond.)

DR. COOL: Okay. Well, that was so-so. There is coffee in the back of the room for those who are not yet awake.

Okay. We made a great deal of progress yesterday. I was very pleased personally with how the discussion went. Particularly grateful to each of you for the way that you participated, how you jumped in, how you weren't shy about sharing your views. That's exactly what we need. We'd like to keep that up for today.

We are ahead of the original draft schedule. So, that's good. That allows us to take all of the time that we need to take care of today's activities.

So, we're going to do several things here briefly, go quickly over the things that happened in Day 1. We will work through Issue 4 on ALARA planning and dose constraints, which I think will bring up again some of the discussion that we had with regards to the dose limits.

We have what we called Issue 5 a/k/a a

placeholder for anything else that people have brought up. And I know of at least three items that were brought up yesterday. We put them in the parking lot.

Those were discussion of extremity dose. We talked a little bit about that yesterday. Just wanted to make sure that we had completed the questions that were raised on that.

There was some questions about our public dose limits versus the EPA's dose criteria in some of their standards.

And then there was a request to talk a little bit about what ICRP has been thinking on protection of the environment. So, we have those three at the moment as additional issues.

Yesterday we spent time talking about some of the underlying scientific basis, the dose coefficients and the actual expression of the limits as effective dose.

We then spent some time, actually quite a bit of time, talking about the dose limits themselves and what would be the impacts of various proposals there.

And then late yesterday afternoon or later yesterday afternoon we spent some time talking about exposures of special populations. That being things

related to occupational exposure of a declared pregnant woman, the exposure of the embryo fetus, and some questions related to exposure of members of the public if they are young children or the embryo fetus versus the normal requirements for exposure to the members of the public.

And I think, Dan, it might be good if the first thing we do is we sort of go around the room. I think we have at least one or two new people. And perhaps see if anyone having now had a chance to think about it overnight, if there's anything we wanted to add on those subjects before we went into the next one.

FACILITATOR HODGKINS: Sounds good.

One of the things - and, Kate, we're going to start with you, but just remember that - just introduce yourself like you did yesterday with just a quick, brief overview of your background remembering that there's webinar people out there.

And then if there is a topic or some lingering, you know, issue that you really want to revisit, you know, in the overview, then just give us that piece.

And I will just go around the table to do that if everybody is comfortable with that, and

starting with Kate.

MS. ROUGHAN: Kate Roughan, QSA Global representing industrial users for industrial radiography, oil well logging gauging and brachytherapy sources. And also representing ISSPA, which is the International Source Suppliers and Producers Association.

The biggest topic for us is probably the annual dose limits. Industrial radiography does certain activities that are critical to our infrastructure that demand that - or require that a higher dose be received during the performance of those activities.

So, it's crucial to that industry that we keep the annual dose at 5 rem.

MS. THISTLETHWAITE: Good morning. Duann Thistlethwaite representing Triad Isotopes and medical use licensees.

Basically just to reiterate from yesterday, to keep the whole-body dose at 5 rem and the other levels also the same.

FACILITATOR HODGKINS: Thank you.

MR. STAFFORD: Mike Stafford, Oak Ridge National Lab, UT Battelle. I come from a DOE-regulated environment. So, it's kind of unique as

compared to the rest of you.

We - I guess one of the things reflecting on yesterday is I think all of us generally agree that we would like the idea of consistency in terms of terminology and some of the technical methods for dose calculation to bring some linearity there, but doesn't necessarily mean that we want to buy into some of the dose limits and other policies that we see in some of the other countries.

Being a DOE-regulated facility where we're already under ICRP 60-type recommendations, you know, we'd like to see greater consistency with our NRC brothers and sisters.

FACILITATOR HODGKINS: Thank you. Steve.

MR. MATTMULLER: Hi. Steve Mattmuller, chief nuclear pharmacist at Kettering Medical Center in Kettering, Ohio, and also for the Society of nuclear Medicine.

And we too as Duann said, would like the dose limits remain where it's at, which would be critical for our field especially for our production facilities for our staff that work there. Thank you.

FACILITATOR HODGKINS: Thank you.

MR. HAYNES: Good morning. Larry Haynes, Duke Energy representing power reactor sector. The

flexibility issue is one that we talked a lot about yesterday. And however the limits would resolve theirselves, having the flexibility and operational flexibility for our plants is critical for managing the specialty-type pieces of work that go on in our plants.

One thing I heard too yesterday, that even more than I already knew and am convinced that, you know, alignment with the international standards is important, but we're totally out of alignment in the U.S.

And I would personally like to see us try to align with both so that we don't have various standards based on ICRP 2 all the way up through 103. It would be very helpful that those of us that deal with numerous regulatory authorities have consistency there too.

FACILITATOR HODGKINS: Thank you.

MR. MARSHALL: Good morning. George Marshall with APNGA dealing with portable nuclear gauges.

I wasn't here yesterday, so I'll be in a catchup mode here this morning. So, I'll pretty much hold off until a little later today.

FACILITATOR HODGKINS: Welcome.

MR. GIANUTSOS: Philip Gianutsos representing Energy Solutions. We're a full services hazardous and radioactive materials management company decommissioning waste processing/waste disposal.

I'm personally a health physicist and radiation safety officer at our processing plant in Oak Ridge, Tennessee.

Our view is pretty much consistent with what I'm hearing a lot of folks say that adopting effective dose and equivalent dose is a reasonable change to the regulations.

We think the models should be updated, but the end point, the final dose limit should remain at the current levels.

FACILITATOR HODGKINS: Thank you.

DR. RABOVSKY: I'm Joel Rabovsky, Department of Energy, Office of Worker Safety and Health Policy. Our office develops the department's occupational radiation protection regulations.

I'm here I guess as the alternate to Peter, Peter O'Connell, and I was very interested in the discussions that we heard yesterday. And once again we were pleased to have the opportunity to offer our experience in the implementation of the ICRP 60 dosimetry system. And we'll continue to offer, I

guess, our perspectives as we continue today.

FACILITATOR HODGKINS: Thank you.

MR. COX: Good morning. Lee Cox. This morning I'm representing the Organization of Agreement States and also the Conference of Radiation Control Directors. Mike Snee couldn't be here this morning.

Our main concern is the possibility of dual regulation of radioactive materials and x-ray producing machines, a desire for no change in the dose limits. And if there is a change, operational flexibility would be preferred.

FACILITATOR HODGKINS: Thank you. Erskin.

MR. HICKMAN: Good morning. My name is Erskin Hickman.

(Feedback in the audio.)

MR. HICKMAN: Try that again.

My name is Erskin Hickman. I'm the radiation protection manager at the United States Enrichment Corporation, the gaseous diffusion plant in Paducah, Kentucky.

Our primary goal here is to align our regulations with our international customers. The administrative issues would cause us some work at the plant changing procedures and doing some training, but it wouldn't affect our operation. Thank you.

MR. BUNDY: Kevin Bundy with the Canadian Nuclear Safety Commission. We've had the ICRP recommendations in place for about ten years now, so I'm here to offer my - whatever experience I can in that respect.

I'd also like to encourage harmonization. It makes all of our lives a little easier I think. Thank you.

MR. BROWNE: I'm Stephen Browne representing Troxler Electronics and portable gauge users.

Portable gauge users are using devices that contain sealed sources that are very small. The dose rates are also very low. So, we're not really affected that much by a change in the dose limits.

However, any kind of a change in the regulations, limits, terminology, constraints would potentially require a lot of retraining and maybe a lot of other work for our portable gauge users.

And they're not professional health physics like all of us or most of us here are. So, these are not easy things for them to do and it has a major impact on them.

FACILITATOR HODGKINS: Thank you.

MR. BOYD: Mike Boyd, EPA's Office of

Radiation and Indoor Air Radiation Protection Division. I spent a lot of time last night thinking about what I said and what I wish I had said.

So, I'm going to take this opportunity to make one little point and I think that today's discussion when we get into constraints and optimization is where the real, you know, the rubber meets the road in terms of radiation protection.

I think it was really helpful to me a few years ago back when David Kocher was still at Oak Ridge National Lab and he spoke to the Interagency Steering Committee on radiation standards about what a dose limit is, and he had a turn phrase that I really liked. He said a dose limit should be a threshold of intolerability.

In other words, you under no circumstances would want to go over that numerical value without having thought about it and gotten a waiver and whatever. But in general, that's your threshold of tolerability.

In that sense, I certainly agree with the need for flexibility and I think 5 rem in any particular year is perfectly acceptable when the conditions demand it.

But I think what we have to look for is

the dose that a worker would accumulate over a lifetime and, you know, I think personally that a sievert is that threshold of tolerability right now.

So, I think we need to craft a new regulation in such a way that we do allow for the flexibility, we do allow for the necessary jobs whether it's the doctor working on a patient or someone doing vital work creating medical isotopes, but also to keep in mind that our job as radiation protection professionals is to keep doses as low as reasonably achievable and just build in flexibility and have an absolute limit of tolerability that you would rarely find it excusable to go beyond.

FACILITATOR HODGKINS: Thank you. Cheryl.

MS. BEEGLE: Good morning. My name is Cheryl Beegle. I work in imaging, hospital imaging at the National Institutes of Health for Nuclear Medicine and PET.

I don't think I have anything else to add this morning or comment on. Thank you.

FACILITATOR HODGKINS: Thank you.

DR. ATCHER: Good morning. I'm Robert Atcher. I'm past president of the Society of Nuclear Medicine. And in addition to Duann and Steve's representation of the radiopharmacy world, I'm

representing the technologists and physicians and others who are involved in the practice of nuclear medicine both for diagnostic and therapeutic purposes.

I'm the director of the National Isotope Development Center which is a virtual center within the isotope program in the Office of Nuclear Physics, the Department of Energy. I'm also a professor of pharmacy at the University of New Mexico.

One of the things that I want to reiterate from yesterday - or two things I want to reiterate from yesterday.

One is that having standards that are based on solid scientific evidence is something that we all appreciate, but there seems to be this drift towards just less is better, less is better without having the appropriate scientific basis to support that standard.

Secondly, particularly for those of us who are practicing nuclear medicine in health care in the United States today, there is very limited opportunities for us to increase the cost of us doing business without specific and very clear benefit both to those who are doing the work, as well as to the patients who are doing those studies.

And I think it's very dangerous for us to

not take into account the fact that a lot of what we are proposing here has an economic penalty for those who are practicing particularly in nuclear medicine and in radiology that is not being adequately thought through.

FACILITATOR HODGKINS: Thank you.

MS. ANDERSEN: Good morning. My name is Ellen Andersen from the Nuclear Energy Institute. I was not here yesterday, so I don't really have anything else to add.

FACILITATOR HODGKINS: Thank you. Welcome.

Okay. And just as far as facilitator, so what we heard as we walked around - as we went around, those comments that you made, is there any follow-up that anybody feels like they need to make because someone did bring up something that they too wanted to add any particular mention to or follow up on those three issues that we've already discussed?

And I guess I'd like to just open it up to the audience, too. Some of you have been through the whole thing.

Is there anything from the audience that you want to add to follow up with yesterday's discussion or an overview?

Yes, please.

MR. DAVIDSON: Hi. Scott Davidson with New World Environmental.

Some people here are industrial gauge people and you'll have a whole group of people who are using gauges currently in the environment with a move towards becoming specifically licensed and now radiation workers. Those older designs may not be compatible, or to some degree maybe the people in that industry group could speak to how this might affect Sealed Source Device Registry changes, U.S. versus international, who may already be using more strict criteria and so on because I don't think they're represented here in that discussion.

FACILITATOR HODGKINS: Okay.

MR. DAVIDSON: Okay. Thanks.

FACILITATOR HODGKINS: Thank you.

Is there some comment the panelists would like to make after that summary? Pretty good?

Microphone 2.

MR. SMITH: William Smith with Southern Nuclear Company. One of the things I thought about later on at break was the timing and effective dates of new regulations coming in.

And if it's in the 2013 to 2014 time frame, that's about the same time that new plants such

as Vogtle will be developing procedures and programs which have already started now, but they will start operating 2016 at that time frame.

And on this scale, you would have new regulations being effective at the time you have new plants coming on line, and that would be a big impact on the programs. Thank you.

FACILITATOR HODGKINS: Okay. Panelists want to follow up with that at all? Any other further comments, concerns?

I'm going to say then at this point, are there any written comments from the webinar participants that need to be read at this point as far as follow-up from yesterday?

I know that they had some difficulty participating. I'm going to take that as a no. Okay. Terrific.

So, I think that what we've just done is summarized our work yesterday. And we're going to hopefully have the same success today as far as everybody having an opportunity to voice their opinions, their ideas with it.

I understand from Don, that this may be a little bit more meaty as far as the conversation. So, I'm going to turn it back over to Don.

DR. COOL: Okay. Thank you. I'm going to suggest that when we get to the additional issues, I wrote down a couple of things that we might want to come back to as we - before we complete the discussion.

One of them was to go back and explore a little bit more with everyone Mike Boyd's suggestion that we needed to have something that was limiting the lifetime dose.

I think we perhaps should explore that a little bit more in terms of practicality, how that would work in implications for people. So, we'll add that to the issues.

And then I think logically at the end, we also probably should be talking again about the time frame and schedule associated with the next steps and issues. So, I've written that down and hopefully we can address any of those questions.

With that, I think we go to Issue 4. And if you'll allow me a moment to try and get this computer to behave - where did it go?

All right. To provide a little bit of background on the incorporation of dose constraints, which is a metaphor, if you will, a particular item within the overall process of ALARA optimization,

reducing exposures to as low as reasonably achievable, this is probably one of the most major things that was strengthened/added as ICRP did the revision of their recommendations which came out as Publication 103.

The actual concept of a constraint was present in the Publication 60 recommendations. There wasn't a lot said about that. There was not a lot of detail about its implementation.

And what that sparked after 1990, was 15 years of debate about exactly what a dose constraint was, is, should be, do and otherwise with approximately N plus two opinions where N would be the number of people in any particular discussion. So, there was a lot of variability and discussion going around.

So, as ICRP looked at revising this set of recommendations and consolidating and updating it, it devoted a lot of its time in that development process to the question of constraints.

Publication 103 places even more emphasis, if that's possible, on optimization. That is looking at what the best possible protection is that can be afforded under the prevailing circumstances for the particular exposure situation.

And it recommends that a licensee, a user

use "constraints," put that word in quotes, as a planning value for optimization.

Now, you say okay, well, how is that different from what many of you talked about yesterday that you have planning values and that you have things in your program to make sure that you don't actually run up to the limits?

Well, after a long discussion within ICRP, the end result is essentially that is exactly what they're talking about is formally making sure that you have some planning up front in the process to sort of bound the area that you want to keep the exposures in whether they're occupational exposures, whether they are public exposures.

As ICRP laid it out, and I'm just reciting ICRP at the moment, constraints are not limits. They're two very different things and ICRP would be very quick to tell you that a constraint would be a prospective value that you're using in the planning, not a limit which is judging the final outcome of the conduct of the activities.

Now, you say that's very nice and good. But when you do the planning, then you figure out where you are and then you look to see how you're doing versus the planning. And one of the biggest

questions that kept coming up was how do you avoid having constraints become defacto limits?

That is, in fact, an ongoing - I use "dialogue" here to try and be nice - discussion, various insundry things, which continues to be occurring in the international community and in various countries that are looking at this because this is an issue where we, the United States, are not alone in figuring out where we want to go or what we would want to do within the regulatory structure around this concept.

Everyone else is looking at it also. So, I'm going to put up a couple of slides. These are from draft materials. Although they are public, these are from draft materials.

The International Atomic Energy Agency, IAEA, most of you will mostly recognize this as the people who go around trying to figure out if Iran has bomb material and things like that.

One of the other major components of their work is safety and security worldwide. There are 163 countries that are members of the IAEA. Many of them are very small countries, they don't have reactors, but they have medical uses, they have industrial uses.

And it is many of those folks for which

these basic safety standards are it. It is their Part 20, their Part 30 and everything else wrapped up into one. This becomes in many cases, adopted verbatim as their regulations.

IAEA for the past four years has been engaged in the process of updating the basic safety standards which were last published in 1996. One of the statements in that basic safety standards is that the regulatory body shall establish requirements for optimization, require documentation, establish or approve constraints or the process for establishing constraints that are used for optimization of protection and safety.

Now, there are other detailed requirements. I wasn't going to copy a lot of them, but I've highlighted for you several items that were there at the way IAEA is looking at it at the moment.

That there should be some requirements, there should be a requirement that protection is optimized. And by "optimized," IAEA means that you've gone through the process of looking at it, figuring out under prevailing circumstances what the best level of protection is, and then you've implemented that because there's been a whole other debate about can you ever be optimized because everything changes over

time.

And the answer is that's not where they're headed. It's that you've looked at it and you've implemented the result of that discussion.

So, a requirement to optimize, requirement to write it down so that you can show people what you've done and there's a way of checking to see whether or not you've had that as part of the program, and that there are established constraints either, in some cases, that the regulatory organization has actually approved them, often the case in exposure to members of the public as in what are going to be the values that are used for effluents and some of those things where there has to be a formal regulatory approval of levels that would be released. And those would be nowhere as close to the actual limits of exposure.

Or the process of establishing constraints as IAEA views that particularly in the occupational realm where it would be upon the user of the material, the licensee, the registrant, to have established their constraints, what kind of process they're going to use and how they're going to go about doing that so that there would be that systematic pattern of a radiation protection program. So, that's how IAEA is

looking at this.

Let me emphasize again this is a draft. It's been under development for four years. This draft text will be discussed again in Vienna in December. It still has about three or four approval steps. The optimistic view over in Vienna is that this might be approved later next year. We shall see.

Another major group that I think a number of you who deal internationally have to work with is the European Commission, the European Union.

European Union also has a basic safety standards. Actually, a series of directives dealing with various items. And they are also in the process of revising those basic safety standards.

And, again, this is a draft of the material that's publicly available having been approved by their group of experts now undergoing review within the council itself still at least a year away from approval within the European Commission, but again another point of reference for us to think about, and they say that dose constraints shall be established.

A very high-level statement. You've got to have these somehow. Doesn't tell you exactly how. They give a little more detail and there's a lot of

words on this slide, but the only thing I've chosen to really highlight for you at the moment is that phrase "established as an operational tool in cooperation between the employer and the undertaking."

By the way, in the European Union, "undertaking" means the conduct of the activity. So, if you're a radiographer in the European Union, you're in undertaking because you're undertaking work.

And in public exposure, that the constraints be set in such a way as to ensure compliance with the dose limit for the sum of the doses.

And this gets to the point that Mike was making yesterday about trying to make sure that you have a mechanism to ensure that any given member of the public from multiple sources is not going to get over what the limit is. But recognizing at least in some sense, that any particular user doesn't have control over the rest of the world.

So, this would be another piece of the constraint puzzle internationally, again I say as a point of reference, for establishing a radiation protection program.

Now, you say well, okay, that's very interesting. NRC, what's going on? Believe it or

not, the NRC regulations today already have constraints. You say oh, what? And you can put some stars and asterisks behind that if you want to, perhaps.

The NRC regulations do require a licensee to develop and implement a radiation protection program. That's been in place for a long time. All of you have that in place.

You're required to use procedures and engineering controls to achieve doses that are ALARA. You've have that in place for a long time.

The regulations do not have a requirement specifically to establish planning values as part of that radiation protection program or ALARA, but many of you do because it is the typical way, a good way to work through a program like that, but it's not mandatory.

So, some people will simply use the limit as their planning value. Some people will use values that are only a small fraction of the limit, but there is no requirement to have those planning values. As I said, there are planning values by many licensees.

Now, Part 20 actually defines a constraint in a nice, generic way. "A value above which specified licensee actions are required." It's taken

right out of the definition section of Part 20. Doesn't say what the actions are. Doesn't say what the consequences are.

The actual requirement for a constraint is only in one place. It applies to the airborne effluents from non-reactor facilities, was actually put in place by the NRC after a long series of work with the Environmental Protection Agency to avoid dual regulation under the Atomic Energy Act and the Clean Air Act so that the EPA could point to this requirement as a mechanism for saying in a legally-defensible way because EPA has stakeholders that just love to take them to court - Mike is smiling - that there is a structure in place to ensure that effluents remain under control.

So, this applies to airborne effluents from non-reactor facilities. It says that if those airborne effluents exceed 10 millirem, that there are certain actions that are necessary.

The actions are to tell NRC and look at the situation and take some appropriate corrective action.

A violation of the constraint as set up under this regime here, is not exceeding 10 millirem. That's not a violation. You can go over 10 millirem.

The violation is if you don't tell us or you don't do something about it.

So, unlike a limit where the violation is the numerical exceedance of the value for that particular thing, the violation is only associated with the procedural aspects of whether you've gone in and done something about it.

And so, in fact, there is a model that is in place today in this one very limited area for how constraints might work. And the staff at least initially has looked at this and said that fits pretty well with how ICRP has defined constraints.

Planning value, check yourself, go in and do something about it, but it's not a violation for a numerical exceedance of the particular criteria.

So, the question for us and for many other people is, should there be a change/addition to the regulations to strengthen, or otherwise, the requirements for the radiation protection programs in optimization?

Should there be consideration of making sure that people do planning, add the requirement for constraints in some manner?

Now, there are lots of possibilities for this. What we've listed here are a couple of the

bigger possibilities.

First, of course, you wouldn't have to change anything. You have a requirement for radiation protection program. You have a requirement to reduce exposures as low as reasonably achievable. Wouldn't have to necessarily do anything. Just continue to rely on best practice/industry practices to do the right thing in trying to reduce exposures.

Second possibility, change the regulation to specify that a licensee establish and use the constraint as part of the radiation protection program and the implementation of the ALARA requirement. In other words, require you to have some values and to write it down.

The initial thought there was that that probably isn't a requirement that's different from what many of you, perhaps most of you are already doing, but that there are some who may not be doing that and for which added structure could in fact have added benefit.

As several people observed yesterday, real radiation protection is this optimization process, not the limit.

So, one way to do this would be to add a requirement that people do planning to do what has

become a good practice.

And then there's a third possibility which builds on that second possibility specifically for the occupational exposure area.

And this is where I'm going to suggest that some of you think about the discussion we had yesterday and think about the possibilities for how to align what happens in the United States and what happens internationally because one of the things that we had thought about and one of the things that we have heard already to date, is that a method to try and increase alignment is to say okay, licensee, you have to establish a constraint for occupational exposure and, licensee, you cannot pick a number greater than X.

Now, since everybody has been focused on the limit and the question of five versus two, one possibility would say the constraint that you pick could be the 2 rem such that the value of 2 rem is a value which you control. Your planning activities are associated with planning within that realm.

But if you go over 2 rem, the fact that you went over would not be the violation. It would be what did you do with it? Would you need to report it or not? Open question.

What sorts of things would be necessary? What sort of additional analysis and justification would be necessary to operate in that realm in that activity?

So, I think there are a number of possibilities. And what I would really like for us to discuss this morning is these three possibilities and the extent to which that could work or not work within your different kind of licensee programs, the fact - the extent to which you may already be doing that and this just writes it in the books as something you do, or whether in fact - and whether in fact it would add to some of the protection that's afforded.

So, I've sort of summarized those questions. I'll quickly lay them up there and then we'll go back to a couple of the options.

Are there benefits and impacts associated with imposing the use of constraints?

Instead of it just being a good practice, say you've actually got to do planning. You've actually got to write it down.

Implementation impacts, and this gets to the real what would the ink dot say, what would you inspect? What would compliance look like? What would we go looking for? What would you be expecting of

yourselves, of your users and otherwise? What kind of reporting or not reporting?

Because the options there range from it's simply a part of your program, there's no need to report anything, it only happens if the NRC or a state were to come out and inspect it. They would expect you to have records that there, here's what you did, this is what we did, this was the circumstance, here's what we did with it. All of that, so perhaps there's no reporting. We need to discuss that a little bit.

The relationship of the limit and the constraints. Most of your yesterday again as summarized this morning, all arguing that there's no basis for changing the 5 rem from an underlying scientific standpoint and wanting flexibility.

This perhaps is a way to have some flexibility while still having numeric values which would seem to align with the international standards present within the regulatory structure.

And as I said, one of the questions that has been raised multiple times is what's the difference between a limit and a constraint, and what would a use like this look like that would avoid it being a defacto limit? Very important for the discussion.

Is it an appropriate insertion of the regulatory requirement?

I know we have some people who say well, you shouldn't just go codify best practice even if not everybody is doing it. So, that question has been raised. You need to think about how that works.

And then at this point, one of these times, Dan, I think it would actually be useful to go around the room and say okay, how familiar are the different groups? What are you actually doing in terms of your planning and activities as part of your radiation protection program?

Because part of what we're seeking to know now is the degree to which this is typical practice and this suggestion is, in essence, codifying that which happens today versus something that would have a new significant impact in the process.

So, are you using them today? What kind of numbers are you using today, if you are using them? How are you using them and how is that working for you?

Because this is an area where there's not a whole lot of information, and I know that sounds sort of - I mean, how is that for you? Was that good for you or not good for you?

Those really was the question that we'd like to try and ask today as we talk about this concept of constraints.

And so, Dan, with that, let's go to the discussion. Here we go.

FACILITATOR HODGKINS: Now, let me just ask the panelists does everybody feel like there's some issues that you want to take with this?

So, should we do round robin or do you want to just open it up and I expect that everybody would have a comment or two?

Round robin. Okay. Kate, because I started with you, I'm going to let you go this time. Right? You did the first one.

Ellen, new participant. Let's try going with you first. And for the sake of the webinar, if you would please say your name before you make your comment, thanks.

MS. ANDERSEN: Thanks. Ellen Andersen from the Nuclear Energy Institute.

The use of constraints is actually used within the power reactor sector as we speak.

FACILITATOR HODGKINS: Use that one.

MS. ANDERSEN: Is that better?

FACILITATOR HODGKINS: Better. Thank you.

MS. ANDERSEN: Okay. Yeah, we do use constraints. We don't call them constraints in the power reactor sector, but we do have - we use them in probably two different areas.

The first one is we have administrative dose limits within each company which is less than the 5 rem per year. So, we don't work beyond a certain number. And that varies from company to company, but it's quite a bit less than 5 rem per year.

The other area is the whole issue of ALARA planning. When we plan specific jobs, and that's basically every job in the plants, we actually estimate what that job is going to be from a dose perspective. And then we go ahead and actually have goals which is somewhat less than the estimate.

And for that reason if you were to look at the collective radiation exposure graph in the United States, you will see that it's been a downhill slope since - actually, for the last 15, 20 years because we have been using these ALARA techniques.

We have been pushing ourselves to reduce exposure as much as possible. So, we have actually instituted our own internal industry constraints.

So, I really don't think, to be honest with you at this point in time from a power reactor

perspective, that we need to codify practices that we've already been implementing for years.

FACILITATOR HODGKINS: Thank you very much. And I'm going to ask you to use the microphone because they are having difficulty. So, let's just pass it around.

DR. ATCHER: Robert Atcher, Society of Nuclear Medicine.

I've worked at two national labs, National Institutes of Health and about five universities, and I can't think of any one of those organizations that didn't have some sort of a formal ALARA program.

And as was pointed out, it's part of the NRC regulations and you can't have an ALARA program without monitoring what people's exposures are in tracking those who seem to be out of bounds in terms of radiation exposure. So, I think there's a danger here of just duplicating what's already in the regulations.

It's also very seductive to, you know, propose this as a constraint rather than a dose limit, but I'll go back to what I said at the beginning. And that is, is that if there's really no scientific basis for a 5 rem dose limit or anything below that, then this again is simply kind of a way of coming in the

back door with trying to institute those exposure limits.

So, you know, every organization I've been a part of has had an ALARA program, has done enough monitoring of the employees to be able to identify those whose exposures are getting out of bounds according to what the internal guidelines are, and I see this as duplicative.

FACILITATOR HODGKINS: Thank you.

MS. BEEGLE: Cheryl Beegle from the National Institutes of Health, but really speaking in terms of just imaging.

It's easy when you work in a large institution with - for example, at NIH we have a whole division of radiation safety that receives all our packages on campus, and then redistributes them to the various institute buildings that are using them and monitors our badge use and things like that. It's very seductive to get used to that kind of structure.

But in the smaller community hospitals that are all over the country and the trailers and the private radiology practices as few as they might be who may see a health physicists on a quarterly basis, it really falls to the lowest person in the structure, which is usually the technologist, as to how this

compliance is dealt with.

And this is just for medical imaging isotopes and while I think there is that oversight from that contracted health physicist, it can be hit or miss and compliance can be with the spirit and not the letter of the law.

FACILITATOR HODGKINS: Thank you.

MR. BOYD: Thanks. I think I agree with a lot of what I'm hearing that -

FACILITATOR HODGKINS: Mike, can you introduce yourself again.

MR. BOYD: Mike Boyd, EPA.

I don't think a constraint is something that you can numerically quantify in a regulation. I think that's, you know, as Don, I think, pointed out very well, that would defeat the purpose of it. I think the importance is that you have a program that incorporates ALARA.

We - also, EPA recognized this in the 1986 Federal Guidance for Occupation when we - and these were the recommendations that were signed by President Reagan in 1986 that established or recommended the establishment of 5 rem at that time as the worker limit.

But in those recommendations, we required

that there be administrative control levels set where appropriate based on the kinds of doses and the kinds of work that might be done in your facility.

We actually implemented that at EPA when we set up our worker safety program for, you know, we only occasionally do site visits across the regions.

And so we looked at all the TLD data that we had for, you know, going back to the beginning of the Agency and found strings of less than detectables, you know, zeroes or, if you will.

So, we said there's no reason for an EPA worker to have to get more than five millisieverts or 500 millirem.

So, we set that as an administrative control level, and then we built in all sorts of waivers that could allow you to get up to the full 5 rem if it were, you know, supervisory approved.

The only time we would ever have to do that now is in our on-scene coordinator responses to a potential nuclear incident.

FACILITATOR HODGKINS: Thank you, Mike.

Stephen.

MR. BROWNE: Stephen Browne representing Troxler and portable gauge users.

Portable gauge users are a class of

licensees that actually are probably one of the - in terms of numbers, probably one of the largest classes of licensees.

The doses from portable gauges are extremely low. So for portable gauge users, they have - they recognize ALARA, they practice ALARA, but there isn't any formalization of constraints in their radiation protection programs. And I would really question that there is a need for it.

Most of the doses for portable gauge users are probably less than minimum detectable almost all the time.

So, what happens is if a portable gauge user - and Troxler is in a unique position because we not only manufacture portable gauges, but we also provide a lot of services to the user community, including radiation monitoring services.

So, monitoring isn't required for these users because they're not going to receive 500, but many of them monitor their employees anyway.

Whenever they get a positive reading, I almost invariably get a phone call. Hey, I got a reading of 20. Should I be concerned?

So, there is a significant level of concern, but I don't think that there would be any

enhancement or any value added by adopting formal constraints when we're talking about doses that are so low.

And I question how you would implement constraints anyway for a population of workers for whom monitoring isn't even required.

If they chose not to be monitored, how would they implement a program of constraints?

One of the big issues for portable gauge users is regulatory burden. It's a really big issue. It's a real issue.

Nuclear gauges are used for a lot of important infrastructure work in this country related to building of roads, the building of airports and a lot of other stuff.

The people that are doing this work are not professional health physicists. They're soil technicians and engineers, and there is a lot more technology, actually, that goes into building of our roads than I realized before I got into this.

I came from a nuclear power background, but there are ASTM standards written around the use of portable gauges. It's pretty much the gold standard for the kind of work that they do.

There are other methods, but they're not

as precise or accurate or fast and the regulatory burden is actually, literally driving people away from the use of this important technology.

And I would really encourage that we not add more burden that would really frustrate these people and, you know, take away this really beneficial use of nuclear technology.

FACILITATOR HODGKINS: Thank you, Stephen.

MR. BUNDY: Kevin Bundy, Canadian Nuclear Safety Commission.

We do not have constraints incorporated in our regulations yet. They were only briefly discussed in ICRP 60. We didn't incorporate them at that time. Although, we see much more detail in ICRP 103.

We do have in our regulations what we call an action level, which is very similar to the value that Donald showed up later for the NRC, except we apply it for right across the board. It can be applied for dose limits or effluents or even workplace monitoring concentrations.

So, it sort of works as a constraint in that respect, but it's more there to notify us or the licensee of a possible failure of control. So, it's not really a constraint in that respect.

And, actually, we expect that limit to be

exceeded a couple of times a year. So, I'm saying it should be set that low within the operational variability of whatever they're measuring.

With that comes some experience, though, because we find some licensees very reluctant to incorporate that value because they are judged, I guess, on the success of their program and how many times they have to notify the CNSC of an event.

And then that qualifies as an event, of course, and then they don't like that. So, they push back and try to have that value raised and it causes some concern.

We've also had issues with understanding what that value is, what the action level is and what tries to do. And although we have a guidance document on it, even some of our own people don't seem to quite understand what it is.

And I think even with the constraint itself, I think just listening to this discussion here, I think we're going to be at that same issue of communicating exactly what the constraint is and what you have to do to convince in what it's really supposed to do. And that will be a challenge when you bring it in.

I don't know if I mentioned it or not, but

we don't have constraints in it. But our regulations are due for review over the next couple of years and I guess we'll be approaching whether to include them or not at that point.

We are waiting to see what happens, what comes out in the IAEA basic safety standards because I understand there's quite a lot of comments on the last draft. And I'm sure a few of them might be with respect to constraints. Thank you.

FACILITATOR HODGKINS: Thank you, Kevin.

Erskin.

MR. HICKMAN: Erskin Hickman, United States Enrichment Corporation.

As Ellen stated, you know, most of us in the - or all of us in the nuclear sector, nuclear power sector, already implement these constraints through our administrative levels or administrative limits that we have established.

I think Dr. Cool asked what those levels are. We do an ALARA planning - formalized ALARA planning at a hundred millirem per individual or a thousand millirem collected dose for a job.

Not to steal Duann's line, but I'd like to vote for 4a because we already implement 4b and 4c.

FACILITATOR HODGKINS: Thank you.

Lee.

MR. COX: Lee Cox representing the agreement states and CRCPD.

I'm really not hearing anything new here. It may be a new terminology, but what I'm hearing is what we call a radiation protection program, ALARA program.

Most of our licensees in most of the states require an investigational limit which is much below the 5 rem per year. It's typically 1 rem or less.

We would - the states would see this as a - just another bureaucratic burden on the states and the licensees on something that we're already doing. And I think I'd like to stress that the NRC, I think, is already addressing this in the appropriate way, and it's called a safety culture policy statement. Thank you.

DR. RABOVSKY: Joel Rabovsky, Department of Energy.

In our Department of Energy occupational radiation protection requirements in 10 CFR 835, we do, as NRC, have requirements to utilize the ALARA process as part of radiation protection programs.

In other parts, we do have design

requirements specifying that - or design goals. I shouldn't say requirements. We have design goals for new and modified facilities. And they're basically about 20 percent of the dose limits.

In guidance, we do have an administrative control level of 2 rem per year. And that would require the head of a DOE element to notify - to be notified if an individual working under that person's jurisdiction would exceed or was anticipated that individual would exceed 2 rem in a year.

And in DOE's environmental protection or environmental and public protection requirements, there is a 30 millirem, I guess you could call it a constraint on the total, I guess, all pathway releases from a facility.

And the purpose of that is if doses are controlled or releases are controlled at that level, then the operators of the facility don't have to do any more environmental dose assessments to account for all sources of DOE doses from any source that might be received by a member of the public.

But once again, you know, I think some of the questions are these are like constraint-like things. I don't know if they're exactly defined in the way that we've heard this morning, you know.

I think what we're talking about is administrative control levels that are part of ALARA programs that we've heard of historically different types of numerical triggers to have people think about things and relieve the effort of doing additional things.

But once again I guess in listening to this and having read a little bit of ICRP 103, I'm not quite sure if these quite qualify as constraints or if this is just a sort of - or if in this discussion we're using "constraints" in a very large and broad type of definition.

FACILITATOR HODGKINS: Thank you, Joel.

Philip.

MR. GIANUTSOS: Phil Gianutsos with Energy Solutions.

We've been operating under the effluent constraint now since, what, `97, `98. It does effectively become a limit.

In terms of facility inspections, facility audits, we were audited every week it seems. I get NUPIC, DOECAP, individual customer audits, American Nuclear Insurers, a variety of checklists. And almost without exception it is communicated as a question, how you doing against the effluent limit?

When I look at even Part 20, it's laid out in 1101 as a constraint. The requirements are that if you exceed the constraint, you investigate, report and determine what needs to be done so it doesn't effectively happen again.

How does that differ from response to a citation?

I guess we don't write a check with it. That's part of it. But when you look at the reporting requirements, it points back to - what is it - 2201, I believe, which sandwiches that constraint between other license limits and a variety of other limit exceedances. So, it's effectively been placed into that category for purposes of reporting already.

As far as numerical guides go, a single value in Part 20 is not going to be a reasonable, equitable application.

What our occupationally-exposed workers are challenged with versus Stephen's, for example, are completely different. How would you apply the same numerical value with the expectation that it's going to have similar impacts? The cost is going to be excessive.

From there, we do administrative limits. And I believe administrative limits being exceeded has

warranted some interaction with regulators maybe not desired, but an administrative limit has been viewed as a control point that is either met or not met.

Constraint is going to turn into a similar limit, so I really don't see the value when licensees are already implementing it.

For our facility, we start at 500 millirem. As your annual exposure increases beyond that, the level of approval required to go increasingly higher becomes more rigorous and the justification becomes rigorous, and that's really what's required.

We'd argue that an appropriate review of the rad protection program is the place to individually analyze application of ALARA and of constraints for a particular licensee and not a wholesale approach for all.

FACILITATOR HODGKINS: Thank you, Phil.

George.

MR. MARSHALL: George Marshall, APNGA, portable nuclear gauges.

And, again, to kind of echo a little bit of what Steve and even Lee said, you know, we have a big industry in terms of number of licensees, you know. Tens of thousands, if not maybe over a hundred

thousand people out there using these gauges. A lot of them construction workers. They come and go. There's a lot of turnover in the industry, but my gut feel looking at this is that the program that's currently in place can be very effective.

Numbers aren't really an issue for us. We're not going to approach those numbers, but then individual cases in terms of methodology of using the gauge would be more, you know, the way you work around the gauge.

I see where there's opportunity for a lot of improvement in training. I am on the panel for the Culture Safety Initiative, and I hope that that initiative will at least for this industry be very beneficial in tapping into getting the leaders of the organization involved, as well as perhaps the RSOs.

And then, you know, another benefit I think would be in revisiting the training. There is a lot of material for these guys, the regulations to learn, but, you know, to have a champion within the organization like an RSO and to revisit the training with those individuals I think will, you know, we have what we have in place will be very effective.

FACILITATOR HODGKINS: Thank you, George.

Larry.

MR. HAYNES: Larry Haynes, Duke Energy, power reactors.

Ellen and several others have talked about a few of the things I want to mention. As far as the power reactors go, you know, we do set administrative limits on an annual basis. Ellen mentioned that utilities sit at various levels. Typically, it's from 1 rem to 2 rem per year is the admin limit.

We have processes and procedures. If a person needs to go above that, they will - we will go through that process to do an extension for those folks that would need to exceed that.

FACILITATOR HODGKINS: Can you hold the microphone up to your - yes.

MR. HAYNES: Okay. Is that better?

FACILITATOR HODGKINS: Better.

MR. HAYNES: Okay. We also in the planning process, we develop what will be the radiation work permit maximum set points or maximum limit for a specific job. And then the set points for that work is generally set below what the maximum allowable will be.

So, we're establishing ourselves with various - and "constraint" is probably the right word with maximum annual limit and then specific job

limits.

And then those set points, as I mentioned, are set on electronic dosimeters so that each specific job is controlled to its own planning level.

In refueling outages or during online periods, we set - we do ALARA planning. And those jobs are planned out for each task within that and mockups and other type things take place to optimize that work.

And then estimates are set for the overall job, and then challenge goals are set for that to try to minimize the dose for - in specific jobs.

And finally I'd mention within the reactor oversight process, we have the significant determination process. Built into that is a look at how did we do against our ALARA planning?

So, the NRC will come in. And when they run the inspection for the radiation protection program, look, how did you do against how you said you would do for your plans? And we're judged against how well we did that.

If we exceed the estimate by 50 percent, then there's questions. Why did you exceed that?

So, we constantly have a loop there of checking back on ourselves. And the last thing I'd

mention there we have performance indicators within the reactor oversight process. And any dose a hundred millirem above what has been planned, and typically that would be the electronic dosimeter set point and unplanned exposure question, and we count those and do investigations. And actually at my utility, we do root cause analysis for why we exceeded that.

So, to all that I'm just to say that, you know, I believe that we've built this into our programs in the power reactors to a significant extent. And anything we would say about constraints in the regulations would really just be trying to reiterate what we already do for - from an excellent standpoint.

FACILITATOR HODGKINS: Thank you, Larry.

Steve.

MR. MATTMULLER: Steve Mattmuller. Listening to the comments and trying to understand what a constraint is in the ICRP publication, and then to think that it first came out in 1990, 20 years ago and everyone is still having trouble defining it, and so I'm concerned about that.

And then even more concerned how the NRC would develop a regulation for a constraint. And perhaps even more troubling would be when the

regulation hits the road, how we would be inspected against this.

Really struggling with this concept and I keep going back to a radio program I was listening to on leadership and a leadership seminar. And it says if you want to be a good leader, you should study history to see like Churchill, how he succeeded. And even to study how leaders fail, to learn from that.

But the most dangerous leader is a leader with a new theory, and this really looks like a new theory to me because I'm really struggling to figure out how - or maybe this would be a question for the NRC: How you think incorporating constraint levels into the regulations would be more effective than what we're already doing with our ALARA program, and I can't see a benefit here.

And so it seems like we're going to be spinning our wheels a great deal here for no gain and potentially some harm in that in a real sense, the constraint becomes a new limit that was not intended. Thank you.

FACILITATOR HODGKINS: Thank you, Steve.

MR. STAFFORD: Mike Stafford, Oak Ridge National Lab.

Yeah, Joel mentioned that 10 CFR 835, you

know, has ALARA processes optimization, but it's been an interesting evolution to get to 835 from DOE Order 54.8011.

There was a transition document. We called it the Rad Con manual. And it was not codified. And in it there was a - the concept of the ACL, administrative control level, set at 2 rem.

And when 835 was codified, contractors were required to submit - we call them radiation protection programs or RPPs, which was the equivalent of our license.

And it became customary to insert language in our RPPs that set that ACL at 2 rem even though 5 rem was still codified in 835. So, now I'm not sure if there are any DOE contractors out there that operate from a different ACL greater than 2 rem.

So, the ACL really became a limit for us and - or sort of a defacto standard for the DOE contractors. Now, the concept of a constraint sounds more lenient than the ACL that we're living under.

Now that being said, we at Oak Ridge National Lab operate - we call it an ALARA control level at 600 millirem and for maximum individual exposure. And it's been 600 for quite a few years.

And to my knowledge, we haven't had a year

yet where we haven't had at least a few people that, you know, we go through the process to grant approval to exceed the 600. And so it seems to be a healthy process.

So I, you know, Phil mentioned they use 500 at Energy Solutions, you know. The idea of sort of establishing a threshold value that seems to fit your operation, your organization, you know, allowing us to have that kind of flexibility, and then take appropriate action, you know, to sort of manage that seems like a good thing and kind of even fits the constraint definition that we're all struggling with.

The idea where if I had to contact my DOE counterpart and make formal notification if someone was going to exceed 600, sounds distasteful to me.

So, anyway, the point, too, is that the 2 rem ACL has sort of crept into the DOE community as a defacto standard. And so there is some danger of that.

FACILITATOR HODGKINS: Thank you.

MS. THISTLETHWAITE: Duann Thistlethwaite, Triad Isotopes.

I'll echo Erskin on his comment, but I wanted to add a couple of other comments. I'm very discouraged by the use of the word "constraint." I'm

wondering who it's supposed to be a constraint for, the people filling out the forms or the regulatory agencies or the workers.

So, I don't like the negative connotations of the word "constraint." I'd rather use something like an action level, investigation level. It just seems like an odd word to have picked.

Also, on constraints to the environment and the public, on that I think it comes into the design and planning of the facilities and what you can do in that aspect.

In cyclotrons, we do volt analysis, what we can do to have any exposure coming from that. I think that sometimes the planning of that really isn't in the radiation protection program. It's somewhere else in the licensing.

So, I think that I guess the question comes up if - right now the way you apply for a license, it says do you have a radiation protection program? Yes or no, you know.

So, I think it's more maybe perhaps there could be guidance more on what is a good radiation protection program for sites that don't have total departments devoted to radiation protection, some guidance on that, what could be in the planning,

what's a good planning, what's not? Maybe some workshops and things on that would be more helpful to the licensees.

I kind of heard that from Cheryl and what we could do to improve where we are. So, I think that could help us all bring our compliance up to another level.

My company now, and past companies, have always had investigational levels, action levels, what you do at certain levels. Is it a written investigation? Do you have a face-to-face conversation with people? How do you avoid certain exceedances of internal triggers?

So, I think that's there. I think it is in a strong radiation protection program or ALARA program.

Also, I think that there has to be that tie with upper management to explain what these levels are, what it means. And then to the workers themselves if you hit this, what does it mean?

You can sit and crunch numbers. And in quality we do a lot of graphing and data trends and things and we're all excited about that, but does it really mean something to the employees where they hit these levels or if we're all below levels?

So, I think it could be more of an educational opportunity for us all to improve our radiation protection programs. I don't believe it needs to be codified at all.

I think we do these things. I think we could probably do it better and help our other counterparts that don't have total divisions devoted to it.

FACILITATOR HODGKINS: Thank you.

MS. ROUGHAN: Kate Roughan, QSA Global and ISSPA.

As a manufacturer and distributor, we have a program where we have our corporate limits. Then we have a safety goal. And if you exceed that - need to exceed that safety goal, it needs specific approvals. But even below that for the different class of workers depending on the job they do, each of the departments has very different average exposures/annual limits. So, take a look at the individual departments and review that quarterly.

If a new process is being introduced, we do one specific section of that is that you look at the ALARA ramifications. How can we design this process so that the workers receive as low a dose as possible?

So, I believe it's a very effective program. It gives us a lot of flexibility to work to reduce the worker dose, but not push us up against any regulatory limit or be assessed against the regulatory limit or a lower constraint level, I should say.

For the industrial radiographers, they all have ALARA programs very specific to the type of jobs they do.

A fixed facility is going to receive a much lower dose. So, their investigation level will be much lower than a temporary job site or a pipeline facility.

I just want to go - I found this interesting. Don, you put something up on the IAEA BSS. And I've participated in some of the IAEA activities and I find that most of the input is from the developed countries. And in the BSS, they are the ones giving the best guidance, best practices of how to implement the safety program for countries that aren't quite as developed.

So, the dose constraints recommendation, I don't want to stick with the word "dose constraint," but the ALARA program is very effective and I think that's where it's been pushed.

But, again, I think it's been pushed by

the developed nations more so to give guidance to countries that need to implement the radiation infrastructure.

FACILITATOR HODGKINS: Thank you, Kate.

Now, what I want to do next is have you guys come back and forth where you agree, where you may disagree, where you feel like you need to echo or magnify a comment that was made.

However, we're having some difficulty with the sound system again for the webinar participants. So, we're going to take a ten-minute break - 15. 15-minute break.

And when we get back into the room then, we'll start that discussion. And that will give you all time to reflect and think real hard of how you want to respond to that.

So, right now I have 9:50. We will get back into this room at 10:05. Appreciate it. Coffee's in the back. Restrooms to the right.

(Whereupon, the proceedings went off the record at 9:50 a.m. for a brief recess and went back on the record at 10:04 a.m.)

FACILITATOR HODGKINS: All right. We're good. We're back at it. One thing is the hand-held mics work the best. So, let's forget about the ones

at the table, and we'll just use hand-held mics.

And I appreciate your patience in coming back into the room with a discussion. I think I'll let Don then facilitate some of the discussion.

DR. COOL: Thank you, Dan.

As people come back into the room, we've gone around the table and let me offer a couple of reflections and then ask some questions.

I think that I've heard that everybody thinks it's a god idea to do planning. That most everybody does planning at some level. That you like to be in control of your own planning. That you don't want to have a requirement just for the sake of requirement. And that there's lots of folks probably not at the table, smaller organizations, institutions and otherwise that could probably do some increased planning and have protection, and it would be really nice to increase the guidance and strengthen the things that are out there so that there's a better implementation of the program.

Are those bits and pieces consistent with what you think you said?

There's some nodding up and down. Okay. And we're going to come out to the audience in a little bit, but I wanted to check those points because

that then leads me to a couple of questions.

And the first is, okay, having some additional guidance is an interesting idea. We didn't have that up on the screen, but that's good. But one of the things you have to know is that a regulatory agency has to have a requirement to write guidance for.

And so I would like to explore - reflect back to you what kind of guidance that you would write and how you would point that back to something that you're actually implementing because I'm not quite sure how we would get there.

And I would like to come to Lee because Lee talked about what I suspect is probably North Carolina-specific, a requirement to do some investigation and sure sounded a bit like what we were talking about.

And the Department of Energy has an administrative control level, which is in fact the word used in the federal guidance. Mike Boyd reminded us of that. So, there's actually that sitting there and down in Oak Ridge that's turned into a limit.

So, I'd like to explore some of those - I won't call them discrepancies, but some things that I think we need to explore a little bit further to

understand how to accomplish good protection, which we all agree has certain facets to it, in a way that's reproducible, consistent and visible to everyone because those are key principles of our regulatory structure.

And perhaps to start, ask Lee to expand a little bit on that little teaser you tossed out for us.

MR. COX: Lee Cox, OAS, CRCPD and from the state of North Caroline.

During the break, I did make some phone calls and confirm what I said. Thought that might be helpful.

(Laughter.)

MR. COX: In North Carolina, we don't have a rule that requires investigative levels, but we do have it in our licensing guidance. And we point all of our licensees to our website with that guidance.

So we do by that guidance, require all radioactive material licensees to have an investigative level that is below the 5R limit per year in their license application, and then we review it.

And typically what happens in one example is, one licensee, it's very flexible depending on what

the application is, what the material is, what the type of use is. One example is one licensee committed to an investigative limit of 250 millirem per quarter.

How we would enforce that is we would accept their commitment in the license application. During the routine inspection or an investigative inspection, we would go in and review their records, see if, number one, has anyone exceeded the 5R limit, and then have they had anyone exceed the 250 millirem per quarter limit, and how they investigated it.

I heard Larry say root cause analysis. We require them to do a root cause analysis. That would all be documented, which I hear is kind of an ICRP requirement or the proposal. That's already being done in the state of North Carolina and many other states.

It is not the same in our electronic radiation-producing machines yet. It is in the radioactive materials program. We're going towards that in x-ray, and all of this is going to be captured under an improved focus safety culture program that the NRC is working on a policy statement.

We're very interested in that and very involved in that, and we will incorporate that into x-ray and radioactive material programs in North

Carolina. I think a lot of other states will too.

DR. COOL: Thank you.

MR. COX: Does that answer your question?

DR. COOL: Mostly. I'd like to come back and check on one thing so that the record is clear.

So, your requirement is in licensing guidance.

MR. COX: That's correct.

DR. COOL: So, it's not part of your regulation, but essentially nobody is going to get a license without having done that.

MR. COX: It becomes a commitment.

DR. COOL: It becomes a commitment.

So, playing devil's advocate for the moment, have you ever been challenged by a licensee because you can't point to something in the regulations or what do you point it to?

MR. COX: Not yet.

(Laughter.)

DR. COOL: Okay. Sorry. Maybe we'll expunge that from the record.

MR. COX: But usually, you know, they - most of the licensees feel that that's a good practice. And that they feel free in committing to that type of investigative limit, something below.

And it keeps them out of trouble from reaching the 5R limit.

DR. COOL: Okay. Very interesting.

Now, I'd like to come to I think perhaps Joel next, because you talked about what DOE has. And there the Regulation 835 has the 5 rem limit, but in your - and I don't know what the right term - it used to be the Rad Con manual, but I think the terminology has changed.

You have what amounts to a requirement for 2 rem, and that going above that requires increasing approvals up to somebody in the secretary's office, as I remember. And Mike over here talked about how that was effectively a limit.

Can you help us understand a little bit more about the DOE model?

DR. RABOVSKY: Sure. As Mike said, things weren't done quite sequentially. The Rad Con manual came out in 1992. At the same time, DOE was in the process of codifying its DOE order on radiation protection 5480.11.

But I guess with what we have, I would start in the following way: We do have a requirement in our section on developing radiation protection programs, that says all radiation protection programs

shall, I guess, include formal plans and measures for applying the ALARA process to occupational exposure. And so I think that basically now sets an ALARA type of requirement.

To be more accurate, everything else we have in DOE has been carefully written to be guidance. The Rad Con manual originally was to be a single document to serve as a model for programs at all DOE sites. As such, it included requirements and guidance.

When we codified 54.8011, turned it into 10 CFR 835, part of the process in developing - well, part of the process was developing implementation guidance, one section of which was ALARA programs, and we also rewrote the Rad Con manual. We turned it into a DOE technical standard.

In that technical standard, we didn't include any new requirements. So, the statement for the ALARA or the statement for the administrative control level is guidance. So, I think hopefully that will clarify.

Now, approval level didn't have to go up to the Secretary of Energy. It went up to the head of the secretarial element that was responsible for managing a DOE site.

So, let's say at Oak Ridge National Laboratory, in DOE that would be the DOE Office of Science.

So, if somebody at Oak Ridge National Laboratory was - there was a chance that person would exceed this administrative control level of 2 rem, then they would - the guidance says they should get approval.

I'll say that's should, because it is guidance, should get approval from the director of the Office of Science. I guess it's now the assistant secretary for the Office of Science that would be the approval level.

With regard to the way these things work, you know, as I listen to our discussions, there were people who use the term "administrative control level," but there were just as many people who said "administrative control limit."

In my own personal experience in radiation protection, one program years ago I worked with had a 500 millirem administrative control level. However, everybody took that as a limit.

And my lesson from that was if you give a number, people take it as a limit. Doesn't seem to make much difference what you call it and what you

wrote it, how you wrote it. They take it as a limit.

So my unofficial, you know, superficial, however you want to describe it, take is that people latch onto numbers because it's an easy thing to do.

So, you know, I don't know if there's any way around that or I don't know if my experience is just limited and people look at that more broadly, but that's how I've seen it.

But I hope the rest of it is clarified, you know. The 2 rem number is guidance.

DR. COOL: Okay. Thank you.

I've actually got two hands. And if you'll give me just a minute, because Duann wants to respond to this, because now I'd like to try and explore some of these.

And I'll tell you very frankly I have no prejudice at the moment. You might be surprised that I have no prejudice towards number, not a number or otherwise.

What I'm interested in is how you have a regulation and guidance and implementation that has a systematic logic to it that people can do the right thing at the right way at the right time to improve protection that works easily for those of you for which this is the routine, you do it all the time,

you've got it down to the Nth squared degree, as well as all the folks that we don't ever get to these meetings, the small municipal places that Cheryl Ann was referring to and otherwise who need a little more something, I'm not even going to put a name on it, to help work on protection.

So, with that as a frame of the discussion, Duann.

MS. THISTLETHWAITE: Thank you.

You had asked about the guidance, what it points to in the regulation. It's basically the radiation protection program saying that you'll have a radiation protection program. That's a must. So, there's your basis of where this all is coming from.

But I would urge us to avoid putting the number 2 rem in there because, as someone said earlier, it's kind of a backdoor approach. We all agreed - well, not all, but I would like us all to have agreed, but -

DR. COOL: We're not going to agree today. We're just going to put all this stuff on the record, but that's okay.

MS. THISTLETHWAITE: That 5 rem was the place to stay, but if you - I believe that, but if you - but if we believe that as all of us here, then you

don't put 2 rem somewhere else as an administrative control limit because then you're saying - doing one thing and saying another and you're not all on the same page.

So, I'd stay away from the 2 rem even in the guidance. Like don't put such as 2 rem as your member that you're trying to meet, because that defeats the whole purpose of sticking with five and believing that we should stay with five, but then on the other page we put two. So, that seems a little bit backwards in my opinion.

But I think that just telling them to put limits in place lower than the actual limit, you could say something as broad as that.

I mean, we usually do a percentage, but it's based on, you know, how often the badges are changed.

Is it monthly? Is it daily? Is it weekly? Is it monthly? Do you set quarterly limits? There is no quarterly ALARA limit. There's annual limits, you know, but then you could go down to say do we want to go that far? Do you want to be that prescriptive or not or leave it more broad?

I don't want to work us into a box, so -

DR. COOL: Okay. Good.

Lee.

MR. COX: Lee Cox, OAS, CRCPD. Just wanted to clarify something I said since I know your lawyers are in the background.

(Laughter.)

MR. COX: In North Carolina, we do have a rule that - like Duann said that points you to have - you must have an ALARA program commensurate with the scope of activity of use of radioactive material.

And what we do in North Carolina is give you guidance that tells you what a good ALARA program is.

We don't specify what the investigative limit below the dose limit should be. We let the licensees tell us that in the application and we review it, because each applicant is unique.

So, we don't hold you - we don't tell you in our guidance this is the administrative or investigative limit that you must have, but you must tell us what that level is. Thank you.

DR. COOL: Okay. Cheryl.

MS. BEEGLE: Mr. Cox, being a lawyer, that was exactly what I logged onto. I wanted to say don't do that, because it's not unusual for a PET technologist to go above 250 in a quarter.

MR. COX: Yes. And I used that as - I use that as an example. That level, that's not what we tell people. That was just one example of a licensee use that limit in their application.

DR. COOL: Okay. I think I had both Phil and Steve. So, let's just sort of work our way around at the moment, because I must admit I don't know who was first.

MR. GIANUTSOS: Well, I just wanted to elaborate a bit on the licensing guidance.

Rather than a numerical value, NRC already has the NUREG 1556 series out there, a guidance for licensing for various specialties.

That's an existing document that could be easily revised to elaborate on what a rad protection program should include. Quarterly Radiation Safety Committee meetings, a demonstration of appropriate metrics for different types of licensees, that works very well.

Further, although there's not a regulatory driver for the ALARA program or for the intervening limits, we'll use that term, our licenses all have a specific condition that require procedures for the conduct of all operations involving radioactive materials. That is a license condition that you must

observe the requirements of those procedures.

So, by incorporation by reference, those are part of our license. If we set administrative control limits whether we call them constraints, admin limits, admin guides, I suspect the consequences would be the same upon inspection. Did you exceed those guidance values?

Further, I mentioned earlier the constraint that we currently have on airborne effluents. To be very clear, when my operations manager comes in and asks me how much tritium-bearing material can I incinerate for the rest of the year, I have an absolute limit to deal with.

It's not a constraint at that point. It is a limit for tritium carbon-14, whatever the volatiles are. So, it does in fact become a defacto limit.

FACILITATOR HODGKINS: Just for webinar participants and to echo kind of your comment, this is from Ann Troxler: Since most states already require commitments to action levels when they apply for a license, why not put the action level suggestion in NUREG 1556 documents, which is what you just said, that are being updated now?

Thank you, Ann.

DR. COOL: Thank you. Lee, I'll let you react to that, and then we'll come over to Steve.

MR. COX: I'll just say that we are now putting members of OAS on working groups to update 1556 with the NRC. So, that's being done.

DR. COOL: It is an opportunity to look at it. And let me simply reflect part of the reason for discussing this, it's not only the fact that you have some international recommendations, see where we stack up against that, but what is the underlying basis for what we might say in the guidance.

And we've said several things here which perhaps lead to some sort of structure and let's continue to develop it. Steven.

MR. MATTMULLER: I just wanted to offer back when you started this session, you gave a nice summary of our discussion. And I was in agreement with everything except for your last point in regards to the small medical licensees.

While it's very true they don't have as extensive of a radiation protection program as a larger institution, I do think they have an appropriate size due to, I think, scope of practice.

And the smaller licensees, for example, they never - or usually never do therapy, or in some

cases it's limited to just one medical isotope with one radiopharmaceutical as far as like a cardiology imaging clinic might be.

So, my concern is, is that there seems to be an implication that they're in trouble and they need special attention, and I'm not sure that's true.

DR. COOL: Okay. Thank you. Someone else, I think it was Lee, said commensurate with the scope of activities.

Michael.

MR. STAFFORD: Yeah, Mike Stafford, ORNL.

I appreciate Joel's candor. And one of the things that I think is important to point out is DOE contractor relationship with Department of Energy in that, you know, we've learned to cope under a 2 rem ACL, but our relationship is such that we're funded by, you know, the same larger entity that also regulates us.

And so that funding relationship as well as a regulatory relationship, you know, there is a cost of doing business that is associated with operating under a lower dose limit. And DOE has recognized that and fund their contractors appropriately so that we're able to manage our business as such.

So, that's a different relationship than most people in this room.

DR. COOL: Cheryl.

MS. BEEGLE: From an imaging standpoint - Cheryl Beegle - I wouldn't say the smaller licensees are in trouble. But what I would say is in the radionuclide area, it's not unusual for a smaller licensee to not even have their physician on site when they're performing procedures let alone if that physician is the RSO.

And, therefore, it is possible that perhaps the only exposure the person who's operating in that facility has is the exposure they had when they were originally in there training and none beyond that.

So, their guidance is coming from their quarterly HP person and there can be holes. So, I think their - not so much a guidance for a program, maybe, because they have the program. They have the program in place. It's the implementation. It's the daily implementation. It's the level of the paperwork and things.

I see it on that level and it's not always there.

DR. COOL: Thank you. Kate.

MS. ROUGHAN: Kate Roughan. I think in terms of the regulatory guidance it would be good if you did a graded approach. The manufacturers and distributors have a broad-scope license which allows them a good amount of flexibility within their own program under the Radiation Protection Committee.

For a larger licensee such as an M&D to commit to specific investigation levels, action levels as part of the license would basically constrain us in terms of our activities.

But again we do have a broad scope. So, it does give us a lot of flexibility within the radiation safety program itself. We can make changes without approval from the regulatory authority as long as we remain within the limits of our license.

For the smaller licensees where they don't have that flexibility, it may make sense to actually commit in the license commitments to an action level under the ALARA program.

And again, I think a graded approach looking to various types of licenses under the guidance for an ALARA program would be useful.

DR. COOL: Duann.

MS. THISTLETHWAITE: Duann Thistlethwaite.

I just wanted to add I don't want the

words that I said to be twisted in just a little bit. I think that having a radiation program protection box that you say yes, you have one, is a good idea for licensing.

I don't want to go back to the part where you put in your program and your program is approved. Did you put in a level of, you know, 4,000 is going to be my level. Then if you want to change it, you have to have a license amendment to change it because it's part of your application.

I don't want to go back to that stage. So, I think that the NUREG guides would be the place to put it, but not so much in your license application so that you don't commit to it from that standpoint, but you have the guidance there. So, then you can develop procedures from there.

DR. COOL: Could you elaborate just a bit because my understanding, Lee can help us, is they're running on a model where it's actually a licensee commitment, which means a condition, which means it would require an amendment for change.

MS. THISTLETHWAITE: Right. I think there are so many different levels of - in the realm that I represent from the different aspects of the jobs, you would have probably ten different categories of

people.

It could be a documentation issue of reporting all these things of which levels are what, you know, from couriers to cyclotron operators. You would have the different levels that are there.

I think sometimes when you codify that too much or you put yourself into that box, then you do become, you know, here's - write another check and change it again and change it again.

It just becomes - no offense there, but it just becomes very overwhelming in the effect of which license application did we put it in? Did you do it at this time? Was it this quarter? When did it cover of the time frame of when you're trying to track people?

So, I think sometimes it becomes too much of a bureaucratic burden in that way.

DR. COOL: Okay. So, let's dig into this a little bit more because this really becomes a question of what the regulation might require that the guidance then describes in a graded approach, I'll use that word, commensurate with the scope of activities. And then what that commitment is or is not that you go and inspect against.

Lee.

MR. COX: Lee Cox, OAS, CRCPD. Duann, I just want clarification.

When you talk about your application and commitments, are you talking about the accelerator portion of the PET or are you talking about your radioactive materials? Are they one in the same? Are they two different licenses?

Because I think if you're talking about accelerator, that's not regulated by the NRC and that - a lot of states do that in a lot of different ways.

If you're talking about radioactive materials, I think you will find consistently across the states that commitments are made in licenses. And if you change those commitments in your application, then you would have to amend your license.

And I'm wondering if you're doing something different that I'm not used to or if you're talking about accelerator versus radioactive material.

MS. THISTLETHWAITE: Basically, I was just speaking broadly under both licenses and not kind of drawing a difference between them because I think they should be the same and not so different.

Because certain states as the NRC becomes more active in cyclotrons and cyclotron-produced products, I think they're crossing into that realm of

- I call it the accordion effect. We all went to agreement states and now we're all coming back, you know, that kind of thing as we bounce back and forth for what's controlled by whom.

But I think that sometimes if you put yourself in a box in a license application or in a procedure, then it's very hard to wiggle out of that or to get out of that or to understand it.

So, I think if you have broad guidance on what you should do and what you should follow rather than saying, as we said earlier, if you put a number there, people are going to go by that number.

So, avoid those numbers because then it becomes if you're trying to track it from a regulatory body standpoint or from a regulatory department standpoint, how many people do you have over these limits if your numbers are always different. And sometimes it's important to report if someone's over 1 rem. And then in other instances, it's important to report if they're over three-and-a-half rem. Then you're kind of - all your numbers are not jiving.

And when you go to upper management or when you go to the Commission and you're explaining all these different things, it just becomes the gloss-eyed look of how you're trying to say well, it's

important for these people to be at 1 rem, it's important for these people to be at 3.5. So, then it's just kind of not comparing apples to apples.

So, if you can just be as - give guidance and say you need to be less than the limit, but not be so specific in saying, you know, you have to be a hundred, you have to be 150 because the reporting aspect in the investigation becomes even confusing for the radiation safety officers because people's jobs don't always stay in that bucket, so to speak. They can jump from one to the other as they get promoted to different levels.

If they were out in the field doing something and then they go to administrative, maybe they still go back in the field. So, maybe their job title didn't get changed.

DR. COOL: Okay. So, let's dig into this a little bit more because to try and make sure that we're thinking along the same lines or perhaps that I'm understanding correctly.

The first one is NRC don't write a number in the regulation. Okay. And I think I've heard that message.

Okay. No promises, but let's go to the next one.

(Laughter.)

DR. COOL: Okay. Might be appropriate to say, licensee, you need to establish something as part of your program. Then you're thinking about what the guidance is that implements you have to do some planning and establish administrative control level, constraint, investigation level or banana. Pick some non-obtrusive word at the moment to describe whatever that is.

Then the next question becomes what of those become numbers that ought to be established as a commitment that the licensee is actually committed to, to the regulator, I'm thinking about what Lee said here, versus numbers that we said we're going to have them, but a particular number, 500 millirem for X type of worker isn't necessarily part of the commitment.

And so I'd see if you've got some views on that and I actually want to come back to the reactors because I think that's sort of where the reactors are.

They have a very detailed program with lots and lots of different things down to the individual tasks and otherwise. Those are not part of your commitment as in they're not in the license or in the technical specifications, but they're recorded in some way under your control and you work each of them

and that sounds like the model that people are talking about.

So, Ellen, perhaps you could help us understand a little bit more and we can see if that's what people are really thinking. Ellen.

MS. ANDERSEN: I'm not quite sure of the question. I'm sorry.

DR. COOL: Oh, okay.

MS. ANDERSEN: Help me out.

DR. COOL: Describe a little bit more what is a commitment, what's in your tech specs, versus what's under your controls and how you deal with that within your administrative system.

Because although you're a large, very complex licensee, I suspect that that procedural approach may have smaller versions that may be what Duann and Lee and some of the others are talking about.

MS. ANDERSEN: Okay. Thanks.

Within our technical specifications which is our licensing basis, the only requirement we have is that we have procedures in place for our programs.

And what we do is, for instance, administrative dose limits, which again are below our annual limits, your annual limits, are established by

each utility and are proceduralized.

Because they're proceduralized, draw it back to the licensing basis where our technical specifications is in the procedure as per our tech specs.

So, it's part - it's indirectly part of the licensing basis and that's for any procedure, any procedure that we have.

Okay. So, that's how that fits in the license. We don't have a license that says it will be this, this or this. It's we have procedures that document our procedures.

So, we do that, but I wanted to bring something else up that I thought was interesting was we were talking about - I think Duann was talking about the issue of employees in different buckets.

One of the things we haven't, I don't believe we've considered, is how we would if we were to establish a constraint with a number, how we would do that with our contractor employees that go from site to site, our contractor rad techs that go from DOE facilities to power reactors during refueling outages, and how example - and I'll just use it as an example because we've had this conversation, if we went to something like a 2 rem per year constraint and

we received a contractor employee from another site who's sitting at 1.8 rem and we as a licensee, take him to two or over two.

Now, we enter it into the corrective action program if this is just a constraint and not a limit. Now, we're doing basically - I would assume we probably would be doing root causes because we're violating - not violating, but in the eyes of the licensee we're violating something that's in a regulation.

So, even though we may not have given him the majority of the - he or she the majority of the dose, we are now as a licensee, responsible from an administrative perspective, to do something about that.

So, that's something I don't think we've thought about. I think we've been talking about people who work for us as licensees, they work just for us, but think about the folks that come in from other facilities.

DR. COOL: Lee.

MR. COX: I would just say you don't hire that person.

(Laughter.)

MR. COX: I don't have any comments other

than that.

MS. ANDERSEN: Let me just follow up with that, Don, please.

Is that if any of you have had an opportunity to try to hire some of these, especially the contract rad techs right now, you'll find that there's a very - there's a shortage. It's ugly.

Okay. And so we are taking technicians from DOE sites and training them to the power reactor side of the house because it is a little different.

So, it is difficult and we are trying to, you know, obviously trying to pull the workforce that we can.

I think Larry had something too.

DR. COOL: Okay. I've got Michael. I've got Larry. We've got Joel. I've got Roger at the microphone out there.

So, lets cycle around. Michael.

MR. STAFFORD: Mike Stafford. Ellen, I'm glad you brought up that about trading technicians back and forth.

Now, it's rare, but we have an interesting interpretation of our 2 rem ACL when we're dealing with someone that comes from commercial and brings dose with them.

What we do is we look at commercial dose sort of separate as DOE-acquired dose or dose acquired from a DOE mission. And so we would make sure that whatever happens, that person stays under 5 rem for a year, but then look at DOE dose and try to maintain that under 2 rem.

So, it becomes a little bit of a record-keeping hassle, but we've only had like two or three people that I know of over the past few years that we feel like we're talking a tightrope.

So, but that's how we manage it, you know. I don't know. There might be a better way.

DR. COOL: Larry.

MR. HAYNES: One thing we haven't mentioned for power reactors is the existence of INPO. And you talk about constraints and low levels of things to measure and report. We've got them.

Along the lines of 2 rem per year, INPO has - they're in the process of updating the radiation protection guidelines. We almost put in there that we would operate at 2 rem or less, and we agreed not to do that.

But one thing we did agree is that for an individual that is approaching 2 rem, that they should have a personal dose reduction plan.

Now, I don't know how that works yet because the company that receives a technician from another utility that's close to 2 rem, the utility that receives him has to write the plan for a guy for a dose he's already received. So, we've got to work through that.

But we are trying to build into the process with INPO, how do we manage within a lower limit from an excellence standpoint?

And I think that's what ALARA plans are, is driving to excellence. And having excellence in the regulatory process doesn't really, I don't think, meet what we're after as some safety standard and below that. We operate and learn from each other with peer reviews and things like INPO.

DR. COOL: Thank you, and that's another important component which exists in the reactor community which doesn't exist in all of the other communities, which is a forcing function outside of the regulation, but which maybe is bigger and badder than the NRC itself in some circumstances pushing towards excellence.

And part of this discussion is how the regulator in assuring adequate protection and trying to foster an environment that is conducive to

excellence and encouraging that, sets a predictable system so that that can happen. Even circumstances where there is not an INPO that's really driving you along.

And I have Joel, and then -

DR. RABOVSKY: Yeah, I was really going to only reiterate what Michael said. In DOE, the dose limit requires that all dose from DOE and non-DOE sources be accounted for.

So in a sense, you know, that would be a subset of just meeting the dose limit of being able to account for a worker's dose from all sources.

DR. COOL: Okay. Roger's at Microphone 2 and perhaps this is the time to let some of you who have been eager in your seats on the outside of the table itself, come and add your thoughts to this discussion.

Roger.

MR. PEDERSEN: Yeah, Roger Pedersen, NRC.

I work in the Office of Nuclear Reactor Regulation, and I've been there for the last 25 years. So, I have to admit I'm a little confused about the discussion of action levels and trying to draw the parallel between those and constraints.

In my mind, they're two different things.

Maybe they could be lined up, but I don't see that. In my health physics background, an action level is a value at which you don't ever expect to take a worker to. And if you do get there, that might be indicative of an event or some abnormal occurrence that you need to investigate to make sure that something worse hasn't happened like exceeding the dose limit.

A constraint from what I understand that the ICRP means, it's a tool that's part of your ALARA program in which you've predetermined that if you take an individual to that level, that you may not be ALARA.

It's not that you're exceeding the dose limit or that there's an event that's happened, but you might be operating in a mode that you're not providing doses to that individual that are ALARA. And at that point, you should do something about that.

That something, and that's I guess where the rubber meets the road here, what is that something that you have to do when you get to a constraint?

And I think that was underlying both Ellen and Larry's comments as to what it is you have to do. If that constraint, you know, if the action statement at that constraint is just to do a more thorough ALARA planning or investigation to see if there's some other

options that hadn't been considered, you know, that could fit well into the definition of what a constraint is in my understanding of the ICRP's application.

I think what we need to keep in mind what the purpose of the constraint is as opposed to some of these other things like planning levels and investigation levels.

FACILITATOR HODGKINS: Thank you. Michael, you want to take it for now? Hold on a minute. Michael.

MR. BOYD: Okay. I had a comment that goes to what I think Larry was saying about INPO and the nuclear power sector. I worked most of the `80s in nuclear power though it's probably not obvious, but I'm very familiar with the great success that that sector has had in bringing down worker doses.

And it makes me think of what Lee said earlier this morning about safety culture, and I haven't heard that repeated that often, but I think safety culture is something that you really can't write into a regulation.

I mean, you can require it nominally and have some paperwork exercise, but in my mind what safety culture really means is a lot broader. It's an

empowered workforce. It's giving people that are actually doing the hands-on work the ability to make suggestions, make changes to reduce their doses, improve your productivity and your processes.

And this could only come from, you know, management, support and encouragement and I just think safety culture is where it's at, personally.

FACILITATOR HODGKINS: Thank you. Microphone 2, can you introduce yourself first?

MR. MECK: My name is Robert Meck. I'm representing the Science and Technology Systems.

Option 4b offers flexibility that hasn't been fleshed out here enough, and the flexibility is a graded approach. Kate mentioned this.

It's reasonable and safer that the brakes on our cars are not either full on or full off, but rather we can apply the brakes and avoid hitting somebody in front of us by a graded approach.

Similarly, when exposures are occurring in the workplace, the full stop is just before 5 rem. And if a situation occurs where exposures unexpectedly or rapidly approach that 5 rem, then a full stop is called for, but things can happen before that in terms of the management of exposures in your ALARA program that don't require reporting.

But for the sake of building safety culture as Mike was mentioning, if a situation occurs where exposure limit is almost exceeded and was approached unexpectedly, rapidly, then that could well be a case for requiring a report to build a database for better practices or best practices in a safety culture. Thank you.

FACILITATOR HODGKINS: Thank you. Microphone 1.

MR. WRIGHT: My name is Tim Wright. I'm with Duke Energy Power Reactor.

In my previous life with Duke, I was an ALARA supervisor. So, I've had many opportunities to spend about two weeks with regional NRC inspectors doing a refueling outage to take a look at my program.

And the fact to say that we don't have any defacto limits is really incorrect, because we do from the region's perspective in that my procedures require me to do a formal ALARA plan for any job that's 500 millirem or greater.

My procedures require me to look at that job at 25 percent completion, 50 percent, 75 percent and so on. And we have experience with inspectors coming in and that if we had an estimate that went over by 25 percent, we received a ding if we did not

change that estimate because we weren't using that estimate as an ALARA tool to help the workers and management to see that we needed to do something different with that particular job.

So, in fact, there is a defacto limit there, and I guarantee you with each region that may be a little bit different based off of what the different procedures are saying at the different utilities.

FACILITATOR HODGKINS: Anybody else from the audience? So, we go around. Your opportunity to step up to the microphone. I think we have one more from the webinar.

Here we go: Jenny Goodman in the webinar. If we want to align with the international community and ICRP recommendations, although from the discussion of the industry representatives, it may cause an increase in mandatory reporting and regulatory burden. How about use something similar to that as used in 10 CRF 20 1403(e)(1) and (2). The decommissioning all controls fail close limit is a hundred rem except in certain circumstances where it can be 500 rems a year. So, the industry medical uses where they could always go over 2 rem, they could establish their own constraint which may still be under 5 rem. But based

on their operations and exposure histories, these constraints would have to have some basis which would be reviewed and approved by regulators.

Did I make sense when I read it?

No, huh?

DR. COOL: I think it was millirem, not rem, I suspect. It was. Okay.

FACILITATOR HODGKINS: Yes.

DR. COOL: All right. That's a view to add to your mix and we'll get some reaction. Microphone 2.

MR. PAPERIELLO: I have three comments.

FACILITATOR HODGKINS: Name first?

MR. PAPERIELLO: Oh, sorry. Carl Paperiello, consultant.

First, 4a strictly speaking as written, is wrong. The NRC has lots of constraints built in its radiation protection framework.

There are decommissioning rules in Part 20 that sits well under a hundred. There's limits in Part 40 based on EPA mill tailings. There's Appendix I in Part 50. There's limits in 60. I don't remember all the numbers. High-level waste and low-level waste that are well below 100.

So, they're not all in Part 20, but

they're in other parts of the rules and they're limits. So, that's one point.

The fact is there are - and the numbers are pretty consistent with ICRP 103. And ICRP 103 generally says, under general it just says less than 100 millirem per year.

It has specific values for things like where the NRC has them, reactors, waste and decommissioning - or I think the words they use is exposure to long-lived isotopes.

Second comment is the law of unintended consequences. About five years ago NCRP of which I'm a counselor, revised a publication on the design of shielding for medical facilities.

And about the time they were ready to go to publication, they realized the design basis was a hundred millirem a year. And in - for other guidance that NCRP had, they had a constraint of 25 millirem per year per facility.

I was on the committee. How do I reconcile these differences? And we reconciled it by who is the - who do we - who do we include in the constraint? Is it a constraint to the maximally-exposed individual or the average?

And we decided that for a medical

facility, the average member of the public was somebody who came as a patient. They were in the facility even if they were hospitalized for a short part of a year.

And that the design basis - and I'm not an expert on medical shielding at all. And I know there are occupancy factors for closets and rooms next to the - and all that sort of thing. That would be an employee of the facility. And that basically they may not be an occupational worker, but they are a worker in a medical facility.

And it was okay to leave the, you know, we would leave the design basis for an x-ray facility or a medical facility to a hundred millirem a year.

If there's a general constraint in Part 20 in the order of 25 or 30 millirem per year, does that mean, and you have unintended consequences, that all of the medical facilities in the United States will have to have their shielding design to 25 millirem per year?

And lastly as I sit here and think about this rule, if a consequence of this rule is to achieve the limits or the constraint, we give - spread the dose over more people and you strictly believe in LNT, the overall number of cancers won't change at all.

Thank you.

FACILITATOR HODGKINS: Okay. Any other comment from the audience?

Panelists want to react to the audience at all?

Any other further comments from the participants around the tables? Hold on a minute, Michael. Stephen.

MR. BROWNE: Stephen Browne, Troxler.

I just wanted to go back and reemphasize one point that I think I had mentioned earlier, which is my feeling that there may be some lower level below which constraints may not make particular sense certainly for occupational workers, because there are thresholds for monitoring. And I have to question what would be the meaning of having a constraint below the level at which we're required to monitor individuals.

And again particularly for portable gauge users where the average exposure is really close to the minimum detectable level anyway, even if they're monitored it's - I'm not sure that constraints are adding any value at that level.

DR. COOL: Okay. If I could sort of ask you to dig into that just a little bit deeper? The

discussion that we've had this morning has seemed to circulate around a good idea that there be planning values in some measure. We've used investigation level, we've used a number of planning values that a licenses is using within their particular program, but staying away from anything that quacks like a number. Okay. How does that fit in?

If I say that that is how constraint perhaps ends up in a portable gauge activity to have some planning, do you have some planning?

Okay. Most of your people are not monitored, but there's some point where you're going to check yourself if something shows up.

Is that the equivalent and how would that play out within the typical programs that are doing portable gauges?

MR. BROWNE: Well, certainly right now most of the portable gauge licensees do monitoring, but not all of them. And they do it for reasons other than the fact that they're, you know, required to.

I think partly they're doing it so that employees feel that they're being protected for - and other reasons as well.

With the case of our portable gauges, I think that ALARA starts with the design of the

equipment itself and the user doesn't really have a lot of control over that. So, their responsibility is primarily in using the equipment in accordance with the way they are trained to use it.

And if they do that, then there should be no concern about their exposure being, you know, unreasonable or not being ALARA.

I wouldn't know how to incorporate a planning level for someone who doesn't have monitoring results.

DR. COOL: Okay. I know George is also in the industry, and I'm going to give Lee just a moment to think about this.

In terms of those kinds of licensees, because I know you have some, how what you've talked about as a requirement that you have in North Carolina works for that class of licensees?

MR. COX: Just to clarify a little bit, Lee Cox, OAS, all portable gauge licensees have to demonstrate that they don't meet ten percent of the limit if they choose not to badge.

So, how we do that in North Carolina is that if it's a new licensee, they have to wear a badge for 12 months.

We also have in our guidance what we've

discussed earlier, investigational limits which we feel is a good practice in ALARA that they would have to commit to in their license application to get the license. Some investigational limits for portable gauges might - an appropriate limit might be 100 millirem in a year.

As far as constraints, you have a radiation protection program. It might involve something you would put into your training of your users. I think you still have training programs. You have an online training program.

Those might be some things you would consider.

DR. COOL: Okay. Thank you.

George, is there anything you'd like to add from your perspective?

MR. MARSHALL: More on the same lines. Again that, you know, what the sheer number - and again we do have the issue that there are provisions again if they can prove that their exposures are at a lower level. They don't have to.

I actually am a proponent that they should use dosimetry, you know. And for different reasons. I view it as a tangible to look at radiation which is more of an intangible, but also getting back to this

culture of safety keeping it fresh in your mind that there is radiation out there.

But again, you know, ALARA would - and constraints. And again for me, I'm kind of looking at constraints as a methodology, you know, just the way you use it and incorporating ALARA into that to just keep it down to that level.

But again there is no - well, in some cases there are - nothing to measure it against if they've gone that route other than the initial demonstration that they're going to be low in that regard.

So, I - for me personally again it has to do with ALARA and making sure they're properly using the gauge.

And again most of them still do use dosimetry. I think it's kind of a CYA thing for anything that might come back to haunt them later.

But again for me, I'd like to see it in use even though it is a very low level.

DR. COOL: Okay. Thank you.

So, I think what I'm hearing is that for uses like gauges which much of the safety is based on the design of the devices and equipment, that planning level may translate in some respects to dosimetry-

required levels, but that there's still something, and it's not necessarily described in dose terms, which triggers the need to go look at your program because certain events happened or certain situations occurred that says I better go look at how we're behaving because it doesn't seem like we're behaving properly.

Is that a fair summary of this piece of the discussion?

Lee's nodding his head up and down. Stephen.

MR. BROWNE: Yeah, I think I could generally agree with that. I'm just very concerned about - again about there being an expectation of setting a numerical number - well, obviously a little bit redundant there, but a number that they have to measure themself against when they're not required to make measurements of individual dose.

Now, in the design of equipment, ALARA - it certainly can be taken into account. And in the SSND process, you know, there can be, you know, goals set there for how much exposure a typical operator of the piece of equipment would receive. That would be more practical to address it at that point than I think through the radiation protection programs.

Training is important. Probably the

single most important thing for a gauge operator in order to ensure that they're being ALARA with their exposure.

DR. COOL: Okay. Thank you. Mike Boyd.

MR. BOYD: Just because Stephen's right here and I can grab the microphone, I wanted to react to something that Roger said earlier about - and I think sometimes we need to just make sure we're all using the same glossary.

I assume from what Roger was saying that in NRC space, an action level is a relatively serious, you know, thing in terms of having to reach a dose that you might not have - that would require some corrective action or discussion with your regulator.

In the 1986 federal guidance, we use a term called - I think it's referenced "action level" in relation to the administrative control level. And if I said "limit" earlier, I apologize, but the reference action level is just a tool for really the first-line supervisor.

And the way we define it in the federal guidance is if you have - if you have a class of monitored employees, you know, with dosimeters and you historically don't see any real measurable dose, or if you do it's at the five, ten millirem a quarter level,

you might set a reference action level at 25 or 50 millirem only because it's an excursion, it's out of the norm.

And all it says is that the supervisor should at least look into what did this guy do that none of my other employees are doing? How did he get this little bit of dose?

It doesn't mean that you've done anything at all wrong, but it is just a flag to generally a first-line supervisor. And that's what we were referring to in the federal guidance as a reference to action level, which would always be below your administrative control level, which would always be below your limit.

DR. COOL: Okay. Thank you for that clarification. That got Lee's hand waving.

MR. COX: Yeah, I would say - thank you for that, Mike.

I would say that's how we're implementing that in North Carolina, the administrative or investigative level. That's how we're administering it in our guidance and implementing it in our inspections and enforcement.

To my knowledge, there has never been any enforcement action if anyone has exceeded that

referenced action level that Mike described.

DR. COOL: All right. Kate.

MS. ROUGHAN: Just to kind of, I think, emphasize what Stephen's saying, there's no - from the regulatory perspective, the users don't have to wear dosimetry. So, you have no measurement of where they are against the ALARA investigation limit.

So, how do you reconcile that?

MR. BROWNE: I don't think it's reconcilable. I mean, you can't have a number as a limit with no number to compare it to. And I'm not sure that it's necessary when the doses are as low as they are. That would be my other point.

If the regulations say that individual monitoring isn't required below this level, then I don't think it makes sense to set other - to set requirements for there to be other measurements made.

I mean, that becomes a defacto requirement to do monitoring for if you're getting one millirem.

MS. ROUGHAN: That's kind of the point I wanted to make is that, again, they're not required to monitor the users at those levels, and yet you're going to use the ALARA program. You need some number to measure against your progress against the ALARA program, and yet that number doesn't exist.

DR. COOL: I think Lee had a reaction, and then I'll come to Duann, because it sounds like we've had a little bubble up here that we need to poke at just a little bit.

MR. COX: Yeah, I would just like to clarify that there is a number - there is monitoring at the beginning, always. And we may disagree on that, but that's the way it's supposed to be and that's the way it is in North Carolina.

And the defacto limit is the ten percent of the dose limit. So, once they have gone a year and not met that administrative, in this case, investigative limit of ten percent of the dose limit, then they no loner have to - or they're no longer required to wear dosimetry.

So, they have demonstrated through their ALARA program, through their radiation protection program, that their policies and procedures are working for 12 months. And they're not seeing anything above minimum detectable level, so they can at that point drop their dosimetry.

So, at some point they are looking to demonstrate that they have an effective safety culture in an effective ALARA program.

DR. COOL: So, let me just ask a question.

That all sounds logical. Ten years later staff has turned over four times and the curious, not necessarily critical question is, how do you still know?

MR. COX: Well, that's a very good question. I'm not sure I have an answer for that, but I think the NRC is consistent with the way that we apply that rule as well. So, I don't know.

DR. COOL: I'm not saying we're not.

(Laughter.)

DR. COOL: You tossed that out there and it was sort of like the obvious - okay.

MR. COX: I did, and that's a good question.

DR. COOL: So, how do we know, Duann?

MS. THISTLETHWAITE: Duann Thistlethwaite. I just wanted to add that in radiation protection programs it's not only administrative controls, but it's engineering controls.

And I think you had brought that out earlier about the design and I had mentioned that earlier today about the design and protection for workers for safety.

So, that's also part of the radiation protection program which even adds more emphasis to

staying away from the number.

DR. COOL: Lee.

MR. COX: I have a better response for you.

We do that throughout the following years through inspections, routine inspections, through observations, through performance-based inspections, through looking at documents during those inspections to ensure that they are following the same policies and procedures and that we're not observing anything outside what we expect for a good safety culture and good ALARA program.

DR. COOL: Philip.

MR. GIANUTSOS: I just want to point out that for most TLDs, the lower limit of recorded dose is ten to 20 millirem.

So, depending on your aware interval if it's a month, you could be missing 120 to 240 millirem over a period of a year.

In all fairness to the other vendor, there's the aluminum oxide dosimeter that goes down considerably lower, but there's also the effective dose equivalent to look at there.

If you're looking at exposure from a very small source, is the gradient significant? Where do you wear it? How do you assign the dose?

DR. COOL: George.

MR. MARSHALL: I kind of came into this thinking about this issue, because I think we've stumbled onto something that you probably didn't anticipate, you know, this segment of the radiological world that you have down here.

And again this is something I'm talking about with the culture of safety, and hopefully Mr. Cox and I will talk about it a little bit, you know, as we get into implementation, but, you know, you don't have recurrent training.

You mentioned about turnover and the like and, again, that is an effective way to do it in inspection. But again, you know, I would like to see something along the lines of recurrent training. They get one shot in the beginning and that's it.

And typically they're highly influenced by the actions of the workers that are already out there and they pick up on those habits.

And you were talking about the design of the equipment, but again there are opportunities out there based on the methodology or the lack thereof that they can get - receive higher, you know, if they're exposing a source rod, if you have an open sliding block, something like that.

And, again, when you don't have dosimetry, when you don't have survey meters, how do you account for that?

Again, kind of getting back to what I started with, you're down to something different a little bit now in terms of deciding at a number, you know.

This isn't really - this is somewhat of a different factor, you know, from that. But if deciding where you're going to move that number to if you are at all, you know, we're down here at such a low level.

But again, you know, ALARA is important. Every individual use is important, you know. And I think that's a bigger factor with ALARA than a given number up there again.

DR. COOL: Okay. Microphone 2.

MR. TAULBEE: Tim Taulbee, United States Enrichment Corporation, Portsmouth site.

We have experience in this being low-dose sites, Paducah and Portsmouth, as well as we're also regulated by the DOE at the Portsmouth facility, and we're regulated by the state of Ohio and the state of Kentucky as well for our x-ray generation and other radioactive material possession. So, Erskin and I

share a lot of regulations.

One, you have to perform monitoring. It just doesn't have to be individual monitoring. We do that. Leak checks, source checks, postoperative checks on x-ray units, radiography. Obviously, all those reports would be compiled.

Our experience is we still wear dosimeters at the sites, but the DOE at the Portsmouth site, they do not wear TLDs. Unless they are in specifically areas that it's required, they use area monitoring and other controls, but they have to demonstrate compliance still with those programs. So, we've seen that. We've experienced that.

Secondly, what I probably stepped up here initially for, I'm going to say the option on this is we don't need any further direction on constraints.

And if you read what 103 really says in the definition, you're going to start down a slippery slope that's going to compel a lot of these - your bigger programs, it's there. I've never been to a reactor site that doesn't have these great programs.

I'm thinking about these smaller companies that's going to be forced into something that we're going to raise the cost of our industry, and I don't think we technically have a problem out there.

So, that would be weighing in from the fuel cycle sector that you don't really need this. And go back and read 103 tonight and the whole thing, and it's a slippery slope when you step on it.

FACILITATOR HODGKINS: Okay. Other views?

DR. COOL: Anybody else from the audience participation?

Anything from the webinar participants?

We're good.

FACILITATOR HODGKINS: We have one at Microphone 1.

MR. DAVIDSON: Yeah, just a couple of things. Okay. Scott Davidson.

FACILITATOR HODGKINS: Up close to the microphone, please. Thank you.

MR. DAVIDSON: Scott Davidson, New World Environmental.

With the North Carolina gentleman, you require monitoring. Do you have a badge exchange requirement of quarterly or something, or can they go annually and you don't really know when you have to realign your program?

MR. COX: We allow licensees depending on the technology, I believe most of them have gone to quarterly badging requirements.

MR. DAVIDSON: When the requirement is annual monitoring, you don't have to have quarterly. So, for the first year use of monitoring devices, somebody could look at it and say I'll wear them, I'll get them read annually.

MR. COX: We haven't allowed that in North Carolina.

MR. DAVIDSON: So, you're proposing a shorter than annual year increasing the exchange requirement?

MR. COX: We - I'm not sure that we're imposing it. It may be technology. I'm not -

MR. DAVIDSON: There are some plants that I note I think that go annually.

MR. COX: I'm not aware of anything that's over quarterly right now that we allow.

MR. DAVIDSON: Okay. That might be because the vendor likes to get more money. I don't know.

My only experience with gauges when they've had doses, is when a person puts them on the side and was cleaning the mud out of them.

Other than that, I've never seen proper use result in the exposure of significance, but I have seen exposures.

I also seen exposures to TLDs when they

sit them on the front seat of a car, but that's a different one. Thank you.

DR. COOL: Thank you.

FACILITATOR HODGKINS: Thank you.

DR. COOL: So, perhaps to make sure that we have gotten some views, I'm going to flip each one of these questions up and reading these questions in light of the discussion today. So, take constraint the way we've talked about this and how people have interpreted this as a more general issue of some sort of planning values.

Is there any additional things that you would want to add related to this question? I'm just going to sort of flip through them and give each of you an opportunity to see if there's anything else that we perhaps missed as we've gone through this discussion and pulled these threads.

Microphone 1.

MR. CONWAY: Ken Conway, Babcock & Wilcox.

Given with constraints, you're essentially reducing the limits beneath what is actually regulatory required, I would anticipate that sooner or later employment will be denied or someone will be laid off because they do not have enough exposure left to be able to do a task.

And that would be a Workmen's Compensation issue, and I would think a legitimate one. Thank you.

DR. COOL: Steve.

MR. MATTMULLER: Steve Mattmuller. In regards to your question, you having to screen, I'm having trouble even thinking of a benefit even - and I can't even go near a significant benefit.

I only see a downside because I still don't see any advantage of this constraint model theory versus what we're already doing under ALARA. So, I see no benefit. Just additional cost.

DR. COOL: Okay. Let's go to the next one. And I think we have addressed all these. I just wanted to make sure if there was someone who had another point beyond that, that we gave you the opportunity.

Duann.

MS. THISTLETHWAITE: I just wanted to speak to the reporting aspect if you put in constraints, that there would have to be an ubiquitous reporting method in order to get that to the states or the NRC itself.

So, I see that as a constraint of the constraint.

DR. COOL: Or perhaps no reporting. If I

understand what Lee has said, there's no reporting. This is just an inspectible item the way you're doing it.

Is that correct, Lee? Lee's nodding his head up and down.

MS. THISTLETHWAITE: Okay. I must have missed that earlier about the reporting. But I feel that when the inspectors came out from the NRC, that they would be looking for your report of your investigation.

DR. COOL: Okay. Well, perhaps we need to clarify. Lee.

MR. COX: Yeah, I think the use of terms "reporting" and "documentation" is different. I think you're talking, Don, about reporting to the Agency, either NRC or the state. You're talking about documentation on site, and that is what we would look at.

As documentation on site, we would not require it from -

DR. COOL: Up close to the microphone, please, Lee.

MR. COX: I'm sorry. If you exceeded a limit, we wouldn't require that reporting to the state, but we would require documentation just like

you're doing now with your dose and exposure.

MS. THISTLETHWAITE: I was actually speaking of both, but probably using the term "report" too many times. But, yes, documenting on site.

And then if there is reporting to the NRC, I know there's not to agreement states, but if there would be a reporting of constraints, because I figured if you're going to track constraints, then you'd need to report them.

DR. COOL: Any other thoughts on this one?

We'll move on to the next one which I think we've talked about a lot. Anybody want to throw a last thought in on that?

We'll go once. Twice. Duann.

MS. THISTLETHWAITE: There's more to the term "constraints." As someone had said, I see this as more - and I did use the term "constraint" as like an action level, an investigation, an engineering control instead of just a dose limit.

So, I think there's more to it than that. And I fear that if we did tie it to something, a dose limit, it would be detrimental. And then it would also make us seem that we weren't being - we were being hypocritical in the way that we were saying two in one place and five in another.

DR. COOL: Okay. Thank you. Microphone 2.

MR. MECK: Robert Meck. In my comments earlier about a graded approach, the relationship to the action level or constraint, whichever term you want to use, is that it's actually the dose limit that would be the signal for perhaps an internal report that - of corrective action so that this doesn't happen again.

But I want to emphasize that I don't see a usefulness in a specified number other than the dose limit itself, but rather the ALARA program, or in this case the constraint, would look at how exposures are managed going up to that limit.

And if those aren't managed in a very well-controlled way such that you may have a surprise on an exposure that didn't exceed the limit, then you would write a report and corrective actions.

But I really want to emphasize that the only number that a graded approach in my mind that would be useful, is the dose limit itself.

DR. COOL: Thank you. Joel.

DR. RABOVSKY: Joel Rabovsky, Department of Energy.

I guess in this whole discussion this morning, one thing that's not clear to me, and maybe

I'm the only one, is it seems as if we're talking more about ALARA programs and how you might want to modify ALARA programs almost - or more than actually addressing what was in 103, ICRP 103.

You know, your first few view graphs about the EC drafts and IAEA draft regulations talk about those constraints. But, you know, we've - because other panelists have said and members of the audience addressed all sorts of types of entities used in radiation protection programs that we call constraints, whether they are not once again in terms of ICRP 103 defined as what they consider a constraint.

Which if you read their language, they would say yes, constraint has to be less than the dose limit. That's what they wanted it for.

But I guess maybe in your writeup in White Paper, you know, they're getting - to me, it's more discussion about how ALARA programs work and how one would add more or not add more requirements and guidance regarding ALARA programs in general rather than the ICRP 103 constraint question.

DR. COOL: Okay. Kate.

MS. ROUGHAN: Kate Roughan. In terms of the relationship from the constraint to the dose

limit, I think it's very important that each individual license looks at their own activities and establishes their own inner limit, if you will, before the dose limit.

That's the most effective way to keep the doses as low as reasonably achievable, because you know - the licensee knows the activities, they know the different classes of workers and they can set an effective number that you're working towards.

You don't want to put across the board a dose constraint if it's some percentage of the dose limit, because that does not result in an effective ALARA program.

DR. COOL: Okay. So, the next question which again I think we've addressed in part if anyone else wanted to add any thoughts to this, what I'm hearing mostly is ALARA is important, planning is important, having some guidance that the licensee uses to bound their own activities is important.

And the question is how to write that in such a way that it doesn't become a numeric lock on a particular licensee, because every licensee is different. You may have multiple groups of individuals within the licensee and the programs in different activities. And so there's no single

number.

And in some cases, it's down in the monitoring range where there may not be a specific planned number other than the impact related to monitoring.

Are there other things that people would want to add or is that a reasonable synopsis of what most of you have been saying?

There's nodding of heads up and down and I don't think they're nodding off to sleep. Okay. good.

And I think we've concluded that everybody is very familiar with planning. Nobody understands the word "constraint" at least in a consistent manner. But in terms of planning values, there is quite a bit of familiarity and discussion in the use.

Would anyone else want to add anything on your perspectives there?

And I think what's the last question, not remembering how many questions I had in my slide set right off the moment, but what I think I've heard is that most of you have something. You may not use the word "planning value," you may not use the word "constraint."

We've used a whole bunch of different

terms. All of which, I think, has been rightly pointed out have somewhat different meanings, but all sort of gravitate around a central theme of guiding how you're looking at your program in your activities.

Any other insights you'd want to share there that would help our record as we're developing it to figure out what a good approach might be?

Duann.

MS. THISTLETHWAITE: I just wanted to add on to something that had been mentioned earlier about the safety culture.

I think this is where the aspects of safety culture can be brought forward. That it is a team approach. That it takes every person, the people on the front line all the way up to upper management working together to bring information forward and to be able to bring things to light that may be going on on the front line without repercussion.

So, I think that's very important that in the planning, that be involved. That input from all the employees all the way through management, and then reporting to management, be involved in that process.

DR. COOL: Thank you.

Any other thoughts that you'd like to add to this? This has been a tremendous discussion. I

congratulate you. It's been quite a long - and we followed lots and lots of threads. I very much appreciate it.

Dan.

FACILITATOR HODGKINS: You know, what we're going to do now is go to lunch a little early. Okay. And then when we get back, we'll go ahead and finish up with our last area.

One of the things that happened yesterday, the feedback we got from the webinar folks is that they had planned to attend at a certain time for a certain topic.

And so in being respectful then to all the folks who are in the webinar, we want to keep to this particular agenda - wait a second, we have some - for the webinar folks.

So, we'll go to lunch a little early, but we'll come back at the same time. Which is I think on your agenda, one o'clock, correct?

So, we've got maybe 65, 70 minutes for lunch today as opposed to an hour-and-a-half that we had yesterday, but we'll keep to the agenda for the webinar participants.

Now, with that being said, I think we have one more question/comment from the webinar.

DR. COOL: We have a question on constraints, but it's fairly lengthy. Kim, rather than having it - having you try to write it all out, if I hand you the microphone, could you just read it off of the computer?

DR. BUTLER: It seems important for licensees and regulators to assure that limits are not exceeded and constraints, e.g., as established in the ALARA programs can assure that folks look at their programs. On the other hand, there is a point of diminishing returns where the doses are so trivial that spending time and money justifying small doses becomes merely a paperwork exercise and quickly becomes meaningless. It does seem that ICRP had meant to have constraints established separately from ALARA programs. My sense is that constraints would be established by project type and that this might be a radiation safety community effort.

And that was by Cindy Blown (ph).

FACILITATOR HODGKINS: So, all the comments from the webinar participants will be incorporated into the documents that - or the thought process that goes on there.

So, not to be discouraged if you haven't heard your comment during this particular performance

or part of the program.

So, we'll continue to try and be respectful of the webinar participants as we move through the day.

With that being said, I think we'll break right now and see you all at one o'clock. Look forward to it. Thank you.

(Whereupon, the proceedings went off the record at 11:45 a.m. for a lunch recess and went back on the record at 12:57 p.m.)

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

12:57 p.m.

FACILITATOR HODGKINS: Welcome back to the webinar folks, and welcome back to everybody in the room. And so at one o'clock, we're starting to do the wrap-up.

I think, Don, I'll just turn over the wrap-up to you. Do we have the slide for the agenda or -

DR. COOL: I'll have to get the computer for that.

FACILITATOR HODGKINS: Uh-huh. Can you get the computer? Would that be a disclosure of some kind of top secret -

SPEAKER: Try P-A-S-S-W-O-R-D.

(Laughter.)

FACILITATOR HODGKINS: Yeah, that.

DR. COOL: If only it were so simple as Capital P-A-S-S-W-O-R-D with a number next to it. Although, I don't think that's the case.

Part of the problem that we suffer at this moment is all of our switching out of computers in technology to try and get our web folks on board, has resulted in the computer that we're using to display things actually being one of NRC's computers and one of the contractor computers doing the webinar now, because for some reason the internet would connect to their computer and not to ours.

Now, I suppose I could say something satirical about NRC IT related to that. I think I won't. But the shorthand is that since this is signed out to a particular individual and loaded with their profile, only that individual has whatever password they use for their NRC account. And I can guarantee you it isn't as simple as PASSWORD, much as we might like it to be or otherwise. So, we can't put that slide up on the screen.

However, the webinar people can actually see the slide. So, for the first time in two days, the webinar people have an advantage over the people

in the auditorium. It's quite remarkable. And I can tell you some of the things that are going on.

What we wanted to do in this wrap-up, was to go to the items that people had raised that weren't specifically part of that discussion at the moment, and come back and discuss those a little bit further if we could see what those issues were.

And there were - I think I've got four of them at the moment. There was some questions about extremity dose and whether there were any other limits or otherwise that might be changing. So, that's one item.

There is the question of the NRC doing some changes versus other federal agencies. And the particular discussion there I think raised by Ralph Andersen of NEI was all well and good for NRC to update. What about some of the EPA requirements that are referenced by the NRC regulations and which still go back to ICRP 2?

I'm very glad that Brian is sitting back there in the back. He's smiling at me and trying to hide. Okay. So, that's the second one.

The third one raised by Mike Boyd this morning was the question of lifetime dose versus an annual dose limit or otherwise and how that might or

might not play in and the implications of that. And if Willie can unlock the computer, we'll be good to go.

And then the fourth one was a request that we talk a little bit about what ICRP has been saying around protection of the environment and how that does or doesn't play into some of these discussions.

And as you'll see, we reveal no data, which we don't get into the computer either. Oh, voila. All right.

So, I don't actually see the slide that - okay. Well, we may need to do a little bit more here because I don't see the slide on this computer which had the Day 2 setup. Willie, help me out here.

Did you hide some of those somewhere? Because I know I had them set up for the webinar. There's a couple of these that we don't need the slides from.

So, we'll pretend for the moment that we are in Oz. We're going to pay no attention to the man behind the screen. You might not pay attention to the man in front of the screen. I'm not sure, but let's start with the extremity dose question, the issues of other dose limits.

And as I recall, that was a question we

talked about effective dose and that applied to the sum of all the organ, whole-body types of activities, and were there things under consideration related to extremity dose, skin dose, eye dose or some of the other limits which are also in Part 20 and in the ICRP recommendations.

I'm looking around the panelists. Is my recollection correct? Mike - and I think we need to use the cordless microphones. That's the only way the webinar people ended up hearing us.

MR. BOYD: I'm just reminding us that I think the issue Vince raised yesterday was the question of lowering the lens - the dose to the lens of the eye. So, I think that's the one that was of most concern.

DR. COOL: Okay. Duann.

MS. THISTLETHWAITE: And I had asked the question about the extremity because I was wondering what was next.

DR. COOL: Okay. So, let me tell you what I believe is happening, and then we can see if there's any views/discussion that you might want to proceed with that.

Extremity dose in the recommendations of ICRP has not changed. So, that's still the 50 rem

value for extremities.

There is a difference between how ICRP looks at skin dose averaging area, one square centimeter of skin versus the way the NRC's regulations are which is ten square centimeters.

For those of you who are going so, how did that happen? The answer is because we actually went probably more than ten years ago now - Roger, help me remember exactly.

We actually - we, the NRC, went to the National Council on Radiation Protection and Measurements here in the United States looking for some specific advice related to effects on the skin because of some questions related to hot particles.

And NCRP came back to us with some alternative guidance which was in fact incorporated into the NRC regulations.

At this moment absent some other new information or push, the staff does not have a change of that on its agenda.

That doesn't mean that one of you couldn't ask for something to be looked at there, but it's not part of what we currently had in our planning.

And I see happy smile - no, don't go anyplace else. Don't go there. Okay. That's good.

All right.

The other thing that we mentioned yesterday in terms of eye dose, and Vince Holahan who was here yesterday, was noting to you that there is a growing body of information that effects to lens of the eye are occurring at lower levels than previously estimated.

The ICRP has said that they are looking at it. It may in fact this week or next week, I'm not sure when the ICRP's main commission is meeting, but very shortly they will be looking at some recommendations that are being developed by one of their committees. And it may be that by the end of the year there are some draft recommendations for public consultation from them which would change the eye dose limit that's currently 15 rem to the lens of the eye.

We can't get anybody to officially say what the proposal may be. Although, we have heard that it would become five. But that and - what is it - $4.25 gets you one of those fancy mochas at Dunkin' Donuts.

So, there is that to stay tuned to. And because it can come up during this development process, the NRC staff will, if we get such a

recommendation, start to look at that as we continue to move forward towards a possible change in regulation.

So, while I'm not sure there's a whole lot you can say today, although I would welcome what sort of impact that might have for some of you, we have no proposal or even options at the moment on the table.

Microphone 2, Roger.

MR. PEDERSEN: Yeah, Roger Pedersen. I apologize, Don. You might have just said this, but I was zoned out a little bit.

The difference between the ICRP and our current regulations in terms of the area of the average over for shallow dose equivalent, I mean that's an accepted difference between us.

And as far as I know, there hasn't been any request to come in line with the ICRP to go back to one square centimeter. I mean, nobody has given us any reason to change back to that bases, right?

DR. COOL: I don't know of anyone who has asked us to change. I know there have been people who have asked if we were going to change since ICRP still says one square centimeter.

MR. PENDERSEN: Yeah, I guess I'm trying to clarify that to my knowledge, there's no intent to

change at this point unless we get some requests, right?

DR. COOL: That's my understanding.

So, let me just look around the table for the moment. If we play the speculative game that there would be a change to the recommendation for eye dose, what might that mean in some of your organizations, if anything?

Does anybody even come close to that in your experiences? And I recognize that I don't think we've got anybody from the interventional communities here now.

Overwhelming silence with a few shaking of the heads no. So, I'm going to take it for this meeting at least that there's no one that's having experiences where you have individuals who are getting close to the values for the eye dose equivalent. Not in radiography or source manufacturing. Not in PET. Okay.

All right. Are there any of the other limits that are associated around occupational exposure or public exposure that people wanted to bring up?

Let's go ahead and see if there's anything else here on the panel or around the room in the

observers.

Lee.

MR. COX: How might these limits affect the limits in the medical event definition, and also decommissioning modeling?

DR. COOL: Let me take those in reverse order because I think the answer is simpler in decommissioning which was done just several years ago, and I don't know of anything in the new ICRP recommendations that would suggest a change there.

There is ongoing discussion within the Commission about some additional requirements associated with planning in minimizing contamination, but that's not related to the dosimetric criteria for decommissioning. It's related to trying to keep sites in a condition where decommissioning isn't so difficult 15, 20, 30 years down the road.

Medical events, don't know personally. I suspect there are people who do that probably are not here.

Philip.

MR. GIANUTSOS: There's also a requirement certainly in our state regulations and I believe it comes from NRC, is the planning threshold possession limits worst case accident exceeding 1 rem to the

public, requires a more sophisticated emergency planning requirement at least for our licenses.

Would that be impacted or pushed lower if the doses to the public are in fact decreased?

That's another one that's on the table that could have an impact if it's removed or lowered.

DR. COOL: Okay. That's a good question. My recollection, and I'm going to say a few words and let Mike Boyd collect his thoughts, my recollection is those numbers are actually driven more by when certain requirements in emergency planning and preparedness would be in place.

The 1 rem actually corresponds to the lower value of the range of planning thresholds for short-term actions of a number of response actions under EPA's protective action guidelines.

So, my first guess would be that that probably isn't going to be open for change. But now that Mike's had a chance to think about it, let me ask Mike to put in some views from EPA.

MR. BOYD: Okay. Since Roger just did this, I was zoning a little bit.

Could you repeat the question?

DR. COOL: Ah, you see? I will find you.

MR. BOYD: Yes, indeed.

DR. COOL: Okay. The question really is emergency planning, there are requirements for licensees which add things related to emergency planning when the possibility of a dose off site exceed 1 rem.

Is that likely to change as a result of any of these discussions?

MR. BOYD: I don't think they would be affected by these discussions. That's a first impression.

We are - we have been trying for a number of years to update our protective action guides and hopefully someday those - that process will come to an end, but I have not heard that specific number discussed as being up for revision.

DR. COOL: Okay. But I - Philip, I take from your statement, and I'm going to put words in your mouth and ask you to either confirm or deny, that you would not suggest that that needed to undergo revision at that time - this time?

MR. GIANUTSOS: We don't think it needs revision. It is a sum of fractions and it would impact what our possession authorization is for the operation. So, that could have significant impacts on us and we don't see the need for that to be reduced in

any way since it hasn't been applied.

DR. COOL: Anyone else want to jump in on that topic?

Larry.

MR. HAYNES: I don't know, but I would speculate that the impact may be through dose conversion factors backwards with the same number. And then, you know, how did that affect thyroid dose or total-body dose.

DR. COOL: Thank you. Okay.

Any other thoughts or any other of the subsidiary limits? I'm using the extremity dose agenda item here just as sort of a marker to see if there's any of those other issues that people want to put on the table.

FACILITATOR HODGKINS: There is a webinar comment.

DR. COOL: Okay. Good.

FACILITATOR HODGKINS: From Vince Holahan. It is believed that the use of leaded glasses will adequately protect fluoroscopy physicians.

DR. COOL: Okay. Thank you.

I suspect that when we are out in Los Angeles next week where at the moment we have, I think, almost all of the different major medical

groups represented around the table, that this may be a much more interesting point of discussion because I know that the interventional folks have some issues around eye dose and protective aprons and things.

Duann.

MS. THISTLETHWAITE: I just had a question on dose, and it yields back to public dose. I know it was on the table if public dose is decreased.

I wondered how that would affect shipping of packages on commercial airplanes and things like that if it would affect the dose rate allowable on packages since the public dose rate if it were to come down, if that had been considered.

DR. COOL: Okay. Another very good question. Another correlated piece of the puzzle.

The transportation regulations have actually been updated more recently. In the United States, the regulations of the Department of Transportation and NRC are very closely aligned, and in fact very closely aligned with the international transportation regs because of not only interstate, but international commerce.

My understanding is that the dose values that are used already reflect the current dose for members of the public and a dose rate through a series

of models.

Again as Larry pointed out, the place where there could be some changes perhaps could be some modification to the A1, A2 types, the amounts of different radionuclides after the dose coefficients have been updated. That's a possibility, but we won't know until they go through that.

I understand from IAEA based on a response to some of the comments on the basic safety standards, that they intend to go through and do a recalculation of all of the exemption levels and transportation levels for all the radionuclides once the new dose coefficients are available, which means that they will engage in that several years from now. That's what I understand. Good question though.

Anybody in the - oh, Larry. Sorry.

MR. HAYNES: Back to skin dose. I think I don't understand now. When we went from one square centimeter to ten, we started from the point that the limit was 500 rad to the skin, assumed to be one square centimeter. And, Roger, if I'm wrong on this, you straighten me out.

So, we said okay, to be consistent with the current skin dose limit of 50 rem, we'll just divide that by ten square centimeters to 500, and that

got us to where we needed to be limit wise.

So, how does that line up with now 50 rem to one square centimeter in ICRP? What is the difference?

DR. COOL: I'm actually going to hand this off to Roger Pedersen from the NRC staff who deals with this much more frequently than I do. Roger.

MR. PEDERSEN: Without getting into too much of it, the ICRP has always recommended one square centimeter which was the bases for our dose limit for the skin prior.

When the hot particle issues came up in the early `80s and we were getting overexposures, skin overexposures, we looked at it because -

DR. COOL: Roger, get closer to the microphone. They're having trouble picking it up.

MR. PEDERSEN: Sorry. We revisited the skin dose limit back in the early `80s when hot particles were depositing a lot of dose in a very localized area and exceeding - when you average it out over one square centimeter, it was exceeding the dose limit. But the bases for that dose limit was the non-stochastic impact of having an ulcer on the skin.

So, we realized that that dose limit averaged over one square centimeter was very

conservative, way too conservative, that these exposures that we were - actually the industry was experiencing, they weren't providing - they weren't even close to providing an ulcer on the skin. They weren't coming close to what would cause a non-stochastic effect.

So, we had the NCRP look at that and come up with a recommendation. The NCRP came back. They had done a very in-depth review of, you know, at what point this ulceration would - from hot particles from various small-point sources would occur.

And so, that's the bases for us changing the area that you average over to ten square centimeters. At that dose, a 50 rem dose limit averaged over the ten square centimeters, still provides a margin so you don't have a non-stochastic effect. It still meets the original intent of the bases of the limit.

Now, when we have the opportunity to comment on the draft versions of ICRP 103, we provided that NCRP report to the ICRP and recommended that they adopt the ten square centimeter, which of course they didn't.

So, you'll have to ask them why they didn't line up with what - but we feel that the

current limit is adequately protected, and that's why I haven't heard any intent to try to change that because it is adequately protected.

DR. COOL: All right. Any other items on here? Otherwise we will move on to the next question which is a geobiopolitic question, which is the relationship of the NRC regulations and the EPA regulations, and some of you would add to that the OSHA regulations, I suppose, because the fact of the matter is that today the NRC regs do reference certain EPA regulations particularly for the fuel cycle.

Those EPA regulations in 40 CFR 190 and perhaps a couple of the other ones of those series, do date back to 1960 methodology. The ICRP Publication 2 methodology for whole-body and organ dose.

So, in fact, and I think it was Ralph who put this on the table, even if the NRC were to update - that's interesting.

Even if the NRC were to update to ICRP 103 terminology and effective dose, there are still connections back to ICRP 2 methodology for compliance.

Okay. That's my understanding of where we are. And at the risk of putting my colleagues from EPA in the bright, glaring spotlight, I'll let Mike and perhaps Brian Littleton talk a little bit about

the discussions that are going on in EPA.

MR. BOYD: Right. And I will turn this over to Brian Littleton in a second, but I just wanted to say as I think I said earlier yesterday, that we are very interested in examining whether the time is right for revising Part 190.

I'm sort of being very cagy in what I say because just like NRC, that decision is, you know, quite a ways in the future. At least I would say, you know, many months.

But certainly we are, if anything, embarrassed that we still have ICRP 2-based dose limits and would like very much to fix that.

One thing that I would point out is the 75 millirem dose to the thyroid is actually quite a restrictive dose compared to an effective dose of, say, a hundred millirem to the thyroid, which would be, you know, a couple of rem.

So, there - it's not always - when you start looking at the tissue weighting factor, sometimes you come up with some surprising answers.

But I'm going to let Brian, if he will, tell you a little about where we are.

MR. LITTLETON: I don't want to steal the show from tomorrow, but we are looking at revising 40

CFR Part 190 so that in an ideal situation this won't be a problem. And, you know, you can - there are several ways that this may turn out.

But if we revise 40 CFR Part 190, one of the things that we are definitely going to look at is a revision of the dosimetry to bring it up to date to an effective dose type of a calculation.

We're not sure, you know - well, number one we're not sure if we're revising it or not. But even given that if we do determine that we're going to revise this standard, we're not sure how far we would go whether it would be up to an ICRP 60 methodology or an ICRP 103 methodology, but these are some of the things that we've had internal discussions about so far.

DR. COOL: Any further questions on that? Is that satisfactory for folks at the moment around the panel, around the room?

Okay. Mike.

MR. BOYD: Brian can correct me if I get this wrong, but I think when we mentioned whether we go to ICRP 60 or 103, I think that's reflecting whether the ICRP actually gets the updates to ICRP 68 out timely or would we be dragging along for another five or ten years waiting on those.

So, the only reason that I can imagine that we would go with 60 would be that there's just simply nothing available for implementation.

Brian, am I right?

FACILITATOR HODGKINS: He's nodding his head.

DR. COOL: He's nodding his head yes.

Okay. If there's nothing else on that subject, let me come next to Mike Boyd's comment from this morning about the original basis of the ICRP changes to the occupational dose limits which was trying to find a practical mechanism to deal with what they viewed as being the ultimate goal of restricting an individual to approximately one sievert or 100 rem over their working lifetime.

Mike, let me turn to you to elaborate on what you were saying and how that might or might not play into the discussions that we would have on the dose limit.

MR. BOYD: I frankly don't know how this could be accommodated in a regulation. I haven't really thought through that.

I was merely making the point that if there's a need - there's clearly a need in certain situations for certain, maybe, exceptional cases or

not so exceptional depending on the industry, for a worker to get more than 2 rem, you know, 20 millisieverts, in an occupational year.

And I was pointing out that the goal is not what you get in a year. The goal is to maintain exposures to an acceptable lifetime - we would say "risk" at EPA, but "dose" is fine, whatever that number is.

So, I think I was speaking to the flexibility that could be written into some regulations that would provide the latitude necessary for the occasional need. And yesterday you said you can only think of one or two examples where the extra 5 rem has been requested from NRC.

But just to point out that the annual dose limit is a mechanism. It's a means to an end. It's not the end itself. The end itself is acceptable dose or risk over a worker's productive years.

Does that - does that help?

DR. COOL: I think that helps a little bit. I mean, simply from my personal perspective, I think what was going on was a desire to see an overall risk level expressed in dose for a worker's lifetime, and then ICRP saying there's no practical way to do a lifetime limit.

People have done - traditionally do sort of annual type things which is a small enough segment to try and deal with it.

And so if you take the average of that wanting to keep a relatively uniform distribution of dose over the life than that is equal to, and they did the calculation out that way.

MR. BOYD: Let me add one other point. If you accept - and for adult workers, I think the standard mortality number is four percent per sievert.

If you, you know, we're not - without debating on certainty around that number, but if you just accept that as a starting point for your debate, four percent lifetime risk is probably a bit outside most - what OSHA would consider most acceptable worker risk.

So, I mean, I'm not an expert on that, I don't do that, but my guess is that there is some number out there that would reflect what I call the intolerable maximum. So, just as a starting point for discussions on.

And then how you go about incorporating that into an operational level which sort of our of necessity is done on a yearly or quarterly or rolling average basis is another matter.

DR. COOL: Okay. Let me reverse the question a little bit. We've had a few people talk briefly about their knowledge of the doses of individuals in your work environments over the course of a period of time.

And I'm guessing that no one has actually done a retrospective look to see what the accumulated dose for your individuals over their lifetime is, but perhaps you have an idea of the extent to which you have individuals who are up in the three, 4 rem per year every single year.

Is there a significant number of those which in fact might be challenging the 100 rem over their lifetime in your areas?

Gauges are saying no. That doesn't surprise me. Radiographers?

MS. ROUGHAN: Very small. Perhaps a very small number, but I can't see that to be a large number that would be affected.

DR. COOL: Duann.

MS. THISTLETHWAITE: I think it's too soon to tell at this point. I think there could be and - but I think the medical use licensees have stayed within the 5 rem per year. So, you could say worst case scenario 5 rem per year for the entire lifetime

of the workers.

DR. COOL: Which would be significantly over a hundred rem?

MS. THISTLETHWAITE: Correct. But there's no lifetime dose limits as it was removed from the books in `91.

DR. COOL: Okay. Other observations?

I think one of the things that we the NRC staff will take away, and I'm looking back at Doris, is perhaps see what we can extract from the database of those who do report to us just to see to what extent we actually have some information and where some of those lifetime doses might be for some folks that we can track.

That will mostly, I think, be folks that are in the reactor community.

Cheryl.

MS. BEEGLE: Speaking as to the medical side on this, when we're talking about lifetime dose because PET is relatively new, within a ten-year window commercially, not obviously research-wise, but ten years commercially, the younger people who are coming into the field at 24 and up who may work an entire 40 years, I don't think we know because their exposures are going to be significantly higher than

ours traditionally have been in nuclear.

And to go back to your database issue from yesterday about how we could track our exposures, unless you have something like that, you're never going to know what a person's lifetime exposure is and you're going to have to start with some little guinea pig first going out into, you know, their career and track them. It could be an experiment that could take your whole career.

And to say that we can't do it because there's too many diverse bodies that would have to contribute, I think it's just because we haven't thought of a creative way that we could do it, but I think it is possible.

Aside from the privacy issues, because I realize nobody wants to divulge their information, but there has to be a way because we've done it for other things when we've been trying to track data.

And the only way to get evidence base is to track data.

DR. COOL: Thank you. Microphone 1.

MR. CONWAY: Kenneth Conway, Babcock & Wilcox.

The EEOICPA program is widely used. Is it possible you could contact the people doing those

admittedly conservative calculations and get a sanitized data set that would be biased high?

Because we really don't care if it's - it would give you an upper limit.

DR. COOL: That's a possibility.

Could you - for those of us for whom that acronym went blowing by way too quickly, including I think the gentleman doing the transcription, could you do it again more slowly and tell us what the letters were?

MR. CONWAY: Well, here's hoping that I actually remember. The - this is the act to compensate the veterans of persons involved with - remotely related to the atomic bomb work.

The acronym is EEOICPA. I'm just drawing a complete blank. I've dealt with the acronym so long. But essentially it's a NIOSH-run Department of Labor act that compensates persons found to have developed cancer with a 51 percent or greater probability from working with materials related to the atomic bomb program.

If anyone does know the acronym -

DR. COOL: I think Joel is going to be able to fill us in now from DOE.

DR. RABOVSKY: No, I actually can't fill

you in. I know it's EE -

THE COURT REPORTER: Energy Employees -

DR. RABOVSKY: Right, Energy Employees -

THE COURT REPORTER: - Occupational Insurance Compensation Program Act.

(Applause.)

DR. COOL: See, we have very good people doing our transcription.

MR. TAULBEE: Actually --

DR. COOL: But the dose assessments though are --

MR. TAULBEE: Actually, I'm a member and I have my card because I am one, among other things. Energy Employees Occupational Illness Compensation Program.

DR. COOL: Thank you. Joel.

DR. RABOVSKY: Yeah, I guess it would be a bit of a biased estimate because the way that those types of programs are designed is to give all benefits to the claimants.

So, the uncertainties are calculated and then the dose at the - I think it's the 99th - upper 99th percentile is what's used to estimate probability of causation on that whether it's greater than - more likely than not that the exposure caused the

condition. So, I guess it would give some estimates, but they'd be sort of very high.

I know in the Department of Energy we do require recording of cumulative dose starting in 1989, going back to 1989. Primarily that's when we issued our first - well, not our first, but that's when the DOE order 5480.11 was promulgated. So, that sort of was the starting point for when we felt that we had a reliable collection of doses required throughout the DOE complex.

So, I mean, I guess a lot of DOE sites would have that, and couldn't some data be removed, I guess, taken out of the REIRS reports or the REMS reports that have been collecting data for many years?

DR. COOL: Yeah, the NRC staff is going to take a takeaway on that to have our contractor see what we can mine out of REIRS. And there's the DOE version of that too which we may be able to collaborate on.

Larry.

MR. HAYNES: A few years ago, maybe five, the U.S. utilities and other Canadians also participated in the IARC study, cancer research. And the reports may have a - and I don't remember exactly. I think there's a table in there that talks about

distribution of lifetime doses in that report that may be helpful.

DR. COOL: Thank you. Okay. Any other thoughts there?

Good place to go mine some data for future looks. Appreciate that. Don't want to cut off discussion, but I have the feeling that we've sort of wrapped that subject.

The fourth one I had on my list was a request to talk a little bit about protection of the environment. And I threw together early this morning a brief synopsis of the things that ICRP is doing on protection of the environment.

So, I'm going to give you this little bit of background and then we can see what, if anything, people want to discuss on that.

ICRP has over the years, modified a view which started with if humans are protected, the environment's protected, to we think that adequate protection of humans will almost always ensure adequate protection of other species, but many people want you to show it explicitly now rather than just taking the assumption.

Traditional environmental monitoring for certainly all of you that are involved in that,

traditionally look at the trends for the radionuclides through the environment and you trace it back, but you're tracing it back to determine a dose to a human through various pathways of food, meat products, etcetera, for protection of humans.

So, that remained an anthropocentric - to use a nice, big word - view of the things as opposed to an ecological look.

And the ICRP was saying - has said that they were receiving increasing requests for an ability to demonstrate more directly and explicitly that the environment is being protected.

Now, as these discussions have gone along, it went from an initial view that we don't know, we have to find out, to we believe the protection is there, but we need to have methodologies to allow a more consistent demonstration, if that's the case, and to find out if there are any unique things going on in a particular circumstance.

So, what they said in ICRP 103 was that they were working to fill a conceptual gap, some science to look at the environment to figure out what was going on, and some methodology. So, that was a modified view.

In ICRP Publication 103, there is a total

of - it's either two or three pages. And when you read it, you actually see what looks like a wonderful research plan.

It's not a set of recommendations in that sense at all. There are no numeric values or anything like that.

Things have moved along since then. ICRP Publication 108 is a document on reference animals and plants which got nicknamed RAPs, and which proposed that there would be a set of different wildlife groups, large terrestrial animals, small terrestrial animals - you can see them, I don't need to read them all there - which could be used as a mechanism of doing an assessment of possible impacts in the environment.

And this sort of made the assumption that somewhat paralleled to the way we do calculations for humans, that you could do some sort of calculation and look at end points for various types of animals and plants in the environment to see if there were any impacts that were associated with a radioactive material.

Now, I think part of what has happened is that people immediately moved from the wildlife group, a rather generic set of things which are present most

places one way or another, and everybody immediately focused on the fact that there is the reference duck, the reference frog, the reference bee and the earthworm, pine tree, wild grasses, and many people I know started to say, but I don't have a duck or I don't have a deer.

Just a couple of weeks ago in Vienna, Austria, I was in a meeting of the IAEA that was updating coordination on a number of these activities. And there were several people from countries particularly in South America and Australia saying, don't have these critters. What do we do?

And part of the answer back from the individual who was there from ICRP, was this is not such a critical - you have some large terrestrial mammal, might be a kangaroo, for which you could then do some wealth generalizations and comparisons to go through this process.

So, they've been working on developing that. And with that, they developed an initial set of what they called derived consideration reference levels, DCRLs.

Now, I think there are several things important to note about this. One, they're very preliminary.

Two, they are not based on whether or not you're inducing cancer to the reference duck. It's actually based on other end points of continued viability of a population, reproductive success and things rather than affects to a particular individual of that species.

So, the underlying end points were very different, and there are huge degrees of uncertainty that are associated with this.

For many of these, the ICRP has said we're running - we're setting these out with a few studies which have lots of uncertainties. So, it's roughly there. Something in that band.

Now, I think what's interesting to note is that compared to where average annual backgrounds are, all of these are significantly above it. And, in fact, and unfortunately when I copied this slide, the black should have tried to translate over for a dark color background so you can't see it, those dose levels are significantly higher than any dose level that you would think about and are in per day, not per year.

So, in fact, those who had been doing a fair bit of work thus far in the analysis in the European Union and some other places, and including

the Department of Energy who has been doing some work in some modeling, their people have not yet run into a circumstance, and I believe I'm stating this correctly, where if you have established a set of protection and established requirements for effluents and otherwise to restrict the movement of radionuclides in the environment, that you could achieve levels which would start to challenge these levels for reference animals and plants.

On the other hand if you have no humans present in any form, conceivably that is possible. And I will tell you very frankly perhaps not completely politically correct, much of this got started because of our friends in the former Soviet Union who, amongst other things, decided that a good way to dispose of a number of their reactors and subs a number of years ago was to put them at the bottom of the ocean.

And it got the folks in Norway and some of the other Scandianian countries more than a bit worried, because there were no humans there and no one could monitor what was happening to pretty significant quantities of material in the environment and perhaps uncontrolled.

So, much of the driving force comes from

some of those considerations, and I think it's reasonable to understand why that would be a concern for them.

Now, what ICRP is suggesting, and they're still working on this, there's actually no publication, again I take this from discussions that were held in Vienna and some other places that I've sort of grabbed as quickly as I could, that they would believe or they think that it's possible to construct a system where you could do some assessments of materials in the environment for reference animals and plants somewhat parallel to the way that you would do it for people, as a way of being able to more explicitly demonstrate that the controls that you placed on a particular source for effluents and radiation were providing adequate protection.

Much of this is yet to be developed. So, you won't actually find that particular chart in any publication that's out there at the moment.

Let me transition just a bit, because there is a connection back to the NRC. There have been a number of issues over the last few years where this little tiny isotope called tritium in the groundwater on some facilities underneath some of the reactors. And that has gotten people at various

stages of interest and discussion and concern that resulted earlier this year in the NRC staff, assembling a task force to look at groundwater issues.

That task force prepared a report which is publicly available on the NRC website. It was released in June.

That report is now under examination by a senior management group chartered by our executive director for operations. And that group held a public meeting on groundwater protection on October 4th of this year just three weeks or so ago at the NRC headquarters.

I suspect the transcripts of that are available. I didn't have the opportunity to try and go look and verify that that was the case.

But the first of the four themes addressed in that day of discussion was the question of whether or not there should be a reassessment of NRC's regulatory framework for groundwater protection. And they asked the participants a series of questions.

And what I'm going to do now is I'm going to show you what each of those questions were so that you're aware of the questions that were described.

The first question was whether there needed to be any modification of the NRC's program to

harmonize the approaches for groundwater protection to reply to different licensees under NRC regulations recognizing that in fact this is one of the places where NRC has multiple legislative mandates.

And so some of the things that the NRC looks at related to uranium mining and milling under the Uranium Mill Tailings Radiation Control Act are somewhat different than that which gets done for reactor facilities and some of the other things. There are some differences.

To what extent should those be harmonized?

To what extent should the NRC's programs accommodate or encourage industry initiatives? Because it is well known that the reactor community has taken a number of steps to try and look at their own programs and activities and to what extent should NRC be looking at those which may go beyond the specific requirements that are in the NRC regulations today.

How should the NRC programs address protection of the environment? And a couple of specific subset questions. Requirements related to prompt remediation of unintended releases of liquid effluents. And part of this comes from the question of where the material is.

If it's on site and is controlled, it would have to be done at decommissioning. Some radiation protection arguments would argue if it's going to sit there and it's going to decay, don't burn a whole bunch of dose now to clean it up if it's going to decay away long before you're ever going to have to go into decommissioning.

On the other hand if it's going to move around, maybe you want to clean it up more quickly. What should be the requirements and what should be sort of the criteria for when you try to do prompt remediation versus making sure that material is controlled and dealt with at the decommissioning?

Should we try to modify Part 20 to address the portions of ICRP related to environmental protection?

That gets to the question of should there be any changes that would bring you to a recognition of other factors of protection, and I will tell you that there are two components of this.

First, you have what the NRC can do under the Atomic Energy Act which, in fact, by our legislative basis has to have an end point that does come back to human protection. We do not have as EPA does, separate legal authorities related to different

kinds of media in the environment from a legal standpoint.

On the other hand, we do have responsibilities under the National Environmental Policy Act and other legislatives, Endangered Species Act and some of those things to do environmental assessments.

And we comply with all those requirements and we in fact use tools similar to the things that ICRP is using, materials like what DOE has developed in RESRAD-BIOTA, to do assessments of the environment where radiation is looked at as one of the possible stressors.

Heat's a stressor. Construction is a stressor. Anything that potentially impacts the environment where a facility is all has to be part of that environmental assessment.

So, the question that was posed to members of the panel was whether there were any specific changes that the panel might suggest for addressing those. I will tell you there were no suggestions during that meeting for specific changes.

Should there be changes to the Reactor Oversight Program related to looking at leaks from pipes or plant releases or otherwise, and to what

extent should any of these criteria be related to our public confidence issues as opposed to health and safety issues?

Because as you can well imagine for small quantities of radioactive material, many people would argue that there is no safety basis, but it is a concern to many people because it has happened.

And I won't try to put any other qualifiers on that, but there have been stressors. I guess that's the proper way to put it. There have certainly been comments to the Commission from both sides of that equation.

There was the specific question asked related to whether or not the Commission - the NRC Commission should consider a policy statement that would put together how we address some of these things in our expectations for licensees.

There was a question on whether or not we should be trying to further modify the framework to pull in some of the things that are undergoing develop in the International Atomic Energy Agency, some of the other international communities, the things happening in the Department of Energy.

And so I can tell you that there was some interesting feedback. You can go to the transcript

and see the results of that. The senior management group is continuing their deliberations. So, there is no results to report to you at this time. Although, there will be at some point in the future.

So, that is a very not-quite-so-brief synopsis of some of the things related to protection of the environment.

And I would invite you for just a moment or two of any particular views or questions that you may have on that, we can take this portion of the transcript and any particular feedback and provide it to the staff that is working that issue for the senior leadership group.

Microphone 1.

MR. DAVIDSON: All right. Mic 1, Scott Davidson, New World Environmental.

Other than an omission, an oversight back when Appendix I and off-site dose calculation manuals were developed, is this any different than any other effluent?

DR. COOL: As far as I am aware, you could say the answer is no. But on the other hand, effluents are supposed to be identified, monitored and tracked.

The initial assumption of course for some

of these underground pipes and tanks was that there would be no leakage. That assumption has proved to be faulty.

So, in fact, there was a question raised not for this particular panel, but later in the day, with regards to whether such releases into the ground on a facility should be considered as effluents or not.

That was actually an open question for which I don't believe a decision has been reached by the Agency.

It's a good question.

MR. DAVIDSON: Again, it's all about capturing the dose to a receptor and combining it with others and showing that the combination of them collectively don't exceed some number.

But, you know, it didn't happen that way and it got huge, but we don't treat other effluents the same way until you decommission and then things get a little strange where you've already released things and they come back to haunt you. But that would be when you would deal with these buried pipes and everything else as well.

Okay. Had my say. Thank you.

DR. COOL: Mike.

MR. BOYD: I wanted to point out - this is Mike Boyd, EPA - if we use the - I mean, if we use as a reference point the guidelines that have been published by either the IAEA a number of years ago or the NCRP which have BIOTA protection recommendations for terrestrial animals at around, you know, I think 10 milligray or a rad a day, and for plants and marine life a tenth of that down at, you know, a milligray or a tenth of a rad a day, it's fairly easy to demonstrate compliance.

We - EPA helped fund a part of DOE's RESRAD-BIOTA Code which was an evolution of their BIOTA Dose Assessment Manual.

And in almost all instances I think when DOE facilities - and I'm not DOE. So, please correct me if I'm wrong, but I understand that in almost all cases this is a graded approach and you'd use a generic screening level. Very conservative. Very high-end estimate.

And if you don't meet that, then you can go to sort of a reference approach. And then there's even a third level where you can design your own receptor in the RESRAD-BIOTA Code. But it's my understanding that it's very rare that you wouldn't pass at the very conservative screening level at these

levels.

Now, we at EPA have been interested in the work that's been done by the ICRP Committee 5 and the ERICA and FaSa programs which were funded by the European Commission and others both because it adds to the scientific knowledge, but also it improves our understanding of transfer coefficients for the very human-based assessments that you mentioned, you know, that we have used this data for.

A lot of times we have been using decades old data. And if scientists have the money and are willing to do the research to come up with better transfer coefficients and bioaccumulation data, it goes to the greater good as well.

So, I don't think this is going to be an impediment to any operational, you know, any radiation protection operations as are being done today. I don't think this is going to change that, but I may be wrong. This is my opinion.

DR. COOL: Thank you. Any other thoughts or questions?

As I said, the senior leadership group will eventually make some policy recommendations to our commissioners. They may at some point ask the staff to consider specific things related to this.

I have no basis for predicting exactly what that is, but at some point that may occur.

Larry.

MR. HAYNES: Kevin, haven't the Canadians approached this in some direction?

MR. BUNDY: You mean the -

MR. HAYNES: Non-human biota.

MR. BUNDY: We have to a certain extent. We have participated - and UNSCEAR just came out with a large report on radiation effects on the environment we've contributed to.

With respect to tritium specifically, we've also gone through a large issue with tritium contamination of groundwater around facilities and we've just recently published six large reports on looking at tritium and the effects to the environment and health effects of tritium and that. And that's available on our website if anybody wants to download them.

Based on that, we are looking at providing design guidelines for tritium in-ground water for any new facilities. Not for existing facilities. But if they have a new facility for designing tritium - a new tritium-handling facility, then these guidelines would be appropriate.

But they are just at the conceptual stage right now. They are not by no means in force yet. There will be some sort of - staff will prepare a guidance document and then it will come up for consultation.

Did I answer your question or -

MR. HAYNES: You did partially. What I'm thinking of is Dr. Speckins is part of the EPRI Advisory Committee that I participate in. And he is with some of the Canadian CANDU reactors. And he had talked about studies with tritium, carbon-14 and the environment and how that may be factored into the environmental protection side of effluents for nonhuman critters.

And just thinking, you know, from what he said, it sounded to me like the Canadians had actually put some things in place that considers that.

MR. BUNDY: Yeah, okay. We do have our environmental - Environment Canada has a number of CEPA documents, Canadian Environmental Protection - it's not association. I can't remember what the full acronym is again, but there are documents on that. And there was - there are limitations for uranium and tritium in those - in that series.

And if something is considered CEPA toxic,

then there are additional environmental constraints, I guess, for lack of a better word at the moment, that are placed on them.

At the moment, I can't think of any actual actions we've done along that line yet, but it's not an area I'm usually involved in. So, I just can't answer it. Sorry.

DR. COOL: Okay. Thank you.

Any other observations on this topic?

If not, I think now is the time for one last chance. I know that for myself if I were to look at a rule, there's always the PET thing that I would want to change.

And so I am going to now invite briefly you to consider if there's any other issue that you would like to put on the table for us to be considering.

And let's do the panel first, and then we'll go to the audience. And I don't actually want to do a roll call necessarily, but perhaps we do.

FACILITATOR HODGKINS: Kate, what do you think? Should we start with you? Why not? come on.

MS. ROUGHAN: I don't - right off the top I can't think of anything right this second. So, maybe if we continue down the path, maybe I can jump in

later.

MS. THISTLETHWAITE: Duann Thistlethwaite, Triad.

The only other thing I could think of is if the rules do change, then inspectional guidance, what to expect from the inspectors, how they'd be trained on following the new rules such as constraints and how they would be enforced.

FACILITATOR HODGKINS: Okay.

MR. MATTMULLER: Steve Mattmuller. Since you've opened the door, I've been struggling with this and I'm going to ask because I keep thinking why are we here? And it, to me, comes back to people really believe in the LNT model and that's what's driven the lower numbers for the current ICRP.

So, I don't think there's a camera on anyone here, but could I just see a show of hands of people who really believe in LNT and think ICRP 103 is really right on the mark?

Okay. Thank you.

DR. COOL: For the record, there's a mixture. There are a few hands, and a number that are not.

MR. MATTMULLER: That's all I have. I'm sorry.

MR. BOYD: Could I have a counterpoint here?

I don't think you can say - I don't think do you believe in LNT is a valid question. I raised my hand just to make a statement, but LNT is a - we think is a plausible mechanism, you know, supported by the biological research.

We know that there's an observable dose range that has nothing to do with LNT. It's observed cancers, excess cancers in well-studied populations, and how you extrapolate that is always going to be subject to the limits of the science.

So, LNT is probably not exactly right, but it's - and I think when we're talking about the levels above, you know, say above 10 rem, it's not a question of LNT. The risk is there.

DR. COOL: Thank you, Mike.

Let's continue around with Larry. Issues on the regulation.

MR. HAYNES: I don't have anything to add.

DR. COOL: Okay. George.

MR. MARSHALL: George Marshall. No comment. I'm fine.

DR. COOL: Okay. And that's perfectly okay. I'm not desperate for more issues. I think I

have plenty to work on.

Philip.

MR. GIANUTSOS: I'm not sure how far you want to open this. But in terms of Part 20 revision, I really think the negligible, individual dose as defined by NCRP should be factored into Part 20 for consideration of other activities released and so on.

DR. COOL: All right.

DR. RABOVSKY: Joel Rabovsky, Department of Energy.

I really don't have too much more to add. I heard a lot of interesting viewpoints the last two days. I think the guidance is always the heart of any change. This is really how you're going to do it and make sure that everybody understands just what these concepts are, including the people who are going to enforce them, because that sort of is where a lot of issues come up.

I guess addressing Mike, we heard a lot about the validity of the scientific basis in the last two days. I'm not sure that is the issue.

As a regulator, we use LNT because it's a simple system to work with that's reasonable, plus I don't know that I believe - even though one doesn't - hasn't demonstrated health effects at the lower

levels, one, on the other hand, hasn't demonstrated the absence of health effects because we know that the tools right now aren't sufficient to make a definitive statement.

DR. COOL: Lee.

MR. COX: Lee Cox, OAS and CRCPD.

I'm hesitant because at lunch I was told I spoke too much this morning.

(Laughter.)

DR. COOL: Not true.

MR. COX: But speaking for the states, we have to keep in mind that we're talking about these decisions effect both material licensees and x-ray producing machines.

And I think before we go down the path of our European neighbors, we might want to learn more about the European occupational model and also, more importantly, the frequency of medical procedures in these European countries.

Having lived under social medicine in Australia, I would suggest that they are able to meet the lower dose limits of 2R per year just by the sheer less frequency of medical procedures in those countries if you believe that they are wearing their film badges.

I would also comment that probably the level of industrial radiography in those countries are not as robust as they are in this country, especially most recently with the stimulus package from the federal government.

So, we might need to learn more about how they're accomplishing this lower level before we dive into changing how we do business in this country. Thank you.

MR. HICKMAN: Erskin Hickman, United States Enrichment Corporation.

I really hate to throw this out. It may be showing my own ignorance, but is it a foregone conclusion that with this regulatory change that we'll be going to the SI units and doing away with the rad, rem and roentgen?

As an old-timer, I sure am comfortable with that.

DR. COOL: No, it is not a foregone conclusion. And if anything, I suppose I would have to say that the leaning is probably not to open up the government's metrication policy with this rule.

Because when you raise that issue and it has been raised before, you raise things which are much broader than the question of NRC's radiation

protection regulations.

Kevin.

MR. BUNDY: Kevin Bundy, Canadian Nuclear Safety Commission.

Larry, since I thought of it a little bit longer, there is another environmental dose consequences. When we have environmental impact statements for new projects or changes to major projects, we do require of course impact on environment. And part of that now includes calculation of dose to biota.

So, that is included. I don't know if there's ever been an issue or not, but that dose is required.

One thought, Donald, that's come to me maybe hopefully not too late in the game, but is the radon - new radon risk coefficients part of this discussion too that are - that the ICRP's talking of changing?

DR. COOL: That's also a good question. Actually, the discussion on the radon coefficients and those programs resides mostly, and again I'm looking at Mike Boyd, in the EPA discussions, the indoor air program and some of their activities.

Because to the extent that I am aware,

radon does not play a significant contributor for most all of the NCR licensees under our regulations. But I know that there has been active discussion in EPA around those coefficients and some of the changes.

Mike, I don't know if you'd like to jump in on that.

MR. BOYD: Well, I guess, you know, you have your Appendix B effluent guidelines which do include radon air emissions, but those would just change based on the ICRP methodology changes.

DR. COOL: Right.

MR. BUNDY: Just one other point with respect to the comment Lee made about the doctors and that. I was part of the original discussions with the BSS that got the current draft. And there was a lot of talk of lifetime doses at that time.

And it was just after ICRP 60 had come out. And there was a large contingent from the French medical doctors, cardiologists and radiologists that were pushing for the larger - keep the larger dose. The same sorts of things I'm hearing now.

DR. COOL: Stephen.

MR. BROWNE: You opened the door very early on with the potential for changing some terminology with regard to -

DR. COOL: Close to the microphone.

MR. BROWNE: You opened the door early on in the discussion yesterday with potential for changing the terminology regarding total effective dose equivalents to total effective dose. And it got me thinking about other terminology like deep dose equivalent and skin dose equivalent.

And if you look at the ICRP, they don't use those terms. And the terms they use are actually a little bit easier, I think, for a person to understand with respect to how they relate to applicable limits.

For example, they use effective dose to the whole body. They use effective dose to the skin. And so that might be something to consider. I kind of suggest that hesitantly because that could have a lot of implications in terms of changing a lot of documents and records and things like that.

But it - for people that - for the average person that we train, deep dose equivalent and skin dose equivalent is always something that we have to explain what in the world that means whereas whole body and skin are something they can probably understand more easily.

DR. COOL: Thank you. Mike.

MR. BOYD: Maybe to throw something out I don't think I've mentioned before, I think if I were to offer a suggestion for something new in Part 20 it would be - I mean, I think operational values almost have to be in either annual dose limits or for, you know, radionuclide concentration - activity concentration limits.

But for situations where you're regulating perspective doses from, you know, determining how clean is clean, the sort of things that EPA does through Superfund and other programs like that, I think you'll find that there's a lot of merit to risk-based approaches.

Because if you start from a nominally-accepted risk to a receptor over a period of time, then you're integrating. You're not, you know, you're allowing for decay, you're allowing for weathering, you're allowing for anything that could happen at a site over the period of future use and integrating that value to see what is a concentration today that could give you an acceptable lifetime risk.

And there are other, you know, the remediation is just one example. There are examples in emergency response and, etcetera.

So, I think risk as a unit of, you know,

as a planning unit for setting clean-up goals and things like that which you might do under Part 20 would be a useful thing to consider.

DR. COOL: Thank you. Cheryl.

MS. BEEGLE: Back to something we sort of talked about yesterday for limits for members of the public, and we didn't touch on this, sort of touched on it, when you're looking at individuals who participate in research treatments in the medical community, they sign, of course, consent agreements to participate in those protocols. And there is disclosure in those agreements as to the dose that they might receive from the various procedures.

And then those consents are actually - they're actually approved before they're used in the protocols by the institutional review boards and then provided to the patients.

And so I can see that if we get into lowering according to the ICRP the limits, that it could throw a huge monkey wrench into these disclosure issues.

Because as Mahesh and I were speaking about yesterday, and Mahesh isn't here today, the exposures to public individuals be it their family members or whoever or the individuals themselves, is

huge when they're in these protocols. And I know there are some constraints as to whether it's their second - perhaps they're being treated for cancer. So, it's their exposure to developing a second cancer as opposed to their first cancer, but it could impact that area of health care also significantly.

DR. COOL: Okay. Thank you. One note at least my recollection, the public dose limits in Part 20 in fact specifically exclude the dose to patients, the dose to individuals likely to be exposed to patients and released under the medical patient release criteria, and individuals receiving exposure under approved research protocols.

I'd have to go back and verify that, but I believe that that's currently part of the language that's in the public exposure limits.

MS. BEEGLE: Yeah, that's what I wasn't sure when I was looking back at this.

DR. COOL: Thank you.

MS. BEEGLE: Thank you.

DR. COOL: Ellen.

MS. ANDERSEN: My comment from the power reactor perspective - again, this is Ellen Andersen from the Nuclear Energy Institute.

My comment is more pragmatic because it

has to do with implementation. If in fact you determine that you're going to make some of these changes, whatever those changes are, we want to ensure that we have an implementation period such that we can establish a good - I guess we'll use that word - change management plan so that we can properly train our workforce, we can budget for procedure revisions, for software changes, whatever needs to be done.

We don't want to do this haphazardly. We want to do it right. We want to do it right the first time. Don't want to get into a situation where we violate any of your regulations.

So, we do request that we have an implementation period that is such - such that we can do this right the first time.

DR. COOL: Good. Thank you.

Let me now come to the audience because I know there are a couple of people who wanted to speak. Come on up to the microphones.

MR. MECK: Robert Meck, Science and Technology Systems. It's my understanding that the Germans have legally defined levels of radioactivity that are not subject to regulatory controls and regulations.

They've implemented these. This would be

a useful thing for the NRC to reconsider.

DR. COOL: Thank you.

FACILITATOR HODGKINS: As the next persons coming to the mic, I do have a webinar issue that was submitted from Vince Holahan.

Development of a standard for the release of volumetrically contaminated material. No standard currently exists.

DR. COOL: Okay. Thank you.

Microphone 2.

MR. COLEMAN: Neil Coleman, ACRS staff. Just a couple of observations.

I guess I just have to put on the transcript it's a little bit disingenuous of all of the federal regulatory organizations, the kinds of doses and differences that we're talking about compared to the very sizable increases in diagnostic doses that the public is getting.

Whatever changes are made in the regulations, there needs to be more communication to the public about the actual risks of all of that diagnostic work.

Okay. Second point, something was kind of bothering me all day yesterday and I realized what it was. The discussion - and this is a comment on the 5

rem limit. 2 rem versus 5 rem limit.

There were three options that were presented early on yesterday, but you know the discussion was all guided by those three options.

First of all, were other options considered because there are many other options that could be considered that might be more favorable than the ones that were shown.

For example, why is a single limit number used?

In the technical world we live in, this does not reflect uncertainty at all. It does not communicate uncertainty.

It's one of the things, I think, that leads to the irrational fear that so many in the public have about all things radioactive.

So, one plausible alternative option would be a dose limit range, coincidentally, from 2 to 5 rem.

Since we have no evidence whatsoever of a difference in risk between those numbers or, for that matter, 3 rem or 4 rem or 4.1, this would be a possibility because it has some sort of that and similar options, a certain elegance to them because you wouldn't really have to change models.

It would embrace the limit from ICRP, which has no technical basis. But my former office director, Carl Paperiello, I don't know if he's still here, said it would be very nice to be able to embrace what ICRP has done and sort of have more consonance with the international community.

That's a way to do it, but what we do should be scientifically based. And two versus five, anything below ten, there's no real risk difference.

But also it's important to send a message to the public that there isn't a number above which people get sick and die. There's a very large uncertainty in all these numbers.

As long as you're below 10 rem, no difference in risk.

DR. COOL: Thank you. Anybody else from the audience then that would like to step up to the mic?

Here we go.

MR. CONWAY: Ken Conway, Babcock & Wilcox.

I understand that a significant part of the internal dose calculation redo will not be done in the 2014. I'd much prefer that if there is going to be a change, it be done all at once with a complete data set.

DR. COOL: Thank you.

FACILITATOR HODGKINS: Anybody else to the microphone? Any introverts having difficulty getting to the microphone?

DR. COOL: Do we have another web - we do have another statement from the last presentation. Okay.

This was a follow-up from Vince Holahan. We have at least one person who is contributing from the web, thank you, Vince, who I think just making a note to put on the record here that the IARC, the I-A-R-C study that was referenced - I'm not sure who put that on the record.

He said - his statement is that he does not believe that the study is useful because the methodology imposed excluded cumulative high-dose individuals. The maximum exposure was 500 millisieverts with no neutron exposures.

So, we have a somewhat countervailing view to the statement put on here by someone that that perhaps might be another source where we could look at cumulative exposures. Certainly something that the staff would have to look at. Thank you.

Do we have any other web items?

Kim says yes. Perhaps I should give you

the microphone and let you read it off the screen.

Have you got it? Okay. Kim.

DR. BUTLER: The ICRP basis is related to lifetime dose of a hundred rem not so much indicating that there is a risk at 2 rem per year. It should also be noted that we are compensating folks who have received organ doses on the order of a hundred rem.

DR. COOL: Okay. And that statement was from Cindy Bloom. Okay. Thank you very much, Cindy. We appreciate that.

Let me wrap up -

FACILITATOR HODGKINS: Yes.

DR. COOL: - my piece very quickly because people are saying what's going to happen next?

I'm going to come back to a slide that I used way back yesterday morning to sort of reset this. We are in the process of trying to assemble a few points and comments.

This was the first of three workshops. We will be in Los Angeles next week. We will be in Houston the week after. A very similar format and set of issues to gain further views and opportunities.

Each time you get a group of people together, you get some new bits and pieces, maybe some slightly different flavors, perhaps some things that

are similar. We're trying to get all of those and not just be here close to Washington, D.C.

There is an open record, and let me reemphasize and invite everyone to submit additional thoughts on the record. The comment period that we announced in our Federal Register Notice for these meetings is open until January 31st of 2011.

The NRC staff will be taking all of this information and will be trying to develop a set of policy recommendations for our commissioners by late next year, with pros and cons, what we've heard, all of the bits and pieces here around some of these issues, and provide that to the Commission and seek commission direction for next steps to take.

So, obviously I cannot stand here today and tell you that certain things will or will not happen.

When the Commission gives this direction on some key issues, the staff would need to complete some of the technical basis work. And some of that would certainly have to consider the availability of some of these numbers that ICRP and others are continuing to work on which could eventually lead to a proposed rule with whatever set of things the Commission concluded needed to actually move forward

to rule making.

That would, of course, provide additional opportunities for public comment. I would fully expect it would be additional opportunities for public meetings as part of that process.

Now, you say so exactly how long is that going to take? Good question.

The crystal ball is a little bit foggy, but it sort of shimmers that the NRC staff is supposed to give its recommendations to the Commission late next year. That one is clear.

When the Commission comes back to us with their recommendations in the process that they use, not quite so clear, could be a couple months, could be longer, the Commission could choose to hold its own meeting or meetings on the subject. That has been known to occur.

Completion of the technical basis development and any proposed rule probably then looks like the earliest 12, maybe even a bit longer than that. With public comment and final rule, I would guess that you're probably in the vicinity of 13 to 14, roughly. It gets murkier as you go out in time.

Now, that's not a short period of time. For someone like me who remembers the last time that

it was 12 years, it still sounds like a short period of time, but it does have some significant additional opportunities for comment and process.

There's at least one person who mentioned the fact that there would be some new reactors that are starting to be looked at for construction authorization permits looking at 14 to 16.

The staff is in fact aware of that and has talked about the fact that it would be nice to have the new system in place for the new reactors to operate on. But we also recognize that the licensing basis is the existing basis today, and the initial license would be on that. So, there are a whole series of those issues.

There's also the implementation issues that several have raised. Rightly so. Staff will have to look at that. The last time there was a revision of Part 20, there was a three-year implementation period between publication and when the rule actually became effective.

So, the staff will look at that and there is certainly precedence for providing additional time to make sure that guidance documents and other materials are in place.

So, all of that not in the sense of trying

to give you a warm fuzzy, maybe it's a sort of cold fog about how long it might take, but there will be a number of additional opportunities.

And the bottom line that I want to leave you with is when you walk out of here and you walk downstairs and you head back to the metro or you get in your car and you have that oh, I wish I had said that, write it in.

When they did the revision of Part 20 now a long time ago, the group that wrote that proposed rule had this little mantra. Now, this was back in the days of the internet and everything. And the little mantra they told everyone was keep those cards and letters coming.

I repeat that to you. You can add Emails to the list. Dan.

FACILITATOR HODGKINS: Thanks, Don.

Just before we leave, there are going to be two other conversations. Let's call them conversations. And through these two days that you participated, we've kind of buried the way we did the feedback.

And at first we thought you would all be very verbal and participatory, and it seemed like you were a little shy and got along quite well and just

echoed each others' comments.

Then when we started the round robin, we did get more differences of opinions and thought ideas and those kind of things.

So, what would help us tremendously is an opportunity for you folks to give us some feedback especially for the next two, as far as what we did well and what we could improve upon. And we'll do the round robin as soon as the microphone on Number 2 gets a chance to have a comment.

MR. PEDERSEN: Yeah, just a real short comment.

Don, in the last couple of days you've invited people to provide additional comments and you've just finished another invitation, but I didn't see anything in the package that was handed out with a single contact point.

Do you want to give an Email address or a website that those - that would be the appropriate way of submitting those?

DR. COOL: Sure. You're right. The actual little last slide, we didn't include the Email address.

There are several ways to submit comments. All of those are in the Federal Register Notice which

was actually in each of the notebooks and available for handout.

So, I'm not going to try and list all of those, but I will tell you there is a dedicated Email address and it's not mine.

The dedicated Email address is actually regs4rp. That's R-E-G-S, the number four, R-P at NRC.gov. And all of those Emails that come in are immediately sent to the docket and made part of the record.

But I would invite you to use any and all of the methods that are listed in the Federal Register Notice. Because as always, there's lots of ways to do it, but thank you, Roger.

FACILITATORY HODGKINS: And, Kate, in honor of you starting so many times, let's start with you once again.

MS. ROUGHAN: Well, maybe that's one of the general comments. Maybe you should mix up who starts. Because when you're the first one, sometimes you haven't really thought the issue through, but I think the round robin is an effective way to do it as opposed to just waiting for someone to comment.

I think one of the reasons you didn't get a lot of contentious comments is that we're all in

agreement of how we want this to go.

MS. THISTLETHWAITE: Duann Thistlethwaite, Triad Isotopes.

I would just agree with Kate. I like the round robin method. I would have liked to have had the PowerPoints beforehand. So, maybe sending those out to the future panelists so they could review the questions and things beforehand, that would be great.

MR. MATTMULLER: Hi. Steve Mattmuller. I guess my first thought would be to give you a lesson in medical ethics, and that would be first do no harm.

Because we are concerned on the medical side if the limits do get lowered, that this will have a severe economic effect on some of our important operations in PET and production centers.

So, you have - you say that you try to make risk-informed decisions. And so I would stress that you make sure you're well informed before you move the limit. Thank you.

MR. HAYNES: Larry Haynes, Power Reactors.

I personally enjoyed the format. I thought it was very helpful to have the various groups involved, various aspects of the regulatory environment.

I learned a tremendous amount about the

business that you guys are in and how different it is from the power reactor side of the world. And I enjoyed it and I appreciate your leadership for the sessions.

MR. MARSHALL: George Marshall, APNGA.

Again, nothing new to add. I do agree with the round robin concept and again enjoyed this. I did learn to help me understand better for this segment of the industry.

MR. GIANUTSOS: Phil Gianutsos with Energy Solutions.

I'll echo Larry's comments. I see the whole issue in terms of our specialty and learned a lot just with the general discussion.

And again with the other folks' agreement, I guess the round robin is the effective way.

DR. RABOVSKY: Joel Rabovsky, Department of Energy.

I too learned a lot. Very enlightening. And I think the round robin is an effective way of getting various viewpoints.

MR. COX: Lee Cox, Agreement States and CRCPD.

As pointed out that I was representing 88 states here today -

(Laughter.)

MR. COX: - maybe that's why I used the mic quite a bit, I really enjoyed this format. And both leadership of the NRC and your leadership was great. I thought the round robin really brought out a lot of diverse opinions. Some similar, some different.

I learned a lot about the various industries and I was encouraged to hear similar comments that the states are facing with this issue. Thank you.

MR. HICKMAN: Erskin Hickman, United States Enrichment Corporation.

Having participated in the new Part 20, now the 1991 old Part 20, this is a real good kickoff for the pending regulatory changes.

I don't remember us having this type of format back in the late `80s, early `90s, and I think this is a good introductory kickoff.

MR. BUNDY: Kevin Bundy, Canadian Nuclear Safety Commission.

I'd like to echo those comments. This is - I've never participated in a forum like this before and I'm sort of wondering if we shouldn't maybe use the same sort of forum as a kickoff when we start

looking at our own revision of the regulations.

And I do thank you for inviting us down to come down. I hope my comments have been appreciated. And I have - another thing I'll be taking back is the verifier dosimetry wearing practices at our cyclotrons. Thank you.

MR. BROWNE: Yeah, I think the format was excellent and everything was very well run and I learned a lot.

MR. BOYD: If I can speak for EPA, which I really can't, but I think it - I really enjoyed the round table approach. And I am just excited that EPA and NRC are coming to similar viewpoints about it being the right time for considering the change to get rid of all these old hodgepodge of bases for our regulations and hopefully move to a consistent basis that's a little more coherent around the world too.

MS. BEEGLE: Cheryl Beegle speaking to the medical side of things. I wished I was going to LA with you all because I think it would be a wonderful meeting to attend from the medical side.

I'm sure you will get a lot of very pointed feedback about occupational exposures in the medical field especially from the cardiology and interventional radiology side.

Very interesting to hear all the other sides. I particularly like the industrial radiography stuff.

FACILITATOR HODGKINS: Are you saying we shouldn't do the round robin in LA?

MS. BEEGLE: No, I would do it, but it's going to go on and on.

MS. ANDERSEN: Ellen Andersen from NEI.

I just want to thank you guys for the opportunity to sit on this panel and thank you on behalf of the power reactor section.

In our industry, this is a great regulatory process and I hope that in the future we can provide more comments and assistance to you as you go forward with this.

FACILITATOR HODGKINS: Thank you.

Now, for the audience members, you all were sitting here because you needed to be here for one reason or another.

Did you feel included, excluded, good process? How do you want to - should we proceed the same way involving you or do you just want to be left alone?

This would be the part where the audience participates. Any comment? Please.

MR. SMITH: It has been at least half an hour since I stood up here. So, yeah, I think that the audience participation, you get a wider variety in the audience than you do on the panel. And some of us have been through this before. I was around for the last revision of Part 20. And some of us are kind of new to this.

So, it's a bigger variation. So, I don't think you can force the audience any more participation than that.

You might want to try planting a few questions in the audience or getting some people in there to get that participation going in there.

And as far as the panel is concerned, you might also want to get Mike some assistance occasionally. He was here fighting the entire rest of the panel a few times.

FACILITATORY HODGKINS: I know. He's a good arm wrestler.

Anybody from the center part? Back table, you guys okay with everything? Any comments, concerns? Anybody else then?

With that, then I think we'll close. Having had that verbal evaluation, please fill out your evaluation because we really are trying our best

to make sure that this process is one that really respects the differences that everybody has. And the feedback that we'll get is definitely going to be used at the next two round tables.

Anything else? Closing remarks.

DR. COOL: I just want to add my thanks to all of you for your active discussion and contribution. I greatly appreciate it.

There will be another day tomorrow for Part 50 Appendix I, the reactor effluents. So, I hope to see a lot of you back. We will use a similar sort of process to work through those issues.

And I understand, Kim, we have one bit of feedback from the web. Should I just let you read it rather than you trying to write it out?

You're shaking your head no. You got it. She's quick. And this is from Cindy Bower (ph): Thank you for the webinar format. Although it wasn't perfect, it was nice to be included.

Wow. After the black mark of all of the frustrations that we've had, I very much appreciate that because we were just as frustrated here as I expect all of you on the web were.

And with that, my thanks. Safe travels.

(Applause.)

(whereupon, the proceedings were adjourned at 2:43 p.m.)