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NUCLEAR REGULATORY COMMISSION

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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

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559th MEETING

+ + + + +

FRIDAY

FEBRUARY 6, 2009

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ROCKVILLE, MD

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The Advisory Committee convened in Room T2B3 in the Headquarters of the Nuclear Regulatory Commission, Two White Flint North, 11545 Rockville Pike, Rockville, Maryland, at 8:30 a.m., Dr Mario Bonaca, Chair, presiding.

ADVISORY COMMITTEE MEMBERS PRESENT:

MARIO BONACA, Chair

SAID ABDEL-KHALIK, Vice Chair

J. SAM ARMIJO, Member-at-Large

JOHN D. SIEBER

SANJOY BANERJEE

DENNIS C. BLEY

JOHN W. STETKAR

ADVISORY COMMITTEE MEMBERS PRESENT: (cont.)

DANA A. POWERS

WILLIAM J. SHACK

MICHAEL T. RYAN

OTTO L. MAYNARD

CHARLES H. BROWN, JR.

HAROLD B. RAY

MICHAEL CORRADINI

GEORGE E. APOSTOLAKIS

NRC STAFF PRESENT:

KIMYATA MORGAN BUTLER

JEAN-CLAUDE DEHMEL

TIMOTHY FRYE

ALSO PRESENT:

RALPH ANDERSON

J. STEWART BLAND

A G E N D A

P R O C E E D I N G S

(8:29:55 a.m.)

CHAIR BONACA: The meeting will now come to order. This is the second day of the 559th Meeting of the Advisory Committee on Reactor Safeguards. During today's meeting, the Committee will consider the following; SECY-08-0197, Options to Revise Radiation Protection Regulations and Guidance Based on Recommendations of the International Commission on Radiological Protection, ICRP, Subcommittee Reports, future ACRS activities, and report of the Planning and Procedures Subcommittee, reconciliation of ACRS Comments and Recommendations, and preparation of ACRS reports.

The meeting is being conducted in accordance with the provisions of the Federal Advisory Committee Act. Mr. Tanny Santos is the Designated Federal Official for the initial portion of the meeting.

We have received no written comments or requests for time to make oral statements from members of the public regarding today's sessions. A transcript of a portion of the meeting is being kept, and it is requested that speakers use the microphones, identify themselves, and speak with sufficient clarity

and volume so they can be readily heard.

We will now start with the first item on the agenda, which is essentially the SECY-09-0197, Options to Revise Radiation Protection Regulations. And I'll turn now to the Cognizant Member, which is Mike Ryan.

MEMBER RYAN: Thank you, Mr. Chairman. I appreciate that.

We had a briefing several meetings ago from Dr. Don Cool that gave us the history and background of where we are today, and where 097 was going. And today's presentation by Dr. Kim Morgan Butler will be on the preferred option that the Staff is recommending to go forward with, and Jean-Claude Dehmel is also at the front table to help with some of the background history and questions. So Dr. Cool sent his regrets, but he's on an international trip for the Agency meeting, and I believe it's Vienna this time, so he's hard at work with the rest of the International Community as a similar topic. So without further ado, Dr. Butler, please go ahead.

DR. BUTLER: Thank you. Thank you, Dr. Ryan. As you mentioned, my name is Kimyata Morgan Butler, and I work for the Office of Federal and State Materials and Environmental Management Programs.

Over the last past year or so, I've been working with Dr. Cool, and Jean-Claude Dehmel in the Technical Advisory Group on preparing and drafting the options to revise radiation protection regulations. This eventually became SECY-09-0197.

Just to give a little overview, the Technical Advisory Group is comprised of senior level HPs, and senior level scientists throughout the Agency, each representing their representative office, so Jean-Claude represents NRO, and Thomas Young and I, we serve the support function on the FSME side.

That Technical Advisory Group reports directly to a Steering Committee, and the Steering Committee is comprised of division-level managers here at NRC, and is Chaired by Mr. Mark Schaeffer. He's the Division of Intergovernmental Liaison and Regulations -- Rulemaking Division Leader, sorry.

Dr. Cool really wanted to be here today, but he wasn't able to make it. He's in Vienna, as Dr. Ryan mentioned. He's on a flight back, and he sent his regrets. And I'm just happy that he asked me to join you guys today, and I'm very honored, and thank you for having me.

(Off the record comments.)

DR. BUTLER: So just to give you a little

background, and to let you know why I'm sitting here before you today, the NRC Staff, which was namely Dr. Cool and Mr. Dehmel, they gave an information briefing to the ACRS on November 6, 2008. As part of that presentation, they gave a background on the ICRP, and their recommendations. There was also a robust discussion on the nature of the ICRP, the history of the ICRP, how it came about, who are the members, et cetera. And in the backdrop of that, he also gave a background on the Radiation Protection here at the NRC. And as part of that, he also gave history about our interactions with the International community, with other federal agencies, and with states and state governments, both agreement states, and non-agreement states. Also as part of that discussion, there was -- Staff identified technical issues in 10 CFR Part 20, and 10 CFR Part 50.

As a result of that discussion that we had within the Technical Advisory Group and the Steering Committee, and the discussions on the Staff identified options, there was a drafting of SECY-08-0197. The last time Dr. Cool came and gave the discussion, that paper was headed into concurrence, and it remained mainly unaltered during that concurrence process. So the paper that he presented before, there's not many

changes from what the Staff views are. So that was published, or finalized on December 18, 2008, and is publicly available.

So in the next slide, I'm just going to give you some information about that paper, SECY-08-0197. It was a policy issue notation vote paper, and it was provided to the Commission on, as I mentioned, December 18, 2008. It provided the options for the next steps regarding NRC Radiation Protection Standards. And it also provided background on technical issues in 10 CFR Part 20, and 10 CFR Part 50.

So just to reiterate some of the background. The last time Part 20 was updated was in 1991. It was after a 12-year process, and during that process, there were a lot of considerations made. And one consideration was which ICRP recommendations would stand, and which ones would not.

As you may know from Don Cool's last discussion, Part 20 is based on ICRP 2630 for the Occupational Dose Limit from 1977. And the public dose limit is based on the ICRP Part 60 recommendations, which were finalized in 1990. So the question -

MEMBER APOSTOLAKIS: How often does the

ICRP update its recommendations?

DR. BUTLER: Traditionally, they've updated their recommendations every 18 years or so.

MEMBER APOSTOLAKIS: Eighteen?

DR. BUTLER: Eighteen years or so.

MEMBER APOSTOLAKIS: So you're right, around 1991?

DR. BUTLER: Yes. And so with that recommendation, I always ask the question myself, why did we choose -- why did we go with the 1977 recommendations for occupational, while we went with the new updated, at the time, dose limit for public?

Well, at the time, there was a meeting in Paris that ICRP held, and they revealed that they will be changing their occupational limits, and also their public dose limits from 500 millirem to 100 millirem. The NRC, we agreed with the public dose limit lowering, but in order to lower the occupational dose limits, we had to vet it within our system. So, actually, I was very pleased that we already had a full study where we looked at the impacts of the reduced dose limits on NRC licensed activities. And it was a NUREG here. It wasn't finalized until 1995, so we didn't have enough background material in order to reduce the dose limits to the average of 2 rem per

year, as ICRP recommends in their 1990 recommendations. So Part 20 is based on two sets of recommendations, ICRP 60 and ICRP 2630.

And then on top of that, Part 50 was not updated during the last update. That's because it was based on explicit dose criteria. So over the 12 years that they updated Part 20, the only regulations that were also updated with Part 20 were the ones that were cross-referenced to Part 20. So if there were explicit dose criteria, then that wasn't an eligible regulation to update.

MEMBER RYAN: Dr. Butler, correct me if I'm wrong, but those Part 50 specific limits are based on 1959 ICRP guidance.

DR. BUTLER: Yes.

MEMBER CORRADINI: The dose limits - I guess this was probably mentioned in November. I don't remember the answer, so just -- the Part 50 limits involved are affecting what part of the operation? I don't remember. Because you said occupational dose, public dose, and then Part 50 is what, for accident calculation?

DR. BUTLER: Yes, for specific dose criteria for -

MR. DEHMEL: Part 50 is not for accident

calculation. They are design objectives in numerical criteria that govern routine effluent releases from nuclear power plant, liquid and gaseous effluents.

MEMBER CORRADINI: But I -- it was my understanding, though, that 10 CFR 20 was also partly -- at least the previous tables were, in terms of concentration release, also affected what could be released from effluents. Am I misunderstanding?

MR. DEHMEL: No. That's why there are criteria also in Part 20, namely, Appendix B, Table 2 addresses effluent concentration limits for all licensees.

MEMBER RYAN: Not just reactors.

MR. DEHMEL: Not just reactors.

MEMBER CORRADINI: And 50 should be consistent with 20.

MR. DEHMEL: It's a subset, yes.

MEMBER CORRADINI: Oh, it isn't.

DR. BUTLER: It is not.

MR. DEHMEL: Basically, there are two requirements in the effluent releases, which with respect to reactor operations. One is, a power plant has to, by all means, always comply with Part 20, Appendix B, Table 2 effluent concentration limits no matter what.

MEMBER CORRADINI: Okay. Everybody.

MR. DEHMEL: Everybody. Above and beyond that, there are a lot of design objectives specified in Appendix I that further reduce the amount of radioactivity that's released in the environment. So, for example, the effluent releases from the stack is limited to 5 millirem per year, and liquid effluents limited to 3 millirem per year. And that can be readily converted to corresponding concentrations.

MEMBER CORRADINI: But then I'm trying to remember, how does Part 50 control anything given that 10 CFR 20 limits are different and lower currently.

MR. DEHMEL: Appendix I is not a safety standard. Part 50.34 specifically says that, that it's not a safety standard. Essentially, it's a set of operating requirements that regulate and control some specific operational requirements on the licensees to monitor and control, and minimize liquid effluent and gaseous effluent releases.

MEMBER CORRADINI: Okay. Thank you.

MR. DEHMEL: So Part 20 is governing in all cases.

MEMBER APOSTOLAKIS: Let me understand what Dr. Ryan said. You said that Part 50 was last updated in `59?

MEMBER RYAN: The dosimetry calculations methods which ICRP has been responsible for were first promulgated in `59. That's one system of dose calculation that still survives in some parts of supporting regulations today. Some parts use the 1970's version, which is 26 and 30, and then the current plan is to synthesize that into a more coherent system, which we heard at our briefing from Dr. Cool, and use publication 103 as the basis.

Now, that's going to take some careful and measured work over some period of time, which I think is the essence of the Staff's preferred option to do that systematically and carefully, so that you're not redoing the same thing perhaps two or three times to get it all up-to-date, if there's a more comprehensive plan to make that happen.

One thing just as an artifact, nobody in any academic program I'm aware of still teaches ICRP 2. In fact, you can't get a copy of ICRP 2, so it's high time to go ahead with the updates.

DR. BUTLER: Yes. I only two people with -

MR. FRYE: Excuse me a second. This is Tim Frye. I'm the Chief of the Health Physics Branch in the Office of New Reactors. And I just wanted to

clarify. I think Jean-Claude and Dr. Butler just mentioned this, but when we talk about Part 50, we're talking now Part 50, Appendix I, which is the ALARA Guidelines, which provide lower, more limiting guidelines for achieving ALARA. And so, it's not -- that's the part of Part 50 we're talking about. That is based on ICRP 2, the Appendix I.

DR. BUTLER: So Part 50, Appendix I, is based on ICRP 2, which was finalized in 1959. So internally at the NRC, we're on three different -- we're regulating based on three different sets of ICRP recommendations, ICRP 2, ICRP 2630, and ICRP 60. So, as you can see, that may cause -- and as you mentioned, Part 20 and Part 50, they're not the same as this point, so that led us to the Staff recommendation that yes, we want to take steps towards moving towards alignment with ICRP 103, as Dr. Ryan mentioned, to have everything on the same accord. So the Staff recommends that the Commission approve Commission approval for Staff to undertake stakeholder dialogue and technical basis development.

So in the next slide, I'm going to go into a little detail with the regulatory options, just give you an overview at first, and then give details. So the Staff thought of three options. The first option

is a no-action option. With that option, we wouldn't update Part 20, or any of the related regulations. We would simply update the regulatory guides that accompany the regulations. And they're already scheduled to be updated.

The second option is to update 10 CFR Part 50, and Part 50, Appendix I, those specific -- those criteria. And the third option was to engage stakeholders and develop technical basis to increase alignment of the NRC Radiation Protection framework with ICRP 103.

MEMBER CORRADINI: You're going to explain the third bullet more fully?

DR. BUTLER: Yes.

MEMBER CORRADINI: Okay.

DR. BUTLER: Yes.

MEMBER APOSTOLAKIS: Or what's the difference between the second -

DR. BUTLER: Yes. In the upcoming slides, I'm going to explain each of them. There's a difference there, and I'll get to it in the next slide.

So the factors that were considered was the schedule for the technical information. Right now, as I mentioned, ICRP - for example, when I

mention ICRP 2630, ICRP 26 was the report, and ICRP 30 was the supporting dose conversion factors, et cetera. And so, there's a ICRP Publication 107 planned for 103. ICRP publication 107 will not be available until at least 2011 for some of the most used, regularly radionuclides, and 2014 for some of the other transuranic radionuclides. So that would give us a time, the Staff took that into consideration, and we gave thought to what could we do during that time period.

Also, we considered new reactor licensing, both current and future new reactor licensing. Jean-Claude mentioned to me before that there may be a second wave of applications, COL, Combined Operating Licensing applications that come in, so we took that into consideration.

There's other issues that may be raised outside of the ICRP changes. For example, the waste classification. That waste classification, in and of itself, is not on the table right now, and we may consider that later. And, also, there's the resources that are involved. So last time Part 20 and its related regulations were updated, there were a lot of resources that were involved, so we had to take into account the resource levels for each option.

So the next slide I'm going through -

MEMBER CORRADINI: You're probably not going to go back to your -- you don't have to go back, but the last thing you said about other issues in waste classification, you're not going to talk about that any further?

DR. BUTLER: No.

MEMBER CORRADINI: So just remind me, by changing this, you would actually alter what's Class B, Class C? It could alter that definition?

DR. BUTLER: Well, the last time Part 20 was updated, there was no updates to Part 32, Part 50, Part 51, Part 61, or Part 72. So this time we're going to specifically make sure that Part 50 is updated, but some of the other parts, they're not going to be updated this time.

MEMBER RYAN: Dr. Butler, on 61, for example, the dose limit is 25 millirem full-body, 75 millirem thyroid, and 25 millirem any other organ. That's completely out of step with Part 20 now, so the idea is that that ICRP 2 type of dose standard would be re-evaluated, or maybe even adjusted to be appropriate with perhaps an updated system. That's at least one idea that you talked about, so it wouldn't necessarily affect the concentration tables, but it

might affect how you cast a particular dose limit in a different part of the regulation. Does that help?

MEMBER CORRADINI: That helps a little.

MEMBER RYAN: Okay.

MEMBER APOSTOLAKIS: Is the NRC represented on the ICRP?

DR. BUTLER: Not specifically. The United States have John Boyce. He's the representative.

MEMBER APOSTOLAKIS: He's not affiliated with the Agency?

DR. BUTLER: No.

MEMBER RYAN: No.

DR. POWERS: It's a private entity.

MEMBER APOSTOLAKIS: I'm sorry?

DR. POWERS: It's not a government entity.

DR. BUTLER: Yes, it's not.

MEMBER APOSTOLAKIS: Oh, it's a private -

DR. POWERS: It's a foundation, or something.

MEMBER APOSTOLAKIS: Private foundation. Who's funding them?

DR. POWERS: Say that again?

MEMBER APOSTOLAKIS: Who is funding them?

DR. POWERS: Well, they get grants from government agencies, but becoming a government-

controlled organization.

MEMBER CORRADINI: Smart move, no bailout money. Huh?

DR. POWERS: They have no bailout money.

MEMBER CORRADINI: But if I just might. So NCRP is affiliated at all with ICRP. It's a separate national -

MEMBER RYAN: That is absolutely correct.

MEMBER CORRADINI: -- version of it.

(Simultaneous speech.)

MEMBER APOSTOLAKIS: So, and there is an understanding that we have to take into account what they say? I mean, how does that work?

DR. POWERS: Well, it's the equivalent of Public Law 103.

MEMBER APOSTOLAKIS: No, I'm talking about the ICRP.

MEMBER RYAN: We're under no obligation to accept anything, but it is -- has to be -

MEMBER APOSTOLAKIS: If we don't, we have to explain why not.

MEMBER RYAN: That's right.

DR. POWERS: Public Law 103, or something like that.

MEMBER APOSTOLAKIS: What does the public

law say?

DR. POWERS: It says if you come up with industrial consensus standards, you've got use them in the regulatory process, unless there's a good, sound reason not to.

Now let me ask this question, which may not be appropriate to ask at this point, but I'll ask it anyway, and you can tell me -- it strikes me that when I look at 20 and Appendix I, that as regulations, they are way too detailed, and that's creating a problem for us. When you have updated, quantitative guidance coming down, you have to update the regulations, rather than just updating the reg guides. When we talk about updating, should we be talking about changing Appendix I and Part 20, so that we don't have the quantitative -

MEMBER RYAN: If I understand right, Dr. Butler is going to talk a little bit about the exact issue, because it needs attention. We now have three different technical calculations that support dose assessments under the various parts we've heard about. And I think, if I understand their Option 2, and we'll hear about it in just a second, is to move forward to synthesizing that into one coherent system over time, but in a measured way that doesn't upset

the apple cart.

DR. POWERS: Well, I can understand that, but I note that even in 50.46 we struggle with the quantitative aspects of the regulation, and the detailed calculational aspects of the regulation. And we'd be much happier if all that stuff was in regulatory guides. And here in Part 20, and to some extent in Appendix I, you have an infinite number of quantitative calculations that you're struggling with because the numbers keep changing.

MEMBER RYAN: It sure would be nice to have a dose assessment manual that's in one place for all the activities, and maybe that guidance would be a better place for some of the detail. But I think we're still having a need to have a dose limit in the regulation itself, but how you do the calculations, and where some of the tables might be, that's certainly something to think about.

MEMBER SHACK: Well, it's just like the PTS Rule, where they're going to insist on putting the embrittlement correlation into the rule.

DR. POWERS: Yes, that's madness.

CHAIR BONACA: Why is it happening?

MEMBER SHACK: Because OGC tells them it has something enforceable, it has to be in the rule,

which is, presumably, the same reason it's in the rule here.

DR. BUTLER: And everything you brought up, we're going to take into consideration as we're developing the technical basis.

MEMBER ARMIJO: Everything?

DR. BUTLER: Not everything. I mean, well, not everything, specifically, but in terms of structure, in terms of structure and what should remain in Part 20, and what can be sent to a reg guide, et cetera. We're going to take that into consideration, also.

MEMBER RYAN: I think it would be helpful if we just think ahead without any specifics in mind, but to have specific briefings on some of those related questions as your process moves along.

MEMBER ARMIJO: Going back one slide. In the factors considered, I see a number of things that are sort of administrative.

DR. BUTLER: Yes.

MEMBER ARMIJO: What are the health benefits of this update? Isn't that going to be considered?

DR. BUTLER: We're already operating under adequate health and safety, even with the

inconsistency of the regulations. So what we're going to consider more is some of the -- the fact that the science will be updated, that there will be more consistency both internationally and within our own regulations.

MEMBER ARMIJO: So are the limits going to be reduced, or whatever dose level? Is there -

DR. BUTLER: We're going to take -

MEMBER ARMIJO: Okay. But you're going to consider that.

DR. BUTLER: Right. We'll take it into consideration. So, for example, the embryo/fetus doses right now, 500 millirem a year for NRC. The ICRP 103, it recommends 100 millirem. We're going to take into account what impacts and benefits that would have for our licensees and our stakeholders, if we make that change.

MEMBER ARMIJO: So you're not just going to buy into that 100?

DR. BUTLER: Not carte blanche, just because ICRP tells us -

MEMBER ARMIJO: Good. That's the one change that bothers me the most, because I think that will likely lead to a lot of females not declaring pregnancy.

MEMBER CORRADINI: And, can actually make it more -

MEMBER ARMIJO: Right.

DR. BUTLER: Yes, we have to weigh whether -- because we also want to -- right now it's 500 millirems, and it goes back from gestation, the whole gestation period; whereas, the ICRP recommendation is 100 millirem from the point of declaration forward. So it may be more or less protective, we just have to make sure that we vet that through our process, and decide which one is the best option to move forward with. So that's an example of something that we're going to take into consideration.

So the next few slides I'm going to go through and explain why -- how the Technical Advisory Group, and the Steering Committee came up with one option over the other options. So the punch line is Option 3 is the Staff preferred option, and the question is, why is Option 3 the best option, in our opinion.

So the first option is a no-action option. If the Commission accepts this option, then they conclude that there's no need for changing any of the current regulations. There's adequate protection, as I mentioned. There is a pro to this, that there is no

resources needed. As I mentioned before, the reg guides are -- the Radiation Protection Regulatory Guides, they're on the schedule to be updated, and they're already funded, so no additional resources would be needed. There are a few cons.

DR. POWERS: Is there not a pro here that adequate protection is still maintained?

DR. BUTLER: I'm sorry?

DR. POWERS: Doesn't Option 1 preserve adequate protection?

DR. BUTLER: Yes. And I think all of the options -- under all options, there's adequate protection, so that wasn't the main driver.

DR. POWERS: Didn't include that, Mike, and I think it should be included.

MEMBER RYAN: Well, one thing I think we'll hear about, the last bullet under Option 1, we have a representative from NEI, I believe, who wants to make some comments when we're done, so we'll hear the industry view on Option 1, and what their views are.

MEMBER APOSTOLAKIS: Given that the concept of adequate protection is really ill-defined, I don't know how you can say -

DR. POWERS: It is not ill-defined.

MEMBER APOSTOLAKIS: It is.

DR. POWERS: It is perfectly well-defined.

MEMBER APOSTOLAKIS: No.

DR. POWERS: You just don't like the definition.

MEMBER APOSTOLAKIS: It is adequate protection when we say it is, so I don't know. I mean, if the international standards have changed, how can you claim -

MEMBER ARMIJO: Those aren't international standards. Those are recommendations from an international committee, which doesn't, necessarily, set the standards for the NRC.

MEMBER APOSTOLAKIS: I understand that. I misspoke there. But the truth of the matter is -

MEMBER ARMIJO: Yes, you did.

MEMBER APOSTOLAKIS: -- that I don't know what the pro that says adequate protection is maintained means.

MEMBER SHACK: It's only a slide, guys.

MEMBER APOSTOLAKIS: The old adequate protection -- the current concept of adequate protection is maintained. That's what -

MEMBER SHACK: Fragmentism again.

MEMBER APOSTOLAKIS: Right? Dr. Ryan, is

that out of line?

MEMBER RYAN: I accept your comment.

MEMBER APOSTOLAKIS: We have a bunch of regulations and then we say if you meet them, there is adequate protection.

MEMBER RYAN: I think as a practical matter, too, other than the principle of adequate protection, which I think the regulations do accomplish that goal, but when you have three separate systems that are the technical underpinnings of various components of the requirements, it becomes very complicated to try and translate I'm meeting it over here, I'm meeting it over there, but I have to change my calculational methods to demonstrate that. So the inconsistencies from one part of the regulations to the other really make it difficult to demonstrate that you are adequately protecting across the scheme.

MEMBER ARMIJO: Yes, but that would be a good thing to correct with or without any new ICRP recommendations, wouldn't it?

MEMBER RYAN: Yes. And I think the idea here is that that's a principal thrust of why it wasn't done last time, and the consistencies issues are what are driving it this time, if I understand the

Staff correctly.

DR. BUTLER: Exactly. And that's why it's listed under a con.

MEMBER APOSTOLAKIS: Isn't it true that when you -- let's say we decide to change the standards. We are, essentially, redefining adequate protection?

MEMBER RYAN: No.

MEMBER APOSTOLAKIS: Why not? If you met this here, you know, plus other things -

MEMBER SIEBER: The same boundary.

MEMBER RYAN: Let's just say the dose limit is the same for a given circumstance, and we're updating the clarity with which you can demonstrate it, but I don't know that we're really -

MEMBER APOSTOLAKIS: That doesn't affect that.

MEMBER RYAN: All right. Why don't we let Dr. Butler continue.

DR. BUTLER: So the cons are that it's not responsive to the current scientific information. Some of the information, as we mentioned, is based on 1959 science, and we want to bring that up-to-date. The regulations would remain inconsistent. We would have these three different recommendations driving our

recommendations, our regulations. It does not improve internal consistency. So, for example, if you have a worker who wants to work in the United States, currently in Canada, and some of the European nations, the dose limit, the annual worker dose limit, is 2 rem average per year. That's 10 rems over five-years, or no more than 5 rems in one year. So if they come to the United States and they work just for one year, that could impact them if they wanted to return to their home country. So that's a international consistency issue, a trans-boundary issue that we have with workers here.

Also, the Nuclear Power industry has stated preference to update some of the requirements. Dr. Cool often mentions in his talks that some of the new employees are not trained on the older technology, the older methodology. And then when they go into industry, they have to relearn some of the old science that our recommendations are based on. And I also heard -

(Off the record comment.)

DR. BUTLER: And I heard this somewhere in the audience today, also, that there's this inconsistency, so there's a preference to update based on that.

MEMBER APOSTOLAKIS: It seems to me the right word there is Commission decides, not concludes.

DR. BUTLER: Yes.

MEMBER APOSTOLAKIS: If you want to conclude, you have to have some resources to investigate and decide, and make -- reach a conclusion. Right? That's nitpicking, though, but that's why we're here.

DR. BUTLER: Okay. So the second option is to update Part 50, Appendix I. And the Commission would conclude or decide that there is no basis to update Part 20, but agrees to update Part 50, and Part 50 Appendix I to the current Part 20 methodology. So at least we can -- the Staff wanted to acknowledge that we wanted to get rid of some of the inconsistency between Part 50 and Part 20 as an option. It needed to be an option on the table.

There's a pro to that. There's a reduced burden for the nuclear power by improving the consistency between Part 20 and Part 50. And there's a few cons. One is that it's not responsive to the current scientific information, the same as Option 1, and the same as with Option 1, it does not improve the internal consistency. And it's only partially

responsive to the industry interests, so I'm sure that the most up-to-date science and consistency would be the most optimal choice.

So with that as the backdrop, the Staff decided that we would like to recommend Option 3, and that is yes, let's consider updating Part 20 and Part 50. And, in that process, before we run out and start rule making, let's engage stakeholders and develop a technical basis. So for every rule making, a technical basis is required. And within that technical basis, we would draft some supporting documents, regulatory analysis, or environmental impact, a cost/benefit analysis, a backfit analysis, so let's go out and engage the stakeholders first so that we'll have information to make these decisions.

MEMBER CORRADINI: May I just ask a question? So, is the process you will use for Option 3 similar to the process you did 12 years ago?

DR. BUTLER: No, it's not the same. I don't think that there was this first initial buffer time of engaging the stakeholders before going into -

MEMBER CORRADINI: In the prior -

DR. BUTLER: Yes.

MEMBER CORRADINI: Okay. If you're getting into this later, that's fine. I'm trying to

understand process relative to timing.

DR. BUTLER: Right.

MEMBER CORRADINI: That is, given new plants, given all of this, is the 12 years an acceptable process time?

DR. BUTLER: Well, I'm not sure if it's going to take 12 years this time. I can give you what we have in mind right now.

MEMBER CORRADINI: Okay. That's fine.

DR. BUTLER: Right now we have in mind a two-phase process over the next -- for this option, engaging the stakeholders, in FY 09 we want to go and just educate some of the stakeholders, and licensees, and the public on what was included in ICRP 103, and let them know that it's out there, and that there are some alternatives, newer methods that are out there. And then FY 10, we would propose to go out and solicit some of the impact considerations, benefits that the licensees or the public may see with adopting these regulations.

MEMBER CORRADINI: Thank you very much.

DR. BUTLER: Okay. So there are some pros to this. It starts the process that could improve the scientific basis, improve the internal regulatory consistency, and increase the international

consistency, all the topics we hit on before, talked about a little before. And this process would actually give us a unique opportunity to engage the stakeholders early in the process. And that would give us a chance to identify the issues and the solution before the beginning of rule making.

So after we finish this technical basis development, engagement of stakeholder process, we would then -- and we, as the Staff, we would -- the Staff would actually write another SECY paper with options for rule making, and present that to the Commission. So we're not proposing rule making right now, we're only proposing that we develop enough material to draft the technical basis, and to understand, get a higher understanding of the issues.

There is a con. There is the resources necessary for stakeholder engagement in technical basis development, so there will be some resources that are needed, both at a Staff level, and a timing issue. And we would have to go in the public, so there will be some contract dollars also associated with it.

DR. POWERS: What resources does the Agency expend in training new people, especially in the health physics area, to understand an inconsistent

and incoherent set of regulations?

DR. BUTLER: Okay. Well, there is an overview of health physics training. There's an introduction, and a more advanced health physics training, but in terms of the -

DR. POWERS: What I'm asking you is, that you've made a point here of resources being necessary to carry out this option, successful completion of this option seems to me that it accrues some benefit with regard to resources, especially as we hire young, bright-eyed and bushy-tailed people coming in trained in one set of regulations, to come in and learn four sets.

DR. BUTLER: Right. I agree.

DR. POWERS: And I have no idea what the magnitude is there, but it's got to be none, zero.

MEMBER RYAN: I think there's another added part to that, Dr. Powers, and that's the regulated community.

DR. POWERS: They have the same problem.

MEMBER RYAN: They have the exact same problem. And their health physicists aren't as well trained on the -

DR. POWERS: Should we ask them to pay for these resources. Well, I guess -

(Simultaneous speech.)

MEMBER RYAN: And without correction, it will only become a problem that's more exacerbated over time.

DR. POWERS: I would think it would not only be a problem with the people you do hire, I think it would positively detour many young hires saying here we're going to bring you into a system that's archaic, it's strange, it's inconsistent, and you can flounder around in this area, or you can go work for a modern organization, like the U.S. Army, and do it right.

DR. BUTLER: Or even globally, this is a global economy now -

DR. POWERS: Yes. Absolutely.

MR. FRYE: I think another resource benefit that would be considered would be that it's not only training of staff, but it's also the -- these improvements will make our licensing reviews much more effective and efficient.

DR. POWERS: Confusion costs are non-zero, as well.

MR. FRYE: So that would be a resource savings, in addition to the staff training.

DR. BUTLER: Okay.

DR. POWERS: I'm just trying to help you with your talk.

DR. BUTLER: So, just to reiterate the Staff recommendation, the Staff recommends Option 3 to begin the process of moving towards a greater degree of alignment with ICRP Publication 103. We propose to begin stakeholder dialogue with stakeholder communities on the technical issues and options. So just to give you an overview, we're still waiting for the Commission votes. We don't have any votes either way, and we don't know which way it's going to go right now, but we've been planning ahead just in case. So, as you know, if you want to make a presentation at a professional society meeting, you usually have to put that marker on the calendar early. So right now we have markers on the calendar for the Conference of Radiation Control Program Director, CRCPD, for the Society of Nuclear Medicine, and for the Health Physics Society.

We've also been in discussions with NEI. NEI met with the NRC senior management a few weeks ago, and they were supportive of the Staff proposals. And these options were presented at the NSIAC. They were supportive of the Staff proposals, and they had a great willingness to work with us to engage on the

issues in the nuclear power industry.

So also during this process, we're going to begin technical basis development and interact with other federal and state agencies to foster consistency in direction and approach. So, for example, I've heard this question often, even within the internal staff meetings, how are we going to align with other federal agencies, and with states, both agreement and non-agreement states? So we're definitely going to make sure, make that a priority.

Don is a part of the inter-agency Steering Committee on Radiation Standards, and he's going to keep -- Dr. Cool is going to keep focus. He's going to keep us on the pulse of that, and also with state agencies, because there's definitely going to be a compatibility issue if we update Part 20 and Part 50.

MEMBER CORRADINI: So that's, I guess -- I want to understand and clarify. So you said a couple of things there that I don't appreciate. Is there going to be -- let's say the Commission decides on Option 3. Then you proceed with Phase I. Then you proceed with rule making to make some sort of consistent set, whatever the limits are, a consistent set.

DR. BUTLER: No, no, no. We're going to

do Phase I. Phase I is just going out and educating.

MEMBER CORRADINI: Right.

DR. BUTLER: Phase II is going and getting a list of problems, impacts, and benefits.

MEMBER CORRADINI: Right.

DR. BUTLER: And then if I could give you a Phase III, Phase III is to draft a rule making options paper and present that to the Commission.

MEMBER CORRADINI: Okay. And so let's say we made it all through -

DR. BUTLER: And then they would decide -

MEMBER CORRADINI: Okay. And let's say we made it all through that and they decide, you said a couple of things that I don't appreciate; which is, what is the impact -- what is the difference in impact between agreement and non-agreement states and state agencies? Because what I just heard is, even though you might make yourself consistent, inconsistencies can exist down the line, and I don't appreciate that.

DR. BUTLER: Well, some of the other agencies are in the same boat that the NRC is. Internally, they're inconsistent with their regulations. And I was just saying that we were going to work together with them, maybe not on the state side. The state, they have a compatibility issue

there. They have to be -- their regulations have to be compatible with the NRC regulations.

MEMBER CORRADINI: Okay.

DR. BUTLER: And so I said there may be a compatibility issue there that we would have to consider in this technical basis.

MEMBER CORRADINI: Okay.

MEMBER RYAN: It will have an impact on states if they have to make changes, which they will likely have to do. But recall that agreement states are required by being an agreement state, and correct me if I'm wrong, but all the radiation protection limits and standards are in a compatibility category where they must change them.

DR. BUTLER: Right.

MEMBER CORRADINI: And the non-agreement states?

MEMBER RYAN: And the non-agreement states are regulated by NRC, if they've got material licenses, so they have to follow the federal regulations.

MEMBER CORRADINI: It's more of a matter of how it works its way out.

MEMBER RYAN: Yes. And I think it's a matter of the same question that Dr. Powers raised,

which is timing, and resources, and all that for how long do they get to become compatible? And that's kind of what the process was the last time that changes were made.

DR. BUTLER: Yes. And for Part 20, the last time Part 20 was updated, they were given a three-year period to become compatible with the regulations.

MEMBER CORRADINI: Thank you.

DR. POWERS: If I was in a profit-making business here, would I not look upon radiation protection as a core competency of the agency? I mean, I'm just thinking of a Washington Post headline that says NRC uses outdated regulation, radiation standards. I mean, it doesn't sound like something that I would like to see if I were a Commissioner.

MEMBER RYAN: I'll give you my own personal view of that. I guess, my view is that while there are some technical differences among the three systems that could be improved by making them more consistent, I think Dr. Butler rightly said that our regulations are protective of the worker, and public health and safety.

DR. POWERS: You have adequate protection.

MEMBER RYAN: You have adequate

protection, so I think that's the measure by which I would judge the system now. Now, could it be made -

DR. POWERS: What I'm asking is that the measure of that the public gauges the agency by?

MEMBER ARMIJO: Well, who knows?

MEMBER RYAN: Who knows?

DR. BUTLER: It just all depends on whether it's going to be more conservative, or less conservative, and we don't know that yet.

MEMBER RYAN: And I think the Staff is timely in this assessment, and in their offering to the Commission, because 103 is just barely has the ink dry on it. I mean -

DR. POWERS: Very barely.

MEMBER RYAN: -- the agency and Dr. Cool's leadership on the Committee has been actively engaged, as you know from the past letters that the ACNW and ACNW&M wrote on criticizing and offering constructive criticism how to improve 103. I mean, we finally get to the -

DR. POWERS: There's room.

MEMBER RYAN: There is, so I think that's - it's not something that's been sort of on the table for years and they're just now thinking about it. It's something where they're reacting to very current

recommendations of the international body.

VICE CHAIR ABDEL-KHALIK: Now, many licensees have administrative limits which are well below Part 20 limits for radiation worker exposure. And going to 103 may have essentially minimal impact on the licensees. Wouldn't it help you in this process to start collecting data, or generating a database on these administrative limits that are imposed by the licensees at this time?

DR. BUTLER: Exactly. That would be one of the first things that we would do in terms of developing a technical basis. Right now, this NUREG that I held up before, CR 6112, it's a 1995 document, but it's -- the impact would reduce those limits on NRC licensed activities. So we would update that through contract dollars through a National Lab, and we would also go out and start engaging the stakeholders. We would update information that will help us develop the technical basis.

MEMBER MAYNARD: I doubt that it's going to be much of an impact, because like Said said, most of the administrative limits are down there, but what it does do is put you closer to the regulatory limits. And it may be an increased workload on inspection and other activities, because a big difference in minor

exceedence of an administrative limit versus minor exceedence of regulatory limits, so that could be an impact there to the regulator, too.

MEMBER SIEBER: I think the impact is going to be to have licensees lower their administrative limits. The reason why those limits are set the way they are is to provide some protection against violation of the law and some kind of early warning. And that's the way the licensee assures compliance. If you take that margin out between the regulation and the administrative limit out of there, then that buffer disappears, and licensees are unlikely to do that. So I think that the net effect of changing the regulation is to change the administrative limit also.

MEMBER RYAN: And I think, too, that the nuclear power industry, and again we'll hear from a representative shortly, will talk a little bit about that. But the medical community, particularly investigative radiology, where nuclear medicine or CT scans or other kinds of devices, where the doctor's hands are actually involved with the patient during some exams and so forth, those areas where there's more likelihood of challenging limits than perhaps in some of the other regulated industries. So the

medical community would be probably, in my view, an area where you'd hear some feedback on that.

DR. BUTLER: And that was the conclusion of the 1995 report.

MEMBER SIEBER: Exactly.

DR. BUTLER: That 5 rem across the board, it was doable, 2 rem, some licensees would be impacted, mostly industrial radiographers and some of the medical community, and 1 rem, it wasn't -- it looked at 5, 2, and 1, and at 1 rem it was actually not an option, because too many people would be impacted.

MEMBER SIEBER: In the case of the medical community, though, care givers are not covered, or patients are not covered by the regulations, but care givers are. Certain care givers are not, but professional care givers are, employees of hospitals or what have you. Greater impact comes in the radiographer category, well logging, things of that nature, where the dose is fixed by the technical requirements of the job being done, and there is some ancillary dose to workers that occurs to those performing the work. It's going to be modification of equipment, change of administrative limits, and so forth.

DR. BUTLER: And the good thing about the proposal in developing the technical basis is that we're going to take these things into consideration, because Dr. Cool went over some technical issues last time, such as the dose limits, and also constraints, and also he mentioned a little bit about collective dose, and also Jean-Claude mentioned some criteria that would be updated or considered during the updates to Part 50 and Part 20. So we would take all these things into consideration.

MEMBER RYAN: Thank you. I guess is Mr. Anderson here?

(Off the record comments.)

MEMBER RYAN: Tell us who you are, and all that.

MR. ANDERSON: My name is Ralph Anderson. I'm with the Nuclear Energy Institute. I'm the Director of Radiation Safety in Low-Level Waste, also a certified Health Physicist.

What I'd like to do is just make three points directly germane to the SECY paper and the Staff recommendations. But given the discussion that ensued, which I found very productive, and interesting, I'd like to also offer some additional comments.

First of all, as captured in the presentation, and in the SECY paper, we've been very forthcoming that we recognize and welcome an eventual alignment of NRC regulations with the International community. We're already in a global nuclear industry. We are already using workers from other countries, and those other countries and their employers, especially, are already starting to express a desire that we not allow workers to get exposures within our regulatory context that would greatly limit their ability to continue to work outside of the United States, so it's an issue we're confronting today.

The data that NRC collects annually and publishes is very informative, and I commend it to the ACRS to take a look at it. But the exposure data for workers not only at nuclear power plants, but in several other industries that are required to report data shows you quickly who might be impacted, for instance, by lower dose limits. So it's not an unknown, it's actually very well quantified.

In the nuclear industry, 82 workers in 2006 received doses greater than 2 rem a year, not from a single facility, but in the large, they are workers that work at several facilities during the

course of the year. In general, they are highly skilled irreplaceable workers, highly certified welders would be a good example, so if one contemplated that they would be less available to do work as a function of reduced dose limits, it's not that you just call down the street and say well, send me somebody else. There isn't somebody else, so we see it as a transition issue, and we embrace that as a transition issue. And we don't look at that as an obstacle in making an eventual change, we look at it as a challenge to figure out how to make it right.

More importantly, and to pick up your point on the administrative dose guidelines that we use, which really is key from our perspective, that is, in fact, the way that we control doses at the plants, as our administrative criteria. It's been many, many years since we've actually challenged regulatory limits. If you consider, for instance, the possibility of a 2 rem a year limit, which is the simplified approach that many regulatory agencies have taken overseas, rather than trying to average doses over a 5-year period, what I did about a year ago is I just polled all my colleagues, namely radiation protection managers at nuclear power plants and I said if you had a 2 rem a year regulatory limit, what would

be your tolerance for letting someone go into the plant with the possibility of a regulatory over-exposure? Where would you set your administrative dose guideline? The highest number I got from anybody was 1.5 rem, most were a little more comfortable around 1.2 rem. So when you apply that number to the data, now you're talking about 1,000 to 1,500 workers, likewise, generally workers that are highly skilled and experienced. The reasons they're in the areas of the plant where dose occurs is because they are particularly qualified and competent to do the work in those areas. So, again, it has implications on workforce in the long run. And, of course, this is at the same time, as you know, that we're confronting workforce issues associated with aging workforce and so forth, so it's a big challenge. But we welcome that challenge, and we really, as our key number one point, we welcome support, and strongly encourage going forward with an alignment to accommodate the fact that we're in a global workforce.

We, in fact, are doing a study this year under the auspices of our NSIAC, which we all learn how to pronounce acronyms after we create them, but that's the NSIAC she referred to. As most of you are aware, that actually is the collective of all of the

chief nuclear officers from all of the utilities operating nuclear power plants, so it's not NEI, per se. It really is the industry directly. In fact, Mr. Ray was a member of that august organization at one time.

We had this discussion actually two weeks ago, and conveyed to the Executive Director of Operations our endorsement for going ahead with Option 3. We conveyed that more directly in a formal comment letter that we submitted a few days ago on some proposed draft regulatory guides on radiological effluents. We called out the SECY paper, and reiterated our support of Option 3 in that SECY paper, so formally we're there.

A second point that I wanted to make is that we think that the idea of going out and getting the necessary input from stakeholders, and especially coupled with educating many of the stakeholders that don't understand the nature of these proposed changes is vital. As mentioned, that was not done with the previous revision. Many of us who were around and actively participated in that previous revision, and certainly one significant lesson learned is that beyond the fuel cycle facilities and the nuclear power plants, and to a lesser degree perhaps radiographers,

and a few other communities, both the states and the vast majority of materials licensees were really oblivious to the revisions to Part 20, such that when the final rule was issued, there were actually some states that were not aware of that. They didn't know there was a new Part 20, and there were hundreds, virtually thousands of licensees that had no idea that the basic regulations had been changed, and that they would need to change their programs. So the NRC had to twice extend the implementation period. It ultimately ended up being three years, or perhaps even four, I'm not sure now, to accommodate the fact that inspectors would show up and say well, show me what you're doing to change to meet the new regulation, and the licensee would say what new regulation is that?

Now, what I would like to offer to the ACRS, and we'll make a similar recommendation, I have not found anywhere a really good lessons learned from this previous massive rule making that was undertaken. And one thing that I think would be very important to build into the several year process that NRC has envisioned to make better preparations for rule making, there still are some people alive in the agency, there are probably others available, and there certainly are stakeholders, like myself, still around,

and which I think it would be very useful to poll people's ideas on lessons learned from the previous rule making, and bring those up, make them transparent to everybody, and not make the some mistakes of the past, because this idea is only one.

Another one I will give you as an example is at the time that the rule was finalized for implementation, virtually all of the regulatory guides either were still published in draft for comment, or had not even been published yet, so we were trying to implement a regulation without the benefit of regulatory guidance up front. So there's many lessons to be learned, and I commend everyone to figure out a way to capture those, and formally place those into the planning process.

Finally, and there has been reference to this, and I really appreciated some of the comments of the members of the Committee in this regard, especially Dr. Powers. I'd like to say that fine minds think alike, but it would be a shame, I think, if we went through this entire process without overall improving the efficiency by restructuring the rules themselves in their entirety.

The fact is that we do have a number of regulations that have their own independent dose

criteria, which is why we're so disjointed right now. There's no reason why one regulation can't contain all of the dose criteria, why one reg guide can't contain all of the methodology for how you calculate a dose. I mean, that would be fundamental, I think, in any good business, so I commend that the Agency take a much broader approach than just simply updating numbers in regulations for the sake of consistency. There's a lot of reform opportunity. And I agree also, specifically, that there's a lot of detail in regulation that should probably be moved into regulatory guidance.

A couple of comments I wanted to make in response to some of the observations of the members. It's a good question for Office of General Counsel, but there has been over many, many years a discussion of whether, in fact, a dose limit constitutes a legal definition of adequate protection of health and safety as called for in the Atomic Energy Act, so that's an interesting issue to take a look at. My understanding over the many, many years since the AEC was that that was a given reason why an actual dose limit would need to be in a regulation, rather than in a reg guide. But that's a good question to pose to legal folks, because really it's a legal question.

Secondly, the headline news on the outdated NRC regulations, that was in the Washington Post in I want to say 1997-1998, when the interesting interactions were going on between the Environmental Protection Agency and the Nuclear Regulatory Commission over the Commission's new license termination rules. There were a whole series of articles in that regard, so the headline already occurred. And, in fact, what it prompted was a very divisive set of interactions between two federal agencies with local stakeholders at a number of plants decommissioning in New England. They were speaking different languages, and talking about different numbers, and managed to convince most of the public that I talked to that neither agency knew what the heck they were talking about, so that was the outcome. Both agencies are equally incompetent. So that, in fact, has occurred. And yes, I could see that coming up in a different vein today.

I also point out that this has been the subject of at least two GAO reports, one sponsored in the late 1980s by Senator John Glenn, which concluded that we ought to get our act together and create consistent regulations. And more recently, about five years ago, a GAO report commissioned by Senator Pete

Domenici, which reached the same conclusions, except just pointed out that the situation has just continued to get much worse; because whereas we used to be two generations out of date, now we're three. So there's a rich background of thoughtful people who have looked at this issue, concluded that we should fix it, and here we are, and so I suggest that this is our opportunity to do so.

I had mentioned the problems that arose in decommissioning, but for some of the members on the Committee, and certainly for some of the NRC Staff, they'll recall that we've confronted this issue of differences in a way that has been less than good in its outcome with the groundwater contamination that has shown up at nuclear power plants, where we've had to try to rationalize the NRC limits for public dose, and how those relate to concentrations in liquid effluents versus the Safe Drinking Water Act criteria, which actually come from quite a different basis. And having those types of discussions, again, what I saw convinced local stakeholders where those discussions occurred that we really didn't know what we were doing, or what we were talking about.

Now, for one who looks closely, I fully agree that throughout all of this confusion, we've

managed to protect health and safety. And it's not in spite of, it is actually because of the way that we have formulated our regulations, and that is for every limit there's also a requirement to maintain exposures as low as reasonably achievable. And, truthfully, that's what we all work to, we don't work to limits. If we can do something that's reasonable and cost-effective to further reduce dose, we do. That's the reason why the average nuclear power plant worker's exposure per year is 140 millirem, which is a minute fraction of 5,000 millirem a year. And that's why the average member of the most exposed member of the public around a nuclear power plant has doses that are a fraction of a millirem, nowhere near the ALARA criteria that are spelled out in Appendix I, and certainly light years away from the actual limits that are specified in Part 20.

It's the outlier situations, though, and one was illustrated graphically in medical. In general, this probably won't have a large impact on the medical community, but there are specific situations where it could have a very significant impact. And I think, as with the highly qualified specialized workers at nuclear plants, these are some of the things that we need to bring out in this

information-gathering that NRC goes forward to. So I would simply encourage the Staff throughout that process to maintain an open mind, rather than go in with a strawman and basically say, tell me what's wrong with it. I just throw the door open, and get as broad and free-thinking input as you can get.

Appreciate the opportunity to make some comments, certainly happy to respond to anything before I sit down.

MEMBER BANERJEE: Could you tell me the difference in the groundwater of concentrations that the Safe Drinking Water Act and the NRC have?

MR. ANDERSON: Yes. Fortunately, they both use 1959 technology, so they're both scientifically irrelevant. And that's a fact. I mean, you could make a judgment about that, but that is a fact. They don't have anything to do with contemporary science. They're fantastically low numbers in both cases, so again, we end up protecting health and safety even when you compare them to contemporary scientifically-based criteria. But in essence, EPA uses different assumptions about the nature of exposure from drinking water to calculate what the resultant dose might be than the NRC does. So there, even though they start with a common vintage

of ICRP, so at least they're using the same units and terminology, calculations that they make in terms of how long a person is drinking that water, and how much water they drink a day and so forth, is different enough that when the EPA says well, this amount of radioactivity will give you 4 millirem a year, in NRC space it would give you much less than that for many radionuclides.

Conversely, there are some other radionuclides where it's exactly the reverse, and that's where it gets convoluted. Strontium-90, for instance, as an example, EPA's methodology tells you it's 4 millirem, NRC's methodology tells you it's, if my memory serves me right, about 68 millirem for the same amount of Strontium-90.

MEMBER BANERJEE: Same concentration.

MR. ANDERSON: Yes.

MEMBER RYAN: Some of the intake assumptions are very different. For example, you think about 2 liters of water a day as a standard intake. Nobody drinks 2 liters of water from their tap a day, so that's a conservative assumption. There are some other differences from one to the other. It is a Rosetta Stone that has to be sorted out to figure out why it's different.

MEMBER BANERJEE: It's not going to get sorted out here.

MR. ANDERSON: It's not.

The third bullet on that slide is -- within all of this is probably the greatest hurdle of all. And that's where the two GAO reports went, is that when all the dust settles, and if NRC goes forward and achieves this, I think it's doable. We still may end up with all of these residual issues associated with other agencies doing things.

Now, lest you think it's completely unimportant, and I know you wouldn't say that in a callous way, but if at the end of the day you decided it wasn't particular risk-significant, it should be an issue of concern as it relates to the topic of off-site protective action guidelines developed by the EPA vis a vis recommendations and analytical things that would be undertaken within a plant in the case of a real accident, and equally important with subjects like improvised nuclear devices that are radiological dispersion devices. This crossover in methodologies does play a role in that, not challenging public health and safety, but thoroughly confusing decision makers that, at best, have a very rudimentary understanding.

A good example that we played out some years back was that the alert criteria in virtually all emergency plans and tech specs are based on the Appendix I ICRP 2 methodology. The assessment of dose, at the alert, one of the things you do is you start off site dose assessment and projection. When you step into that, you step into ICRP 26 methodology. And when you run the calculations with the ICRP 26 methodology with the nuclides that we would deal with in an accident, the first thing you find out is that you're not at the alert level. So there's an example of transition.

You call the local community and saying we're declaring an alert. We've got 15 minutes to start talking to you, and getting things stood up, and we'll start sending you our dose projections, and you call them back 15 minutes later and say okay, we've recalculated. No, we're not in an alert. You can go back to sleep now. We're going to go take care of business. So, hypothetically, it sets up -

MEMBER SIEBER: But you have to call them back after that.

MR. ANDERSON: Beg your pardon?

MEMBER SIEBER: You have to call them back after that, though.

MR. ANDERSON: Yes. That's right. You could find yourself in a -- but I'm just trying to point out that the reasons go far beyond just a desire to have all things more or less look alike, and to train people easier and things like that. There are real issues that can exist as a result of analysis, or as a result of the real world, if certain conditions ever happen to pop up. And the groundwater, in my mind, is a good example.

We've known for years the disparity and differences. It's just that suddenly when we were called upon to have to explain those to decision makers, I will tell you two people that we personally spent a lot of time explaining them to, because they had an acute interest because of plants in their states. One of those persons is currently the President of the United States, and the other one is the Secretary of State. That's one of the things that they know about nuclear power plants, is that EPA and NRC do things differently, and they're probably both a little suspect as to whether either agency knows what they're doing in that regard.

MEMBER BANERJEE: Could I ask a question?

MR. ANDERSON: Sure.

MEMBER BANERJEE: I mean, there is a model

to convert the concentration, I presume, to a dose of some sort.

MR. ANDERSON: Yes.

MEMBER BANERJEE: Within this model, there are presumptions which have to be made. One of these presumably has to do with intake of how much stuff you're taking in, and the other is how you convert that into a dose.

MR. ANDERSON: Right.

MEMBER BANERJEE: Where is the major problem, in the intake model, or in the conversion from what you take in into what dose you get?

MR. ANDERSON: Well, it's -- you mean between the two agencies?

MEMBER BANERJEE: Yes.

MR. ANDERSON: Yes. Okay. Intake is one. A second one is the period of time over which lifetime dose is assessed. EPA uses 30 years, we use 50, is my recollection. I could be wrong in that now, but that was the case at least several years ago when we were dealing with this. And another one is that what EPA drives for is risk, a risk number. They're looking for risk in the range of fatal cancer, 10 to the minus 4, 10 to the minus 6, so they go beyond dose to risk. And it's that final conversion and take me

at face value here, having used the 50-year old methodology to calculate the dose, they actually use the most contemporary conversion of dose-to-risk that exists. In fact, it's so contemporary, a lot of us aren't even sure it's real because it's one step beyond sort of generally accepted global practice.

MEMBER RYAN: Ralph, one other point I would add. If you have an intake, and you know the intake, you could think about what is the calculated dose. If you're within an order of magnitude for a given single intake, that's not a bad way to think about your precision or accuracy for an intake. Tritium and a couple of radionuclides are a little bit more accurate than that, but for solid -

MEMBER BANERJEE: You've lost me. What you're saying is if you take a certain amount in, there's a certain uncertainty in the dose that you calculate?

MEMBER RYAN: Yes.

MEMBER BANERJEE: By whatever model you use.

MEMBER RYAN: Fifty percent or better.

MEMBER BANERJEE: Right. Okay.

MR. ANDERSON: I'll also say that if a worker came to the U.S., got an intake, we calculated

a dose, assigned that dose in their record and sent them back to France, for example, my French colleagues would recalculate their dose because it would be a different number. Not just because of what we talked about, but also because of the basic differences in the vintage of how radioactivity itself translates to the dose. I don't think that's a good place to be.

I'll mention to you, also, that all the vendors of the nuclear power plants have two sets of analyses, they have one for the United States, and they have one for all the other countries they might want to sell reactors in. Within figuring out the design, Tim Frye had mentioned this, the ultimate criteria that you use for accident dose are not the Part 100 criteria that you're probably intimately familiar with; that is, the 25 rem whole-body, and the 300 rem to the thyroid. It's actually the 25 rem total effective dose equivalent that was promulgated some years back in Part 52, so you uniquely you do that calculation, but then when you do control room habitability, then you end up either using ICRP 26. Arguably, you could use ICRP 2, probably not, and then more likely you appeal to the -- not appeal, you propose to the NRC that you're going to use more contemporary dose conversion criteria. So even

internally in analyzing the radiological aspects of a new design, you're using different methods to look at different things.

This gentleman up here has to live this every day in reviewing license applications, and design documents. And, in fact, recently when we worked our way through the whole issue of off-site dose calculation and so forth, we're really having to come to grips with that. Fortunately, we found some solutions to that, but it was getting very confusing when we were trying to translate applications calculated population doses to what that means in terms of effluents discharged, and so forth. So all of this just tells us that we ought to get it eventually updated, and set the stage for yet the next generation of reactors that's going to come along.

MEMBER MAYNARD: You stated something that piqued my interest. You said that they would recalculate the dose when they went back overseas. What about when we bring overseas workers into here, do we accept their exposure numbers, or do we recalculate based on our methodology?

MR. ANDERSON: In the instances where it's been limiting, we do recalculate. This is infrequent. I shouldn't characterize -- nuclear power plants, in

general, you don't have significant intakes. But occasionally you do have one where it's in the record, and then you take a look at it, try to ascertain how it was calculated, and see how that would translate in your own space, because when you make your exposure reports, those are the kinds of things that you need to take into account.

MEMBER RYAN: Just to clarify for Otto's benefit, that's really a question of internal radiation exposure, rather than a badge reading.

MR. ANDERSON: Yes.

MEMBER RYAN: The badges will translate fairly clearly external dose, but we're talking about an internal intake where there would be a recalculation.

MEMBER BANERJEE: You said something more - one last question.

MR. ANDERSON: Sure.

MEMBER BANERJEE: The utilities, the vendors, or whatever maintain two sets of books, essentially.

MR. ANDERSON: Yes.

MEMBER BANERJEE: One for everybody else, and one for the United States. Does that mean that everybody else is consistent with each other, and we

are the only ones -

MR. ANDERSON: Well, I misspoke myself. Japan is like us, so it's not all countries and us only. But in general, the plants that are build -- the countries that are currently moving forward with new nuclear power plants use the ICRP 60-based methodology; whereas, our analysis, in general, is either ICRP 26 or ICRP 2-based, depending on what the specific aspect is.

MEMBER BANERJEE: And who else is maintaining a set of books like us?

MR. ANDERSON: There is yet another problem, and I hate to throw kerosene on the fire. We also have the problem of international units independent of all of this, so they've got a set of books that talk about becherels and sieverts, and our set of books is talking about curies and rem. Now, rem and sievert isn't quite so hard because you can divide by 100 and get there in your head. Becherels and sieverts is a little more complicated, and is more suggestive of the type of thing that caused us to crash a lander on a planet when we didn't do the metric conversion right. So that's why they maintain two completely independent sets of books.

MEMBER BANERJEE: Is it just Japan and us

who are in this group, or are there other people?

DR. POWERS: It's more complicated than that, because in some cases when a country buys a plant, they buy the regulations from the vendor. For instance, Spain, or U.S. plants uses U.S. regulations, where the plants they use vending country regulations, so it's not as clear as that.

MEMBER BANERJEE: So let's talk about China and India for who are planning to buy 12 plants, AP 1000. Are they going to adopt the American regulations for AP 1000, or are they going to take the French? I mean, what's going to happen?

MR. ANDERSON: I don't think there's an answer to -

DR. POWERS: Why do you care?

MEMBER BANERJEE: Because there are lots of plants being built there.

DR. POWERS: Yes, but you don't regulate them.

MEMBER BANERJEE: No, but I'm just interested in understanding what is the -- are they going to -

MR. ANDERSON: My best understanding is that there are still a lot of decisions to be made in that regard; that is, it isn't set. The most recent

interaction I had with Indian colleagues a few years ago, they were still using ICRP 26.

MEMBER RYAN: We have just a few minutes -

MR. ANDERSON: I'm 10 years out of date on that.

MEMBER RYAN: Are there any other questions for the Staff?

MEMBER BLEY: Yes, I've got one. I mean, it sounds like a very significant job to reconcile the U.S. regulations for NRC. Are there really significant activities interagency internationally, and do they have any hope of trying to get that part of it under control?

DR. BUTLER: Interagency, other agencies are considering updating their standards, as well.

MEMBER BLEY: Independently, or are you working in some kind of -

DR. BUTLER: Well, there's the ISCWR's that interagency Steering Committee, where they keep each other apprized. We keep each other apprized of what we're considering. For example, DOE recently moved to ICRP 60, and they're in their 3-year implementation period as we speak for ICRP 60. Now, will they consider moving forward to 103? We'll have

to keep that conversation open.

MEMBER RYAN: I think it's fair to say that the ISCWR's working group at least keeps every agency apprized of the other agency's activities, but it's probably also fair to say that there's not really close alignment with all their decision making as time marches on. So awareness is there, but not necessarily concurrence.

MR. ANDERSON: Now, I'll mention that we've started reaching out independently, at least in interacting with the Environmental Protection Agency. What should be of great interest is that under law, under the Reorganization Act of 1974, the EPA actually sets the generally applicable environmental radiation standards from which all of the NRC effluent environmental standards are derived; that is, they're required to assure implementation of these EPA standards. The EPA standards are ICRP 2-based. That hasn't created any significant issues over the years with radiological effluents from nuclear power plants. I suggest to you that people are looking very hard now at how it might affect future technologies or closing a fuel cycle. The antiquated criteria that are in there may challenge us when NRC goes to implement regulations to license reprocessing and the

like in the future. That's probably a very fruitful area at some point down the road to hear about from those folks.

MEMBER RYAN: I think in our remaining nine minutes, we have another comment. Would you tell us who you are, sir?

MR. BLAND: Stewart Bland with Chesapeake Nuclear Services. I wanted to pick up just quickly on the issue of the international and the global community. Back in October, I had the privilege of being on an NRC-sponsored two-week training program for the Chinese regulators in the AP 1000. And the main purpose was to support the Chinese in their adopting a lot of NRC's evaluations that have been done to certify the AP 1000.

In that process, I was doing the training on the Chapter 11 and Chapter 12 parts of the FSAR. Some of the more in-depth discussions and longer discussions were actually held related to the difference in the radiation standards that we have, and what we evaluated under for the Part 20, for the Appendix I versus the radiation standards that they have, which are more based upon the 2 rem, and the more up-to-date ICRP. And, whereas, they're trying to look at the evaluations that we've done, which are now

based upon old dosimetry, old Part 20, and adopt that so they do not have to go through a lot of other detailed reviews and evaluations, and they're hitting a roadblock there. So that was rather problematic for them in their evaluations, and we did spend a lot of time discussing what were the differences and the basis for those.

MEMBER RYAN: Thank you. Any other questions for the Staff from members?

DR. BUTLER: I wanted to make one other comment.

MEMBER RYAN: Yes, and any final comments? Yes, please.

DR. BUTLER: Yes. I just wanted to say that we are really looking forward to working with the ACRS during our technical basis development, if the Commission decides to take the Staff's recommended option. We don't know as of yet whether the Commission will vote for the recommendations of the Staff, but if they do, we look forward to continued dialogue with you.

MEMBER RYAN: Let me thank you, Dr. Butler, and Jean-Claude, both for your presentations and participation. I think it's been a full and broad-reaching discussion. We've had some good input

from stakeholders already in our meeting today, and I think you've given us what we need to formulate our thoughts for a letter. So with that, I'll turn it back to you, Mr. Chairman.

CHAIR BONACA: Thank you, and I second the comments of Dr. Ryan, for the excellent presentation. And at this point, we're going to take a break until 10:15, and we will start at that point with Beaver Valley. Are we going to be off the record after -

MEMBER SHACK: I think so. We're going to be off the record for the rest of the day.

CHAIR BONACA: Okay. So 10:15.

(Whereupon, the proceedings went off the record at 9:53:59 a.m.)

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Options to Revise Radiation Protection Regulations

SECY-08-0197

Advisory Committee on Reactor Safeguards
February 6, 2009

Kimyata Morgan Butler, Ph.D.
Office of Federal and State Materials and Environmental Management Programs

Background

- **NRC Staff Information briefing to ACRS on November 6, 2008**
  - **Presentation of background information on ICRP recommendations, radiation protection**
  - **Discussion of staff identified technical issues in 10 CFR Part 20 and 10 CFR Part 50**
- **SECY-08-0197, December 18, 2008, is publically available.**

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SECY-08-0197

- Policy Issue Notation Vote paper provided to Commission on December 18, 2008
- Provides Options for next steps regarding NRC radiation protection standards
- Provides Background on technical issues in 10 CFR Part 20 and 10 CFR Part 50
- Recommends Commission approval for staff to undertake stakeholder dialogue and technical basis development

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Regulatory Options

- **Options include:**
  - **No Action**
  - **Update 10 CFR Part 50 and Part 50 Appendix I**
  - **Engage Stakeholders & Develop Technical Basis to Increase Alignment of NRC Radiation Protection Framework with ICRP 103**
- **Factors considered**
  - **Schedule for technical information**
  - **New reactor licensing**
  - **Other issues that may be raised outside ICRP changes**
  - **Resources**

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Option 1: No Action

- Commission concludes there is no need for changes in any of the current regulations
- Pros
  - No resources needed
- Cons
  - Not responsive to current scientific information
  - Regulations remain inconsistent
  - Does not improve international consistency
  - Nuclear Power industry has stated preference to update requirements

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Option 2: Update Part 50

- Commission concludes there is no basis to update Part 20, but agrees to update Part 50 and Part 50 Appendix I to current Part 20 methodology
- Pros
  - Reduced burden for nuclear power by improving consistency between Part 20 and Part 50
- Cons
  - Not responsive to current scientific information
  - Does not improve international consistency
  - Only partially responsive to industry interest

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Option 3: Engage Stakeholders & Develop Technical Basis

- Commission concludes there is sufficient basis to continue dialogue and develop technical basis
- Pros
  - Starts process that could improve scientific basis, improve internal regulatory consistency, and increase international consistency
  - Engages stakeholders early to identify issues, and solutions, before beginning rulemaking
- Cons
  - Resources necessary for stakeholder engagement and technical basis development

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Staff Recommendation

- Option 3, begin process of moving towards greater degree of alignment
- Begin stakeholder dialogue with stakeholder communities on technical issues and options
- Begin technical basis development Interact with other Federal and State Agencies to foster consistency in directions and approach
- Provide recommendations for rulemaking when technical basis available

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Questions?

Questions?

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Background Materials

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Background

- Most recent rulemaking to incorporate the recommendations of the ICRP into 10 CFR 20 was completed in 1991, and was based primarily on ICRP Publications 26 (1977)
- Regulations that contained explicit dose criteria, rather than cross-references to Part 20, were not updated in 1991, and remain based primarily on ICRP Publications 1 (1958) and 2 (1959)

Background (continued)

- NRC staff recommended in 2001 that the Commission wait for next set of ICRP recommendations, and begin Technical Basis development
- Commission agreed in April 2002, but did not approve Technical Basis efforts
- ICRP Recommendations published in December 2007, as Publication 103, following considerable public consultation

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Considerations

- Numerous inquiries to Commission and Staff about the status of updates to U.S. radiation protection regulations
- Globalization of economy and industry places greater importance on regulatory consistency
- Other countries and international organizations already starting process of update
- Interest from nuclear power industry to update standards and increase consistency

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Initial Interactions

- Staff has engaged States, nuclear industry, medical community, ACRS, ACMUI
- General agreement that updates and modifications are warranted
- Impacts of technical issues are highly dependent upon approach taken for resolution
- Lack of information for some licensee segments, particularly industrial and medical
- States will use revision as basis to regulate both AEA and non-AEA radiation activities

Technical Issues for Part 20

- Total Effective Dose
- Constraints
  - Occupational Exposure
  - Public Exposure
- Dose limits
  - Occupational
  - Public
  - Embryo/fetus of Declared Pregnant Woman
- Numerical values of weighting factors and Appendix B

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Technical Issues Part 50, App I

- Align App. I criteria concepts with Part 20
- Reconsider criteria in Sect. II.A, II.B, and II.C
- Update definition of dose receptors in Sect. II and IV
- Update cost-benefit criteria in Sect. II.D
- Assess whether Sect. I and V need qualifiers, i.e., existing fleet of reactors vs. new plants

Technical Issues Part 50, App I

- Revise Sect. I in differentiating applicability between LWR, Non-LWR, and NGNP
- Redefine compliance requirements for “licensed operation” for sites with multiple licensees
- Assess whether compliance with 40 CFR Part 190 needs further elaboration in Part 20 or guidance

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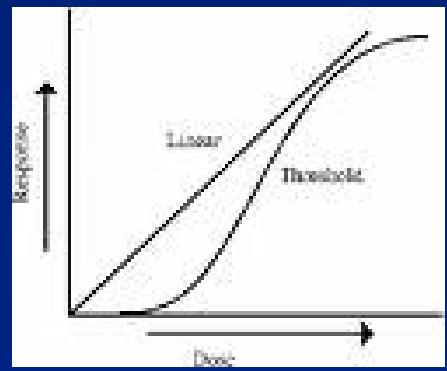
ICRP Publication 103

- Consolidated material from ICRP Publication 60 and subsequent publications
- Maintained fundamental principles of:
  Justification, Optimization, and Limitation
- Radiation risk remains as ~ 5 x 10^{-4} per rem
- LNT for prospective radiation control programs



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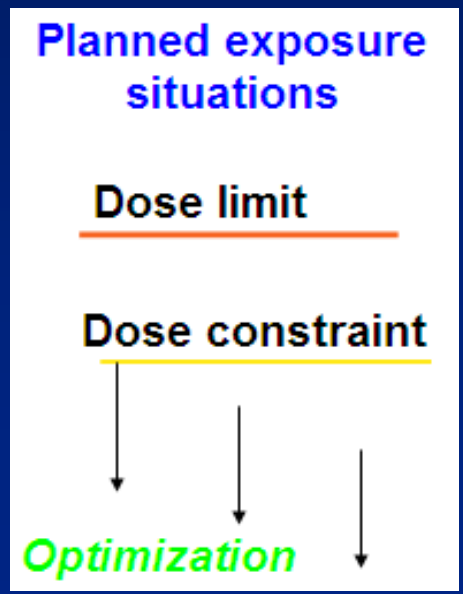
ICRP Publication 103

- Moved to a “situation” based framework
  - Planned Exposure Situations
  - Emergency Exposure Situations
  - Existing Exposure Situations
- Emphasized Optimization using Dose Constraints
- Retained Dose Limits and values
  - Occupational Exposure: 10 rem / 5 years, max of 5 rem in any one year
  - Public Exposure: 100 mrem
  - Embryo/Fetus: 100 mrem



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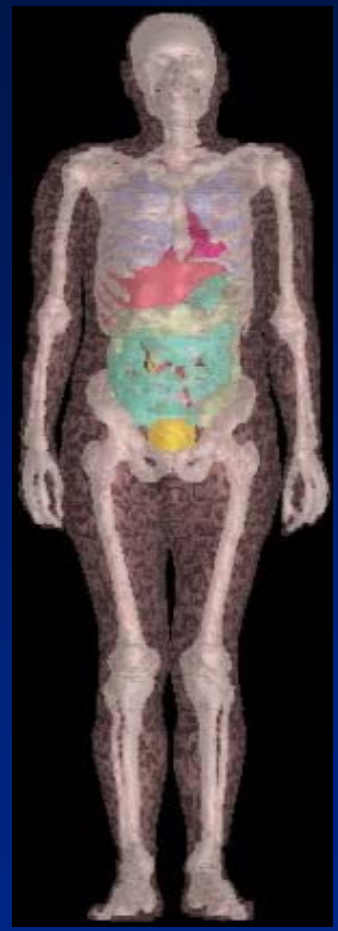
ICRP Continuing Work

- Assessment of new scientific information has resulted in new tissue and radiation weighting factors
- Efforts now underway to calculate new dose conversion factors using updated models and information
- Commonly used radionuclides to be available in 2011 ... Complete set 2014



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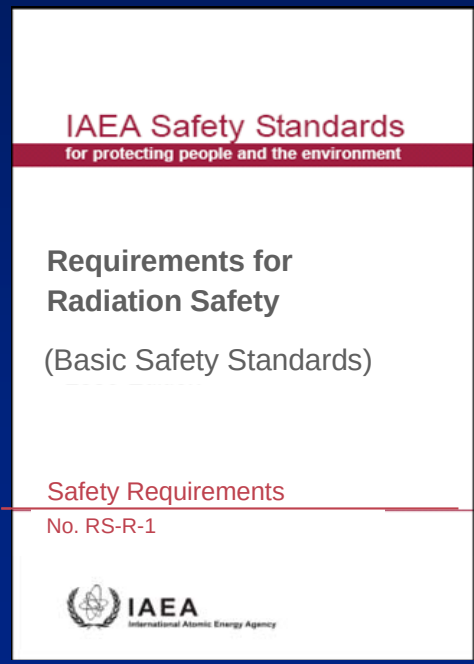
International Standards Work

- **IAEA continuing revision of Basic Safety Standards.**
  - **Draft reviewed by RASSC in November**
  - **Additional drafting in topical meetings**
  - **Further review at RASSC in June, 2009**
  - **Eventual Member State comment**
- **Draft moves to adopt ICRP Recommendations**



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International Standards Work

- **Revision of Euratom Basic Safety Standards**
  - **Revision of BSS Directive 96/29**
  - **Incorporate new ICRP recommendations**
  - **Consolidate all existing legislation**
  - **Integration of natural and artificial sources**
  - **Protection of the Environment**
- **Draft to Article 31 Group of Experts Plenary October, 2009**

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