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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

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PUBLIC MEETING ON THE ADVANCE NOTICE OF PROPOSED RULEMAKING ON REACTOR EFFLUENTS

(10 CFR PART 50, APPENDIX I)

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MONDAY

AUGUST 24, 2015

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The Public Meeting was convened in the Commissioners' Conference Room, One White Flint North, 11545 Rockville Pike, Rockville, Maryland, at 9:30 a.m., Carolyn Lauron, project manager, presiding.

STAFF PRESENT:

RICHARD CLEMENT

JEAN-CLAUDE DEHMEL

NISHKA DEVASER

TONY HUFFERT

MICHAEL McCOPPIN

CAROLYN LAURON

BILL RAUTZEN

ALSO PRESENT:

ELLEN ANDERSON, Nuclear Energy Institute*

CHRIS COURTENAY, Duke Energy*

JERRY HIATT, Nuclear Energy Institute

KAREN KIM, EPRI*

BETSY LANGILLE, Tennessee Valley Authority

BRIAN LITTLETON, EPA

CARL TARANTINO, Dominion*

SAMUEL WENDER, First Energy Nuclear Operating Company

* Present via telephone

T-A-B-L-E O-F C-O-N-T-E-N-T-S

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

9:31 a.m.

MS. LAURON: Good morning, everyone. I'd like to start the meeting today. Welcome to the public meeting on the Advance Notice of Proposed Rulemaking for Reactor Effluents. I'm Carolyn Lauron. I'm one of two co-project managers for this activity. Since we're a small group assembled here in headquarters, we'll just go around the room and introduce ourselves and organization and then we'll open it up to the bridge line for those who have called in. So we'll start on my left.

MR. DEVASER: Hello, hello. Nishka Devaser, NRC. I'm also the co-project manager.

MR. RAUTZEN: Bill Rautzen, also with the NRC, Division of License Renewal.

MS. LANGILLE: Betsy Langille, TVA.

MR. HIATT: Jerry Hiatt, Nuclear Energy Institute.

MR. WENDER: Sam Wender, FirstEnergy.

MR. DEHMEL: Jean-Claude Dehmel, NRC, health physics.

DR. CLEMENT: Rich Clement, NRC, Office of New Reactors.

MR. McCOPPIN: Mike McCoppin, Chief of the Radiation Protection and Accident Consequence Branch, Office of New Reactors.

MR. LITTLETON: Brian Littleton, EPA, Radiation Protection Division.

MR. HUFFERT: Tony Huffert, NRC, Office of Research.

MS. LAURON: Okay. If we can move to the bridge line.

MR. COURTENAY: Chris Courtenay, Duke Energy.

MS. KIM: Karen Kim, EPRI.

MS. ANDERSON: Ellen Anderson, Nuclear Energy Institute.

MS. LAURON: Are there any others on the line?

(No audible response)

MS. LAURON: Okay. So the purpose of today's meeting is to discuss the issues and questions identified in the *Federal Register* notice. The NRC is contemplating changes to Part 50, Appendix I, and we seek your support in developing a reg basis through

your written comments. The meeting is not intended to be a formal solicitation of comments, but rather to encourage you to provide those in writing consistent with the ANPR.

Who just joined the line?

MR. BURROUGHS: Kevin Burroughs just joined.

MS. LAURON: The meeting is being transcribed and the transcript of the discussion will be available shortly after the meeting.

Next slide. You may submit your comments through any of the means described in slide No. 2. These methods are also provided in the addresses section of the ANPR.

Next slide. We request when you submit your comments you indicate the docket ID for this project, which is NRC-2014-0044 in the subject line. We caution you not to include any identifying or contact information you do not wish to make publicly available. All comments will be provided at the web site regulations.gov under the docket ID, NRC-2014-0044.

If you're combining comments from other individuals or entities, we request that you also advise

them of not making contact or identifying information available. This information that is summarized on slide 3 is also available in the supplementary information section of the ANPR.

MR. DEVASER: So, good morning. As I mentioned I'm Nishka Devaser and I'm the second half of the co-project manager team for the project.

Before we get started with the technical presentation I wanted to remind everyone present that there's no eating or drinking allowed in this room, and also that we have copies of the presentation at the front of the room at the opening and a sign-in sheet, so please sign in if you haven't already. We also have public meeting feedback forms over there should you be interested in providing any of that.

For today's meeting we plan on having staff make its presentation on the details of the ANPR, the Advance Notice of Proposed Rulemaking, followed by a break before we open the floor to the public feedback and discussions.

Recognize that some of the issues and questions are pretty involved. The main presenter, Dr. Richard Clement, will pause after each slide and open the floor to allow feedback for clarification.

We ask if you do have a question or have feedback please come up to the podium or ask me for the -- actually forget about the podium. Ask me for the -- signal me to hand you the microphone and Carolyn or I will help. We also ask that for the court reporter at the corner of the room back there that you identify yourself whenever you're going to ask a question or make a comment. For those on the phone, please do let the operator know that you have a question or a comment.

Should there be any emergency or evacuation, if you're not an employee of NRC, find an employee of NRC and stick with them.

And with that, I can turn it over to Dr. Rich Clement.

DR. CLEMENT: Great. Thank you, Nishka. Good morning. My name is Rich Clement. I work as a senior health physicist and reactor technical reviewer in the Office of New Reactors. This presentation is on NRC's regulation, Title 10 Code of Federal Regulations for Part 50, Appendix I, Advance Notice of Proposed Rulemaking.

Part 50 is NRC's regulations for domestic licensing of production and utilization facilities such as nuclear power plants. Appendix I to Part 50 is our

numerical guides for design objectives and limiting conditions for operation to meet the as low as is reasonably achievable criterion for radioactive material and light-water-cooled reactor effluents.

I would like to clarify that this effort is not actually an Advance Notice of Proposed Rulemaking, but is using the ANPR process to solicit comments from stakeholders for the staff's consideration in developing a regulatory basis in a possible future rulemaking.

Next slide. This presentation will discuss background on reactor effluents in Part 50, Appendix I, policy and technical issues and the cumulative effects of regulation in the ANPR, other considerations involving a possible future rulemaking, possible changes in the next revision to NRC Regulatory Guide 1.109, which is the principal guidance document used as an acceptable method for demonstrating compliance with Part 50, Appendix I, and works in progress from the interagency agreement initiated between the Environmental Protection Agency and the NRC with the Oak Ridge National Laboratory to support possible future revisions to Part 20 and Part 50, Appendix I and NRC guidance development.

Next slide. Reactor effluents are also referred to as effluents, liquid and gaseous effluents and radioactive effluents. Effluents include categories of radionuclides such as noble gases, tritium, carbon-14, radioactive iodines and particulates.

Effluents must be monitored. NRC regulations require effluents to be as low as is reasonably achievable, or ALARA. NRC Reg Guide 1.109 describes exposure pathways, dose calculational models and parameters for estimating public dose including dispersion of effluent in the environment and water bodies.

Effluents must be reported. Reg Guide 1.21 provides guidance in measuring, evaluating and reporting effluents, solid radioactive waste and public dose. Licensees submit the Annual radioactive Effluent Release Reports, which are available in ADAMS, and on the NRC public web site at that address. Licensees enter effluent data from the Annual Radioactive Effluent Release Reports into a database maintained by the NRC. This database is also accessible on the NRC public web site at that URL.

Next slide, please. The NRC publishes

annual summaries of the licensee's Annual Radioactive Effluent Reports in NUREG Contract Report 2907. This figures shows an 99 percent reduction over 35 years of mixed fission and activation product activity discharge in liquid effluents. This category includes all radionuclides and liquid effluents except for tritium, dissolved noble gases, and alpha-emitting radionuclides.

Next slide, please. This figure shows a 99 percent reduction over 35 years of noble gases discharged and gaseous effluents from nuclear power plants.

Next slide. The National Council on Radiation Protection Report 160 shows our total average annual radiation exposure in the U.S. is about 620 millirem. About half, or 310 millirem, comes from natural sources. Radon and thoron gases account for two-thirds of this radiation exposure, while cosmic, terrestrial and internal radiation account for the remainder. The other half, or 310 millirem, radiation exposure comes from manmade sources, mostly from diagnostic medical procedures of which computed tomography account for about 150 millirem, while other medical procedures, commercial products such as

tobacco, fertilizers, welding rods, exit signs and smoke detectors and industrial activities such as nuclear power plants account for the remainder.

Doses to the public from nuclear power plants are less than one-tenth of one percent of what the average person receives annually from all sources of radiation. Doses to workers from occupational exposures are also less than 0.1 percent of the annual dose to a member of the public from all sources of radiation.

Next slide. Part 50, Appendix I applies to licenses under Part 50, which is referred to as the existing fleet, and combined license holders and applicants under Part 52, which is considered new reactors. Part 50, Appendix I prescribes the design and performance of equipment used to control effluents to the environment and doses to the public. These are the design objectives which are found in 10 CFR 50.34a. Unlike Part 20, Part 50, Appendix I is not a radiation protection standard. It contains numerical guides for design objectives and limiting conditions of operations. It provides guidance for developing technical specifications to keep effluent releases as low as reasonably achievable. It allows for some

operational flexibility while ensuring public health and safety.

Next slide. Part 50, Appendix I comprises about four pages in the regulation. There are five sections. The introduction is in Section I. Section II contains the design objectives or dose criteria for liquid and gaseous effluents. Section II.A is the dose objectives for liquid effluents, three millirem per year total body dose, 10 millirem per year dose any organ. Section II.B is for noble gases and gaseous effluents. These are the gamma and beta air doses of 10 millirad per year gamma-air and 20 millirad per year beta-air. The noble gas objectives can be increased or decreased based on the total body and skin dose.

Section II.C contains design objectives for radioactive iodines and particulates in gaseous effluents. That design objective is 15 millirem per year to any organ. And there's a typo in that bullet. It should be 15 millirem per year to any organ. Section II.D is the cost-benefit ratios of $1,000 per total body man-rem and $1,000 per man-thyroid-rem.

Next slide. And Section III, implementation is demonstrated by calculational procedures, exposure pathway analysis, and monitoring

for radioactive iodine. Section IV contains the guides on technical specifications for limiting conditions of operations. Section IV are the effective dates of the regulation. And lastly, is a concluding statement on the rulemaking docket RM-50-2.

Effluent releases are controlled by a technical specification to ensure releases are ALARA using Part 50, Appendix I design objectives to a small fraction of Part 20 dose and effluent concentration limits and with the EPA 40 CFR Part 190 environmental dose standards.

Part 50, Appendix I design objectives are far more restrictive than Part 20 allowable dose limits to members of the public or effluent concentration limits in Part 20, Appendix B, Table 2. As a result, Part 20 dose limits and effluent concentration limits are rarely controlling limiting radioactive liquid and gaseous effluent releases from nuclear power plants.

Part 50, Appendix I relationship to EPA 40 CFR is that they're both based on the recommendations in the International Council of Radiation Protection Publication 2, which was published in 1959. There is an EPA requirement in Part 20, which is 10 CFR 20.1301(e)

that applies to uranium fuel cycle facilities such as nuclear power plants. The methods for demonstrating compliance with that requirement are found in NUREG-0543 and these include compliance with nuclear power plant technical specifications meeting the ALARA design objectives in Part 50, Appendix I, assessment of off-site direct radiation doses, and conformance to Regulatory Guide 1.109.

The ANPR for the EPA was published in February of 2014 and it was closed for public comment in August of 2014.

Part 20 ANPR, radiation protection, was published in July of 2014. It had been closed after almost one year being open for public comments, and that was closed in June of 2015. The comments are available on the regulations.gov web site searching under Docket ID NRC-2009-0279.

The EPA limits for the member of the public are 25 millirem per year whole body, 75 millirem per year to the thyroid, and 25 millirem per year to any organ.

Part 50, Appendix I was published in 1975. It's based on the recommendations in ICRP-2, which was published in 1959, while Part 20, which was

published in 1991, is based on the recommendations in ICRP Publication 26 published in 1977. The issue is how the dose is defined and how the dose is calculated. ICRP-2 is fundamentally different than any other ICRP recommendation. ICRP-2 is based on the total body and critical organ concepts rather than effective dose.

In ICRP-103 an anatomical phantom represents the approximate masses, shapes and spatial relationships of organ tissues of a reference person of a given sex and age. The U.S. has not updated its regulations beyond the 1977 recommendations of ICRP-26 for Part 20. ICRP-103, published in 2007, provides the most recent dose terminology and methodology.

Next slide. In 1995 there was an early effort conducted by the staff to amend Part 50, Appendix I. About 13 years after that the NRC and industry was thinking they were experiencing a nuclear renaissance. The branch that I was working in received about 14 new reactor applications. Then initiated this new effort which has resulted in a SECY paper. These are staff papers to the Commission identifying an issue with some pros and cons and recommendations which were followed by Staff Requirements Memorandum. These are the Commission's direction to the staff for both Part

20 and Part 50, Appendix I.

In SRM-SECY-12-0064 the Commission approved the staff's development of regulatory basis a revision of Part 20 and Part 50, Appendix I to align with the most recent methodology and terminology for dose assessment and also conforming changes to all NRC regulations. There were specific instructions in the SRM for Part 20. There were no explicit instructions in the SRM for Part 50, Appendix I. And the central theme is alignment.

Next slide. Overview of the Part 50 ANPR. It was published on May 4th in Volume 80 of the *Federal Register*. Two-five-two-three-seven is the first page and it's titled "Reactor Effluents." The easiest way to get this ANPR is to Google 80 FR 25237. The public comment period ends after 120 days on September 1st of 2015.

MS. LAURON: This is Carolyn Lauron. Currently the staff is expecting to publish in the *Federal Register* notice the extension of the public comment period, an additional 30 days, to end on October 1st, 2015.

DR. CLEMENT: Thank you, Carolyn. The summary, as Carolyn went over, is how to comment on

docket ID NRC-2014-0044. These are submitting comments online to the regulations.gov web site, email, fax, hand carry, so forth.

Section II, we went over some brief background information on reactor effluents in Part 50, Appendix I. We'll be shortly -- for regulatory objectives. This was to engage stakeholders, collect stakeholder comments, consider stakeholder input, evaluate options to achieve better alignment between Part 50, Appendix I and the most recent terminology and methodology in ICRP-103, establish a technical basis and prepare and submit a regulatory basis document to the Commission in accordance with the Commission's direction in SRM-SECY-12-0064.

We'll go over policy and technical issues in Section IV.

Section V talks about the public meetings. Prior to publication of the ANPR there were several outreach activities that were conducted to professional organizations to the nuclear industry and to the public. Since the ANPR was published there have been presentations made to professional organizations, to the nuclear industry. And today is the first public meeting.

Section VI, we'll be talking about the cumulative effects of regulation.

Section VII lists the cited documents in back of the ANPR with ADAMS section numbers or ML numbers which are available in ADAMS, but the staff has found it is much easier to Google the ML numbers to get the information. The two computer codes are not accessible, publicly accessible because you have to be a registered user to get that information.

Rulemaking process is in Section IX. If the NRC develops regulatory basis sufficient to support a proposed rule, then there will be an opportunity for public comment when the proposed rule is published and the NRC will respond to such comments if and when it publishes a final rule.

Next slide. Part 50, Appendix I. This is the overview of the ANPR as it's broken down by issues, options and questions. I would like to note that the options and questions in this presentation have been paraphrased for brevity, so please refer to the ANPR for the complete text. The staff also recognizes that some of the questions in the ANPR can only be answered by the nuclear industry.

Next slide, please. Issue No. 1, which

is closer alignment of Part 20 and Part 50, Appendix I with ICRP-103. This issue is common to Issue 1 in the Part 20 ANPR. It is also common to Issue 2, which is updated dose methodology or dosimetry in EPA 40 CFR 190 ANPR.

Next slide. Issue 1, Option 1a. This option is based on current NRC regulations continuing to adequately protect the public, although Part 20 and Part 50, Appendix I are based on different methods of assessing dose. Licensee compliance with Part 50, Appendix I will continue to demonstrate that effluents to unrestricted areas are ALARA. NRC may make minor revisions to updates supporting NRC guidance. If the NRC does make revisions to update guidance, stakeholders and the public will have an opportunity to provide comments.

Option 1b. Revise the terminology and methodology for dose assessments in Part 50, Appendix I to more closely align with ICRP-103 in parallel with any revisions made to Part 20. This approach would ensure a consistent application of regulatory criteria between Part 20 and Part 50, Appendix I. This option would also offer the opportunity to use a common regulatory basis for calculating and reporting doses.

Next slide. Option 1a - question. This is Question 1-1: What are the advantages and disadvantages of not changing the basis and revising guidance from the late 1970s? So basically this is status quo. Don't make any changes except for the staff may make minor revisions to the NRC guidance documents.

Next slide. Question 1-2: What are the advantages and disadvantages of aligning Part 50, Appendix I with ICRP-103 terminology and methodology?

Question 1-3: What are the advantages or disadvantages of conducting parallel rulemaking between Part 20, Part 50, Appendix I with a common effective or compliance date for both rules?

Question 1-4: What are the backfitting implications to Part 50 licenses? What are the issue finality implications to Part 2 combined license holders and applicants? This particular issue was probably the reason for the delay in the Part 50, Appendix I ANPR. The staff wanted to make sure that the backfitting issue of finality determination was properly addressed in the ANPR.

Question 1-5: What cost savings would be realized over the lives of operational programs if the dose calculation methods are standardized?

Next slide. Question 1-6: What are the impacts and costs per reactor unit in updating programs, procedures, computer codes and training?

Question 1-7: Would these costs and impacts be similar for both boiling water reactors and power water reactors?

Question 1-8: Should all the conforming changes to dose based criteria in Part 50 be changed coincidentally or in a separate later rulemaking? This refers to the total effect of dose criteria in 10 CFR 50.34a, 10 CFR 50.67 and Appendix A of the General Design Criteria in Part 50, Criterion 19 for control room.

Question 1-9: Should the number of age groups be expanded from four to six as recommended in ICRP-103? Currently in Reg Guide 1.109 there are four age groups: infant with an age interval from 0 to 1 year, a child with an age interval from 1 to 11 year, a teenager with an age interval from 11 to 17 years, and adult is greater than 17 years. ICRP-103 has six age groups: a newborn, 1-year-old, 5-year-old, 10-year-old, 15-year-old, and adult male and female.

Next slide. Issue No. 2, scope of changes to NRC guidance with Part 50, Appendix I and Reg Guide 1.109. So this relates to the possible changes made

to Reg Guide 1.109, which was published in 1977, which is the principal implementation guidance for Part 50, Appendix I.

Next slide. Option 2a is a limited scope reduction. No changes to numerical values. The NRC would change the design objective for the total body dose only and the dose factors or dose coefficients in Reg Guide 1.109 which includes the dose factors for semi-infinite cloud of noble gases; Table E-6, which is standing on contaminated ground, dose factors for standing on contaminated ground; Tables E-7 through E-10, which are the inhalation dose factors; and Tables E-11 through E-14, which are the ingestion dose factors for all the age groups. Now what's really important to note is that this option does not update the exposure pathway models and assumptions. It only changes the dose factors or dose coefficients.

Next slide. Option 2b is a full scope revision which involves retiring, revising, consolidating over 30 NRC guidance documents. These are reg guides, NUREGs, contract reports. The staff would also evaluate new rad waste systems, update atmospheric dispersion models and also develop new source terms. This is a parallel offer that's ongoing

right now with the NRC in an update to the GALE code, which is a computer code that was developed in the '70s, late '70s that is used to calculate the effluent release rates from nuclear power plants. Update computer codes such as GALE, LADTAP and GASPAR. With respect to updating computer codes, the staff have found that computer codes developed in the 1980s by NRC is an acceptable method for demonstrating compliance with the regulations have been modified by applicants in new reactor applications. This approach requires the applicant to provide its technical basis on the alternate method which results in significantly longer license review times and costs and multiple requests for additional information and follow-up requests for additional information for the staff to reach its reasonable assurance of safety conclusion. And for this option the staff would rewrite Reg Guides 1.109, 1.110, 1.111 and 1.112.

Option 2c is an expanded scope revision somewhere in between Option 2a and 2b. This could include possibly updating the dose coefficients in Reg Guide 1.109, updating the exposure pathway models and assumptions and updating the associated computer codes.

Next slide. Question 2-1: Which option seems most appropriate and are other options available?

Question 2-2: What are the advantages and disadvantages of each option?

Next slide. Issue 3, detailed considerations for revising Part 50, Appendix I. What's important to note here is Options 3a through 3e deal with alignment with ICRP-103 while Options 3f and 3g are unrelated to alignment with ICRP-103, but have some implications for associated NRC guidance.

Next slide. Option 3a. The NRC would keep the numerical values but change the units. Probably this should be change the terminology. For example, three millirem per year total body dose would be changed to three millirem per year effective dose. So it's not really changing the units. It's changing the terminology.

In Option 3b the NRC would eliminate the organ dose or provide a single effective dose based criterion.

In Option 3c the NRC would eliminate the gamma and beta-air doses or convert them to an effective dose.

Next slide. Option 3d. In Section II.D

the applicant shall include in the rad waste system all items of reasonably demonstrated technology that when added to the system sequentially in order to diminish the cost-benefit return can for a favorable cost-benefit ratio affect reductions in dose to the populations within 50 miles of the reactor.

So the cost-benefit ratios in Part 50, Appendix I in Section II.D are based on interim values of $1,000 per total body man-rem and $1,000 per man-thyroid-rem. The current cost-benefit ratio is based on the value of the statistical life of $3 million and the stochastic cancer risk coefficient based on ICRP-60 is about $2,000 per person-rem. In the updated guidance in NUREG-1530 the NRC is proposing that the cost-benefit ratio be increased to $5,100 per person-rem.

Option 3e. Docket Rulemaking-50-2 would be removed if no longer applicable to pending applications. This provides some relief to the cost-benefit ratios for construction permits that were filed on or after January 2, 1971 and prior to June 4th, 1976 if the rad waste systems and equipment described met the design objectives in RM-50-2.

Next slide. Option 3f. The NRC would

expand the scope to include designs other than boiling water reactors and pressurized water reactors.

In Option 3g the NRC would consolidate where appropriate and applicable and update Reg Guides 1.21, 1.109, 1.206 and Reg Guide 4.16. Also NUREGs-1301, 1302 as pertains to the off-site dose calculation manuals for BWRs and PWRs, NUREG-0133, 0543 and 0800, which is a standard review plan, and NUREG Contract Reports 4013 and 5643, which are the LADTAP and GASPAR computer codes. And again, these two options are unrelated to alignment with ICRP-103, but have some implications for associated NRC guidance.

Next slide. Question 3-1: So should the focus be only on those changes to align with ICRP-103; that is, Options 3a through 3e, or should all changes, Options 3a through 3g, be evaluated?

Question 3-2: What significant impacts would be expected if Part 50, Appendix I were revised to include all options?

Question 3-3: If all changes were made should selected options be addressed in future implementation phases or in separate rulemaking efforts? if so, what options should be delayed?

Next slide. Question 3-4: Should

licensees still report doses separately for organs; for example, the skin and the thyroid, whenever airborne effluent releases are dominated by radioactive effluents and noble gases?

Question 3-5: Should the licensees continue to report skin dose, total body dose and organ doses, including thyroid doses, if organ doses are eliminated? Why or why not?

Question 3-6: Should categories of releases such as liquid activity, noble gases, radioactive iodines, tritium, C-14, be expanded or revised? Possibly include hard to measure radionuclides.

Next slide. Issue No. 4, which is metrification. This is common to Issue 5 of the Part 20 ANPR. In 1992 NRC published its metrication policy. It supports and encourages use of the metric system of measurement by the nuclear industry. NRC will publish documents and all written public communications in dual units first followed by English units in parentheses. NRC documents specific to a licensee such as inspection reports, documented material will be in the licensee's units. Event reporting and emergency response communications between licensees, NRC, state

and local authorities will use traditional units. The Commission does not intend to revisit the 1992 policy unless shown to cause undue burden or hardship. This is published in Volume 61 of the *Federal Register* on 31169.

The Commission's direction to the staff in SRM-SECY-12-0064 disapproved eliminating the English units from the NRC regulations. The staff also acknowledges that there is an issue with conversion of radioactivity unit from traditional unit such a microcurie to a Systeme International unit of becquerel since it's not a whole number or integer value. This could actually result in a more restrictive value.

The applicability of metrification to Part 50, Appendix I is in Reg Guide 1.109 dose factors Table A-1, which is bioaccumulation factors; and this is based -- the SI units also pertain to mass, right, Table B-1, which is dose factors for semi-infinite cloud of noble gases, Table E-6, which are dose factors for standing on contaminated ground, Tables E-7 through E-10, which are the inhalation dose factors, and Tables E-11 through E-14, which are the ingestion dose factors.

Next slide, please? Question 4-1: Should the Annual Radioactive Effluent Release Reports

contain metric and English units with metric units first followed by English units in parentheses? Would this be an undue burden or hardship? Explain and provide examples.

Question 4-2: Whether costs or other impacts to operational programs would be incurred if metrification was changed.

Question 4-3: Should 10 CFR 20.2101(a) and Reg Guides 1.21 and 4.15 be revised and integrated with Part 50, Appendix I allowing licensees to provide records and reports in SI units only?

Next slide. Cumulative effects of regulation. Four questions.

Next slide. The NRC has implemented a program to address the possible cumulative effects of regulations, or CER, in developing a regulatory basis for rulemaking. Cumulative effects of regulation recognizes challenges licensees or other impacted entities may face while implementing new NRC or other agency regulatory requirements. Cumulative effects of regulation is an organizational effectiveness challenge from implementing a number of complex positions, programs or requirements within a prescribed implementation period with limited resources and access

to technical expertise.

The NRC is specifically requesting comments on the cumulative effects of regulation that may result from potential amendments to Part 50, Appendix I with revisions to associated NRC guidance documents.

Next page. So the following questions are being asked: Question 5-1: if the NRC conducts parallel rulemaking; that is with Part 20 and Part 50, Appendix I, should there be a separate later compliance date? If so, when should this compliance date be set? One year after or two years after, for example. Explain your rationale or justification for any such compliance date.

Question 5-2: What actions could be taken to reduce or minimize implementation time?

Question 5-3: What other requirements, regulations or orders issued by NRC or another federal agency such as the Environmental Protection Agency may compete with or take priority over implementing any potential changes? What are the consequences including costs and how should they be addressed?

Question 5-4: What are the unintended consequences including costs that would negate any

benefits? What could be done to minimize these unintended consequences? Please also provide information on costs and benefits of any potential revisions and associated NRC guidance documents.

Next slide. Other considerations. In developing the ANPR the staff has identified about 16 policy, regulatory and technical issues that would require Commission approval. We talked about backfit and finality. In SRM-SECY-14-0087 the Commission directed the staff to look at qualitative considerations. This would be using scientific accuracy, improving the public trust and confidence, improving clarity, transparency and consistency of regulations and alignment within the federal family, such as EPA and the DOE, and the international community.

There's also a shrinking technical expertise and knowledge of applying existing guidance and computer codes at the NRC from the 1970s, as well as with the nuclear industry.

The NRC is also looking at right-sizing its work force based on the Project AIM 2020 report. And if you're interested in that, you can look at SRM-SECY-15-0015.

Next slide. Possible changes to Reg Guide 1.109. The Electric Power Research Institute is an independent, non-profit organization that conducts research, development and demonstration relating to the generation, delivery and use of electricity for public benefit. In 2013 EPRI published a technical report with several recommendations on C-14, or carbon-14, for accurate dose assessments and updating the dose factors in Reg Guide 1.109 on all radionuclides of interest to nuclear power plants, not just carbon-14.

The staff would consider also updating the non-dose factors or the non-radiological parameters in Table A-1, which are the bioaccumulation factors, Table D-1, which are the food distribution transport times, Tables E-1 and E-2, transfer data and parameters, Table E-3, animal consumption rates, Table E-4, which are the parameters for the average individual, Table E-5, which are the parameters for the maximum exposed individual, Table E-15, which are other values. This data has not been updated in almost 40 years and there is current data published by the Food and Drug Administration and by DOE that could be used to update this data.

Also, for the recreational boating and swimming exposure scenario, this is a scenario that is not described in Reg Guide 1.109, but provisions to assess this exposure pathway scenario is in the LADTAP computer code. So an update to Reg Guide 1.109 would describe this particular exposure pathway.

Next slide. For the surface contaminated grounds exposure pathway Table E-6 provides the dose factors for standing on contaminated ground. Reg Guide 1.109, this is actually for an undefined age group. To find out which age group this actually applies for requires you to look at the FORTRAN source code. And it's for the adult. It's not for the other age groups.

Also, residential structural shielding. This is attenuation for residential structures. We have possibly new data to update that. This effectively reduces the exposure to residents from airborne plumes.

For the contaminated shoreline sediments, Table E-6, this table actually serves as a dual purpose. It takes the contamination profile, modifies it by a series of equations based on a sediment density of 40 kilograms per square meter assuming a contamination depth of 2.5 centimeters based on the study from the

Columbia River. So the staff would look into developing dose factors or dose coefficients specific for that exposure pathway scenario.

For the exposure pathway scenario semi-infinite cloud of noble gases, the staff would evaluate why the radioactive iodine and particulate releases were actually dropped out of consideration in that exposure pathway scenario.

With respect to the air doses, gamma and beta-air doses, Federal Guidance Report 15, which is in draft; it's not be cited because it's not publicly available at this time, has developed air submersion doses that are developed using the ICRP-103 methodology. So if the gamma-air dose and the beta-air dose factors were to be retained in Reg Guide 1.109, the air submersion doses would have to be split out essentially. So the NRC would be looking into how that would be done if the gamma-air dose and the beta-air dose were split out from the air submersion model.

For elevated plume releases the staff would evaluate and update the atmospheric dispersion models and update the 1970s nuclear decay schemes to ICRP-107, which was published in 2008.

Next slide, please. Works in progress.

This is from the interagency agreement between the Environmental Protection Agency and the NRC with the Oak Ridge National Laboratory. We are expecting data at the end of next month which will be dose coefficients for Part 20 and Part 50, Appendix I.

For the occupational data we expect to receive a subset of annual limits of intakes and derived air concentration values. Also, the tritium model and the C-14 model are being updated. The inhalation dose coefficients and the ingestion dose coefficients have been published and Federal Guidance Reports 11 and 12 are being updated.

With respect to the public data, the effluent concentration limits in Part 20, Appendix B in Table 2 are being updated using the ICRP-103 dose methodology. The releases to sewer in Part 20, Appendix B, Table 3 are being updated. For Part 50, Appendix I age and organ-specific dose coefficients are also being updated. And for Part 20 DOE per-capital dose coefficients in support of a reference person.

Next slide. Questions?

MS. LAURON: So, currently on the schedule we had planned for a break before taking questions, but if you'd like to ask your questions now or take

the break now -- I'll leave it to people in the room.

Okay. All right. So we'll take a break for 15 minutes. We'll come back by 10:45. That's 20 minutes.

(Whereupon, the above-entitled matter went off the record at 10:22 a.m. and resumed at 10:45 a.m.)

MS. LAURON: Okay. If we could restart the meeting with the question session. So we'll open it up for members who are present at this meeting, and then we'll switch over to the bridge line.

MR. HIATT: This is Jerry Hiatt with the Nuclear Energy Institute, and just kind of a generic question, which if the rulemaking does go forward how will that coordinate with the Part 20 ANPR and also the 40 CFR 190 ANPR that's out that is currently being reviewed?

DR. CLEMENT: That's really a great question, and I'm sorry I don't have an answer for that. One of the objectives would be to have internal NRC alignment between Part 20 and Part 50, Appendix I with ICRP-103. The EPA published an ANPR with one of the issues for updating the dosimetry methods or dosimetry also in alignment with ICRP-103. It's recognized that the EPA is the lead federal agency on this, so I know

it's somewhat challenging to get all the federal agencies aligned at the same time. And one of the questions we asked was pertaining to the cumulative effects of regulation and the impact on the licensees for doing that. I don't know if anybody else at this table would care to comment on that, but it would require coordination between the NRC and the EPA to do that.

MR. LITTLETON: This is Brian Littleton with the EPA. All I can say regarding that matter is that right now the agency is kind of reviewing how it intends to move forward with the 40 CFR 190 standard. If we're going to move forward with the proposal or not, we are still reviewing our options there, but that we will be working and we do continually work with the NRC and the other federal agencies to assure that to the extent possible that all parties know what the other hand is doing on that issue.

MS. LANGILLE: This is Betsy Langille from TVA. Will the presentation be available electronically?

MS. LAURON: Yes, the presentation is available on the NRC web site through the same meeting notice.

MS. LANGILLE: Okay.

MS. LAURON: There should be two assession numbers there. If you have a problem finding it, just give me a call or email me. Yes.

MS. LANGILLE: Thank you.

DR. CLEMENT: This is Rich. I did check this morning. The presentation is available on that web site with the meeting notice as well.

MR. HIATT: Jerry Hiatt with NEI. Just another question, Rich. The last couple of slides you were talking about the data that is going to be coming available from Oak Ridge, some of the Appendix B Table 2 effluent concentration limits. Once that data is available what are the plans for the staff to do with that data?

DR. CLEMENT: Thank you, Jerry. This is Rich from the NRC. What the NRC is expecting at the end of September; that's next month, is an abridged set or a subset. ICRP-107 has 1,252 radionuclides. What the NRC is expected to receive at the end of next month is a subset or about 100 of those radionuclides. This top 100, if you want to call it, was -- these radionuclides were selected by the office at the NRC Office of Nuclear Reactor Regulation, Office of New Reactors, Office of Nuclear Material Safety and

Safeguard -- are believed to be the radionuclides that are most sensitive to the dose.

So what the staff intends to do as soon as it gets the data is to do a comparative analysis to see what that data is. What is the difference between the current values that are in Part 20 and the current values in Part 50, Appendix I? There is no data in Part 50, Appendix I. It's all in the regulatory guidance document.

One of the challenges that the staff will face, particularly for Part 50, Appendix I, is that there may not be -- in fact there will not be an apples-to-apples comparison between the ICRP-103 derived data and the ICRP-2 data. It's because ICRP-103 has the six age groups. Reg Guide 1.109 has four age groups. So there is not really an overlap in the age groups. And for example, the child, the interval is from 1 to 11 years. ICRP-103 has 1-year-old, 5-year-old and 10-year-old. So there's like three age groups within the one age group for Reg Guide 1.109.

There's really not an easy way to do that comparison for that particular critical group. So we have to think about how we're going to do a comparison like that.

Again, it may not be a one-for-one comparison.

The other considerations that the staff needs to look at is that when you look at the dose factors, we don't expect that the values are going to be a safety issue. Some of the numbers may go up a few percent; some of the numbers may go down a few percent. What's important to understand is that at the end we're looking at a calculated dose.

And what we're only going to be comparing at this time is the comparison made between an new dose coefficient and an old dose coefficient, but we understand that there are non-radiological parameters like usage factors, transfer factors that also could go up or down based on new published data. In some of these dose calculational methods and assumptions the equations could change if NRC decides to update the dose calculational methods.

So there's -- I'm not going to say confounding factors, but there's multiple factors that would have to be considered in calculating this dose. But with respect to the data that we're getting at the end of the month next month is that we'll be doing a comparative analysis on that to see what the delta is.

The remaining data, which is 1,152 radionuclides approximately, is expected to be delivered to the NRC I think October of 2016. The thought also maybe is that once the data has been reviewed by the staff and accepted by the staff is that this data could be possibly published in an NRC guidance document. There's also a possibility that this data could be published in a federal guidance report. Possible. So, thank you.

MS. LAURON: Okay. We'll move to the phone, the bridge line right now. If you could un-mute the phone line and we'll give members who have called in a chance to ask their questions.

MS. ANDERSON: Hello, this is Ellen Anderson from the Nuclear Energy Institute.

MS. LAURON: Hi, Ellen. You can go ahead and ask your question.

MS. ANDERSON: Okay. Thank you. In recognizing NRC's Project AIM 2020 initiative, has the NRC determined the resources necessary to complete each of these options including the revisions to the applicable regulatory guides?

DR. CLEMENT: This is Rich from the NRC. We have developed an internal resource estimate. It has not been finalized yet, but I don't have any

information on that to actually provide on that question.

MS. ANDERSON: Will that become available publicly?

DR. CLEMENT: No, not that I'm aware of.

MS. ANDERSON: All right. Thank you.

MS. LAURON: This is Carolyn Lauron. Is anybody else on the bridge line who would like to ask a question?

MR. COURTENAY: Yes, this is Chris Courtenay at Duke Energy.

MS. LAURON: Hello, Chris. Go ahead with your question.

MR. COURTENAY: Yes, my question is concerning issue No. 2, the scope of changes for Reg Guide 1.109, in particular Option 2c, the expanded scope revision. When I reviewed the ANPR, it threw me for a loop a little bit because it says anything between nothing and full. And I think I kind of understand why the question was asked. You're looking for suggestions. But I was just kind of wondering if you guys could maybe provide a little bit more detail on specifically what you were looking for for that one.

DR. CLEMENT: Thank you for the comment.

This is Rich from NRC. Option 2a is limited changes, right?

MR. COURTENAY: Yes.

DR. CLEMENT: And then 2b was full scope, recognizing they're almost at the extremes. The third option would be something in between. And also the question is asked are there any other options that could be considered? So what I had mentioned is just a possible option that me and the staff at the NRC that reviews these new reactor applications would somehow propose. Not only are the updates to the dose coefficients needed, but also to the dose calculational models and the parameters because those have not been updated in almost 40 years.

And the computer codes are actually used to implement those dose calculational models and calculate the dose to a member of the public in the nearest unrestricted area. So the computers codes are more used as a tool that would implement the NRC guidance. They really have to be done together. You can certainly use the dose calculational methods that are in Reg Guide 1.109 and possibly develop a spreadsheet, but it's very complicated to do that. So that third option was to get somewhere in between

the extremes, if you want to call it that way.

MR. DEHMEL: Jean-Claude Dehmel, NRC. For further background information on these three options I would recommend that you go to precursor SECY paper, Enclosure 3 of SECY-08-0197, which has been endorsed by referencing SECY-12-0064. Enclosure 3 presents a lot of technical detail about what the staff is envisioning. Remember that this is 2008 information. There are some elements of this 2008 SECY paper that are being rethought about as part of the SECY-12-0064, but we have not reissued a revision to Enclosure 3 to SECY-08-0197. But there's a lot more technical information describing the underlying thinking of what the NRC staff is thinking about these three options. But you should go to that, Enclosure 3 to SECY-08-0197.

MS. LAURON: This is Carolyn again. Is there anybody else on the bridge who has another question?

(No audible response)

MS. LAURON: All right. Anybody else in the room who has another follow-up question for Rich or the staff?

MS. LANGILLE: I just have one question.

This is Betsy Langille again from Tennessee Valley Authority. You presented the graph from NUREG-2907, which are really compelling and I think the industry -- I think the NRC is pretty proud of those decreases in our commitment to ALARA and the environmental stewardship we hold. So how does the NRC go about doing their evaluation knowing that we're already pretty low. We've done a good job over 30 years weighing the cost of implementing this with what might result in a small change in our reported doses, but still no change to the overall benefit to the public?

DR. CLEMENT: Thank you for that comment. This is Rich from the NRC. That is the reason why NRC has asked those specific questions. What are the cost benefits? We understand that the doses from nuclear power plants -- and if I remember from reviewing the 2010 report, which is not out yet publicly, is the annual dose from all power plants I think is around one millirem per year, which is such a low number it has to be calculated. That's far below something that's measurable above natural background.

So, we recognize that and it's why the question has been asked to provide your comments on what are the cost benefits associated with that.

MR. DEHMEL: Jean-Claude Dehmel again. Again, I would urge you to look at SECY-08-0197, Enclosure 3. There's a discussion later on in the latter part of Enclosure 3 discussing on how we would do a comparative analysis with the before and after, so to speak. So the idea and what is described in SECY-08-0197 is that we would take data from the fleet of operating reactors for both liquid and gaseous effluents and then generate a reference PWR, a reference BWR, locate each one on a fresh water site and a salt water site and do calculations on doses using ICRP-2, the current Reg Guide 1.109 methodology and LADTAP and GASPAR-2 code and then repeating the same analysis all over again with a new methodology using the ICRP-103 code dose coefficients with the revised computer code and whatever revisions we make to certain model parameters or equations of models and do a comparison between the two.

That addresses the technical aspect. It doesn't address yet the cost implication, but with respect to the difference. So with that we'd be able to determine whether for the same release rate, right, what will be the increase or the decrease in doses comparing the two methodologies. And then from that

we would go to the next step in determining what are the other implications that are traditionally required for rulemaking.

MS. LANGILLE: So the NRC will be doing that comparison?

DR. CLEMENT: Yes. I think at this point the staff would be the only stakeholder that would be able to do that. We would have the computational models, which probably would have not been released to the public at this point. So we would be best informed on what the differences in the calculated doses may be to provide a recommendation to our management. But same goes with the data that we're getting. The staff will have firsthand information and knowledge on that and we'll get a fairly rough idea what the potential impacts may be from doing a comparative analysis n that data.

MS. LAURON: All right. This is Carolyn again. I'll go back to the phone line and see if there are any follow-up questions.

MR. TARANTINO: Yes, this is Carl Tarantino with Dominion on the line. You may be aware that EPRI is doing a project, a three-year project on looking at improving the accuracies for the effluent

dose to member of public, and they're going to be looking at a lot of data and a lot of research behind that. Is thought is does this play, if at all, in terms of the work that's going to come out of that that would be useful prior to making a decision about going forward with something like this proposed rulemaking. We anticipate there will be some good information that's going to come out of that study. I don't know, the question I guess to NRC would be if they're aware of that EPRI project going on specifically to the effluent public dose accuracies performing those calculations based on the current guidance.

DR. CLEMENT: This is Rich from the NRC. I think I've heard of a presentation related to that at either the NEI Radiological Effluents and Environmental Workshop -- is that being led by Karen Kim?

MR. TARANTINO: Yes. Yes. They met at the workshop, after the workshop.

DR. CLEMENT: I've looked at the EPRI technical report on accurate carbon-14 dose assessments, and the recommendations in that technical report I thought were very helpful and useful in the possible revision to Reg Guide 1.109. And I would

expect that this technical report from EPRI would also be very useful in that regard as well.

MS. LAURON: Are there any other follow-up questions from those on the line?

(No audible response)

MS. LAURON: Okay. So there are no further questions. I'd like to bring the meeting to a close. The transcripts will be made available on the web site once they're ready. We'll also have a meeting summary. On your way out there are public feedback forms that you can mail in that does have our contact information. For those of you on the line, following this meeting there will be a link on the public web site for this particular meeting so that you will be given a chance to provide your feedback. And with that, I'd like to call the meeting to a close. Thank you.

(Whereupon, the above-entitled matter went off the record at 11:06 a.m.)