



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS  
WASHINGTON, DC 20555 - 0001**

May 1, 2013

MEMORANDUM TO: ACRS Members

FROM: Derek A. Widmayer, Senior Staff Scientist **/RA/**  
Technical Safety Branch, ACRS

SUBJECT: CERTIFICATION OF THE MINUTES FOR THE MEETING OF THE  
RADIATION PROTECTION AND NUCLEAR MATERIALS  
SUBCOMMITTEE, APRIL 9, 2013 – ROCKVILLE, MARYLAND

I hereby certify, to the best of my knowledge and belief, that the minutes of the subject meeting on April 9, 2013, are an accurate record of the proceedings of that meeting.

Attachment: Certified Minutes

cc: C. Santos



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS  
WASHINGTON, DC 20555 - 0001**

MEMORANDUM TO: Derek A. Widmayer, Senior Staff Scientist  
Technical Support Branch, ACRS

FROM: Dr. Michael T. Ryan, Chairman  
Radiation Protection and Nuclear Materials Subcommittee

SUBJECT: CERTIFICATION OF THE MINUTES FOR THE MEETING OF  
THE RADIATION PROTECTION AND NUCLEAR MATERIALS  
SUBCOMMITTEE, April 9, 2013 – ROCKVILLE, MARYLAND

I hereby certify, to the best of my knowledge and belief, that the minutes of the subject meeting on April 9, 2013, are an accurate record of the proceedings of that meeting.

                    / RA /                    4/28/2013

Michael T. Ryan, Chairman                      Date  
Radiation Protection and Nuclear  
Materials Subcommittee

**ADVISORY COMMITTEE ON REACTOR SAFEGUARDS  
RADIATION PROTECTION AND NUCLEAR MATERIALS  
SUBCOMMITTEE MEETING MINUTES**

**April 9, 2013  
Rockville, MD**

The Advisory Committee on Reactor Safeguards (ACRS) Subcommittee on Radiation Protection and Nuclear Materials (RPNM) met on April 9, 2013, at 11545 Rockville Pike, Rockville, MD, in Room T2-B3. The meeting was convened at 8:30 am and adjourned at 12:07 pm.

The entire meeting was open to the public. Mr. Derek A. Widmayer was the cognizant ACRS staff scientist and the Designated Federal Official for this meeting. No written comments or requests from members of the public for time to make an oral statement were received from members of the public concerning this meeting.

**ATTENDEES**

**ACRS**

M. Ryan, Chairman  
D. Skillman, Member  
H. Ray, Member  
S. Armijo, Member  
S. Schultz, Member  
J. Stetkar, Member  
D. Widmayer, ACRS Staff

**NRC Staff**

L. Camper, FSME/DWMEP  
D. Jackson, FSME/DILR  
C. Grossman, FSME/DWMEP  
C. McKenney, FSME,/DWMEP  
A. Carrera, FSME/DILR  
D. Esh, FSME/DWMEP  
G. Alexander, FSME/DWMEP  
P. Yadav, FSME/DILR

G. Suber, FSME/DWMEP  
M. Lee, FSME/DWMEP  
C. Ridge, FSME/DWMEP  
D. Lowman, FSME/DWMEP  
J. Shaffner, FSME/DWMEP  
A. Schwartzman, FSME/DWMEP  
L. Parks, FSME/DWMEP

**Others**

J. T. Greeves., Talisman  
L. Suttora, DOEI  
E. Regnier, DOE  
C. Cariedor. DOE  
D.. Schultheise , EPA

### **Others (via Teleconference)**

W. Brunkow  
T. Buckner  
D. D'Arrigo  
R. Lundberg  
C. Thomas

### **SUMMARY**

The purpose of the meeting was to review and discuss the proposed rulemaking language and technical basis for revisions to 10 CFR Part 61, *Licensing Requirements for Land Disposal of Radioactive Waste* published in December 2012. The Subcommittee planned to gather information, analyze relevant issues and facts, and formulate proposed positions and actions, as appropriate, for deliberation by the Full Committee at the upcoming July 2013 Full Committee meeting. The RPNM Subcommittee will also hold another meeting on this same matter in June 2013 before taking it to the Full Committee in July.

<b><i>SIGNIFICANT ISSUES</i></b>	<b><i>Reference Transcript Pages</i></b>
M. Lee presented the FSME staff views of how the Recommendations in the ACRS Letter Report of September 22, 2011, were factored into the current Part 61 revisions being commented on by the Committee. There was a great deal of discussion on this matter, including how the staff has had to balance the recommendations of the Committee with the three sets of directions they have received on Part 61 revisions in Staff Requirements Memos from the Commission.	9 -19 (Slides Pgs 179 – 184)
Members of the Subcommittee brought up the following issues during this presentation from staff:	
- The transition from qualitative to quantitative in the analysis and how this is taken into account in the decision whether compliance is achieved. (Ryan)	12
- The relationship of the period of performance (10,000 years) and the institutional control period (100 years). (Skillman)	14
- Achieving compliance given the time period of 10,000 years. Since the answer is it is all analysis (i.e., there are not measurements and/or data provided over the years) what does an applicant actually have to do to comply. (Armijo)	16
M. Lee presented the FSME staff analysis and response to public comments they received from the first request for public comments on the initial proposed revisions to Part 61. Members were particularly interested in the comments received (or not	19 – 52 (Slides Pgs 185 – 196)

<p>received) from the Agreement States that have operating LLW Disposal facilities (namely TX, SC, UT, and WA).</p> <p>Members of the Subcommittee brought up the following issues during this presentation from staff:</p> <ul style="list-style-type: none"> <li>- That protection of the intruder is still a driving concept in the Part 61 regulation, and how it is being implemented in the revisions compared to either the original Part 61 and/or whether it has any relationship to a real individual who requires protection. (Armijo)</li> </ul>	<p>34 – 37</p>
<p>Drs. Esh and Grossman presented the bulk of the presentation to the Subcommittee on the major technical concepts used to derive the Part 61 revisions and the technical basis behind the revisions proposed in the rulemaking language.</p> <p>Members of the Subcommittee brought up the following issues during this presentation from staff:</p> <ul style="list-style-type: none"> <li>- The analysis in the revisions of Part 61 are an emphasis on the front-end (the decision to operate) performance assessment and intruder assessment, instead of having any requirements or emphasis that this should be an “ongoing” analysis that factors in the results of new information and data, especially environmental monitoring. (Ryan)</li> <li>- The inclusion of engineered barriers in the analysis for periods of time beyond the 500 or so years that the hydrological parameters are considered “exclusionary.” (Ryan)</li> <li>- What should be considered a “catastrophic” event when performing the long-term analysis, or the second tier of the analysis as recommended by both ACNW and ACRS, and when does the analysis become “unrealistic” or no longer “meaningful.” (Armijo)</li> <li>- How will the results of the analysis be used in the context of a decision on whether the facility is safe or “not safe,” when a qualitative judgment is being used on the basis of the quantitative analysis. (Ryan)</li> <li>- Ensuring that the use of modern ICRP dose methodology ensures safety and sound decisions, and does not have unintended consequences and creates a burden for licensees. (Armijo and Skillman)</li> <li>- Whether the revisions to the rule, since the 100 year institutional control period of 100 years seems so short now that we are talking about DU, shouldn’t consider mandating</li> </ul>	<p>53 – 156 (Slides Pgs 197 – 238)</p> <p>75 – 77</p> <p>88 – 89</p> <p>103 – 110</p> <p>111 – 117</p> <p>119 – 128</p> <p>133 – 139</p>

a longer institutional control period with maintenance of it – re-licensing the site even after closure. (Skillman)	
<p>In summarizing their comments on the presentation, members had the following issues:</p> <ul style="list-style-type: none"> <li>- Whether Depleted Uranium (DU) can be separated out as a separate problem and dealt with as special case waste stream. Staff defends the current approach as responsive to stakeholders who want a solution to any waste stream without singling out DU. (Armijo and Skillman)</li> <li>- Continued concern over the use of a specific intruder assessment that goes out far into the future, rather than factoring in realistic conservatism. (Armijo and Skillman)</li> </ul>	<p>165- 170</p> <p>169 – 172</p>

<b><i>ACTION ITEMS</i></b>	<b><i>Reference Transcript Pages</i></b>
A comment letter from CRESS at Vanderbilt University contains comments of direct interest to Member Armijo. Staff pointed out that those comments came in response to the second request for comments and will be addressed in the June 2013 Subcommittee meeting.	21 – 23

### **ATTACHMENT**

Official Transcript of Proceedings, Meeting of ACRS Radiation Protection and Nuclear Materials Subcommittee, April 9, 2013, Rockville, MD.

### **Documents Provided to the Subcommittee:**

1. Federal Register, Vol. 77, No. 236, *Low-Level Waste Disposal: Regulatory basis and preliminary rule language; second request for comment*, (77 FR 72997), December 7, 2012.
2. *November 2012 Preliminary Rule Language for Proposed Revisions to Low-Level Waste Disposal Requirements (10 CFR Part 61)*. (ML12311A444)
3. *Regulatory Analysis for Proposed Revisions to Low-Level Waste Disposal Requirements (10 CFR Part 61)*, November 29, 2012. (ML12306A480)

# **Official Transcript of Proceedings**

## **NUCLEAR REGULATORY COMMISSION**

Title: Advisory Committee on Reactor Safeguards  
Radiation Protection and Nuclear Materials

Docket Number: (n/a)

Location: Rockville, Maryland

Date: Tuesday, April 9, 2013

Work Order No.: NRC-4112

Pages 1-173

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1 UNITED STATES OF AMERICA

2 NUCLEAR REGULATORY COMMISSION

3 + + + + +

4 ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

5 (ACRS)

6 + + + + +

7 RADIATION PROTECTION AND NUCLEAR MATERIALS

8 SUBCOMMITTEE

9 + + + + +

10 TUESDAY

11 APRIL 9, 2013

12 + + + + +

13 ROCKVILLE, MARYLAND

14 + + + + +

15 The Subcommittee met at the Nuclear  
16 Regulatory Commission, Two White Flint North, Room  
17 T2B3, 11545 Rockville Pike, at 8:30 a.m., Michael T.  
18 Ryan, Chairman, presiding.

19 COMMITTEE MEMBERS:

20 MICHAEL T. RYAN, Chairman

21 J. SAM ARMIJO, Member

22 HAROLD B. RAY, Member

23 STEPHEN P. SCHULTZ, Member

24 GORDON R. SKILLMAN, Member

25

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WASHINGTON, D.C. 20005-3701



1 NRC STAFF PRESENT:

2 DEREK WIDMAYER, Designated Federal Official

3 LARRY CAMPER, FSME

4 ANDREW CARRERA, FSME

5 DAVE ESH, FSME

6 CHRISTOPHER GROSSMAN, FSME

7 DEBORAH JACKSON, FSME

8 MICHAEL LEE, FSME

9 CHRIS MCKENNEY, FSME

10 ABY MOHSENI, FSME

11 LEAH PARKS\*

12 GREGORY SUBER, FSME

13 PRIYA YADAV\*

14  
15 ALSO PRESENT:

16 WARD BRUNKOW\*

17 TED BUCKNER\*

18 DIANE D'ARRIGO\*

19 RUSTY LUNDBERG\*

20 CHRISTOPHER THOMAS\*

21  
22 \*Present via telephone

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Adjourn

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

(8:30 a.m.)

CHAIRMAN RYAN: All right, we'll go ahead and open the meeting. This is a meeting of the Advisory Committee on Reactor Safeguards, Radiation Protection and Nuclear Materials Subcommittee.

I'm Michael Ryan, Chairman of the Subcommittee.

ACRS members in attendance are Sam Armijo, Dick Skillman, Harold Ray, Steve Schultz. Dana Powers and Dennis Bley will be joining shortly, I believe.

The purpose of this meeting is to discuss the rulemaking language in 10 CFR Part 61, proposed revisions to low-level waste disposal requirements. The proposed revisions were published in the Federal Register for public comment this past December.

The Subcommittee will gather information, analyze the relevant issues and facts, and formulate proposed positions and actions as appropriate. The Subcommittee will meet and discuss again on this matter on June 20, and which the matter will be taken up by the Full Committee at the 606 ACRS Full Committee meeting in July.

This meeting this morning is open. The rules of conduct are that your participation in the

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1 meeting will be published in the Federal Register as  
2 part of the notice for the meeting. Derek Widmayer is  
3 the Designated Federal Official for the meeting.

4 A transcript of the meeting is being kept,  
5 and will be made available on the ACRS webpage.  
6 Therefore, it is requested that speakers first  
7 identify themselves and speak with sufficient clarity  
8 and volume so they can be readily heard.

9 We have not read received any requests for  
10 time to make oral statements from anyone prior to  
11 today's meeting. However, there will be time made  
12 available at the end of the proceedings for anyone who  
13 wishes to comment at that time to make a comment at  
14 that time.

15 I understand there are a number of folks  
16 who are listening in on the meeting on our bridge  
17 line. The bridge line will kept in a listen-only mold  
18 to minimize noise disturbance here in the meeting  
19 room, but we will open it for any comments that anyone  
20 wishes to make at the end of the proceedings.

21 Thank you.

22 We will now proceed with the meeting. I  
23 call upon Deborah Jackson, Deputy Director of the  
24 Division of Intergovernmental Liaison and Rulemaking  
25 and FMSE, to open the proceedings.

## 1 INTRODUCTION

2 BY DEBORAH JACKSON

3 DEPUTY DIRECTOR JACKSON: Thank you, Mike,  
4 and good morning to everyone.

5 We are here today at your request to give  
6 you an update on the work with the Part 61 rulemaking  
7 up to December 2012. At our meeting with you in June,  
8 we will discuss public comments on the proposed rule.

9 Over the course of this rulemaking, the  
10 staff met with the ACRS on multiple occasions to  
11 provide updates and solicit the Committee's views on  
12 certain technical issues related to the Part 61  
13 rulemaking and implementation guidance document  
14 development.

15 These meetings resulted in an ACRS comment  
16 letter dated December 22, 2011. This letter provided  
17 four recommendations to the staff with regards to the  
18 approach to this rulemaking. In a response letter  
19 dated November 3, 2011, the staff discussed its views  
20 on the ACRS recommendation approach. Mike Lee will be  
21 discussing the views in greater detail in the next  
22 presentation.

23 Next slide.

24 This rulemaking began when the staff  
25 received direction from the Commission to engage in a

1 limited-scope rulemaking to add requirements for site-  
2 specific technical analysis prior to the disposal of  
3 significant quantities of depleted uranium and blended  
4 waste.

5 With this direction, we were to identify  
6 the technical requirements that would apply to the  
7 site-specific analysis and develop a guidance document  
8 that outlines the parameters, assumptions, and those  
9 things conducting with such site-specific technical  
10 analysis.

11 In the SRM in 2012, listed at the second  
12 bullet, the Commission directed the staff to expand  
13 the ongoing limited-scope provision of Part 61 to  
14 include the following issues:

15 1. Allowing the licensees the flexibility  
16 to use the latest ICRP dose methodologies in the site-  
17 specific assessment for the disposal of all  
18 radioactive low-level waste;

19 2. developing a two-tiered approach that  
20 establishes a compliance period that covers the  
21 reasonably foreseeable future, and a longer period of  
22 performance that is not a priority and established to  
23 evaluate the performance of the site over longer time  
24 frames;

25 3. providing flexibility for disposal

1 facilities to establish site-specific LORW acceptance  
2 criteria based on the results of the site's  
3 performance assessment and intruder assessments; and

4 4. recommending a compatibility category  
5 element of the revised rule that ensures alignment  
6 between the states and federal government on safety  
7 fundamentals while providing the states with the  
8 flexibility to determine how to implements these  
9 safety requirements.

10 I'll note for item number four on that  
11 previous slide, the agreement states' compatibility,  
12 the staff is working with NRC Standing Committee on  
13 Compatibility on appropriate compatibility  
14 recommendations on these proposed revisions.

15 Now, for the last slide, the submitted  
16 agenda is different than, I believe, what's on this  
17 slide and that Mike Lee is going to discuss the ACRS  
18 comment letter. I think what we had submitted was  
19 different.

20 So today, we have five presenters. Mike  
21 Lee is going to go over the ACRS comment letter, and  
22 he'll discuss the 2012 public outreach initiative.  
23 Dave Esh and Chris Grossman well talk about the 2012  
24 regulatory basis development document. Andrew Carrera  
25 will go over the proposed language that luminary

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1 proposal language. And Aby Mohseni will discuss the  
2 path forward under Part 61.

3 So, with that, I'll turn it over to Mike  
4 Lee.


5 MICHAEL LEE: STAFF VIEWS ON  
6 THE ACRS RECOMMENDATION APPROACH

7 MR. LEE: Good morning.

8 CHAIRMAN RYAN: Good morning.

9 MR. LEE: Can everyone hear me?

10 CHAIRMAN RYAN: Yes.

11  MR. LEE: I drew the short straw, and I  
12 get to talk to the Committee about its earlier letter  
13 to the staff.

14 (Laughter.)

15 MR. LEE: While I was on vacation, I got  
16 volunteered -- no, I'm just joking. It's always a  
17 pleasure to talk to the Committee.

18 I'm currently in FSME, and this slide  
19 speaks for itself, so why don't we go to the second  
20 slide, please?

21 Just to provide some context, as everyone  
22 in this room knows, or is probably aware by now, the  
23 staff has received no fewer than three sets of  
24 direction on this particular rulemaking from the  
25 Commission.



1           The initial direction was provided in an  
2           SRM from the Commission in March 2009. This is in  
3           response to SECY-08-147, and that's been, in many  
4           respects, the primary driver for what we're doing in  
5           the rule.

6           If I were to amend the slide today, I  
7           would also acknowledge that there was a second piece  
8           of direction we received soon thereafter in connection  
9           with the blending paper that Jim Kennedy put together.  
10          So that was kind of the two pieces of information that  
11          were in play when the Committee first looked at the  
12          Part 61 rulemaking that the staff submitted.

13          Your letter dated September 22, 2011,  
14          reflects, as you know, a series of interactions the  
15          Committee had with the staff in the summer of 2011.  
16          And the Committee submitted four recommendations to  
17          the staff to consider. We subsequently reviewed those  
18          recommendations and responded to you and a letter  
19          dated November 3, 2011.

20          Slide three, please.

21          For the first part of this presentation,  
22          I'm going to follow this standard template, if you  
23          will. It shows what the Committee recommended to the  
24          staff initially in its letter, how the staff responded  
25          in the November 3rd letter, and then how we're

1 currently implementing it in the context of the  
2 rulemaking.

3 So your first recommendation, of course,  
4 was that Part 61 should not be amended in accordance  
5 with the staff's recommendations. We believe that, in  
6 response, we know we're doing with the Commission told  
7 us to do, which was to introduce an explicit  
8 performance assessment and human intrusion analysis  
9 for requirement for the Part 61 regulations.  
10 Heretofore, they did not exist.

11 (Cell phone ringing.)

12 MR. LEE: As a reminder, everyone please  
13 turn off your phones.

14 (Laughter.)

15 MR. LEE: I'm sorry.

16 Returning to slide three, in the context  
17 of the rulemaking that the Committee looked at  
18 previously, we did introduce an explicit performance  
19 assessment and intruder analysis requirement to the  
20 regulation, consistent with earlier Commission  
21 direction. So we believe we're doing what the  
22 Commission told us to do.

23 Slide four, please.

24 In the Committee's second recommendation,  
25 "Implementation guidance for Part 61 should not

1 specify it *a priori* a period of performance." The  
2 staff agrees.

3 Originally, we specified a longer-term  
4 period of performance. As you recall, that was a  
5 20,000-year number consistent with the dose  
6 calculations that the staff did. However, the staff  
7 believes that it is important now to specify a period  
8 of compliance in the rule because that's the most  
9 recent set of directions we received from the  
10 Commission.

11 We now are proposing a time of compliance  
12 of 10,000 years and a longer unspecified period of  
13 performance based on risk insights that were developed  
14 consistent with the performance assessment.

15 CHAIRMAN RYAN: Mike, this might not be  
16 the right the right time to ask this question, but let  
17 me just put it out there.

18 MR. LEE: Sure.

19 → CHAIRMAN RYAN: Somewhere between 100  
20 years and 20,000 years, you go from quantitative to  
21 qualitative.

22 MR. LEE: Right.

23 CHAIRMAN RYAN: I'd like to understand  
24 somewhere during our conversation, maybe not even  
25 today, but --

1 MR. LEE: Yes, how the --

2 CHAIRMAN RYAN: -- through that --

3 MR. LEE: Either through the presentations  
4 later today or in the next presentation that we have  
5 in our second meeting with you all, we'll be able to  
6 articulate it.

7 CHAIRMAN RYAN: And I asked the question  
8 because I think it's critical that the Committee  
9 understand the details of what that transition is,  
10 from a quantitative to a qualitative assessment.

11 MR. LEE: Sure.

12 CHAIRMAN RYAN: You know, where we draw  
13 conclusions from analytical data, it's pretty clear to  
14 everybody, you're above or below something.

15 MR. LEE: Right.

16 CHAIRMAN RYAN: But how we make a decision  
17 based on qualitative criteria is not clear.

18 MR. LEE: Sure.

19 CHAIRMAN RYAN: Generally and  
20 specifically, in this case, it's not clear at all, to  
21 me at least. So that's one area where I think we  
22 hopefully will spend a little bit more time --

23 MR. LEE: Sure. Yeah.

24 CHAIRMAN RYAN: Again, not necessarily  
25 today, but --

1 MR. LEE: Well, seeing that I drew the  
2 short straw, I'll volunteer Dave Esh to talk to that  
3 later, either later today or in the next two.

4 CHAIRMAN RYAN: That's fine. Whenever we  
5 get to it is fine. I just thought I'd get it out on  
6 the table.

7 MEMBER SKILLMAN: Mike, let me follow up  
8 on Dr. Ryan's question.

9 MR. LEE: Yes.

10 → MEMBER SKILLMAN: In this discussion  
11 sometime today, I would like to her the distinction  
12 between the period of performance --

13 MR. LEE: And the time of compliance.

14 MEMBER SKILLMAN: -- and institutional  
15 control period.

16 MR. LEE: Oh, okay. Sure.

17 MEMBER SKILLMAN: It seems to me that one  
18 is the analytical for how the progeny may affect what  
19 might be discovered many, many years from now. But  
20 institutional control period has a direct bearing on  
21 the ability to identify it, discover it.

22 You have a driver's license that expires  
23 every two years.

24 MR. LEE: Sure.

25 MEMBER SKILLMAN: You have another kind of

1 permit that might expire after five years. I'm  
2 wondering if there isn't a connection between the  
3 period of performance and the institutional control  
4 period that would serve to address some of the  
5 concerns that this Committee has.

6 MR. LEE: Well, I think the short answer  
7 is, the original institutional control period is a  
8 derivative of how the waste classification system  
9 under Part 61 was first developed, and that's  
10 described in the EIS that dates back to the late 1970s  
11 and early 1980s.

12 The staff arrived, based on its analyses,  
13 at 100 years, and that's pegged to the waste  
14 classification scheme which pegs out, I think, for  
15 class A.

16 There was no period of performance under  
17 the original regulation. The original regulation was  
18 predicated on assumptions related to siting, design,  
19 and the basic classification system in the context of  
20 those concentration levels for the isotopes  
21 identified.

22 Currently, there's no nexus between the  
23 two, but we can get into this discussion later on.

24 MEMBER SKILLMAN: Great.


25 MR. LEE: Either Dave or Chris Grossman

1 will speak to it when Brian comes up.

2 MEMBER SKILLMAN: Well, like Chairman  
3 Ryan, I'm just getting it on the able right now.

4 MR. LEE: It's good to have these --

5 MEMBER SKILLMAN: Thank you.

6  MEMBER ARMIJO: Mike, one of the things  
7 I'd like to hear about this morning from the staff is:  
8 How does one actually satisfy your compliance  
9 requirements that you're going to propose in this  
10 rule? Exactly what does someone who manages one of  
11 these facilities have to do to demonstrate that this  
12 is the appropriate compliance period, and this is how  
13 it's satisfied? It's all analysis; right? No one can  
14 guarantee what's going to happen 10,000 years from  
15 now.

16 So what will it take to satisfy the staff  
17 that the requirements of this proposed rule have been  
18 met?

19 MR. LEE: Well, I don't put too much on  
20 Dave's plate, but the short answer is that in the  
21 numerical performance assessment that's been proposed  
22 for the 10,000-year time of compliance, you'd run the  
23 numbers for 10,000 years and evaluate them against the  
24 61.41 performance objectives.

25 The details of the analysis, the

1 attributes of the features that we believe should be  
2 included in the performance assessment, will be  
3 discussed in detail in the guidance document that goes  
4 out in parallel with the draft rule text.

5 Dave, is there anything you'd add, or?

6 MR. ESH: I think I already have  
7 indigestion and it didn't even get to me; it sounds  
8 like my plate is filling up.

9 (Laughter.)

10 MR. ESH: For this topic, yeah, I plan to  
11 talk about it in detail after we get through Mike's  
12 spot. So we can wait and talk about it then in  
13 context with the slides, or we can talk about that  
14 now, whichever you prefer.

15 MEMBER ARMIJO: When you're ready to talk  
16 about. Why don't we cover it in the --

17 MR. ESH: I'm making notes here to try to  
18 remember to talk to these things, and if I forget,  
19 just remind me.

20 MEMBER ARMIJO: We'll try.

21 CHAIRMAN RYAN: Thanks, Dave.

22 MR. LEE: I think I'm on slide five --I'm  
23 at the end. Thank you very much.

24 I have another presentation.

25 On slide five, the Committee noted that it



1 believed that its earlier recommendations were equally  
2 applicable to both DU as well as other low-level  
3 waste. The staff agrees, for the reasons that are  
4 outlined in our earlier letter responding to your  
5 comment.

6 We believe that once you become more  
7 familiar with the current edition of the rule text,  
8 you'll begin to see how we've implemented that  
9 direction, or how it comports with your views.

10 The final slide of this series, slide six,  
11 applies to Recommendation 4. Compliance with the  
12 performance objectives of the disposal system after  
13 institutional control ends, as well as the possible  
14 doses to the hypothetical intruders should be  
15 evaluated considering the features, events, and  
16 processes for a given site for a period of time,  
17 commensurate with the risk for a specific facility and  
18 site.

19 The staff agrees, and we believe that in  
20 the context of the regulation that we developed in  
21 2011, and the current version, we were consistent with  
22 that theme, and we would again be glad to point that  
23 out as we get farther into the presentation.

24 So, unless there are other questions with  
25 respect to your earlier letter, I can jump into the

1 second presentation I have, which speaks to the 2012  
2 public outreach initiative.

3 CHAIRMAN RYAN: Please go ahead.

4 2012 PUBLIC OUTREACH INITIATIVE

5 MICHAEL LEE

6 MR. LEE: So, again, to put things in  
7 context, in 2011, the staff developed a rulemaking  
8 consistent with Commission direction in both SRM SECY-  
9 08-147 as well as the blending Commission paper that  
10 Jim Kennedy put together. For the life of me, I can't  
11 remember the number. I think it was 10.47, but it's  
12 in the record somewhere, and we can get to that  
13 number.

14 As the rulemaking was making its way  
15 through the concurrence process, we received  
16 additional Commission direction in the January 2012  
17 SRM.

18 The Commission told us to take the  
19 existing direction they had given us and complement it  
20 with the additional requirements that they told us to  
21 go out and float with the public. Consistent with  
22 that direction, we were told to seek public feedback.  
23 We issued Federal Register notices, and we were very  
24 proactive in contacting our partners at the agreement  
25 states on what the Commission asked us to look at.

1 I believe Debbie has already spoken to  
2 those four additional initiatives in the earlier  
3 slides, so I'm not going to repeat them here.

4 So what the staff did was it kind of work  
5 on two fronts. The first front is we already had some  
6 pre-program public meetings. We were going to  
7 participate in certain public events. We also hosted  
8 our own independent events.

9 Slide three.

10 So if you look at slide three, you'll see  
11 a series of events that the staff participated or  
12 sponsored during the summer of 2012. The events that  
13 the staff sponsored have little stars after them.

14 We had public meetings in Phoenix, Dallas,  
15 and here and Rockville, Maryland. We had transcripts,  
16 and from those transcripts, we collected information  
17 from the public that were in attendance, and got their  
18 views on the four initiatives that the Commission  
19 asked to be added to the rulemaking effort.

20 Slide four.

21 The other initiative we undertook is we  
22 created a docket in the Federal Register. We announced  
23 that availability of that docket for receipt of public  
24 comments, and through the course of the summer, we  
25 received approximately 16 sets of comments from

1 various individuals, organizations, and entities, and  
2 they approximately corresponded to 200 individual  
3 comments, questions, and suggestions.


4 So, between the record and the meeting  
5 transcripts as well as the docket, we had a body of  
6 some data that we could evaluate and consider in the  
7 context of the four additional things that the  
8 Commission asked us to consider.

9 So turning to slide five --

10 MEMBER ARMIJO: Mike, before you --

11 MR. LEE: Yes, sure.

12 Slide four.

13  MEMBER ARMIJO: We got a copy of a letter  
14 from the Consortium for Risk Evaluation, with  
15 stakeholder participation three, and that's not on  
16 your list of commenters. Is that an oversight, or  
17 didn't they comments in time?

18 MR. LEE: You received a letter directly.

19 MEMBER ARMIJO: Yes. It was addressed to  
20 Larry Camper. It was just a copy of this letter --

21 MR. LEE: I think they --

22 MEMBER ARMIJO: -- C-R-E-S-P.

23 MR. WIDMAYER: I think the answer is I  
24 think it was within the time frame.

25 MEMBER ARMIJO: The reason I bring it up

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1 is because their comments were pretty consistent with  
2 ACRS comments.

3 MR. LEE: That's E-S-P.

4 MEMBER ARMIJO: C-R-E-S-P.

5 SPEAKER: It's Cresp. What is the date on  
6 it?

7 MEMBER ARMIJO: Vanderbilt University,  
8 Howard University, Oregon State.

9 MR. LEE: Oh, I'm sorry; that -- we're  
10 kind of confusing two, we're talking about two  
11 populations of comments. The letter that I believe  
12 you're talking to is the one we received in a second  
13 round of comments that we submitted.

14 MR. McKENNEY: No, January 4, 2013.

15 MEMBER ARMIJO: This is January 4, 2013.

16 MR. McKENNEY: Which is --

17 MEMBER ARMIJO: So was early this year.

18 CHAIRMAN RYAN: Chris McKenney?

19 MR. LEE: Chris.

20 MR. McKENNEY: Just to clarify, that is in  
21 the second set of comments, none of which are on the  
22 chart above, because, as requested by the Committee,  
23 we're here to bring you up to December 2012 because  
24 we're not addressing the comments received on the  
25 draft proposal text that we put out in December. And

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1 that Cresp letter will be discussed in June.

2 MEMBER ARMIJO: Okay. Thank you.

3 MR. LEE: Thank you, Chris. Just the kind  
4 of everybody on the right page.

5 You know, I'm confused. We went out for  
6 comments in 2011. We got additional direction in  
7 January 2012. We went out for comment yet again in  
8 calendar year 2012. The slides three and four  
9 summarize what we did in 2012 up until December to  
10 seek public input on both the original Commission  
11 direction as well as the second set of direction we  
12 got from the Commission.

13 The letter from Dr. Armijo, that you're  
14 referencing from the Consortium at Vanderbilt and, I  
15 think, Rutgers, was in response to a third outreach  
16 request made as recently as December of this year, and  
17 that will be discussed later. It's not part of this  
18 population that I'm talking now right now.

19 MR. WIDMAYER: Do the comments that you're  
20 referring to on the slide predate the ACRS? Is that  
21 correct?

22 MR. LEE: These comments were post-ACRS.

23 MR. WIDMAYER: So, post-ACRS would have  
24 been pre-December --

25 MR. LEE: These are the comments we got

1 last summer subsequent to the receipt of the  
2 Committee's letter.

3 MR. WIDMAYER: Okay.

4 MR. LEE: And these comments, the material  
5 that I'm speaking to on slide three and four, are with  
6 respect to the four additions that the Commission  
7 asked us to seek public input on, in the context of  
8 its earlier direction.

9 As a result of that second request for  
10 comment, if you will, we received 200 individual  
11 comments, questions, and suggestions. So this is  
12 basically what we heard last summer after we received  
13 your letter.

14 Turning the slide five.

15 The intent of this slide is to give the  
16 Committee and others a sense for how the public's  
17 comments were tracked out. We kind of pinned them,  
18 for the purposes of review, in some categories. These  
19 are ranked-ordered. The bold type with the asterisks  
20 refer to the four Commission questions that came out  
21 of the January 2012 SRM. We received additional  
22 comments from the public and other interested  
23 stakeholders on other matters bearing on the  
24 rulemaking.

25 We applied some simple statistics your to

1 give everyone a sense for where most of the comments  
2 fell. The other comments, if you will, the second-  
3 highest rank bin was basically miscellaneous comments.

4 As you can see from the slide, most of the  
5 comments we've received are on the period of  
6 performance and time of compliance, themes that you've  
7 expressed some interest in already this morning. Our  
8 second and third rank ends were miscellaneous  
9 comments. We received a lot of comments on the waste  
10 classification tables found at 61.55. And then, in  
11 decreasing order, are the other themes that we heard  
12 from our stick was on.

13 And just for the record, the total is not  
14 exactly 100 because of rounding errors.

15 On slide six, what we tried to do is, have  
16 two populations of comments: comments received at the  
17 public meetings and available in the transcripts, and  
18 the written comments. I think we could fairly see  
19 that there was generally no disputing the need for the  
20 rulemaking. By and far, most commenters felt that  
21 there was a need to freshen up Part 61. However, they  
22 were disparate views on how we should freshen up the  
23 rule and what the rulemaking should include.

24 With respect to comments from the  
25 agreement states, the staff were very proactive in



1 contacting the agreement states. Not all agreement  
2 states chose to express that you on the rulemaking at  
3 this time, which is understandable because we're only  
4 in the drafting of proposal rule text.

5 Later on, when the rule goes out for  
6 public comment, we expect to solicit additional  
7 comments from our --

8 CHAIRMAN RYAN: Mike, do you think this  
9 will be focused mainly on the sited states as opposed  
10 to states that don't have and probably think they will  
11 never have a low-level waste site?

12 MR. LEE: We went to sited as well as  
13 unsited states.

14 CHAIRMAN RYAN: And what was the response  
15 from each?

16 MR. WIDMAYER: What does the -- obviously,  
17 not all agreement states express an opinion -- what  
18 does the slide mean?

19 MR. LEE: Well, I'm trying to communicate,  
20 first of all, that we directly targeted agreement  
21 states. And in particular, to put a finer point on  
22 Dr. Ryan's question, we made direct calls to the four  
23 sited agreement states. Not all four sited agreement  
24 states chose to express a view on what we're doing  
25 right now.

1 CHAIRMAN RYAN: How many didn't?

2 MR. LEE: I think between -- two, three,  
3 maybe. I mean we contacted South Carolina Washington,  
4 Texas, Colorado -- Utah; excuse me. We also contacted  
5 Washington state, Tennessee, and Pennsylvania by  
6 virtue of their arrangements in terms of waste  
7 processing and other interest, historically.

8 CHAIRMAN RYAN: Okay. Thank you.

9 MR. LEE: I mean we can get back to you  
10 with that detail if you'd like to see it.

11 CHAIRMAN RYAN: I guess what I'm reaching  
12 for a little bit -- and I don't expect an answer this  
13 minute -- is, what were the tone and tenor of comments  
14 from the various constituencies?

15 MR. LEE: We're going to get to that in a  
16 little bit --

17 CHAIRMAN RYAN: Okay. That's fine.

18 MR. LEE: -- in the remaining slides.  
19 What I've tried to do is, with respect to the four  
20 comments or questions that the Commission asked us to  
21 take to the public, I do have some details on that.  
22 But for future reference, if you go to Chapter 5 of  
23 the regulatory basis document, there are tables that  
24 address specific agreement states comments.

25 CHAIRMAN RYAN: Yes, okay. All right.

1 Thanks.

2 MR. LEE: But to kind of put a flavor on  
3 this particular issue if you will, in terms of what  
4 the agreement states had to say, they noted that like  
5 many state governments, the agreement states have  
6 budget challenges, and these challenges, you know, are  
7 -- there are other things besides implementation of  
8 new NRC regulations that the states have to balance in  
9 terms of their budget priorities.

10 Of course, some of the states' comments  
11 that we received are very limited. To the extent that  
12 we did receive comments, there were comments to the  
13 effect that the duration of institutional control  
14 should be extended from 100 to 300 years. And other  
15 comments were that states were wary of adding new  
16 requirements to the regulations that might oblige them  
17 to receive large quantities of depleted uranium.

18 MEMBER SCHULTZ: So the bullet, "Budget  
19 Constraints" means we just don't have the resources to  
20 look at this now, not that they have budget  
21 constraints and can't implement what you're proposing.

22 MR. LEE: No, I think they were  
23 sensitizing the staff to the fact that given competing  
24 priorities at state levels, if the Commission were to  
25 go ahead and issue new regulations in the area of Part

1 61, this would impose another challenge to their --

2 MEMBER SCHULTZ: -- budget line. So it's  
3 a regulatory burden issue.

4 MR. SUBER: Mike, how are you doing?

5 This is Gregory Suber. I'd just like to  
6 put a finer point on some of the things that Mike's  
7 talking about because he participated in some of the  
8 outreach but not all of it.

9 CHAIRMAN RYAN: Could you introduce  
10 yourself, please?

11 MR. SUBER: I'm sorry; my name is Gregory  
12 Suber. I am the Chief of the Low-Level Waste Branch.

13 We did contact each sited state. In fact,  
14 we had meetings in various locations. We had a  
15 meeting in Texas at which we invited Texas to  
16 participate. They wanted to observe, but they not  
17 actively participate.

18 We also went to OAS, and at the OAS  
19 conference, we had a meeting with all of the sited  
20 states that chose to attend at those meetings. They  
21 did come to us with a variety of concerns, and one of  
22 them was a resource concern.

23 The state of Texas was having a high  
24 degree of turnover in their program, and that was one  
25 of the reasons that their participation was limited.

1 And one of the constraints that they mentioned as far  
2 as actively participating in the process and being  
3 able to simultaneously complete the licensing of WCS  
4 and actively participate in a Part 61 limited ruling.

5 South Carolina also expressed concern  
6 about their ability to manage the Barnwell site and  
7 simultaneously participate actively in the number of  
8 Part 61 activities that we had ongoing because we had  
9 the rulemaking going on at the same time we had the  
10 revision of the Branch Technical Position on  
11 concentration averaging.

12 So the staff have a lot of stuff going on,  
13 and several sites said it was a challenge. They  
14 didn't say they couldn't do it, but they did recognize  
15 that they had the same kind of fiscal constraints that  
16 the federal government has and that it was becoming  
17 increasingly challenging for them to actively  
18 participate in all of the Commission activities as  
19 well as to manage the sites that they were responsible  
20 for. MR. LEE: Okay. So again, just for  
21 additional details, I would refer you to Chapter 5 of  
22 the regulatory basis document, which is publicly  
23 available. I believe there's a table or two in there  
24 that summarizes what we heard from the agreement  
25 states.

1 All right. Turning to slide seven, the  
2 next series of slides, I again kind of followed the  
3 same format here. In the left-hand column, you see  
4 the Commission proposal from January 2012. The  
5 stakeholder response, response from the agreement  
6 states, and then some preliminary staff observations.  
7 Again, this was high-graded from Chapter 5 in the  
8 regulatory basis document.

9 The first direction received from the  
10 Commission in January 2012 was to allow licensees the  
11 flexibility to use the latest ICRP does methodologies.

12 The stakeholder response was generally in  
13 favor of this topic by this proposal. The agreement  
14 states, to the extent that we heard from them, were  
15 mostly in support of this proposal. And in terms of  
16 implementation, allowing the staff to use or allowing  
17 licensees the flexibility to use the up-to-date ICRP  
18 recommendations would align with past agency practice  
19 generally in this area.

20 Slide eight.

21 Same format again -- the Commission  
22 proposal to implement a two-tiered approach to  
23 performance assessment that establishes a compliance  
24 period that covers the reasonably foreseeable future,  
25 and a longer period of performance that is not defined

1       *a priori*.

2                   Again, the stakeholders expressing a view  
3       on this topic were generally in support of the  
4       Commission's proposal. The agreement states -- again,  
5       not all agreement states expressed a view on the  
6       merits of the two-tiered approach at this time, and  
7       the comments that we did receive from agreement states  
8       were mixed.

9                   The preliminary staff observation is the  
10       staff had previously advocated the adoption of a two-  
11       tiered approach to the conduct of PA both in 2011 and  
12       the current rulemaking package that's in concurrence.

13                   MR. WIDMAYER: Mike, I've got a question.

14                   MR. LEE: Sure.

15                   MR. WIDMAYER: The staff interpretation of  
16       this, that the performance assessment should be done  
17       this way, did you guys assume that they also meant the  
18       intruder assessment?

19                   MR. LEE: No.

20                   MR. WIDMAYER: You did not.

21                   MR. LEE: No.

22                   MR. WIDMAYER: So that intruder assessment  
23       does not have to be done in a two-tiered approach.

24                   MR. LEE: I don't believe so.

25                   MR. WIDMAYER: Okay.

1 MR. LEE: Chris Grossman's here, I think,  
2 if he wants to make any additional response.

3 MR. GROSSMAN: The December package that  
4 we put out at the compliance period and period of  
5 performance for both performance objectives, both  
6 61.41 and 61.42, 61.41 being the PA, essentially, and  
7 61.42 then being the intruder assessment.

8 (Pause.)

9 MR. LEE: Okay.

10 MR. WIDMAYER: Yeah, but it sounds like  
11 it's been okayed by the Commission if you took two  
12 separate purchase.

13 MR. LEE: Help me out here.

14 MR. WIDMAYER: The Commission did not say,  
15 do an intruder assessment with a two-tiered approach;  
16 so, therefore, you could have done some other approach  
17 it. Am I missing something, or?

18 MR. LEE: Yes -- I -- yes.

19 MR. GROSSMAN: The Commission wasn't  
20 explicit about intruder assessment.

21 MR. WIDMAYER: Okay.

22 MR. GROSSMAN: There could have been a  
23 different approach, yes.

24 MR. WIDMAYER: Okay.


25 MR. LEE: And we'd be happy to talk to you



1 about the current approach that's in the rulemaking  
2 package later on this morning.

3 MEMBER ARMIJO: Let me ask you a question.

4 MR. LEE: Sure.

5  MEMBER ARMIJO: Is the intruder assessment  
6 still a central driver for this new rulemaking?

7 You know, it seemed to me, in the earlier  
8 version that I read, that so many of the things we're  
9 doing were all driven by this hypothetical intrusion  
10 sometime in the future. And I thought that if it just  
11 disappeared, there wouldn't be much left to this  
12 rulemaking.

13 Is that way out of line, or is the  
14 intruder assessment still central to this rulemaking?

15 MR. LEE: Well, I think, to put a historic  
16 perspective on this, you'll recall that the waste  
17 classification tables were designed around an acute  
18 exposure to an intruder. So, for the purposes of the  
19 development of the waste classification system under  
20 61.55, the staff historically relied on the intruder,  
21 the acute does to an intruder.

22 CHAIRMAN RYAN: I think the key point is  
23 that probability of intrusion has always been one.

24 MR. LEE: Yes. Yes.

25 CHAIRMAN RYAN: It's one. That's what the

1 assumption is; there will be intrusion. At some  
2 point, there might be a different structure to the  
3 ways people look at it, but there are dose scenarios  
4 where the intrusion is less than one or 100 percent.  
5 So that's something to think about a little bit, I  
6 think.

7 Is there it been where protections or  
8 designs or other features could make the probability  
9 of intrusion less than one?

10 MR. LEE: Yeah, well, the tension in the  
11 philosophy underlying Part 61 generally is that, at  
12 some point, you maintain a period of institutional  
13 controls for about a hundred years. There's some  
14 feeling that you'd have some additional duration of  
15 time for which institutional knowledge is maintained.  
16 Society is aware that this site exists, and folks  
17 would generally avoid it.

18 Today, if you want to drill a well, you  
19 have to get a permit, you have to go to the local  
20 government center, maybe the county seat, and go  
21 through records, look through land affidavits and  
22 things like that, to get permission stick do certain  
23 things.

24 But the Commission recognized at some  
25 point, there would be a loss of institutional

1 knowledge of the site, and there was a potential for  
2 an inadvertent intruder to go in there and to get  
3 exposed. And that's how the tables were arrived at.  
4 That's the assumption, that you can't protect that  
5 site in perpetuity, at some point there was the  
6 potential for --

7 MEMBER ARMIJO: Can you regulate and  
8 perpetuity? That's the thing that bothers me. You  
9 know, there's no way to prove that you're actually  
10 accomplishing anything except adding burden to the  
11 siting of a new low-level waste site and discouraging  
12 the creation of more low-level waste sites, which the  
13 country needs.

14 I just don't see how you're getting around  
15 that, particularly if you make the intrusion a  
16 probability of one.

17 MR. LEE: Well, unless Kenny or Grossman  
18 has something to say, I prefer defer to them. It's a  
19 point as well noted, but --

20 MR. GROSSMAN: This is Chris Grossman of  
21 the staff.

22 To get to your first question, Dr. Armijo,  
23 yes, we believe inadvertent intrusion protection for  
24 intruders is still an essential component of Part 61.

25 MEMBER ARMIJO: Okay.

1 MR. GROSSMAN: We'll discuss a little bit  
2 of the probability more and our presentations later  
3 on.

4 MEMBER ARMIJO: Okay. You know, different  
5 people on the Committee will have different views on  
6 that, but I just think this whole intrusion  
7 requirement is just so arbitrary and so difficult to  
8 prove that you've taken into account short of not  
9 building any low-level waste sites that it's really an  
10 impediment to a good regulation --

11 MR. LEE: Well, I --

12 MEMBER ARMIJO: -- that says let's  
13 concentrate on protecting the people, here and now,  
14 and maybe for a couple of hundred years. What is it  
15 Mike? Five hundred years? This is still low-level  
16 waste site, so after that, forget about it. You know,  
17 if the country is still in existence, people in the  
18 future will deal with the problem.

19 MR. LEE: Right.

20 MEMBER ARMIJO: Why do we have to deal  
21 with it now? Where do licensees have to deal with all  
22 these hypothetical things so far into the future?

23 It just seems to me it's -- I struggle  
24 with how you can do reasonable regulation without --

25 MR. LEE: Well, the original framers of

1 the Part 61 regulation found that by limiting  
2 concentrations of waste in the ground, you could  
3 protect future generations to an intrusion event.  
4 That's how the concentration tables came up. They  
5 viewed this as an issue of, at some point, there was  
6 not going to be any control of the site, so how do you  
7 protect future generations?

8 MEMBER ARMIJO: It seems to me that made  
9 a lot of sense.

10 MR. LEE: Right, and one of the things you  
11 do is limit concentrations of what you put in the  
12 ground because of decay factors and certain  
13 engineering features for different classes of waste.  
14 And that's a burial. The original framers of the  
15 regulation found that there was some level of  
16 protection that could be afforded.

17 CHAIRMAN RYAN: There were some accepted  
18 constraints on this thought process. One is, for  
19 example, uranium, which has a half-life that's way  
20 longer than most of the universe, is in play in low-  
21 level waste. Take that out and you've got a whole new  
22 ballgame in terms of what's in play.

23 MR. LEE: Sure.

24 CHAIRMAN RYAN: And if you look at  
25 inventories of existing sites, the fraction of the

1 inventory that's going to be there in 100 years of 300  
2 years is quite thoroughly small.

3 So, you know, I think we're trying to  
4 wrestle with the long term and the short term of  
5 what's there and what's not there. And, you know, is  
6 there some way to address that? Correct me if I'm  
7 wrong.

8 MR. LEE: Yes. I mean these points are  
9 very good to discuss, but again, going back to the  
10 Commission's direction, we were given a set of  
11 instructions to do some limited changes to the  
12 rulemaking and not to undertake a wholesale revision.

13 CHAIRMAN RYAN: And I do appreciate that,  
14 I think, very much. So I'm not --

15 MR. LEE: Yes.

16 (Simultaneous speaking.)

17 MEMBER ARMIJO: We understand you have a  
18 history of different instructions. Some of them are  
19 in conflict. And you have other people, including  
20 ourselves, giving you other input.

21 MR. LEE: Sure.

22 CHAIRMAN RYAN: But as you beyond the  
23 scope of our discussion today.

24 We also have the conundrum of depleted  
25 uranium, which is basically piled up; we put a little

1 topsoil on it, and grass, and that's the end of that.  
2 So, you know, I wonder where the risk management  
3 analysis is for that --

4 MR. LEE: Chris McKenney.

5 CHAIRMAN RYAN: -- analysis on -- sorry.

6 MR. MCKENNEY: This is Chris McKenney of  
7 the Performance Assessment Branch.

8 Just to manage expectations for a second,  
9 while we'll be getting into some of the intruder  
10 assessment, a lot of the discussions of how much that  
11 can possibly drive and analysis and some of the stuff,  
12 especially with the WAC, a lot of those details will  
13 likely be more in June when we can talk about the  
14 guidance and everything else, and how guidances  
15 differed for different in some stuff, just so that,  
16 just my reminder that we can get into a bit more  
17 detail on the management of some of these activities.

18 CHAIRMAN RYAN: That's great. I will look  
19 forward to that very much, Chris.

20 I think what Dr. Armijo and the other  
21 folks who have spoken are trying to say is that we're  
22 just trying to share with you what the thoughts are,  
23 that we're thinking about, how we can somehow come to  
24 alignment, so we're all on the same page.

25 MR. MCKENNEY: And that's what I'm saying;

1 right. But for most of the facilities, so far, they  
2 have actually done site-specific intruder analyses.  
3 That's not the driving risk. Even using generic  
4 scenarios, those are not the driving risks for the  
5 facilities that have been developed for the analyses  
6 we do for waste-incidental processing. In both cases,  
7 the site-specific analyses no longer drive the risk.  
8 It becomes --

9 CHAIRMAN RYAN: And getting insights into  
10 what does drive the risk there would be helpful.

11 MR. MCKENNEY: It would be the off-site  
12 dose, the off-site dose level.

13 CHAIRMAN RYAN: Okay, then I guess we'll  
14 hear from you either way. Okay.

15 MR. LEE: Slide nine.

16 In this slide, what we wanted to do is  
17 provide the Committee with a little additional detail  
18 on what we've heard relative to the Commission's  
19 proposal regarding a tiered approach to the conduct  
20 low-level waste PA.

21 Just to summarize, again, we found that  
22 there was general support. With respect to the time  
23 of compliance concept, we received mixed responses.

24 In the Commission's SRM, they use the term  
25 "foreseeable future," which heretofore was an



1 undefined term. It's a new term of art, if you will.

2 We received comments to the effect that  
3 1,000 years was an acceptable duration for that  
4 calculation of any dose under the first tier. We  
5 received comments that 1,000 to 10,000 years was an  
6 acceptable duration for the time of compliance. We  
7 also received comments to the effect that 10,000 years  
8 was a number that was easily achievable in terms of  
9 arriving at a meaningful number.

10 Again --

11 MEMBER ARMIJO: Easily achievable -- it's  
12 easy to calculate anything, Mike, but I can't  
13 understand how anybody could --

14 MR. LEE: I'm playing the tape and telling  
15 you what we heard from stakeholders.

16 MEMBER ARMIJO: Okay.

17 MR. LEE: Whether or not it means it's  
18 meaningful is really up to the eye of the beholder, I  
19 guess.

20 In terms of the period of performance  
21 concept, stakeholders told us that it should not be  
22 defined in the regulation. They argued that it was  
23 technically challenging as well as questionable in  
24 terms of its decision-making value.

25 And we also received comments to the

1 effect that you really shouldn't have a dose  
2 associated with any performance, longer-term  
3 performance period.

4 CHAIRMAN RYAN: When you're dealing with  
5 receptor as the --

6 MEMBER ARMIJO: The 500.

7 CHAIRMAN RYAN: Yes.

8 MR. LEE: Yes.

9 Slide 10.

10 In terms of comments on the flexibility of  
11 disposal sites to establish a site-specific WAC, the  
12 majority of stakeholders commenting on this were in  
13 favor of it.

14 To the extent that we heard from the  
15 agreement states, they were also in favor of it. In  
16 fact, many several of the agreement states have WAC-  
17 like features in their regulations licensing  
18 conditions today.

19 However, one of the comments we received  
20 under this particular topic was the caveat that,  
21 again, some agreement states didn't want to be forced  
22 to receive large quantities of depleted uranium.

23 A preliminary staff observation is that  
24 many is that any many states in fact already have a  
25 WAC, if not in name, then certainly in practice.

1 Slide 11.

2 Moving along, the compatibility issue is  
3 one that we received a lot of comments on. I guess  
4 the short version, for the purposes of time, is that  
5 many of the agreement states are interested in  
6 maintaining maximum flexibility in terms of how any  
7 new amendments to Part 61 might be implemented.

8 We noted that comment. This is an issue  
9 the staff will make a recommendation on, for the  
10 purposes of the rulemaking, and later on, as the  
11 rulemaking package proceeds, there's a compatibility  
12 committee that evaluates this in more detail.

13 My last slide is slide 12.

14 In addition to comments on the  
15 Commission's four rulemaking proposals, we received  
16 other comments, and these comments in some respects  
17 fall into that miscellaneous category that I referred  
18 to earlier on slide 5.

19 Some of the key comments we received were  
20 that the tables at 61.55 should be updated with the  
21 latest ICRP dose conversion factors and methodologies.  
22 I've already made reference that the duration for the  
23 institutional control period should be revisited.

24 We also received comments with respect to  
25 the so-called Phantom 4 isotopes, which were found to

1 be the limiting isotopes for the purposes of the  
2 groundwater dose in the earlier Part 61 EISs put out  
3 --

4 CHAIRMAN RYAN: Just to complete our  
5 record, would you mind listing those four?

6 MR. LEE: Okay. This is a test on the  
7 Phantom 4.

8 (Laughter.)

9 MR. LEE: Chlorine-36 --

10 CHAIRMAN RYAN: No.

11 MR. LEE: No? I'll let McKenney answer.  
12 I'm sure he's --

13 MR. MCKENNEY: He's gets it wrong on the  
14 first one.

15 (Laughter.)

16 MR. MCKENNEY: Chris McKenney from the  
17 Performance Assessment Branch.

18 The four radionuclides in the hard-to-  
19 detects considered to be tritium, which of course is  
20 a short-term mobile radionuclide present in most of  
21 the issues that we've had in the past disposal sites;  
22 iodine-129; technetium-99; and -- now I'm in the --

23 MR. LEE: oh, man.

24 MR. GROSSMAN: Carbon-14.

25 MR. MCKENNEY: Carbon-14, yes.

1 CHAIRMAN RYAN: The reason I asked that --  
2 and thanks for getting us the right list among you all  
3 -- is that those are interesting in that, in terms of  
4 dose consequence in the performance assessment, are  
5 they really that important? Are they hard to detect?  
6 Are they of relative low importance in terms of  
7 importance in terms of an overall PA?

8 MR. ESH: This is Dave Esh from the  
9 Performance Assessment Branch.

10 There's an interesting issue with those,  
11 in that many times, they do show up in the performance  
12 assessments. But is that a real effect, or is that  
13 due to the fact that the inventories are over-reported  
14 due to limitations in the detection technology?

15 CHAIRMAN RYAN: In the detection.

16 MR. ESH: Yes. I'm not at liberty to say  
17 which is the answer for that, but they do show up, and  
18 a number of times they will show up in the output of  
19 the performance assessments.

20 CHAIRMAN RYAN: Okay. I think that kind  
21 of raises a general question, which may be not for  
22 today but sometime in the future. What is the real  
23 relative certainty or uncertainty of some of the  
24 assessments that make assumptions used limited data on  
25 those kinds of issues?

1 MR. ESH: Yeah.

2 CHAIRMAN RYAN: You know, in other words,  
3 how do we propagate a range of uncertainty in any  
4 conclusions for the revised view of a performance  
5 assessment? We'll be looking ahead to maybe hearing  
6 a little bit about your insights in that area.

7 MR. ESH: Yes, and I can talk about  
8 uncertainties during my presentation.

9 CHAIRMAN RYAN: Okay.

10 MR. ESH: And if want to talk about it  
11 further --

12 CHAIRMAN RYAN: Okay. Fine. And I'm not  
13 looking to get the whole story today, but I just kind  
14 of want to have a placeholder. Maybe that's a more  
15 detailed discussion for our follow-up meeting.

16 MEMBER SCHULTZ: Dave, are you -- excuse  
17 me.

18 Are you going to talk about the  
19 uncertainties as well as other treated?

20 MR. ESH: Yes.

21 MEMBER SCHULTZ: How the uncertainties are  
22 treated?

23 MR. ESH: Yes, I can.

24 MEMBER SCHULTZ: I would appreciate that.  
25 Thank you.

1                   MEMBER ESH: I mean, there are a lot of  
2 different methods to manage uncertainties, and there  
3 are lots of different types of uncertainties in these  
4 assessments. So there's not necessarily one way to  
5 treat the problem, and we allow people to do different  
6 types of analyses, but they have different  
7 implications, how you treat them.

8                   One of the biggest issues for me in the  
9 whole rulemaking process and moving forward is, if  
10 you're going to rely more on site-specific technical  
11 analyses, then that requires that those analyses are  
12 credible, and it requires that they undergo a  
13 sufficient review by an independent entity to ensure  
14 that they're credible. Those are the two main  
15 pillars.

16                  Everything else -- talk about  
17 requirements; what they are, time of compliance,  
18 intruders -- all that's in the wash if you don't do  
19 good analyses, if you don't have a good independent  
20 review of those analyses.

21                  So those are the two things. If you  
22 really want to get them right and make sure your  
23 process is truly effective in terms of public health  
24 and safety, that's where you really want your energy.

25                  CHAIRMAN RYAN: Tell me if I'm summarizing

1 this well in terms of what you just said, David.

2 To me, that says that you have to have a  
3 credible representation of the geohydrologic  
4 environment at which a site sets. By "geohydrologic  
5 environment," I mean all the parts and pieces and how  
6 they all interact and over what time frames, you know,  
7 at what ranges and interaction and all of that, to  
8 say, yeah, I understand how the system works.

9 MR. ESH: One way that a true risk purist  
10 gets upset about things is when people try to manage  
11 risk with conservatism. But from a regulator's  
12 standpoint, that is a valid approach to manage  
13 uncertainties and, therefore, manage risk. When you  
14 have limited information or you're faced with  
15 uncertainties of different types, you can choose  
16 conservative representation or conservative approach  
17 to evaluate that problem, so that comes into play in  
18 these analyses and the review of the analyses.

19 Like I said, there's multiple ways you  
20 could handle this problem.

21 And by analogy, saying the XLPR program  
22 for the Extremely Low Probability of Rupture in  
23 reactor piping systems, you could take a conservative  
24 approach there and try to estimate what's the impact  
25 to the systems, how you need to redesign the systems



1 and enhance them, what not. You could also do  
2 something similar to what they're doing, which is  
3 basically do a nested Monte Carlo analysis with an  
4 epistemic globe and an aleatory loop to try to fully  
5 assess the uncertainty and make estimates of  
6 probability and, therefore, decisions about what you  
7 what you need to do the system.

8 We don't necessarily dictate in these  
9 sites and for these analyses that somebody must use  
10 one approach or another. Our objective is to lay out  
11 the requirements that allow them to succeed with  
12 whatever approach they choose, especially in the area  
13 of uncertainty.

14 CHAIRMAN RYAN: Thank you.

15 MR. LEE: So, to finish up this slide, we  
16 also received comments that if you're going to go  
17 ahead and amend Part 61, you should introduce  
18 requirements for the disposal of greater-than-Class-C  
19 low-level waste, and lastly, we should introduce  
20 criteria for clearance, a la low activity waste.

21 The staff put together a paper designated  
22 SECY-13-001 that described what its views were,  
23 relative to these issues. We received direction from  
24 the Commission previously that if anything came up  
25 that would potentially affect the timetable for the

1 completion of the rule, we were to inform the  
2 Commission accordingly.

3 In that paper, we lay out some proposals  
4 for the Commission to consider relative to these five  
5 recommendations. First, relative to the ICRP update,  
6 we currently have direction from the Commission to  
7 proceed with an update of the 61.55 waste  
8 classification tables. That's currently scheduled to  
9 begin in Fiscal Year 2015.

10 In reference to the duration of  
11 institutional controls, as part of any update to the  
12 61.55 tables, we could look at that issue in that  
13 context.

14 In terms of the so-called Phantom 4 plus  
15 chlorine-36, which was offered up by our friends at  
16 Waste Control Specialists in Texas -- I get partial  
17 credit for that -- the staff has begun that  
18 initiative. We had a meeting earlier this year in  
19 Phoenix following the waste management meeting. And  
20 Don Lowman of the staff is leading up that initiative,  
21 and we're going to have a number of interactions over  
22 the next several months to address how the guidance  
23 document in NUREG/DR-0204 would be updated to address  
24 that stakeholder recommendations.

25 In reference to greater-than-class-C

1 waste, the ball is currently in DOE's court. They  
2 have an EIS to prepare. They have to get  
3 congressional approval on the preferred approach. So  
4 right now, the staff doesn't believe it has any  
5 obligations other than to letting that process run its  
6 course relative to that decision-making.

7 And lastly, in reference to low-activity  
8 waste, that issue was addressed previously a  
9 rulemaking to Part 20, and in 2005, the Commission  
10 decided to defer any decision-making on any amendments  
11 to Part 20, including consideration of clearance.

12 So, with that, unless there are any  
13 questions, we'll just segue right into Dave Esh's and  
14 Chris Grossman's presentations.

15 CHAIRMAN RYAN: We're going to take one  
16 break this morning, and I would suggest that you be  
17 the place where it's good to do that. We'll be happy  
18 to have you guide that decision.

19 MR. LEE: What time is it?

20 MR. ESH: We have 42 slides. So, if we  
21 did Mike five minutes per slide, we're going to eat up  
22 four hours.

23 MR. LEE: I tried to go as fast as I could  
24 go.

25 CHAIRMAN RYAN: Let's go ahead and get

1 started David. Are you next? Yes. And we'll take a  
2 break at a good point when you point it out to us.  
3 Okay?

4 MR. ESH: We're going to share the  
5 presentation, and we're going to cover three elements  
6 and he's going to cover two. So maybe I can cover  
7 three and we can break and then Chris can start off  
8 with the second part.

9 CHAIRMAN RYAN: That's fine. Whatever  
10 suits you all.

11 STAFF EFFORTS TO REVISE PART 61: KEY CONCEPTS

12 DAVID ESH, PERFORMANCE ASSESSMENT BRANCH

13 MR. ESH: It's my pleasure to be here  
14 today and talk with you about our efforts on the Part  
15 61 rulemaking. Fortunately, I do not have to sing  
16 Hail to the Victors before I start this morning. I'm  
17 going to talk about our efforts to revise Part 61.

18 Next slide, please.

19 The main topics we're going to cover is,  
20 I'm going to cover some key concepts, site-specific  
21 low-level waste technical analyses and analysis time  
22 frames and then Chris Grossman is going to cover the  
23 second two topics.

24 For key concepts, it's important to  
25 understand basically the problem context. So what is

1 the risk? How do these systems perform? How are the  
2 disposal systems anticipated to perform? And what,  
3 especially, are the waste characteristics that we're  
4 dealing with?

5 I'm basically going to cover the what,  
6 how, and why of site-specific low-level waste  
7 technical analyses. And then everybody's favorite  
8 topic -- analysis time frames, which is kind of like  
9 having a political debate at Thanksgiving dinner, but  
10 we will have it nonetheless.

11 (Laughter.)

12 MR. ESH: Basically, we're going to  
13 outline for you what we think the requirements should  
14 be, why we think the requirements should be that, and  
15 how with somebody satisfy these requirements. Part of  
16 that is going to be, I think Chris McKenney tried to  
17 indicate earlier, in our guidance document. We put a  
18 lot of effort into developing our guidance document  
19 and outline.

20 If NRC was doing a review, here's how we  
21 would go about it, here's how we would go about it,  
22 the types information we would look for, and how we  
23 would interpret that information.

24 It's important understand -- I think, this  
25 is one of the things you asked right from the get go,

1 Dr. Ryan -- you start off with something that's  
2 quantitative, and at some point, you move to something  
3 that's qualitative. What I'm going to try to express  
4 to you here is that the information is quantitative.  
5 The decision-making might move from something that is  
6 valuing it as quantitative and then values it more as  
7 qualitative. But ultimately, these models or analyses  
8 are not going to make the decision for you. They  
9 provide input to the decision-makers.

10 The way the low-level waste regulations  
11 are constructed, there's a whole bunch of things to go  
12 into determining safety of that action. One of them  
13 is the technical analyses, but there are all sorts of  
14 other requirements that go and, I think, have been  
15 very effective.

16 So I'll talk about hazard and risk, and I  
17 think is a big difference between hazard and risk in  
18 this problem. That's a good thing because that means,  
19 from when Part 61 was developed, hazard, especially  
20 from the short-lived activity, is being managed very  
21 well. And you know, whether the long-lived activities  
22 being managed well, I think probably is, too. Our  
23 requirements that we're putting forth provide a common  
24 metric for everybody. I'm going talk about those  
25 things.

1           So, key concepts on slide three, "Low-  
2   Level Waste Hazard Versus Risk," I'm going to talk in  
3   detail about the inventory a little bit and then some  
4   delays in these systems from a barriers and transport  
5   perspective. I have a slide on the generic waste  
6   qualification system -- I'm not sure how familiar all  
7   the Committee members are with it -- and then the  
8   inadvertent intruder issue, which we've talked about  
9   some.

10           Slide four, please.

11           "Low-Level Waste Hazard Versus Risk."  
12   Basically, a large percentage, whether it's 90 or some  
13   other higher number, of the hazard comes from the  
14   short-lived isotopes. We've heard that discussion a  
15   lot: all the inventory is gone at 500 years. A lot  
16   of the inventory is gone at 500 years. That's the way  
17   the system was constructed, to make sure that the  
18   system could contain all the short-lived activity  
19   because the short-lived activity is such that it has  
20   a high specific activity. If you lose a little bit of  
21   it, it can cause a risk, so you have to be pretty  
22   certain that you keep that material in the system in  
23   order to protect public health and safety.

24           Then, in the analyses, especially for  
25   61.41, what you see is, most of the risk is driven

1 from the long-lived isotopes. So that's what comes  
2 out in the ground water, or if you have a erosion  
3 concerns, or maybe corrosion followed by air pathway.  
4 What you see is that the long-lived isotopes are what  
5 drives the wrist, specifically in 61.41.

6 So when we're talking about a technical  
7 requirements in, say, 61.42 and 43, those are kind of  
8 driven by the first bullet, the short-lived isotopes,  
9 whereas 61.41 and 44 are driven more by the risks of  
10 long-lived isotopes.

11 So you have to understand, there are  
12 different things that drive risk in these problems.  
13 Therefore, the low-level waste requirements have  
14 different requirements to tackle each of those risks.

15 Next slide, please.

16 MEMBER SKILLMAN: Before you go on,  
17 Dave,

18 MR. ESH: Yes?

19 MEMBER SKILLMAN: For the portion that  
20 is a hazard, cobalt 60 is, what, 5.2 years? Cesium,  
21 strontium, and tritium are all approximately 30. Were  
22 those isotopes chosen because that is their half-life,  
23 or were they chosen for different reason?

24 MR. ESH: That I listed them here?

25 MEMBER SKILLMAN: Yes. What set those



1 four apart, that you have them --

2 MR. ESH: They're on the slide as just  
3 examples of the short-lived isotopes that we see in  
4 the different analyses of driving the risks from the  
5 short-lived isotopes.

6 MEMBER SKILLMAN: So these are the  
7 prominent species that come forward when you do this  
8 analysis.

9 MR. ESH: Yes, and basically, when the  
10 regulation developed, they made their best guess about  
11 the inventory that they expected was going to be in  
12 the facilities.

13 They made these different waste streams  
14 and different isotopic lists for each of those streams  
15 and then did estimates of volume, and they basically  
16 did a summation over all those streams and all those  
17 isotopes and came up with kind of a generic inventory  
18 that they thought would be in a low-level waste  
19 disposal facility, "they," meaning NRC, so, us.

20 So then NRC took that inventory and did an  
21 analysis in the FEIS in the draft EIS and the final  
22 EIS, in the early 1980s, to develop basically the  
23 structure of her regulatory reporting requirements.  
24 So they considered short-lived isotopes and long-lived  
25 isotopes. They analyzed them somewhat differently to

1 try to provide protection from the short-lived  
2 isotopes, and try to provide protection from long-  
3 lived isotopes.

4 I'm not sure if I answered your question  
5 fully.

6 MEMBER SKILLMAN: Well, I think you did;  
7 just one other follow-up.

8 MR. ESH: Okay.

9 MEMBER SKILLMAN: These were the hazard  
10 come basically from the fission process from a light  
11 water reactor.

12 Is there another set that comes from a  
13 different process?

14 MR. ESH: Well, part of the reason we're  
15 doing the rulemaking is, when the initial regulation  
16 was developed, there were estimates about what the  
17 inventory would be, and that's kind of hard-wired into  
18 the whole regulatory structure and other requirements.

19 Now, as we move forward, other waste  
20 streams have come into being that people want to  
21 disposal of as low-level waste, so depleted uranium,  
22 blended waste, and some of the new medical technology,  
23 of developing isotopes for medical procedures. You  
24 can envision that you might generate special amounts  
25 and quantities of certain isotopes in those processes.

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1 And then, also, if in fact they went to reprocessing  
2 fuel cycle, you'd generate different isotopes from  
3 that type of waste than you would from what comes out  
4 of the traditional light-water reactor operation.

5 CHAIRMAN RYAN: I think it's a fair thing  
6 to say there's got to be some kind of balance between  
7 -- well, cobalt is not a fission product, of course;  
8 it's an activation product.

9 MR. ESH: It's irradiated, yes.

10 CHAIRMAN RYAN: It's screaming hot for a  
11 relatively short period of time, so it's an  
12 operational/management question. And once you get it  
13 "in the ground" or in its disposal configuration, it's  
14 probably not a huge long time you're really worried  
15 about it. In 50 years, it's pretty much done.

16 MR. ESH: Yes, in my experience, I can't  
17 remember ever seeing technical analyses where cobalt-60  
18 was the driver of the risk.

19 CHAIRMAN RYAN: So I think it's not only  
20 does a little bit of -- you know, there's a little bit  
21 of how you got to handle it in an operating  
22 circumstance at a licensee's facilities to get it  
23 ready to be an honorable. Those tend to be buried  
24 based on the operational risks of physically handling  
25 those materials.

1           And the forward-looking part is, how do I  
2     have requirements for waste form, waste packaging,  
3     disposal technology, and transportation technology?  
4     As David said, all of that has to be balanced into  
5     some kind of program that addresses all those  
6     component risks in sequence, if you will, to the  
7     endpoint.

8           And I appreciate David's thoughtful way of  
9     trying to explain that the metrics of thinking about  
10    risk. It certainly evolves as the material goes  
11    through a process to ultimate disposal.

12           Is that a fair summary?

13           MR. ESH: Yeah, sure.

14           Chris, did you have a comment?

15           MEMBER MCKENNEY: I just wanted to also  
16    add that along with the operational, there's an  
17    institutional control period, again, and the short-  
18    term waste form in the interior varies because, like  
19    the cobalt-60 that can disposed of in Class C, at  
20    Class C levels, an irradiated hardware can be up to  
21    like 20,000- to 60,000 r per hour at the point of  
22    disposal. So making sure it's isolated is important  
23    because you still need almost 500 years to get that  
24    down to where it's fairly innocuous.

25           CHAIRMAN RYAN: Cobalt-60?

1           MEMBER MCKENNEY: Well, at 20,000- to  
2           60,000, that's half -- yeah -- half is 10,000 r per  
3           hour, then half again. And at 20,000- to 60,000 r per  
4           hour, you need a little bit more time than 50 years.

5           MR. ESH: But at 500 years, you're at 100  
6           half-lives. That's a lot.

7           MEMBER MCKENNEY: Right. It's very  
8           innocuous, dealt with. But I'm just saying that it's  
9           a combination of operations and the institutional  
10          control, which is why the system does work for short-  
11          lived.

12          MR. ESH: Yeah.

13          So let's go on to slide five --

14          MEMBER SKILLMAN: You answered my  
15          question.

16          MR. ESH: Okay.

17          MEMBER SKILLMAN: Thank you.

18          MR. ESH: Let's go on to slide five.

19          We showed some of the Committee members  
20          this slide before, about the low-level waste inventory  
21          analysis.

22          Basically, we took some information that  
23          we had on inventories in low-level waste facilities,  
24          and we did a hypothetical calculation of, if you  
25          wanted to get that inventory down to a level where

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1       you'd meet, say, a 25 millirem standard, how much  
2       reduction do you need in that material? So it's  
3       trying to address this issue of, is the material  
4       inherently riskless? Okay?

5               Some of the isotopes are disposed of below  
6       the level you already need to meet.

7               CHAIRMAN RYAN: Just for everybody's  
8       benefit, the dashed line across the page, kind of  
9       below that is 'low risk'.

10              MR. ESH: Yes, or it would already meet  
11      the standard.

12              CHAIRMAN RYAN: That would meet the  
13      standard, okay.

14              MR. ESH: As disposed, it automatically  
15      would meet the standard because it's at such  
16      concentrations.

17              But in most facilities and for many  
18      isotopes, you need some reduction out of the system in  
19      order to meet the standard. So our approach is about  
20      what analyses you need to do to ensure you achieve  
21      that reduction.

22              As you can see, on the X-axis here, it's  
23      going out in half-lives. There are a lot of isotopes  
24      disposed of, in our four operating facilities, that  
25      are long-lived and aren't inherently riskless. So, at

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1 500 years, you aren't automatically going to meet  
2 standard. You have to do an analysis what is the risk  
3 from that inventory that you put into your system.

4 So the main point of our rulemaking is,  
5 then: What analyses or requirements you need to  
6 ensure to achieve this? Conceptually, I think that's  
7 a good point for the Committee to understand.

8 So, if we move on the slide six, then,  
9 "All existing low-level waste facilities contain  
10 sufficient inventory that could result in unacceptable  
11 radiological risk." This is for 61.41, primarily. In  
12 some cases, you need many orders of magnitude of  
13 reduction.

14 The Commission direction, which we talked  
15 about earlier, was to perform a limited-scope  
16 rulemaking so it would operate within the framework we  
17 have, then, what you would need to do within that  
18 framework to specify additional technical requirements  
19 and develop guidance. As I indicated, we spent an  
20 awful lot of time developing the guidance, and we look  
21 forward to talking with you about that in the future.  
22 I'm proud of the work that my coworkers have done on  
23 that.

24 So, if I look at the Commission direction,  
25 it's, change what you need to what don't go crazy, and

1 provide the requirements to determine if public health  
2 and safety is protected. Like I said, we really put  
3 a lot of effort into the guidance because some of  
4 these things are not amenable to specifying words in  
5 a regulation. They're too detailed and too  
6 complicated to write regulatory requirements that  
7 would necessarily get people to do what you think they  
8 need to do.

9 You need to put the principle or the main  
10 idea in the regulatory requirement and then, in the  
11 guidance, specify the various approaches that somebody  
12 could do to achieve that requirement, and that's one  
13 of the approaches we take.

14 MEMBER SCHULTZ: David, just a quick  
15 question. There's another step that goes past the  
16 guidance, and that is, how do you get it into a  
17 license condition?

18 MR. ESH: Yes.

19 MEMBER SCHULTZ: And then, the operator's  
20 use of that licensing condition. So have you thought  
21 about that or addressed that the guidance?

22 MR. ESH: No. I don't think we've  
23 addressed that in any detail in the guidance. That's  
24 a good point.

25 MEMBER SCHULTZ: You know, if you get



1 guidance that says, if you use these kinds of words to  
2 describe this implementation, which is what the  
3 guidance should help people do, it might be helpful to  
4 think about whether or not you can point agreement  
5 states or whoever the regulator is to -- this should  
6 be addressed in the license condition.

7 MR. ESH: Yes, sure.

8 MEMBER SCHULTZ: Or it could be crafted  
9 using something like that, just to point folks in the  
10 right direction.

11 MR. ESH: And I think that is a very  
12 useful and worthwhile avenue for the agreement states  
13 to impose what they see fit in their systems and for  
14 their stakeholders, and it gives them some  
15 flexibility. But it is a mechanism that they can  
16 ensure, if there's something important to them, that  
17 it happens for their particular facility in the  
18 licensing.

19 MEMBER SCHULTZ: Yeah, or it could be  
20 something that's very particular to a given site for  
21 some reason.

22 MR. ESH: Yes.

23 MEMBER SCHULTZ: So, you know, that gives  
24 him a lot of flexibility. But if you recognize that  
25 in the guidance, that probably would be helpful to

1 everybody.

2 MR. ESH: Yes. A lot of the challenges  
3 with this problem is because you're dealing with  
4 things that are in multiple dimensions, and you're  
5 trying to make requirements that are one-dimensional.

6 So we have variability in inventories and  
7 site characteristics and half-lives and a variety of  
8 things. And then you're trying to make a requirement  
9 that applies to all of those, but it's really maybe  
10 unfair to ask that. So you can't necessarily do the  
11 reduction and make that simple requirement that's  
12 going to apply to all the cases.

13 That's why, if we look at the low-level  
14 waste regulation overall, my personal opinion is, if  
15 we weren't limited in this limited-scope rulemaking,  
16 I would have loved to change the waste classification  
17 system to separate out long-lived waste from short-  
18 lived waste. And you could make special requirements  
19 for short-lived waste that are different than the  
20 requirements for long-lived waste.

21 So, if you have a waste stream like  
22 depleted uranium, which is not necessarily a short-  
23 lived concern at all but poses a pretty large long-  
24 lived concern, you could make special requirements for  
25 that waste stream. But in the low-level waste

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1 classification system as it exists right now, all the  
2 waste classes, the short- and long-lived, are mixed  
3 together throughout the classes, so it makes it really  
4 cumbersome to try to do that. We still tried to do  
5 that in our revised language, which we'll talk to you  
6 about in the next meeting, for how we handle the need  
7 for someone to do the performance analyses. So was  
8 still tried to do that. But it's not easy; it's a  
9 little bit messy, how you do it.

10 We did have an extensive stakeholder  
11 interaction, and they basically said don't limit the  
12 technical requirements to the particular waste streams  
13 initiated it best, meaning depleted uranium and  
14 blended low-level waste.

15 We have had some stakeholders after that  
16 express that opinion though: Do we limit it just to  
17 those waste streams? But the majority was, don't  
18 limit it to the waste streams. We think that's smart  
19 because, number one, the majority of our stakeholders  
20 didn't want it. It's very difficult to do, as I was  
21 trying to express in a technically sensible way. And  
22 we end up at the same place we are now, potentially.  
23 So, if there's a new waste stream we aren't  
24 anticipating right now in this rulemaking, then we  
25 have to go back, and the new waste stream that has

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1 somewhat different characteristics, well, we now have  
2 to add it into the rulemaking process. My personal  
3 opinion is I would like to get out of the regulatory  
4 business and move on with other regulatory business.

5 So let's move on to slide --

6 MEMBER SCHULTZ: Dave, before you move on

7 --

8 MR. ESH: Yes?

9 MEMBER SCHULTZ: The discussion you had on  
10 the second bullet suggested to me that you wouldn't be  
11 able to achieve the request of the stakeholders in the  
12 third bullet. In other words, the prescriptive waste  
13 forms that currently exist may prevent the proposed  
14 analysis process to achieve not limiting the  
15 requirements of waste streams.

16 MR. ESH: Yeah, it's definitely a  
17 balancing act of how we develop requirements that we  
18 think are going to work for the waste streams that  
19 came into being that initiated the process, and future  
20 waste streams, while still operating within the  
21 structure of the existing regulation without modifying  
22 it substantially. And that's where this intruder  
23 issue comes into play.

24 MEMBER SCHULTZ: Right.

25 MR. ESH: Now, the "intruder" part of the

1 whole analyses is one of the four Subpart C  
2 performance objectives. It's fundamental to the  
3 regulation. We felt, we don't have the ability to  
4 remove one of the legs of the chair, so to speak. We  
5 can change the length of the leg or maybe change the  
6 size of the leg, but we can't remove it completely.

7 So, that's conceptually what we were doing  
8 in the rulemaking process. And I think we've achieved  
9 that, but you'll have to see some of the details and  
10 tell us whether you think we've achieved that or not.

11 So, on slide seven, "Delays, Barriers, and  
12 Transport," this is just to communicate that in these  
13 systems, there are different types of barriers, and  
14 there are different types of functions for those  
15 barriers. We have both engineered and natural  
16 barriers, and they can reduce and delay risk.

17 So, on the left-hand side, I listed some  
18 things that act as risk reduction in these problems,  
19 and then on the right-hand side, things that delay  
20 risk. The technical requirements must account for  
21 both of these types of processes in the system.

22 Barriers that reduce risk are generally  
23 preferred over things that delay risk because, if  
24 you're just shifting risk and time, eventually, the  
25 risk is realized. Whereas, if you achieve a true

1 reduction, then you can have more confidence the  
2 public health and safety will be protected regardless  
3 of when that risk may be realized.

4 Slide eight, please -- the generic waste  
5 classification system.

6 The generic waste classification systems  
7 serves a variety of functions, and I think it was a  
8 good system for its desired purpose. So, when the  
9 regulation was developed, they said, we think we're  
10 going to have a lot of low-level waste sites, and do  
11 we want to have everybody analyzing this kind of  
12 hypothetical, subjective process of what we think  
13 people are going to be doing and how they might  
14 disturb the system? They decided, well, we think that  
15 it's better done by the regulator, and the regulator  
16 will do that analyses and develop limits on  
17 concentrations that can be disposed, and that will be  
18 imposed on everybody. So those limits provide some  
19 sort of limit on the suitable concentrations for near-  
20 surface disposal.

21 It also constrains this issue of the  
22 societal uncertainty. So, you know, we have different  
23 types of uncertainties in the problem. There are  
24 technical uncertainties associated with the natural  
25 system for performance of engineer, those sorts of

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1 things. We also have the societal uncertainty of what  
2 people are going to be doing. What do they do now,  
3 what are they going to be doing in the future, and how  
4 does that impact the regulatory analyses?

5 The societal uncertainties, I think, is an  
6 area where I think it's prudent to choose a  
7 conservative approach based on what people do today,  
8 and I think that's what the Commission did. They  
9 said, look, generally, people, regardless of what may  
10 happen in the future, they're going to be trying to  
11 seek shelter and use resources. And if we design our  
12 scenarios around that sort of philosophy, that should  
13 apply in the future as well as it does today.

14 What technologies they may have a  
15 billable, whether they solve cancer or whether they  
16 have better protection systems to know they're exposed  
17 to radioactivity, all those sorts of things are beyond  
18 our capability today to say what impact they are going  
19 to be in the future.

20 So this approach limits speculation about  
21 the component of the problem. It goes both ways. If  
22 you open up the part of the problem, I've dealt with  
23 stakeholders who have very specific and extreme views  
24 about future land use and activities that may be based  
25 on personal experience. You know, one of their

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1 relatives does such and such, and they live within X  
2 of the facility. And it's hard to dispute that sort  
3 of activity.

4 Of course, you have to put in context.  
5 Well, how many people do that? This is where you're  
6 driving up the probability. What's the probability of  
7 that particular behavior in action? I don't think  
8 it's fruitful to open up that area of analysis because  
9 it's very subjective and people have very strong and  
10 different opinions.

11 The regulatory approach that NRC has come  
12 up with is, let's choose something that we think is  
13 reasonable, conservative, and is robust for regulatory  
14 decision-making. Ultimately, I think some of the  
15 confusion is derived from, this is not a prediction of  
16 the future; it's a regulatory analysis to justify that  
17 a decision from a safety standpoint. And those two  
18 things can be divergent.

19 So risk in the future might be quite  
20 different than the regulatory safety decision and the  
21 information that goes into it. That's what we want to  
22 try to communicate the Committee here, is the purpose  
23 of this type of analysis. It's a regulatory analysis.  
24 It's not a prediction protection of the future.

25 CHAIRMAN RYAN: Yes, I think that's a very



1 important point. Thank you for articulating it well.

2 MR. ESH: As I said, there's a 'combined  
3 long- and short-lived isotopes' in the waste  
4 classification system that causes some challenges now  
5 for how we would develop requirements.

6 The downside using the generic waste  
7 classification approach is there are embedded  
8 assumptions in the system. So there are embedded  
9 assumptions about inventory; there are embedded  
10 assumptions about future activity of the people.

11 If you read the comments on the original  
12 draft EIS and FEIS -- I don't remember which national  
13 lab it was -- one of the national labs basically said,  
14 we see that you've developed classification tables for  
15 the humid site. People say, it's very conservative to  
16 use a humid site and apply it to all. It is for some  
17 pathways and some behavior; it's not, for other  
18 pathways and other behavior.

19 So, if you're talking about resuspension  
20 of plutonium in a dry climate, that's a lot higher  
21 than it is in a humid climate. And so that issue  
22 comes into play when you try to reduce something  
23 complicated into something more simple. I think the  
24 system that's been done is very effective for the  
25 inventory, but that's the issue of why we're doing the

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1 rulemaking, that the inventory that was analyzed then  
2 is now different.

3 So our approach is, well, how would we do  
4 that today? NRC could have done an analysis and came  
5 up with new tables, but then it's still being  
6 constrained by our assessment of a generic  
7 representation for all sites.

8 Instead, we go with the ability to do the  
9 WAC approach, or this site specific analysis for the  
10 intruder, more specifically, which is, take into  
11 account your actual conditions at that site, and land  
12 use and behaviors and everything else, and develop  
13 what you think is representative of your specific  
14 site, instead of being driven by the decisions that we  
15 make in some sort of generic scenario by the  
16 regulator.

17 I think that is a good approach and it  
18 will work very well, but as I said, it requires you to  
19 have good oversight of the evaluation and the analysis  
20 and that appropriate detail went into that analysis to  
21 begin with.

22  CHAIRMAN RYAN: One part of that I think  
23 is very important, too, David -- correct me if you  
24 disagree -- I think it's fair to put in the regulation  
25 somewhere along the line -- all right, let's say we've

1 got a new segment. There's got to be a modeling  
2 effort that will get the regulator, whether it's  
3 through an agreement state, to say, yes, this is okay;  
4 we can proceed.

5 What about the ongoing requirement that as  
6 a site continues to do monitoring and all that sort of  
7 stuff, they can build the body of evidence that can  
8 become decades long in terms of the ability to better  
9 protect what they first thought, and say, we're on  
10 track to being where we thought we'd be, or, we need  
11 to make these adjustments based on these new findings  
12 from the data that we now have.

13 Is that something you've built in?

14 MR. ESH: Yes, that's part of the process  
15 right now. If you look at Part 61, at closure, it  
16 basically says, considerable all those things that  
17 you've learned, whether it's monitoring data or  
18 technical analyses or whatever, and factor those into  
19 your closure, design, and decision, basically.

20 CHAIRMAN RYAN: Yeah. I think the real  
21 option for the guidance to do that in the guidance  
22 document might be to make sure you've captured the  
23 depth of what you just said and all the things that  
24 back it up.

25 MR. ESH: Yes, in our guidance document,

1 we are much more focused on the front-end regulatory  
2 analysis than on the back-end parts of the process.  
3 That was driven by, what do we need to put on the  
4 front end, based on the new waste streams, to ensure  
5 that the appropriate analysis done? Rather than, on  
6 the back end of the process, what could be done better  
7 to improve the back end of the process?

8 We did change a few things there, like  
9 requiring the analysis at the end --

10 Right, Chris?

11 MR. MCKENNEY: Okay.

12 Chris McKenney -- as we'll discuss in  
13 June, there is more of an emphasis, even in our  
14 previous NUREG-1573, which is a performance assessment  
15 rule on waste.

16 In 2000, we did note that this is an  
17 iterative process, meaning that as you get through,  
18 you need to review the program, review your  
19 assessments and say, are you still within the  
20 envelope? Can you make a better estimation? And  
21 there would be an expectation that they could, if they  
22 got better data, make a new performance assessment,  
23 which, the way the ruling is, they could take more  
24 waste, take more inventory, either concentration or  
25 inventory, and take advantage of that. Or, if other

1 information becomes available, they need to reassess  
2 their performance assessment because something isn't  
3 working as it should.

4 That also should be triggered by their --  
5 one is the fact that in Part 20, of course, there's an  
6 annual review in the radiation protection, and the  
7 envelope which your performance assessment as part of,  
8 should be part of the review of saying, do we have new  
9 information that says we need to either question or we  
10 can come in for amendment to do a revisal.

11 CHAIRMAN RYAN: Thanks.

12 MR. ESH: So the most important part of  
13 the slide, though, are the last two bullets. So, if  
14 there's anything that you remember from what I say  
15 today, it's the last two bullets that I want people to  
16 remember.

17 The generic waste classification system  
18 doesn't, and was never intended to, ensure that you  
19 will meet 61.41. And not all isotopes important for  
20 61.41 are necessarily reflected in these tables of  
21 61.55. Because it was driven by the analysis of the  
22 intruder for 61.42, that concept is important to  
23 understand.

24 There's always been the expectation in  
25 Part 61 that you will do an analysis to demonstrate

1 that you can meet 61.41. That's an analysis that's  
2 basically a modeling or a projection or whatever you  
3 want to call it, but it's some sort of forward-looking  
4 assessment of what radioactivity can you take in your  
5 facility? How is it going to be transported through  
6 the system? And what's the potential dose to  
7 receptors to result from the transport of that  
8 material?

9 Okay, so inadvertent intruders -- slide  
10 nine.

11 This is the concept that the Commission  
12 used when the intruders were put into play in the  
13 regulation. Some of our stakeholders and made various  
14 comments on this area, and I wanted to just talk about  
15 it at a high level conceptually. so the Committee  
16 understands what is assumed and what's not. It is not  
17 based on the assumption of failure of society. It is  
18 based on the assumption of error of the government.

19 As somebody was talking about earlier  
20 today -- I think it was Mike -- it's basically, you  
21 have 100-year institutional control period, which is  
22 an active institutional control. At the end of that  
23 hundred-year period, you have a passive institutional  
24 control period.

25 NRC expects that that passive system is

1 going to be effective, but not 100-percent effective,  
2 because governments make mistakes. And they'll make  
3 mistakes in ways like inappropriately looking at the  
4 zoning plan or, you know, something about land-use, is  
5 basically what it boils down to, and managing future  
6 land use. And over long periods of time, you have  
7 records that are destroyed, you have all sorts of  
8 things like that, that can happen, so there can't be  
9 assurance that that sort of passive system, where you  
10 don't have a fence and people patrolling is going to  
11 keep people out of that area.

12           There was also the assumption that the  
13 intruder, as 61.42 is written, is protected, it says,  
14 at all times. There's no limited to time of when that  
15 person is protected in the system. But conceptually,  
16 they expected that low-level waste is going to have  
17 limited quantities of long-lived waste and that the  
18 decay hazard, as Dr. Ryan has said, is reduced  
19 tremendously over the 500-year period. New waste  
20 streams might not necessarily meet that description.  
21 In particular, the depleted uranium stream waste  
22 stream, more waste streams that are generated from  
23 some of the other processes, might not necessarily be  
24 waste streams with low amounts of long-lived waste.

25           So the issue becomes, how do you assess

1 that part of the problem? That's where the  
2 inadvertent intruder comes into play in the site-  
3 specific intruder analysis. The inadvertent intruder  
4 concept, and the way it goes about, it relieves  
5 licensees of financial responsibility after the  
6 institutional control period. So they develop a fund,  
7 as you're well aware, and they use that fund to do  
8 closure activities. But then, ultimately, the site is  
9 given to state and federal ownership, and license are  
10 off the hook.

11 If you want to go to an approach of longer  
12 institutional control, then I think that has financial  
13 impacts for your assurance fund and things like that.  
14 Or, if you wanted to go to a perpetuity-type approach,  
15 which is the Commission in the past has said does not  
16 support or isn't reasonable in developing the approach  
17 that they did here originally in Part 61.

18 That isn't to say that the necessarily  
19 change that position now, but those are alternatives  
20 that we can considered in the process. That is because  
21 there wasn't at the time, and I don't think there is  
22 still is, an adequate basis for long-term robustness  
23 of passive control issues.

24 This should say "passive," I think, not  
25 "active," on the fourth bullet down.



1           The concept for the intruders was that the  
2 intruders were on unlikely, albeit possible. Not  
3 expected; unlikely, albeit possible. So, while you're  
4 right that there is a conditional probability of one,  
5 we're going to assume, for intrusion, the fact that we  
6 are applying the 500-millirem dose limit the NRC did  
7 in developing the classification tables, and which  
8 we're proposing in the rulemaking process, implies a  
9 probability of five percent.

10           If you draw an imaginary line at the edge  
11 of the buffer zone and you put a public receptor at  
12 one side of the buffer and you move the receptor to  
13 the other side of the buffer zone, if you think the  
14 probability is one that they're going to be inside the  
15 buffer zone, there's no reason to set the dose limit  
16 at 25 on one side of the line and 500 on the other.  
17 The limits should be the same if, in fact, you think  
18 that than expected behavior.

19           So, conceptually, that what's done with  
20 the intruder, and we're not moving far away from that,  
21 except, as I indicated, we want to allow people to do  
22 that in a site-specific way now that takes into  
23 account things like the depth of the waste, the  
24 barriers that are present, the materials that they  
25 have, the site-specific environmental conditions. And

1 all those things that go into that type of evaluation.

2 It is still a regulatory analysis. It's  
3 not projection of the expected future. It's a  
4 regulatory analysis to make a safety decision, and  
5 that's an important distinction that I think needs to  
6 be understood.

7 So, slide 10, please.

8 The low-level waste technical analyses --  
9 the requirements must apply -- and there are a couple  
10 of important points here. They must apply to all  
11 sites and inventories.

12 The low-level waste disposal sites have  
13 vastly different inventories, engineered barriers,  
14 natural barriers, and environmental conditions. The  
15 approach that we took is that the technical  
16 requirements have to be established for the most  
17 challenging inventories and site conditions or else we  
18 can't ensure that health and safety will be protected.

19 So, if you said, well, I have a site that  
20 has all short-lived waste and, therefore, they should  
21 only analyze for 500,000 years, I would agree with  
22 that. Technically, that makes sense. Why wouldn't  
23 you do that? But, if we put 500 or 1,000 years into  
24 the regulatory requirement and somebody comes along  
25 with large quantities of long-lived waste, well,

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1 there's no bets at all that the dose results, in these  
2 types of analyses, that they get in 500 or 1,000 years  
3 will in any way be representative of what they get in  
4 the period after 1,000 years and, say, 10,000 years.

5 Generally, the engineered system and the  
6 radionuclide transport in the groundwater system can  
7 get you delays of at least 1,000 years in many cases.  
8 But for a lot of for a lot of systems, and especially  
9 for a humid site, they don't get delays past 10,000  
10 years. So, if you want to see what the risk is, the  
11 risk usually occurs after a thousand, not before a  
12 thousand, for 61.41 in particular.

13 The approach we took was to specify the  
14 requirements that would ensure that the challenging  
15 sites in inventories are, that public health and  
16 safety is protected for them, but in the guidance  
17 document and the analysis, allow somebody to do  
18 something that's simpler and more straightforward when  
19 they have a low-risk condition. So, if they have a  
20 low-risk inventory at long times, sure, the  
21 requirement says analyze for 10,000 years.

22 But if I was a licensee, I'd go in there  
23 and say, look, my inventory is gone; what's the point  
24 of me estimated that? And as a regulator, I would  
25 say, there's really no point in that. But there's no

1 pain to projecting the numbers at that point if the  
2 risk is low or zero. The risk is going to come out of  
3 the analysis based on there being no inventory there.

4 So it's like a nuclear version of Occam's  
5 razor. So, when we have this issue of having two  
6 competing decisions, and one is not necessarily much  
7 different than the other, we'll err on the side of  
8 protectiveness or safety, and that's what we're  
9 attempting to do with these regulatory requirements.  
10 So we think the best approach is to risk-inform the  
11 technical analyses.

12 So, if we could go to slide 11, and this  
13 is what I want to convey to you -- I know the  
14 Committee probably don't like the fact that I'm saying  
15 what we're doing is risk-informed, but that's the  
16 argument that I'm going to try to make. But we do a  
17 lot of things in this revision that I believe are  
18 risk-informed.

19 Now, we aren't abandoning the intruder  
20 performance objective, which I think is one of the  
21 hang-ups of the Committee with the whole approach.

22 MEMBER ARMIJO: It's mine, yes.

23 (Laughter.)

24 MR. ESH: We aren't abandoning that  
25 because, as I said, we were given direction for a

1 limited scope. We think it's one of the fundamental  
2 components that they put in their analysis originally,  
3 and we don't feel like we have the ability to move  
4 away from that. There are a diversity of opinions,  
5 and some people understand or agree with why it's  
6 there in the approach that it serves, including many  
7 of the staff.

8 But putting that to the side, the rest of  
9 it, I would say, are examples of how we are trying to  
10 be risk-informed in this process. So the tiered  
11 approach to the analysis time frames, it's trying to  
12 work with the uncertainties and the problems while  
13 still trying to ensure that appropriate analysis that  
14 appropriate analyses of done for the more risky waste,  
15 especially for 61.41.

16 We are, in the proposed revisions,  
17 allowing for site-specific technical analysis rather  
18 than generic waste classification. We're trying to  
19 still avoid what I would call unnecessary speculation  
20 about the societal uncertainty component. Maybe it's  
21 a lot like the rulemaking; you go around and around  
22 and around and you end up at the same place anyway.

23 But the higher dose limit for the intruder  
24 scenario, if we weren't being risk-informed, we would  
25 set the probability of one to the intruder and say,

1 use the same dose limit for the intruder.

2 The site stability is based on the impacts  
3 to 61.41 and 42 not and some abstract concept about,  
4 like, dimensional change at the facility, or  
5 structural change, because we don't think it is  
6 reasonable for somebody not to tie changes in the  
7 stability and structure of the system to how it may  
8 impact the public health and safety. So, as we wrote  
9 the requirements, that's how we tie it in, and we  
10 explain it in the guidance.

11 And then one area of the regulation that  
12 the Committee probably hasn't talked a lot about, but  
13 we've gotten some good comments from stakeholders on  
14 it, was 61.50, Site Suitability Characteristics. What  
15 we decided to do there was to say the site suitability  
16 characteristics are only exclusionary, the  
17 hydrological ones, for 500 years because, basically,  
18 if you're having hydrological problems within the  
19 first 500 years of your facility, you're likely to  
20 have very big problems after 500 years from those  
21 processes.

22 But the other things --

23 CHAIRMAN RYAN: What would be the limits  
24 of those? I can understand a meandering stream or  
25 river or something that's --

1 MR. ESH: Well, to put it more simply, the  
2 issue is this: The site suitability characteristics  
3 have something like, the facility may not be in the  
4 location of the 100-year floodplain. How would  
5 somebody demonstrate that over thousands of years,  
6 whether you're in a 100-year floodplain or not? It's  
7 based on things like you just sited, how rivers move  
8 and all the geomorphology that goes on. I think that  
9 would be almost impossible to demonstrate.

10 You should be able to demonstrate it for  
11 500-year period. I think that's credible to  
12 demonstrate based on all the science I know about  
13 geomorphology and the programs available and what not.  
14 But after that, if it doesn't impact public health and  
15 safety, it shouldn't be exclusionary.

16 That's the approach we took, and an  
17 example for you of what we decided to do there.

18 → CHAIRMAN RYAN: I guess what I'm reaching  
19 for is, would that kind of analysis suggest that  
20 engineered barriers or engineered aspects of the  
21 disposal system would be credited?

22 MR. ESH: Yes. Certainly after, for  
23 hydrological characteristics, after 500 years. We  
24 intend for this to be smart and performance-based. If  
25 you can credit any engineered barrier for whatever

1 period of time, you're free to credit that in your  
2 analysis.

3 CHAIRMAN RYAN: Okay. That's the answer  
4 to my question.

5 MR. ESH: Yes.

6 And then also, as you are well aware, in  
7 the dose modeling area, we recommend moving away from  
8 something that's quite dated at this point and doing  
9 something that we said people can do any way in other  
10 analogous programs.

11 So, Analysis Time Frames -- I have, I  
12 guess, three --

13 CHAIRMAN RYAN: So just to make sure  
14 everybody is on the same page right now one, that's  
15 basically using the more updated ICRP models for  
16 internal radiation protection analysis.

17 MR. ESH: Yes. That's right.

18 CHAIRMAN RYAN: That's really very focused  
19 on the internal part because all the radionuclide  
20 stuff has been updated.

21 MR. ESH: Yes.

22 CHAIRMAN RYAN: Okay.

23 MR. ESH: Slide 12 -- Chris?

24 MR. McKENNEY: Actually, because of the  
25 way we're writing the rule, if there were to be a



1 change in the external assessment process, they could  
2 be able to take advantage of that as soon as the new  
3 federal guidance report came out.

4 CHAIRMAN RYAN: Okay.

5 MR. McKENNEY: So, the way the rule is set  
6 up, it's not stuck on a specific federal guidance  
7 report anymore.

8 CHAIRMAN RYAN: Ah, okay, so that's the  
9 tie.

10 MR. McKENNEY: They can update their  
11 assessments to take account of the latest science.

12 CHAIRMAN RYAN: Thanks. That's great.

13 MR. ESH: So slide 12 -- Analysis Time  
14 Frames -- is a summary of the international  
15 experience.

16 We went out and tried to find as much  
17 literature as we could on the subject. And the bottom  
18 line, as you can imagine, is there is a variety of  
19 different approaches, but they have a common theme to  
20 them. They usually do one of the things I've listed  
21 on the subtexts under "approaches included."

22 Some countries will do long-term analyses.  
23 Some countries will just say, go to peak, whenever  
24 that is. And others will set regulatory defined  
25 limits on the near-surface disposal of long-lived

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1 alpha, especially. So they say we're going to limit  
2 how much long-lived you can take, and once we do that,  
3 then you can analyze for a short period of time  
4 because we've placed a limit on what the risk may be  
5 for the long-lived component.

6 If you're not going to place a limit on  
7 what the risks can be for the long-lived component,  
8 then my opinion is you at least have to do an analysis  
9 looking out sufficiently long to see what the risk is,  
10 from that component.

11 Some --

12 MR. WIDMAYER: Hey, Dave?

13 MR. ESH: Yes?

14 MR. WIDMAYER: Sorry. Can you tell us  
15 what the bases are for those countries placing a limit  
16 on the long-lived alpha? I mean they must have done  
17 some sort of analysis to come up with a --

18 MR. ESH: I don't know how detailed the  
19 analyses are, because it's very difficult --

20 MR. WIDMAYER: Do they have ranges all  
21 over the place, or are they --

22 MR. ESH: They're kind of condensed in,  
23 like, the 4 E to the -5, 4 E to the -6 Becquerels per  
24 kilogram, I think; I forget the units. It's in the  
25 paper; we can talk about it. But basically, it's not

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1 clear how they derive those values.

2           You know, is it a case of herding  
3 behavior, where somebody came up with one and then the  
4 next guy is doing his regulations, and he says, they  
5 have that, so let's make it about that. So I don't  
6 know. We couldn't find sufficient detail to see  
7 specifically how those numbers were derived. But the  
8 fact of the matter is that they do set them, and some  
9 people, instead of setting the number like that, they  
10 just say, no near-surface disposal.

11           So some countries put all their waste,  
12 even the most benign waste, deep because what's the  
13 primary mechanism for people who are trying to manage  
14 risk from different types of waste? It's disposal  
15 depths. High-level waste, geologic repository;  
16 intermediate waste, intermediate depth; more benign  
17 waste, near-surface.

18           So, if you have waste that you think is  
19 kind of intermediate-level waste or kind of pushing  
20 towards there, I would search for a site where I can  
21 bury it deeper and mitigate a lot of these concerns  
22 about changes to the environment, what people are  
23 doing, all those sorts of things. It's a really  
24 simple and effective way to properly mitigate those  
25 risks.

1           Many of our existing facilities, though,  
2           do not have sufficient depth in their locations that  
3           they can take that approach. So that would be a  
4           problem to use that for some existing facilities. Or  
5           if we were to say, you know, if NRC was to derive, you  
6           should put this type of waste at least this depth,  
7           that also, then, adds a problem, just like the generic  
8           waste classification system, in that value based on  
9           some analyses that may not be representative for  
10          another site or another condition, and we're going to  
11          impose that on all.

12                 So, while it's smart from a policy and  
13          technical perspective, it could also not necessarily  
14          be risk-informed from a site-to-site variation and  
15          inventory perspective. Our approach for analysis time  
16          frames, we think, is consistent with this  
17          international experience, which is kind of congealed  
18          around some of these main elements.

19                 Now, the domestic experience in low-level  
20          waste, as summarized of slide 13, as you know, all  
21          currently operational low-level waste disposal  
22          facilities are in agreement states. There are  
23          different interpretations of our regulations because  
24          our regulations are silent on time frame for the  
25          analyses.

1           It does mention time frames were slow the  
2 things -- say, the Class-C intruder barrier, for  
3 instance, or site characteristics that says 'consider  
4 for at least 500 years.' The institutional control  
5 period is 100 years. By putting some of those numbers  
6 in that are conditional for specific parts of the  
7 analyses and then being silent on this other part, it  
8 has led to some various, quite diverse interpretations  
9 of what we expect.

10           But for different interpretations in the  
11 various agreement states, Washington used 10,000 years  
12 and they looked longer in their EIS. Texas went out  
13 to 50,000 years in their analyses. Both of those  
14 licensed operating facilities. Utah had 500 years,  
15 and now they're currently reviewing a performance  
16 assessment that goes to 10,000 years. And then they  
17 do something that they call a deep-time analysis after  
18 that, which will look at very long-term effects at  
19 that site. And then South Carolina did 2,000 years,  
20 have I understand it.

21           In 2000, the NRC staff performed a  
22 detailed technical analysis for low-level waste  
23 disposal, looking at this and other issues in the  
24 development of NUREG-1573. They basically said, look,  
25 you need 10,000 years because, otherwise, you can have

1 situations where you design a facility and you put in  
2 an engineered barrier and you defer the risk for some  
3 period of time, especially 500 years or maybe slightly  
4 more than 1000, but then you have a big risk pop up  
5 for certain inventories and designs, and that's not  
6 something we want.

7 We want to ensure that the criteria are  
8 met for a reasonable time frame due to the reduction  
9 to the system, and not necessarily the delays in the  
10 system. Delays are good; don't get me wrong. You  
11 definitely want delays.

12 So, if I'm worried about my family or  
13 future generations of my family, it's really important  
14 for people to understand that even hundreds of years  
15 is are very long periods of time. But from a  
16 regulatory analysis standpoint, the reductions in risk  
17 are much more powerful, and this is about ensuring  
18 that the analysis communicates what those reductions  
19 are or are not.

20 In addition to the international and  
21 domestic experience, we also considered some technical  
22 things on slide 14.

23 As I discussed earlier, we have this  
24 traditional waste. The traditional waste, all of it  
25 in all of the operating facilities has a long-lived

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1 component to it, and the long-lived component is the  
2 driver of the projected doses for 61.41. In fact, for  
3 three of the four facilities that went out longer, all  
4 of their peak doses occur after 1,000 years, so the  
5 peaks are larger.

6 So, if you want to talk about risk, based  
7 on what they know today and their analyses, the risk  
8 is larger in the longer-term period than it is in the  
9 shorter-term.

10 Now, depleted uranium is a different  
11 beast. It's a much more extreme case of what I just  
12 described, and it's due to the fact that it's, as  
13 currently envisioned, essentially pure powdered  
14 uranium, where the daughters then grow in over long  
15 periods of time.

16 The problem with it is, at 1,000 years,  
17 your only capturing one one-thousandth of the impact  
18 of where it ends up as those daughters build in over  
19 time. At 10,000 years, you are roughly in an order of  
20 magnitude. It depends on the isotopic ratio U-234 and  
21 U-238, but you're roughly within an order of  
22 magnitude.

23 So our concept was, if we're dealing with  
24 a system that has a lot of different types of  
25 uncertainties, whether they're from performance of

1 natural or engineered barriers, or the waste  
2 characteristics themselves, we should at least be able  
3 to get within an order of magnitude.

4 We realize that there are a lot of  
5 uncertainties as you go out in time, and that causes  
6 challenges to the value of information, but for  
7 regulatory decision-making, if we look at what's done  
8 internationally and domestically, there are decisions  
9 that are made using information from those time  
10 frames. It's not that that information is valueless;  
11 it has been used, and those facilities are licensed.  
12 We think it's prudent to continue with that approach,  
13 considering some of the waste streams that we were  
14 told to do this rulemaking for.

15 Another example I would use for the  
16 traditional waste that's interesting is, I think, the  
17 ILAW facility at Hanford. Although DOE uses 1,000  
18 years under DOE Order 435.1, at Hanford, they present  
19 results usually that they communicate a 1,000-year  
20 impact and then the 10,000-year impact. And what you  
21 see is that in many cases, a 1,000-year impact is only  
22 a five-hundredth or a thousandth of what you see that  
23 in a period of 1,000 years to 10,000 years.

24 So that system does a good job in pushing  
25 risk out. But the magnitude of it, and whether you



1 need to evaluate that magnitude to assure that public  
2 health and safety is protected, is quite different for  
3 those different time frames. We think that the  
4 analysis should be done to communicate what that is,  
5 and the decision should be based off that.

6 So the guidance that we got from ACNW in  
7 slide 15, or ACNW and then ACRS, was to use a two-  
8 tiered approach, so the time at which the more mobile  
9 radionuclides produce doses, and then, avoid  
10 catastrophic impacts after. Consider things like teal  
11 hydrology, the waste isolation technology, and other  
12 controls.

13 And we really appreciated this  
14 recommendation -- I appreciated it when it was first  
15 generated and 1997 and then again in 2011, and I said,  
16 yeah, that looks great; okay, how do we do that.

17 So then we move to slide 16.

18 Well, when we tried to say, how do we do  
19 that? What requirements will be right for this?  
20 Well, when we tried to say, well, how will we do that,  
21 to try to make the requirement be flexible to adjust  
22 with the problem, we ran into all sorts of challenges  
23 of what these things would mean. So we said, okay,  
24 what are the more mobile radionuclides? How would you  
25 define that?

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1           The challenges are listed in these  
2 subtexts, like, "Radionuclide A maybe more mobile at  
3 one site and less mobile at the next; Radionuclide A  
4 may be less mobile than Radionuclide B at one site and  
5 more mobile at another. So how do you define more  
6 mobile?

7           Then, in addition --

8           MEMBER ARMIJO: Dave?

9           MR. ESH: Yes?

10          MEMBER ARMIJO: Could you give a specific  
11 example of that mobility difference from one site to  
12 another?

13          MR. ESH: Yeah, any isotopes. So, if you  
14 look at the distribution of most of the -- usually,  
15 the engineers condense the geochemistry of transport  
16 down into a single parameter called the Distribution  
17 Coefficient, which is kind of a linear absorption  
18 isotherm for the partitioning of the material between  
19 a solid and a liquid phase. It's a crude  
20 representation all the complicated geochemistry that  
21 can go on in some of the systems, but it's --

22          MEMBER ARMIJO: Is it a water-soluble  
23 element --

24          MR. ESH: Yes --

25          MEMBER ARMIJO: -- in a dry site versus a

1 wet site. The example would be, say, take uranium.  
2 Uranium, if you look at the observed values and say  
3 there's generic references of compiled KD values. The  
4 one that we'll look at is the Shepherd and Thibodeaux  
5 reference. The uranium KDs have been measured from  
6 like 0.02 milliliters per gram up to like 20,000  
7 milliliters per gram.

8 So, at one site, uranium would be  
9 effectively immobile, and at another site, it could be  
10 quite mobile. It would depend on the geochemistry and  
11 mineralogy and all the sorts of things.

12 MR. GROSSMAN: An example there might be  
13 if you have like a carbonated groundwater source, for  
14 the uranium case.

15 MEMBER ARMIJO: Sure, pH changes.

16 MR. GROSSMAN: Yes.

17 MR. ESH: Yes.

18 So the challenge becomes, then, you're  
19 dealing with these distributions of quite variable  
20 information that you're trying to evaluate. And if we  
21 can't get people, just from a fundamental standpoint,  
22 to do a similar analysis in this area, if we were  
23 really specific about how you might go about doing  
24 this, I can see we'd get even more diverse results in  
25 terms of the types of analyses that were done.

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1                   And then you run into additional  
2 challenges like, say, you have a site where tritium  
3 comes out first, then a little bit later iodine-129  
4 come so and then maybe technetium-99, then carbon-14.  
5 Where do you draw the line? Which ones do you call  
6 more mobile, and which ones are less mobile? And I  
7 don't know.

8                   If the Committee can give us insights on  
9 that as what you intended -- I think that's a  
10 challenge for finding the more mobile radionuclides in  
11 using this sort of approach.

12                  CHAIRMAN RYAN: That's a really  
13 complicated question because, for sample, you could  
14 have tritium in physical forms in waste that are  
15 relatively immobile, where tritium is obviously, you  
16 know, mobile in a liquid form --

17                  MR. ESH: Yeah.

18                  CHAIRMAN RYAN: -- or a not-absorbed form,  
19 or something like that.

20                  So I guess maybe we're hitting on the idea  
21 that that has to be site-specific.

22                  MR. ESH: Yeah, the problem --

23                  CHAIRMAN RYAN: So the guidance you offer  
24 should be, you need to these things for any specific  
25 kind of determination of the questions you just asked.

1 MR. ESH: Yeah. My problem is I don't see  
2 that, even in guidance phase, that we could put  
3 something down that would lead people to interpret it  
4 the same way or come up to a similar conclusion. So  
5 it would be --

6 CHAIRMAN RYAN: Well, maybe it's not the  
7 same way, but maybe it's within some range of, you  
8 know, high, medium, or low sorts of thinking for  
9 mobility, for example.

10 MR. ESH: Yeah.

11 CHAIRMAN RYAN: Come up with some  
12 qualitative decision-making that would allow you to  
13 say, okay, in this bracket, we're going to do this,  
14 and in this bracket, we're going to do that. So --  
15 I'm sort of thinking a lot.

16 MR. ESH: Yeah, it's even worse, though,  
17 because we focus on groundwater, but there are  
18 multiple pathways. So, you know, an air pathway or  
19 suspension or surface water or something else.

20 CHAIRMAN RYAN: And combinations of them,  
21 yeah.

22 MR. ESH: And then colloids -- what does  
23 that mean? You know, colloids have the ability to  
24 move things that really don't move, quite some  
25 distance in a short amount of time. And so, exactly

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1       how would that impact whether you determine something  
2       is more mobile? You know, it can impact the whole  
3       inventory, not just a specific isotope, or the ones  
4       that are prone to form colloids. So that's the first  
5       part of it.

6               The second part, the catastrophic impacts,  
7       you know, what would that be? What sort of impact  
8       does the Committee feel is a catastrophic impact?

9               → MEMBER ARMIJO: Well, it certainly isn't  
10       an exposure of individual to some, even fatal dose;  
11       it's thousands of people, large numbers of people.

12               That's where I get hung up on the intruder  
13       assessment. It's certainly not catastrophic in any  
14       sense of the word "catastrophe."

15               MR. ESH: Yes, and I would like to have  
16       you with me whenever I'm getting challenged by  
17       stakeholders that 25 millirem is not protective, for  
18       you to explain that line of thinking that thousands of  
19       people exposed to very large doses is what you mean as  
20       catastrophic, and that that's consistent with the  
21       Agency's mission of protecting public health and  
22       safety. That seems like a very difficult discussion  
23       --

24               MEMBER ARMIJO: Well, it is for people  
25       will really moping about any kind of radiation

1 exposure. What I'm talking about, as a regulator, is,  
2 you say, what is a catastrophic exposure and impact,  
3 and it's certainly not a hypothetical intruder at  
4 1,000 years or 10,000 years, 20,000 years. Clearly,  
5 that doesn't meet any definition of "catastrophic."

6 So that's what we were trying to say, you  
7 know, that when you do this analysis, what could  
8 possibly go wrong way out in time for low-level waste  
9 that could even come close to being catastrophic?

10 You don't have a burden to protect against  
11 some individual exposure of one individual. We don't  
12 have a moral or an ethical or legal burden unless we  
13 impose it on ourselves for our particular reasons, and  
14 I don't think that's of value from a public health and  
15 safety perspective.

16 MR. ESH: Yes, I understand what you're  
17 saying there, but also remember, we're talking about  
18 more so, 61.41 here, for the protection through the  
19 61.41 performance objective, not necessarily the  
20 61.42, the intruder performance objective --

21 So would your same line of thought apply  
22 to 61.41?

23 MEMBER ARMIJO: For you --

24 MR. ESH: -- because, because we didn't get  
25 direction from the Committee to limit this to the

1 intruder. This is just basically, for the time frame  
2 for the analyses, this two-tiered approach, with the  
3 first phase being the more mobile, and the second  
4 phase, catastrophic, was to all analyses of time  
5 frames. It wasn't limited to just the intruder.

6 MEMBER ARMIJO: I think it was in the  
7 intrusion, the long-term intrusion. That was my  
8 thinking when we were working on this letter.

9 But I can't envision a low-level waste  
10 facility ever leading to a catastrophic impact, even  
11 in 100 years or 50 years or 300 years. We'd really  
12 have to be poor engineers and regulators to ever have  
13 that happen.

14 MR. ESH: Well, I think the issue is, if  
15 you have requirements where you could potentially,  
16 based on what allowed by the definition of low-level  
17 wastes, put in large concentrations of long-lived  
18 isotopes into the facility, and you'd only analyze for  
19 a short period of time, you can in fact have something  
20 that I think some of our stakeholders would call a  
21 catastrophe because you end up with very large  
22 groundwater impacts over a very large area,  
23 potentially.

24 So it's a difference of opinion. I'm just  
25 trying to communicate that we have stakeholders who



1 feel that the obligation to protect is not limited.  
2 The obligation to protect is what it is. So, whether  
3 you take the strong anthropocentric approach to the  
4 protection of future generations, or a weak approach,  
5 the NRC has some obligation to protect.

6 If you go back and look at the  
7 congressional testimony around the time when Part 61  
8 was developed, they talk about protecting for as long  
9 as it's hazardous. They don't talk about limiting it  
10 to some period of time based on the fact that future  
11 generations can solve those problems.

12 So it gets us in a little bit of an  
13 uncomfortable position if we try to take that approach  
14 because I don't think it's consistent with the  
15 international experience. It's certainly not  
16 consistent with the domestic low-level waste  
17 experience, but of course, we may have driven that, so  
18 that point is understood. And the technical  
19 characteristics of the problem, I think, challenge  
20 that approach.

21 So that's kind of where we're coming from.  
22 We're more comfortable with being where we are than  
23 taking that approach. We certainly understand the  
24 opinion, and we understand where you're coming from.

25 I tried to express this in some of the

1 early meetings about, if we're going to talk about  
2 risk, let's really talk about risk. What's the risk  
3 that I hit a deer on the way home and I'm killed,  
4 compared to my risk from 25 millirem in groundwater  
5 from a low-level waste site? We deal with real risks  
6 all the time, in our own lives and in our families,  
7 that are much more significant than these radiation  
8 risks. But that discussion went nowhere, when I tried  
9 to take it.

10 MEMBER ARMIJO: Well, it's still valid.  
11 And the point is that, you know, unless we keep  
12 raising that issue and saying, we really want to be  
13 based on a real health and real risk, you can't live  
14 in two worlds where, in one case, we deal with  
15 reality, and in the other case, we elevate radiation  
16 exposure in low-level waste to an extreme, when there  
17 is no basis for it.

18 MR. ESH: Yes.

19 MEMBER ARMIJO: So the idea behind this  
20 letter was just, hey, try to get it into a real-world  
21 situation; what is the obligation for the regulator?

22 MR. ESH: Yes, I understand.

23 MEMBER ARMIJO: Obviously, you know, there  
24 are some people who say, hey, look, we have a duty to  
25 protect any individual as far out into the future, as

1 long as there's a miniscule possibility of any health  
2 risk, and I don't believe that.

3 MR. ESH: Well, it should be clear that --

4 MEMBER ARMIJO: I just don't think that's at all  
5 reasonable.

6 MR. ESH: I mean it would be helpful if,  
7 whenever you eventually write on this subject, you  
8 communicate on the difference between technically what  
9 you think should be done, and then the more  
10 fundamental issue of, say, the policy of what NRC  
11 should be doing with respect to protection of future  
12 generations.

13 On one hand, you know, we can deal with  
14 the technical things at our level, but to make a  
15 fundamental decision about protection of future  
16 generations and, you know, the policy of that approach  
17 is something that, if we got direction on it,  
18 certainly, we'll implement it. But we don't feel  
19 comfortable charging ahead without trying to make that  
20 sort of change.

21 CHAIRMAN RYAN: That's a very important  
22 point, David. I appreciate Sam's comments, but to me,  
23 you can build a mountain so high in all of this  
24 thinking, you could never climb it. I think that's  
25 what we're trying to avoid.

1 MR. ESH: Yeah.

2 CHAIRMAN RYAN: What is technically sound?  
3 What is technically reasonable? What are the kinds of  
4 materials to try to manage and get some envelope  
5 around it? You've described that pretty well this  
6 morning so far.

7 MR. ESH: My opinion boils down to this:  
8 You know, we have operating facilities that have been  
9 licensed using requirements that are similar to what  
10 we've propose, so it's not a hurdle that's impossible  
11 to get over. Whether the hurdle should be in place to  
12 begin with is a different story. But the fact is that  
13 it's not something that's going to prevent licensing  
14 and regulation of low-level waste sites.

15 MEMBER ARMIJO: Dave, that's very  
16 important to me because, I'll tell you, the regulation  
17 seems to be getting bigger and more complicated. And  
18 maybe because I'm far from being a next work in this  
19 area, but there is in the in this country for low-  
20 level waste facilities to be signed.

21 If we make the regulations so difficult to  
22 meet and we prevent the signing of these low-level  
23 waste facilities, then a lot of other benefits to  
24 society will not be available.

25 MR. ESH: Yes, I understand.

1                   MEMBER ARMIJO: So, you know, the question  
2 is, if this is just some calculational method that you  
3 can use to assure yourself, that's not a big problem.

4                   But if it creates an impossible barrier  
5 that you can't get over, and it can be easily  
6 challenged in court or by intervenors -- like, for  
7 example, I can say, I don't believe any analysis you  
8 made for 50,000 years, and I will take you to court on  
9 that. You can't defend that. If two different people  
10 make up 50,000-your analyses, they're going to get  
11 very different results.

12                  So, if you set up some hurdles that can't  
13 overcome or are easily challenged by someone who  
14 simply wants to stop a low-level waste facility,  
15 you're not doing a service to the country.

16                  MR. ESH: Yeah, I understand that. That's  
17 --

18                  MEMBER ARMIJO: That's where I'm at.

19                  CHAIRMAN RYAN: Sam, just to be fair to  
20 David's presentation this morning, I think several  
21 times, we talked about how this leads into decision-  
22 making.

23                  MR. ESH: Yes.

24                  → CHAIRMAN RYAN: I think that's the real  
25 tough part of this, which is, how does the technical

1 analysis you laid out and will be in the guidance and  
2 the documents that will come out, how does that get  
3 translated into non-science and non-regulatory  
4 decision-making about "yes" or "no" on facilities, and  
5 that kind of thing?

6 MR. ESH: Yes.

7 CHAIRMAN RYAN: So I think there's  
8 certainly something to think about there. But having  
9 you all think about you can discuss that, at least in  
10 part, in your work would be -- or value work. You  
11 know, here's the technical part, and here's what we  
12 think its best use is -- that's something to think a  
13 little bit more about.

14 MR. ESH: I mean our standard is a  
15 reasonable assurance that we use in evaluating those  
16 sorts of things. So it's not actually --

17 (Simultaneous speaking.)

18 CHAIRMAN RYAN: So what you're saying is  
19 it's reasonable assurance in the context of all these  
20 things we just talked about.

21 MR. ESH: It's not absolute proof. There  
22 are lots of things that go into it. You know, I could  
23 envision as a regulator that somebody gives me an  
24 analysis that way below the limit, and I can't find a  
25 reasonable assurance with it because of technical

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1 things one through 72 step into that were deficient in  
2 the analysis that they did.

3 CHAIRMAN RYAN: Right.

4 MR. ESH: Likewise, I could find that  
5 somebody that might estimate something right at the  
6 limit, or maybe the above, that I can say, all things  
7 considered, they have a lot of conservatism in their  
8 analysis for this, that, and the other thing that I  
9 could easily argue for and justify that maybe supports  
10 a decision-making.

11 CHAIRMAN RYAN: Well, that kind of  
12 presence of certainty or uncertainty and how you deal  
13 with it as a regulator in getting it into the  
14 documentation would be very, very helpful.

15 MR. ESH: Decision-makers are really  
16 uncomfortable with uncertainty. So they do not like  
17 it and they don't want it. 'Tell me what the number  
18 is.' For fans of The Office, it's it's like --

19 CHAIRMAN RYAN: Well, no, I'm not saying,  
20 in the regulation or requirement. I'm saying that  
21 when you make a decision about it, the decision might  
22 have an analysis or a thought process about  
23 uncertainty, but you're going to say yes or no at the  
24 end of the day, and you're going to base it on this  
25 kind of thinking and analysis.

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1 I think that getting insights as to how  
2 the material will be used and judged is a helpful  
3 thing to try to figure out how to write it down.

4 MR. ESH: The modeling and analysis  
5 provides input to the decision, but it does not make  
6 the decision.

7 CHAIRMAN RYAN: Right.

8 MR. ESH: There's a whole bunch of things  
9 that go into the decision, especially in low-level  
10 waste regulation. There is defense-in-depth there.

11 So all the waste characteristics of  
12 limiting certain things that can go into the facility,  
13 that's a defense in depth. You know, is it smart to  
14 put chelating agents in the disposal facility?  
15 Probably not. Is it smart to put a lot of liquids in  
16 the facility? Probably not. So there's all these  
17 things that go into providing a defense in depth, of  
18 which the analysis is one of them.

19 But the analysis, in our opinion, has to  
20 look at the problem. In some cases, based on done  
21 changes to the inventory over time, that problem is  
22 different than when it was in 1982. So the  
23 requirements need to be aligned with the types of  
24 materials that are going to be disposed of.

25 And on the bottom part of slide 16 -- just



1 a couple more points -- for the WCS facility and the  
2 projected time of the peak dose for the more mobile  
3 radionuclides, the first radionuclide to show up  
4 was at 30,000 years or greater than 30,000 years. So  
5 based on the direction in your letter, should they be  
6 doing a 30,000-year analysis? And should some other  
7 facility, if their first isotope shows up at 50 years,  
8 be doing a 50-year analysis?

9 And if, in fact, you did that, what sort  
10 of unintended consequences and disincentives would  
11 result in the system?

12 And that's what I'm going to talk about on  
13 the next slide.

14 CHAIRMAN RYAN: Okay.

15 MR. ESH: Slide 17, Site-Specific Analysis  
16 Time Frames, the disposal practices and selection of  
17 sites -- so licensees are for-profit entities. And of  
18 course, they're stewards of the environment. People  
19 laugh at me for saying that, but I think most people  
20 have good intentions. They want to do the right  
21 thing. They have people that live in those  
22 communities. They aren't out just to make a buck.  
23 But they are for-profit entities.

24 So, if you're going to maintain to me that  
25 it's much more difficult and expensive to do this

1 longer analysis as opposed to a shorter analysis, then  
2 why wouldn't they pick a site and design that would  
3 allow them to do the short analysis?

4 Then likewise, how does that ensure, from  
5 a national standpoint, that our regulations and  
6 policies are having people do the right thing from a  
7 waste management perspective? I don't think the  
8 Committee would disagree with us that they should pick  
9 as good of sites as possible and do as good of  
10 engineering as possible.

11 Some of those may have very long time  
12 frames that they are able to defer the risk to, to and  
13 reduce the risk to, and some may have less. But the  
14 overall requirement should make sure that people are  
15 trying to operate with that mindset of, have I  
16 demonstrated that I picked a good site? Have I put in  
17 as much engineering as practical, not being overly  
18 burdensome and expensive, and show that I met the  
19 criteria? That's kind of a fundamental policy  
20 approach that we have in our mind that probably we'd  
21 run into with doing the site-specific approach.

22 We think that defining a number and having  
23 everybody work from that number, allowing them to  
24 scale their analyses or the sophistication of their  
25 analyses, based on the risk of their problem, is a

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1 much cleaner, smarter way to go, all things  
2 considered. Because, we have some people, licensees,  
3 in agreement states that are much more sophisticated  
4 than others, and we have to take that into  
5 consideration when we develop our requirements.

6 We do think that the Commission policy  
7 regarding stability in waste isolation, you know, they  
8 basically say, keep the material stable for as long as  
9 you need to. And if you went to the site-specific  
10 approach, then why would people have an incentive to  
11 try to do that?

12 The reality is, if you said, I put my  
13 material in a site which was very unstable, which  
14 allows me to analyze for shorter period of time --  
15 say, as a practical example, the state-licensed and  
16 NRC-licensed disposal areas at West Valley is not an  
17 ideal location for a disposal facility.

18 But in fact, that was a decision that was  
19 made many decades ago, and now it's considered as part  
20 of the scope of the decommissioning process of that  
21 site. Who knows what the eventual disposition will  
22 be. But why wouldn't you pick a site like that as  
23 opposed to, you know, the NTS in Nevada, which might  
24 be stable for hundreds of thousands or millions of  
25 years from a geomorphic standpoint? There would be a

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1 disincentive to maybe not doing the right thing from  
2 the requirements.

3 I'm not necessarily saying it would  
4 happen, but we think the requirements should be  
5 aligned with the incentives we want people to choose,  
6 and those would be things like choosing to the sites,  
7 having stability for as long as possible, consistency  
8 with the international approaches, and so on and so  
9 forth.

10 So that's pretty much it for me if we want  
11 a break time.

12 CHAIRMAN RYAN: Yes.

13 Let's go ahead and take a 15-minute break  
14 and come back at 11:00 for the last hour.

15 (Whereupon, the above-titled meeting went  
16 off the record at 10:41 a.m. and reconvened at 11:00  
17 a.m.)

18 CHAIRMAN RYAN: Okay, we'll come back to  
19 order, please.

20 I've been advised that sometimes, from the  
21 table, it's hard for folks in the back to hear us. So  
22 maybe it's just us facing you that it's hard. So  
23 we'll speak a little louder. Maybe we can be mindful  
24 to speak up a little bit.

25 So, back to you, David. Or, Christopher?

1 MR. GROSSMAN: I've got this one.

2 STAFF EFFORTS TO REVISE PART 61:

3 SITE-SPECIFIC LOW-LEVEL

4 WASTE TECHNICAL ANALYSES

5 CHRIS GROSSMAN, NRC STAFF

6 MR. GROSSMAN: I'm Chris Grossman, with  
7 the NRC staff, so I'll be covering the rest of this  
8 presentation on the technical topics.

9 The Commission's direction last year gave  
10 us or items, which Mike previewed earlier today and  
11 Dave has covered, the time frame part of that  
12 direction, and so I'll cover two of the remaining  
13 three. The compatibility, we don't plan to talk to in  
14 great detail today. It's a fairly simple issue.

15 So the two that I'll be talking about our  
16 flexibility to use the latest ICRP dose methodologies  
17 in the PA and then flexibility for site-specific waste  
18 acceptance criteria. So we'll start with the  
19 dosimetry part.

20 Slide 19.

21 Just to reiterate, the Commission directed  
22 the staff to weigh the pros and cons of allowing the  
23 licensees the flexibility to use ICRP dose  
24 methodologies in a site-specific PA. We won't spend  
25 a lot of time on that flight.


1 Slide 20.

2 Just to give you a little context, that we  
3 weren't sure of the familiarity level with Part 61 and  
4 the different methodologies, so just to kind of set  
5 the stage, NRC regulations are based on or derived  
6 from varying ICRP methodologies over years. Part 61,  
7 I think, may be the oldest methodology that draws.  
8 And then it draws from ICRP 2, which is from the late  
9 1950s, early 1960s. That was an organ dose approach.

10 ICRP's recommendations have been updated  
11 significantly since then. There was a major revision  
12 in the 1970s for 26.30, which largely formed the basis  
13 for Part 20 as well as Part 60, which some of those  
14 were pulled forward into Part 20 as well.

15 And then the most recent recommendations  
16 were issued in 2007 in ICRP 103.

17 So, again, you --

18  CHAIRMAN RYAN: Again, which have not been  
19 adopted in any regulation at this point; correct?

20 MR. GROSSMAN: That's correct. That's  
21 correct.

22 And ICRP 103, it's my understanding -- and  
23 I haven't gotten the most up-to-date -- but in terms  
24 of what we would use in the analyses, the dose  
25 conversion factors, those numbers have not been

1 developed for that yet. So ICRP 68/72 are the latest  
2 dose conversion factors that would be available.

3 The other thing to note on this slide is  
4 that Commission policy in SRM SECY-01-0148 allows for  
5 exemptions for current models on a case-by-case basis.  
6 So that is a possibility.

7 MEMBER ARMIJO: So somebody could use the  
8 ICRP 103.

9 MR. GROSSMAN: Well, practically, no,  
10 because the conversion factors have not been developed  
11 yet. So the latest that would be available would be  
12 68/72. When must become available, we anticipate  
13 roughly a 2014, 2015 timeframe for those numbers.  
14 Then that possibility would be available on a case-by-  
15 case basis.

16 CHAIRMAN RYAN: Just so it's clear to  
17 everybody, you're not showing that fancy bullet for 72  
18 in the picture.

19 MR. GROSSMAN: No. The reason for that is  
20 the bullets for the recommendations.

21 CHAIRMAN RYAN: Yeah.

22 MR. GROSSMAN: The parameters and so forth  
23 come in under other ICRP guidance.

24 MEMBER ARMIJO: In between --

25 (Simultaneous speaking.)

1 CHAIRMAN RYAN: -- Document 72 actually  
2 augments 60.

3 MR. GROSSMAN: Thank you, Mike. I  
4 appreciate that.

5 MEMBER ARMIJO: Okay, and that is what can  
6 be used under the --

7 CHAIRMAN RYAN: This is where the dose  
8 factors are. That's the basis for the dose factors.

9 MEMBER ARMIJO: Okay, got it.

10 CHAIRMAN RYAN: So that's correct.

11 MR. GROSSMAN: Sorry about that. Okay.

12 Slide 21, then.

13 In analyzing this to present a proposal to  
14 the Commission, we considered, obviously, Commission  
15 direction. We also looked at the different  
16 methodologies and how the updates had provided a more  
17 realistic evaluation of radiation risks from what is  
18 currently used in Part 61, which would be the organ  
19 doses.

20 The methodologies account for the radio  
21 sensitivity of the organ. That's something that  
22 wasn't incorporated and ICRP 2, and thus, Part 61.  
23 And they consider a wider range of organ and issues.

24 The other thing that we considered was  
25 public feedback, and I'll go into some of that in a



1 little more detail in the following slides.

2 MEMBER SKILLMAN: Chris?

3 MR. GROSSMAN: Yes?

4 MEMBER SKILLMAN: When you identify in the  
5 first bullet, under the second big bullet, "holistic,"  
6 do you mean thorough?

7 MR. GROSSMAN: Holistic in the sense that  
8 you're looking at kind of the whole body, so the  
9 different organs are weighted in that system. And  
10 then you take an aggregation of that risk.

11 The methodology used in Part 61 would be  
12 more, if you look at target organs in each case and  
13 there's no weighting by the radio sensitivity of the  
14 organ and so forth.

15 MR. McKENNEY: Basically, it's from a  
16 holistic point of view. For optimization in ALARA,  
17 you can make a consideration of comparing because one  
18 radionuclide would focus on certain organs and another  
19 radionuclide would focus on other organs. So what is  
20 a 20-millirem dose to the lung versus 30 to the  
21 kidneys? What is more important?

22 The ICRP methodologies, from 26 on, were  
23 able to take the radio sensitivity of each organ and  
24 say, what is 20 millirem to that organ, and associate  
25 it into cancer risks long term, versus being fully

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1 exposed to the whole body the same amount of those?

2 So, each organ has a different radio  
3 sensitivity, so that gets taken into account.  
4 Therefore, you're allowed to holistically evaluate.  
5 When you have a mix of different radionuclides, you  
6 can look at different things. If you were to control  
7 these radionuclides, would you reduce the risk, or  
8 would you just have an exchange because a different  
9 radionuclide is now being realized.

10 MEMBER ARMIJO: Is it fair to say that the  
11 new ICRP dose recommendations would be, are more  
12 restrictive in that the --

13 MR. MCKENNEY: No. No, it is not.

14 MEMBER ARMIJO: That is not correct.

15 MR. MCKENNEY: No, because they take into  
16 account the latest understandings of how the elements  
17 move through the body, and with the latest age-based  
18 models associated with it, and include the latest  
19 updates on the risk associated with all that stuff.  
20 So actually, they tend to get better.

21 Now, on a radionuclide-by-radionuclide  
22 basis, the allowable intake in picocuries per year to  
23 a certain dose may change, and some go up and some go  
24 down as the science changes, but it's not getting more  
25 restrictive. In the old system, it actually was that

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1 way. It was whatever organ got 25 millirem first --

2 MEMBER ARMIJO: That was the end of the  
3 line.

4 MR. MCKENNEY: -- was its stop.

5 In the new system, because they are all --  
6 almost every organ is, first of all, subfractioned.  
7 So you multiply by a fraction for every organ because  
8 there is no organ that is as radio sensitive as the  
9 entire body. The lung is a multiplier of 12 percent.  
10 The breast is 25 percent in the current model. And  
11 it's not necessarily as limiting in the system.

12 MR. GROSSMAN: Okay.

13 Slide 22, then.

14 The options that we considered were  
15 specifying a specific methodology in the regulation  
16 for adopting a neutral stance where we wouldn't  
17 specify, and the licensees could elect to use a  
18 different methodology or the latest methodology, or to  
19 address this in guidance and for the rule to be silent  
20 on it.

21 Slide 23.

22 I'll talk a little bit about the public  
23 views that were received for the technical basis to  
24 the develop the rule.

25 MEMBER ARMIJO: Just to make sure I

1 understand --

2 MR. GROSSMAN: Sure.

3 MEMBER ARMIJO: -- currently, we don't  
4 specify a methodology, or we do?

5 MR. GROSSMAN: Well, it's implicit through  
6 the dose requirements in 61.41. And so, because of  
7 the way -- the dose currently is not a 25-millirem  
8 TEDE, although it can be implemented that way if the  
9 dose is actually -- I don't remember the specifics  
10 from the regulation. It's 25-75-25.

11 MR. McKENNEY: It's 25 millirem, full  
12 body; 25 millirem, any other organ; and 75 millirem  
13 for thyroid.

14 MR. GROSSMAN: Right.

15 MR. McKENNEY: And because it's listed out  
16 by organ, that tells you that it's an ICRP-2  
17 methodology system and that you should be using that  
18 methodology with those dose limits.

19 There's a similar issue in Appendix I of  
20 Part 50. It has similar language, and of course, the  
21 Commission just ruled, told the staff this last year  
22 that they should go forward with updating Appendix I,  
23 and also Part 20, to the latest recommendations to  
24 that.

25 MEMBER ARMIJO: Okay.

1 MR. GROSSMAN: So back on slide 23, we  
2 received both supportive and critical views. I think,  
3 in this case, most of the views were supportive of the  
4 approach, reflecting that it would be using the latest  
5 science.

6 Specifically, some of the views were mixed  
7 between whether we should allow flexibility for the  
8 licensees to elect the latest methodology versus  
9 directly citing it in the regulation, which would tie  
10 it then to a methodology. We received comments, I  
11 think, on both sides of that.

12 And then there was also a comment to  
13 periodically revisit this in the PAs, and this was all  
14 the DOE's approach for PA maintenance, where they come  
15 back, and if new information becomes available, say,  
16 on a five- to ten-year basis, they would reconsider  
17 the analyses using the latest methodology.

18 The critical comment we received largely  
19 was around the safety significance in removing the  
20 critical organ limits. They thought that was more  
21 conservative approach and, therefore, should be  
22 retained, than some of the more modern methodologies.

23 Slide 24.

24 The staff's proposal was to adopt a  
25 neutral approach. We felt this was consistent with

1 Commission direction through some of the policies. It  
2 allowed exemption on a case-by-case basis. It allowed  
3 for use of current science. There is a precedent in  
4 Part 63 to using more recent methodology.

5 Part 63, for those of you who may not be  
6 familiar, is the regulation for the disposal at Yucca  
7 Mountain. And also, we felt it would help minimize  
8 future revisions to Part 61. So, by not tying it to  
9 a specific methodology, there was flexibility for the  
10 future. One of the underlying goals in all of these  
11 changes was, how do we avoid tinkering with the rule  
12 nonstop in the future?

13 So that's all I have on the dosimetry  
14 part. If there any questions, we can take them at  
15 this time, or I can move forward to the waste  
16 acceptance.

17 MEMBER ARMIJO: Just on the issue of the  
18 public view that the safety significance of removing  
19 the critical organ limits was in the wrong direction  
20 and being less conservative, how much merit does that  
21 argument have? It will be less conservative, but the  
22 question is, is it safe?

23 MR. GROSSMAN: Right. I think, in some  
24 cases, it would be more conservative; in some cases,  
25 it wouldn't be as conservative. So that argument is

1 a little mixed, in reality.

2 And I think, as a society, we've learned  
3 quite a bit about how radionuclides move through the  
4 body, and I think the staff's position is that to  
5 ignore that information and to use some of the more  
6 modern methodologies would be bad science.

7 CHAIRMAN RYAN: Okay.

8 MR. GROSSMAN: So that's all we would move  
9 forward with, the neutral approach as a proposal.

10 The next topic then is waste acceptance,  
11 and it will be a similar format to the last one. The  
12 Commission's direction was to weigh the pros and cons  
13 of allowing flexibility for disposal facilities to  
14 establish site-specific waste acceptance criteria  
15 based on the results of the PA and intruder  
16 assessment.

17 Slide 27.

18 I'll walk through a little bit of what  
19 Part 61 is today in terms of waste acceptance. We  
20 don't use that terminology in Part 61 explicitly, but  
21 it's there through the requirements. So I'll kind of  
22 point out how the waste acceptance is in the  
23 regulation today, to bring everyone kind of up to the  
24 same page.

25 You'll see it largely through three

1 sections of regulation -- 61.55 deals with  
2 classification scheme, or system; 61.56 are the  
3 requirements on waste characteristics and waste forms,  
4 and then 61.68 is a provision that allows, on case-by-  
5 case basis, alternative classification and  
6 characteristic requirements. So licensees could come  
7 in and request an alternative scheme to what is in  
8 61.55 and 56.

9 Fifty-five lays out the concentration  
10 limits for the different classes of low-level waste.  
11 So there are three classes and then, by default,  
12 because low-level waste is defined by what it is not  
13 -- there's also actually a fourth class that would be  
14 a greater than Class C, which falls into low-level  
15 waste but is generally not acceptable for near-surface  
16 disposal.

17 As Dave mentioned, one thing to note with  
18 the waste classification system is that it does not  
19 ensure protection of the public via the 61.13 analysis  
20 for 61.41, which is the offsite releases, so there  
21 needs to be an analysis, and the rule recognizes an  
22 analysis to evaluate that.

23 On slide 28, this is just a snippet from  
24 61.55. We have two tables there. There's a long-  
25 lived table, Table 1, and a short-lived table, so they



1 consider both long-lived and short-lived  
2 radionuclides. And I'll talk a little bit more about  
3 how these numbers were derived from the environmental  
4 impact statement in the early 1980s.

5 The thing that's not on this slide is  
6 there is what I'll term an escape hatch. There's  
7 section of the rule or a statement in the rule that  
8 says, basically, if they're not in the tables, they're  
9 Class A by default, and this is kind of a tie back to  
10 the estimate of the inventories that were assumed for  
11 the original analysis. And you can begin seeing how  
12 those assumptions are hardwired into the regulation in  
13 some instances.

14 CHAIRMAN RYAN: Chris, tell me if I'm  
15 wrong, but my recollection is that reactor waste was  
16 really where everybody was thinking, or at least fuel  
17 fabrication reactor waste. And some of the other uses  
18 of radioactive material really were -- I don't want to  
19 say "offhandedly assumed," -- but they were assumed to  
20 be covered by this blanket. And these are really  
21 based on reactor considerations.

22 MR. GROSSMAN: Yeah, there were 36 or 37  
23 waste streams.

24 MR. ESH: Thirty-seven.

25 MR. GROSSMAN: Thirty-seven in the end.

1 And they covered the gamut of BWR- and PWR-type  
2 wastes, but they also covered institutional wastes  
3 from large and small facilities. So I would say those  
4 are probably -- I don't know the volume off the top of  
5 my head -- but for each of those. They probably  
6 dominated the waste streams.

7 CHAIRMAN RYAN: Yeah.

8 MR. GROSSMAN: But there were  
9 considerations of other waste streams, as well, that  
10 were expected.

11 CHAIRMAN RYAN: There was not a lot of  
12 detail analysis as I recall, just sort of, these are  
13 covered because these are more important.

14 Okay, thanks.

15 MR. GROSSMAN: Okay.

16 On Slide 29, we'll talk about a little bit  
17 about how those tables were derived.

18 They essentially did a reverse calculation  
19 using three scenarios.

20 The intruder construction scenario, which  
21 is an inadvertent intruder comes on site to build a  
22 residence of some sort and begin excavating into the  
23 site and removes or exhumes waste, and it's deposited  
24 on the surface, and so, during those construction  
25 activities, they would be exposed to the waste.

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1           There is a variant to that, which is  
2           called intruder discovery scenario in which the  
3           construction crew, because the waste is in a stable  
4           form and it maintains that stability, it's  
5           recognizable to the crew, so, as soon as the crew  
6           discovers it, they back off and so your exposure  
7           durations are much shorter in that case. And that  
8           largely, then, forms the limits for Class B waste,  
9           which is the first category of stable waste.

10           So Class A would be kind of your unstable  
11           waste and then Class B and C would be stable waste.  
12           And then C takes it one step further with intruder  
13           protections.

14           So they looked at layering of the waste  
15           and waste that needed to be placed deeper than was  
16           assumed to have some intruder protections, so those  
17           wastes then were deemed Class C wastes.

18           The third scenario is called with intruder  
19           agriculture.


20           So these three scenarios were used to  
21           evaluate radionuclides in those waste streams that  
22           were considered and then to come back and calculate  
23           what sort of limits we're looking at to meet a 500-  
24           millirem dose limit for the intruder.

25           Another big assumption in this, and this,

1 I think, gets to one of the questions we had earlier  
2 about the institutional control period. Dave  
3 mentioned this and I'll follow up on it.

4 The intent of the rule is that there will  
5 be permanent system control, but there's a recognition  
6 that after 100 years, we can't guarantee that. So the  
7 assumption in the analysis is that after 100 years,  
8 the institutional controls are deemed ineffective at  
9 limiting access.

10 Then the analysis also recognized a need  
11 for certain radionuclides that were likely to be  
12 driven by site-specific analysis for water-dependent  
13 pathways. That, then, formed the basis for the  
14 requirement for 61.13(a) analysis, which is the  
15 pathways analysis for an outside receptor.

16  MEMBER SKILLMAN: If the institutional  
17 controls were changed from 100 to 200 years or 300  
18 years, would that make much of a difference?

19 MR. GROSSMAN: Yes, I think it would,  
20 mostly for your short-lived nuclides. So, depending  
21 on which way you went, it could have an influence.  
22 Like, some comments were on the order of 300 years for  
23 an institutional control period. I think at that  
24 point, you're probably looking different cesium levels  
25 certainly than what we have in the tables today.

1 MEMBER SKILLMAN: Okay.

2 MR. GROSSMAN: So that would be an  
3 influence there.

4 CHAIRMAN RYAN: You've got cesium and  
5 strontium at 300 years that will pretty much decay a  
6 pretty small amounts.

7 MR. GROSSMAN: Yes. Intruder, yes.

8 CHAIRMAN RYAN: And they capture a few  
9 more radionuclides with that 300 years.

10 MEMBER SKILLMAN: The reason that I ask is  
11 --

12 CHAIRMAN RYAN: It doesn't solve the  
13 problem; it makes it smaller.

14 MEMBER SKILLMAN: Yes, that's what I was  
15 pointing to when Dave was talking earlier.

16 If there is isn't a case for challenging  
17 that 100 years from the perspective of requiring for  
18 a site a re-up every 30 years for 60 years something  
19 that's in our conscious lifetimes -- you do your  
20 driver's license every two years or five years; if you  
21 have a concealed weapons permit, I think it's every  
22 five years, depending on what state you're in.  
23 There are other portions of our existence that require  
24 us to show up, sign a paper, have our picture taken,  
25 and re-up, whatever it is.

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1           If we think we just let this go for 100  
2 years and then all is forgotten, doesn't that make the  
3 case for a periodic re-do? One says, I applied for  
4 this site use permit, and about every 10 years, I've  
5 got to certify I'm still on watch or I've transferred  
6 the title for this to this gentleman, something that  
7 makes it necessary to keep the institutional memory  
8 alive. It seems to me that that's not difficult.

9           CHAIRMAN RYAN: I think the site, at least  
10 the sites that I'm familiar with, most of them have an  
11 institutional monitoring program that's going to  
12 answer your question, I think, over time. It's  
13 closed, and then the institutional maintenance and  
14 monitoring effort kicks and that's sort of site-  
15 specific in the sense that it's tailing that site.  
16 But I don't think there's any period during that  
17 institutional control where people would just not be  
18 knowledgeable about what's going on. At least that's  
19 the current scheme I'm familiar with.

20           MR. GROSSMAN: The idea isn't that all is  
21 forgotten on purpose after 100 years. This is an  
22 assumption that is made for the purposes of  
23 establishing concentration limits.

24           MEMBER SKILLMAN: I understand that.

25           CHAIRMAN RYAN: Well, one concept we

1 thought about -- "we," meaning when I was at a site --  
2 is that there's no reason to assume that at the end of  
3 that first institutional control period, you have to  
4 walk away. There may be information that says, well,  
5 there's plenty of money in the institutional control  
6 fund, and we want to watch these three little things  
7 that are going on, and there's no reason you couldn't  
8 continue.

9 The way I've always looked at it, and  
10 maybe it's wrong, is that the institutional control  
11 period is set as the first period. Then, you know,  
12 there can be a regulatory decision to decide, well,  
13 that's enough or that's not enough, or what do we need  
14 to do going forward?

15 MR. WIDMAYER: frankly, the notion was  
16 that the maintenance or whatever it is that you were  
17 talking about wouldn't be necessary. I was the  
18 thinking, was that --

19 MEMBER SKILLMAN: Well, I kind of got  
20 back, except if you say that there is a hazard that is  
21 not too far after 100 years, whether it's 200 or 300  
22 because you want to let the cesium AND the strontium  
23 die out, one might say the time to let go of  
24 institutional controls is after that time period.

25 CHAIRMAN RYAN: Well, but don't forget,

1     you've got the power of groundwater monitoring,  
2     surface water monitoring, erosion monitoring, and  
3     every other kind of cutting the grass and everything  
4     else under the sun, for a very long period of time.

5             You can make whatever decision you want to  
6     make about what to do moving forward from year 100  
7     plus zero days into that next period. And it can be  
8     everything from nothing to continuing doing the same  
9     thing to ramping up and doing something different or  
10    any combination thereof.

11            The point is, you would be informed of the  
12    information that's been gathered to make a decision  
13    that makes sense.

14            MEMBER SKILLMAN: Well, they can establish  
15    a comfort level at that time with doing an analysis of  
16    100 years with the expectation that the institutional  
17    controls would not be lost. That was their thinking.

18            MR. GROSSMAN: I think Chris McKenney  
19    wants to add something to this discussion.

20            MR. MCKENNEY: I think we're going off  
21    Derek, off Derek, but this is sort of like a defense-  
22    in-depth sort of thing, from the concept from the  
23    calculation of, you're putting waste in the ground  
24    someplace for it to be there over time. And if you do  
25    the analysis first, it doesn't give full credit for

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1 these management processes, then again, your decay  
2 risk is finite. And in case something actually were  
3 to occur, you'd still have some buffer on the risk/

4 There is no intention for somebody to say,  
5 it's 100 years; you've got to leave. It's that we  
6 wouldn't mind that continuing for a long time, but you  
7 don't want to make a decision where, because of what  
8 you put in the site, you have to have perfect  
9 institutional controls for 300 years.

10 Remember, when we talked about  
11 institutional controls in Part 61, we were saying that  
12 that has absolutely zero chance for an intrusion event  
13 because that is part of the analysis. We don't do a  
14 PRA, an analysis of any risk level to the public for  
15 intruding onto the site or anything like that during  
16 the institutional control period. So, when we talked  
17 about action on that, it's all there.

18 This is a completely different assumption,  
19 which the Commission had in front of it at the same  
20 time, which was versus the standard, do assume  
21 perpetual institutional controls. But the Commission  
22 chose at the time to go an assumption of being  
23 conservative in the first place when you license a  
24 facility so that you don't cause the site that you are  
25 required to have perfect institutional controls for

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1 very long time.

2 MEMBER SKILLMAN: I understand. Thank  
3 you.

4 MR. GROSSMAN: Okay, moving on the slide  
5 30.

6 We're still talking about Part 61 today.  
7 And so 61.56 deals with waste characteristics and what  
8 would be acceptable waste to be received. It defines  
9 two large classes, a minimum requirement for all waste  
10 that facilitate handling and then afford protection of  
11 public health and safety. These would be things like  
12 no cardboard boxes; minimize water. I think the  
13 chelating agents is on that list. There's a list of  
14 best practices, of these kinds of forms should not be  
15 accepted for any waste.

16 And then the second class are what I call  
17 stability requirements. These are for wastes that  
18 need to be stable, so the B and C wastes. They're  
19 designed to minimize the water infiltration, which was  
20 some of the initial problems that pushed the Part 61  
21 forward in the first place is that some of the sites  
22 were having trouble with that. And then also, to  
23 limit the intruder exposures in the form of  
24 recognizable and non-dispersible waste forms.

25 CHAIRMAN RYAN: I think there's one part

1 that we haven't touched on very much, Chris, that fits  
2 well in there, and that's engineered features of the  
3 disposal system. I mean what comes to my mind is  
4 Byerhoff, for example, has very thick slabs of the  
5 class B and C cells that have brass plates that say  
6 "Radioactive material: do not dig every" -- I forget  
7 how many feet.

8 But there's ways to at least push back an  
9 intruder.

10 MR. GROSSMAN: You're exactly right.

11 MEMBER ARMIJO: It assumes an intruder can  
12 read.

13 MR. GROSSMAN: That's a great segue into  
14 slide 31. So, thank you.

15 (Laughter.)

16 MR. GROSSMAN: So one of the things I hope  
17 you get out of this -- and this kind of guided our  
18 thinking in this waste acceptance area -- is that the  
19 classification system is integral to the regulation as  
20 it is today, and this graphic here kind of illustrates  
21 that, and it gets to one of Dr. Ryan's points: You  
22 have ties from classification to -- it's not directly,  
23 it's implied throughout the other parts of the  
24 regulation through a lot of the other parts of the  
25 regulation, and I've listed some of the direct ties

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1 here.

2           Once you define the class of waste, then  
3 you have certain characteristics that you need to meet  
4 in 61.56. Once you define the classification of the  
5 waste, then you have certain segregation requirements.  
6 So unstable A waste can't be put in with B and C  
7 waste, which needs stability, and so you won't get the  
8 infiltration issues or you minimize those. Same thing  
9 with intruder barriers.

10           As you'll see with our proposal, this  
11 influenced our thinking quite a bit. We tried to  
12 minimize tinkering too much with the existing  
13 regulation to meet the Commission's direction. We  
14 felt that if you did too much with waste  
15 classification now, you've blown up a whole rule, and  
16 you're maybe starting over from ground zero. So we  
17 didn't want to do that, and we didn't feel the Commission  
18 was directed to do that.

19           Just to finish out today, there's also  
20 waste acceptance guidance, predominantly, in two  
21 guidance documents. There's a guidance document on  
22 waste form from the early 1980s and then also guidance  
23 on concentration averaging, which deals with how you  
24 identify what class it's in, and encapsulation. That  
25 is currently undergoing revision. I think it may be

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1 Jim Kennedy who's working on that, and Christian  
2 Ridge.

3 Is that this summer that we're looking at?

4 MR. KENNEDY: Later this year.

5 MR. GROSSMAN: Later this year, okay.

6 Thank you.

7 Sorry to put him on the spot.

8 Okay, slide 33, then.

9 To analyze the Commission's direction, we  
10 looked at the direction and also some domestic and  
11 international regulatory approaches as well as the  
12 public feedback we received, to derive from options.

13 And on 34, then, I lay out those options  
14 for waste acceptance. One was to continue with just  
15 the existing waste classification system. One of the  
16 things I didn't talk about is 61.58. I mentioned  
17 early on as part of the waste acceptance requirements  
18 of Part 61. That allows the use of alternative  
19 classifications and characteristic requirements. That  
20 could be used on a site-by-site basis and so we  
21 thought this could be an option, under the  
22 Commission's direction still, to allow that  
23 flexibility but do it with the existing system  
24 unchanged. We looked at that. We received comments  
25 to that and as well.

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1           The second option was to replace the  
2           classification system with site-specific waste  
3           acceptance criteria; so, to abandon the classification  
4           system, essentially, and just go site-specific WAG.

5           And the third one was kind of a hybrid  
6           approach, which was to maintain the classification  
7           system alongside flexibility for site-specific waste  
8           acceptance criteria.

9           MEMBER SKILLMAN: From your stakeholders,  
10          is there any preference among the three?

11          MR. GROSSMAN: Well, you'll see in the  
12          comments -- I'll talk a little bit about that --  
13          there's kind of mixed opinion about why and there's  
14          lots of reasons why one versus the other, and so  
15          forth. And so, if I don't answer your question there  
16          --

17          MEMBER SKILLMAN: Okay. Thank you.  
18          That's all right. Thank you.

19          MR. GROSSMAN: Bring it back up please.

20          MEMBER ARMIJO: But you kind of keep  
21          everybody happy with the third bullet; right?

22          MR. GROSSMAN: Yeah, it's the Three Bears  
23          briefing, yeah.

24          (Simultaneous speaking.)

25          MEMBER ARMIJO: Well, hold it. Is there

1 anything technically deficient with option three?

2 MR. GROSSMAN: We don't believe so.

3 That's our proposal to the Commission.

4 MEMBER ARMIJO: Okay.

5 MR. GROSSMAN: You'll see it come forward.

6 Based on our analysis, we don't see anything at this  
7 point, but we won't say it isn't.

8 MEMBER ARMIJO: Thank you.

9 MR. GROSSMAN: Some of our goals, then, in  
10 selecting one of the options or proposing one of the  
11 options to the Commission -- it's theirs to select,  
12 ultimately -- was to ensure protection of public  
13 health and safety consistent with the mission, look at  
14 risk-informed, performance-based regulatory processes  
15 to the extent that we can incorporate those, provide  
16 flexibility for the WAC, per the Commission's  
17 direction -- that's obviously a prime goal here -- and  
18 minimize disruptions to the existing framework so that  
19 we're not "blowing up" Part 61 and starting over.

20 MEMBER ARMIJO: I just want to make sure  
21 that I -- let's assume that the rule gets written and  
22 it's got a number of new things in it. Do the  
23 existing sites that are currently operational, will  
24 they have to comply with this? Will they have to do  
25 a re-analysis to be in compliance with the new rule?

1 Or is there something equivalent to --

2 MR. GROSSMAN: There is, in fact, that, in  
3 Part 61. And so the intent is that but all licensees,  
4 existing and prospective, would be doing the analyses.  
5 They would all have to do them eventually anyway  
6 through the closure analysis, but that's the intent of  
7 the way our proposal is set forth.

8 MEMBER ARMIJO: So it would impact the  
9 existing operating low-level waste facilities, whether  
10 they were through an agreement state or under direct  
11 NRC control.

12 MR. GROSSMAN: Yes, so the way that would  
13 work is, assuming the Commission went forward with the  
14 proposal and implemented it, the agreement states  
15 would have three years to write conforming  
16 regulations. Then there would be some time for the  
17 licensees to develop their WAC or whatever, whatever  
18 approach they took, as you'll see. I haven't gotten  
19 to the approach yet, exactly.

20 But there would be some time for that to  
21 happen.

22 CHAIRMAN RYAN: Mike?

23 MR. MCKENNEY: Let the record recognize  
24 Larry Camper.

25 MR. CAMPER: Larry Camper, Director of



1 Division Waste Management and Environmental  
2 Protection.

3 The simple answer to your question is yes,  
4 and it's one year after the state has its implementing  
5 regulations in place, but they'll have three years to  
6 do that, in terms of our compatibility requirements.  
7 But yes, it impacts them all.

8 MR. GROSSMAN: Now, along that line, Mr.  
9 Armijo, as we mentioned -- I think Mike may have  
10 mentioned earlier in his talk -- most of these sites  
11 are actually developing waste acceptance plans, which  
12 you'll see -- well, we don't talk to those examples,  
13 but we certainly look at those, and we feel they align  
14 pretty well with the requirements. So most of the  
15 sites would be are going to be a long way to meeting  
16 that. And again, some of it depends on which option  
17 they select.

18 Okay, moving on to slide 36, here's where  
19 I talk about the viewpoints. I've got a slide of  
20 viewpoints that are generally supportive of the  
21 flexibility for site-specific waste acceptance  
22 criteria. And the next slide then talks about  
23 critical viewpoints.

24 Stakeholders who were supportive believe  
25 that this would allow a recognition of the

1 improvements that have been made in the engineering  
2 and site selection and facility design from the  
3 environmental impact statement and its assumptions  
4 that originally developed the rule.

5 There were some mixed views on the types  
6 of scenarios that the public felt should be  
7 considered. Some felt that they should be limited to  
8 hypothetical scenarios, all of the intruder scenarios  
9 that were used in Part 61. And others argued that it  
10 should be only site-specific scenarios. So we heard  
11 both sides of that -- even if they were supportive of  
12 site-specific WAC.

13 There was some concern about abandoning  
14 the classification system, and this is a little quirk  
15 maybe with US legislation. That long, garbled acronym  
16 is the Low-Level Radioactive Policy Amendments Act of  
17 1985, and it lays out federal and state  
18 responsibilities low-level waste.

19 The quirk here is that it ties the  
20 dividing line between federal and state to Part 61.55.  
21 It ties it back to a regulation, and that created a  
22 little bit of a wrinkle, not necessarily  
23 insurmountable if you wanted to move away from the  
24 classification system. But we thought it certainly  
25 would create confusion if you abandoned the

1 classification system, about whose responsibility is  
2 the waste then?

3 We don't think that banning it in the  
4 regulation would change the legislation because that's  
5 not how things work. But it could lead to some  
6 confusion among generators on this, among the disposal  
7 sites about that, unless there was some clarity. So  
8 we received a lot of comment on that, as a concern  
9 about abandoning classification in that option.

10 There were some comments about 61.58 and  
11 the case-by-case allowance for alternative  
12 requirements. Some of the concerns that we had in  
13 that regard were that they may create some  
14 transboundary issues, so you might have some different  
15 sites operating on different requirements and the  
16 implication that might have at a national level for  
17 commerce, so to speak, in terms of the movement waste  
18 and so forth in the country.

19 And there were some mixed views on the  
20 waste acceptability requirements. Some were happy  
21 with some of the requirements currently in Part 61,  
22 which tend to be a little more prescriptive, like you  
23 shall not have waste with a certain amount of liquids,  
24 and so forth. And some thought they should be  
25 performance-based, where, whatever I can demonstrate,

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1 I'm allowed to do, essentially.

2 So we heard both sides, even if they were  
3 supportive, that, in some cases, you might need to  
4 keep some of that prescriptiveness, and in some cases,  
5 you may need -- some people don't, but that should be  
6 opened up for consideration.

7 MEMBER SKILLMAN: Chris, at the next to  
8 last bullet, 61.50, transboundary concerns, you  
9 mentioned movement of waste in the country. Does that  
10 suggest that could be 49 CFR impact, transportation  
11 regulations or 10 CFR 71, which is fuel?

12 MR. GROSSMAN: I don't foresee anything to  
13 the transportation issue. It's more of you have a  
14 kind of a different playing field for different states  
15 in terms of -- and the generators in those states --  
16 and what can I do with my waste? And so that was kind  
17 of the issue, versus having a kind of stable national  
18 framework of, I have a consistent requirement across  
19 the country, and I know by generate this waste that  
20 there is a disposal option at some point for it.

21 MEMBER SKILLMAN: Thank you.

22 MR. GROSSMAN: That's more what the  
23 transboundary deals with.

24 MEMBER SKILLMAN: Thank you.

25 MR. GROSSMAN: That's jargon from our

1 compatibility criteria. I apologize for using that.

2 MEMBER SKILLMAN: Okay.

3 MR. GROSSMAN: So slide 37, then, we get  
4 into some of the critical viewpoints from people who  
5 were generally not supportive. Or, in some cases,  
6 they were supportive, but they had some major concerns  
7 beyond what I identified previously.

8 Dr. Schultz had a question earlier with  
9 Mike about the agreement state comments, and this is  
10 an example that I can point to. The first two bullets  
11 were specifically agreement state comments.

12 The first bullet was also made by people  
13 who were parties outside the agreement states.  
14 Basically, this would create a resource burden on the  
15 agreement states in the sense that they would have to  
16 then evaluate the waste acceptance criteria. It's  
17 maybe a more complicated process and involved more  
18 resources on their part. That being said, I think,  
19 overall, the agreement states were generally  
20 supportive of that flexibility, but they wanted to  
21 note these concerns.

22 The second was the potential impact on  
23 state laws. The example I can give there is from the  
24 state of Utah. The state of Utah was concerned about,  
25 they have a law on the books about limiting disposal

1 of Class A waste in the state, and they were concerned  
2 that this might be an end run around that legislation,  
3 so they expressed those concerns as kind of a critical  
4 viewpoint here.

5 Some of the other stakeholders expressed  
6 concern about the negative effects on public  
7 confidence, and this was largely, you know, the public  
8 was kind of invested in Part 61. They went through  
9 the rulemaking and began to understand how it was  
10 developed and so forth. And there's some acceptance  
11 of the limits that have been imposed by it and that  
12 they were afraid -- I think the sentiment was there  
13 was some fear that if you're doing this in each state,  
14 it's hard to follow and keep up with, and maybe the  
15 amount of public would be not as high as it might have  
16 when it's done at the federal level.

17 Some stakeholders expressed viewpoints  
18 which have emphasized conservatism rather than  
19 maximizing capacity, in their words, and they felt  
20 that this was an attempt to maximize the capacity.

21 There were some concerns about perverse  
22 economic incentives to maximize capacity at the  
23 expense of safety.

24 And then the complexity and lack  
25 transparency of the analyses was another comment that

1 we received, and this is related back to that negative  
2 effect on public confidence.

3 Some stakeholders viewed these analyses as  
4 black boxes, and very complicated and hard to for the  
5 average member of the public to follow.

6 Slide 38.

7 Then we get our proposal, so ta-dah.

8 What we've done in the proposal is we  
9 replaced 6158, which was the option for alternative  
10 classification and characteristic requirements with a  
11 waste acceptance criteria section. We felt this would  
12 basically obviate a need for those alternatives  
13 because it allows the licensee to do this through the  
14 rule.

15 There are three components of waste  
16 acceptance, the primary one being the criteria -- so,  
17 what's acceptable at this disposal facility and how  
18 you develop that -- and the second being  
19 characterization methods the facilities would need to  
20 identify what parameters and what level of uncertainty  
21 in characterization would be needed to demonstrate  
22 that the criteria are met. A third would be a  
23 certification program, basically someone to certify an  
24 administrative process that this waste meets the  
25 acceptance criteria. The idea would be that this

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1 would apply to all licensees, this we mentioned  
2 earlier.

3 We adapted this approach heavily from the  
4 Department of Energy's approach in DOE Order 435.1.  
5 I think it's a good example of the approach that's  
6 been used domestically, so we adopted it where we  
7 thought it would be useful and relevant for Part 61.  
8 And generally, it's consistent with the international  
9 approaches, which vary quite a bit from the current  
10 Part 61, where you specify concentration limits to  
11 fully site-specific. So it's kind of a Three Bears  
12 approach. It certainly fits in that range.

13 Slide 39, I'll go through it quickly. I  
14 don't want to take too much time, I've gone on too  
15 long already.

16 We reach those three legs of the stool.

17 CHAIRMAN RYAN: I would ask you to just --

18 MR. GROSSMAN: Okay.

19 So, you've got -- this is where  
20 flexibility comes in. You've got to approaches. You  
21 can rely on the 61.55 concentration limits, or you can  
22 develop your WAC from the 61.13 analyses, which are  
23 the four analyses, to demonstrate the four performance  
24 objectives. You also need to specify acceptable waste  
25 form characteristics, container specifications and

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1 restrictions, and prohibitions.

2 Slide 40 gets into the characterization  
3 methods, and again, here, identifying parameters and  
4 what's the acceptable uncertainty. That section of  
5 the regulation also specifies minimum characterization  
6 information, such as the dates samples were taken, the  
7 weights of samples, those basic things that you have  
8 to have.

9 Slide 41, then, talks about the  
10 certification program, and these are administrative  
11 procedures to ensure that the waste is acceptable. So  
12 you're looking at who are the appropriate authorities  
13 to certify the waste is acceptable for disposal,  
14 identifying any documentation that need to be  
15 developed and maintained to support that decision, and  
16 then approaches for maintaining certification once the  
17 waste has been certified; how do you ensure that, from  
18 the time it's shipped to receipt at the disposal  
19 facility, that that certification is still intact.

20 Quickly, on slide 42 -- this is my last  
21 slide -- this will result in some accommodating  
22 changes because we've essentially taken with  
23 classification as central to the ruling and made waste  
24 acceptance now central to the ruling. Waste  
25 classification is a subset of waste exceptions if you

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1 can visualize that.

2 So waste classification has ties around  
3 the rules. We needed to generalize those ties, and  
4 that's what these largely revolve around, is making it  
5 more for the waste acceptance; so, if you chose the  
6 61.13 route of developing site-specific WAC, how these  
7 parts of the regulation would apply to you in that  
8 case.

9 CHAIRMAN RYAN: Any thoughts about moving  
10 Appendix G to Part 61?

11 MR. GROSSMAN: Yeah --

12 (Simultaneous speaking.)

13 CHAIRMAN RYAN: -- Part 20.

14 MR. GROSSMAN: We didn't think about that  
15 specifically, but there was some thought above, for  
16 the approach of abandoning the waste classification  
17 system, of potentially putting it there if we too were  
18 to abandon, but the proposal wasn't something we were  
19 moving forward with necessarily.

20 CHAIRMAN RYAN: It just seems odd that  
21 that requirement is holding up our --

22 MR. McKENNEY: The real reason is that  
23 Part 61 applies to the land disposal facility, and  
24 that's why it starts, for the purposes as that applies  
25 to Part 61, the Part 61 facility, while Appendix G

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1 applies to all people who produce waste.

2 CHAIRMAN RYAN: Right.

3 MR. McKENNEY: So, because Part 20 applies  
4 to all licensees. That's why -- and it's all about  
5 shipping.

6 So, unless it go put in transportation, it  
7 could be put there, but it wouldn't belong in Part 61.

8 CHAIRMAN RYAN: So it really doesn't  
9 belong and 61 or 20. Is that what you're telling me?

10 (Laughter.)

11 CHAIRMAN RYAN: It's fine where it is, but  
12 it's just kind of a --

13 MR. GROSSMAN: We figured that was beyond  
14 the scope of limited --

15 CHAIRMAN RYAN: Okay.

16 MR. GROSSMAN: So that's all I have.

17 Are there any questions?

18 CHAIRMAN RYAN: Thanks, Chris. That was  
19 a good presentation.

20 MR. GROSSMAN: Dr. Ryan, in Andrew's  
21 presentation, he's actually going to go through those  
22 changes in the rulemaking language. Do you want to  
23 skip that?

24 CHAIRMAN RYAN: I want to let Andrew to  
25 have some time to make his comments.

1 MR. CARRERA: I can make a really quick.

2 STAFF EFFORTS TO REVISE PART 61:

3 TIME LINE

4 ANDREW CARRERA, NRC STAFF

5 MR. CARRERA: Thank you, Dr. Ryan, ACRS  
6 members. My name is Andrew Carrera, and I'm the  
7 project manager for the Part 61 rulemaking. And  
8 naturally, as a PM, none of my team members likes me,  
9 so they only gave me five minutes to cover what is  
10 here.

11 (Laughter.)

12 MR. GROSSMAN: I tried to give you zero.

13 (Laughter.)

14 MR. CARRERA: And, you know, the committee  
15 asked me to cover my materials up to December 2012.  
16 So my goal is to provide you with a high level of  
17 awareness of the proposed ruling which will be put  
18 out. And in June's meeting, will go into the weeds of  
19 how we adjusted this language based on stakeholders'  
20 comments.

21 So we received the request from the  
22 Commission to proceed forward with the proposed  
23 rulemaking, and the staff revised the regulatory basis  
24 document to support the rulemaking. A team of  
25 multidisciplinary staff was assembled, composed of

1 representatives, obviously, from across the NRC as  
2 well as the representative from the agreement states,  
3 Mark Yeager, who is from South Carolina.

4 The rulemaking team developed the purpose  
5 of the rule, and that's to specify site-specific  
6 technical analysis requirements, permit development of  
7 criteria of waste disposal, as Chris just covered, and  
8 better align the requirements with current health and  
9 safety standards.

10 We developed the preliminary proposed  
11 rule, which was published on regulations.gov for  
12 public comments in December 2012.

13 And slide number four is a summary of the  
14 centerpiece of this language. It contains site-  
15 specific analysis of requirements for performance  
16 assessment, intruder assessment, long-term analysis,  
17 but it's also performance period analysis and updated  
18 technical analysis.

19 The staff is also proposing waste  
20 acceptance, which Chris just covered.

21 The staff also proposed other supporting  
22 changes to facilitate the implementation of proposed  
23 requirement, adding new definitions in concept to  
24 Appendix G, which is 10 CFR Part 20, and also allow  
25 the use of up-to-date ICRP recommendations.

1           So I'll quickly go over the actual ruling,  
2           which is offered as 61.41. This is a current  
3           regulation, and we're proposing to revise it to  
4           incorporate the time components into this layer of  
5           this section, the compliance period and the  
6           performance period. The compliance period would be  
7           covered in revised 61.40 1(a), which points back to  
8           the performance assessment requirement and 61.13(a)  
9           instead of (b).

10           The second part of 61.41 is proposed to be  
11           (b), which we added, a long-term performance analysis  
12           which has -- we proposed ALARA's lowest achievable  
13           metrics to dose analysis.

14           Section 61.42, protection of inadvertent  
15           intruder -- similarly, we proposed, we wanted to  
16           incorporate the time components into this section.

17           Section 61.42(a), we've pulled the 500-  
18           millirem dose limit out of the table and we put it  
19           into this section.

20           Section 61.42(b) -- similarly, we have a  
21           performance assessment requirement with an ALARA  
22           metric associated to it.

23           The long-term analysis or performance  
24           period analysis -- this analysis applies only to land  
25           disposal facilities that have long-lived wastes that

1 contain alpha-emitting radionuclides with average  
2 concentrations exceeding 10 per gram, a radionuclide  
3 with average concentration exceeding one tenth value,  
4 at table 1, as necessitated by site-specific  
5 conditions.

6 Slide number eight, waste acceptance --  
7 I'll skip that. It was covered in greater detail  
8 previously.

9 Slide number nine, contents of application  
10 for closure -- well, currently, we don't have the  
11 requirement to do all these internal analysis of  
12 exposure, and we'd like to have that incorporated into  
13 the revised analysis, into application proposal.

14 Slide nine -- this is my last slide. We  
15 also proposed other changes, supporting changes, and  
16 new definition, concentrated intruder assessment, low-  
17 risk waste, et cetera. And also, in Appendix G for 10  
18 CFR Part 20, we also propose a revision to Section 2  
19 and Section 3 of that appendix.

20 And that's all I have.

21 CHAIRMAN RYAN: Good.

22 Any questions for Andy?

23 (No response.)

24 MR. CARRERA: The final piece -- I hope so  
25 far, we've answered some of your questions that you

1 had earlier.

2 CHAIRMAN RYAN: Yes. You have.

3 MR. CARRERA: Good. It's been a very  
4 informative discussion. We appreciate your time.

5 Looking forward, we're scheduled to have  
6 one more subcommittee discussion in June.

7 CHAIRMAN RYAN: Yes.

8 MR. CARRERA: And we'll close the loop  
9 with you on the remaining, the rest of the story as  
10 votes have developed, and then full committee of ACRS  
11 in July.

12 CHAIRMAN RYAN: Okay. ACRS.

13 MR. CARRERA: Maybe it leads to a letter.  
14 That's up to you guys to decide.

15 CHAIRMAN RYAN: I would say --

16 (Simultaneous speaking.)

17 MR. CARRERA: Okay. And in July, same  
18 month, we'll probably submit to the Commission the  
19 proposed rule for its consideration.

20 If the Commission approves, we will issue  
21 for public comment, in the Federal Register notice and  
22 all that, later in calendar year 2013. Early in 2014,  
23 we'll have public interactions on receiving comments,  
24 which will finally lead, finally, to a final  
25 rulemaking by end of 2014.



1 CHAIRMAN RYAN: Just so you're familiar  
2 with our procedure -- I'm sure you are -- we have a  
3 meeting in July. We will be preparing the letter at  
4 that July full committee meeting.

5 MR. CARRERA: Yes.

6 CHAIRMAN RYAN: So that will be concurrent  
7 with that week.

8 MR. CARRERA: Yes. Right.

9 Well, thank you very much.

10 CHAIRMAN RYAN: Thank you.

11 Thank you all. Look at a few minutes for  
12 any questions.

13 Steve?

14 MEMBER SCHULTZ: No questions, just a  
15 comment. From what I've heard today, the work was  
16 done to try to get engagement with, with the agreement  
17 states, especially the sited agreement states, but  
18 there was not a huge response to date, in 2012 at  
19 least. Perhaps there's been more information that's  
20 been developed in 2013 that we can talk about in June.

21 Silence doesn't mean agreement to the  
22 proposals. I still feel there might be a lot of  
23 concern among the agreement states related to the  
24 proposal, so I hope that engagement is continuing to  
25 see how that information might be developed.

1           Then again, maybe we'll hear it. Maybe  
2           you've got more information that your present in June,  
3           and we'll look forward to hearing that.

4           MR. LEE: This is Mike Lee of the staff.

5           We understand from past experience, the  
6           agreement states usually wind up becoming more vocal,  
7           the closer we get to issuing rulemaking for public  
8           comment.

9           MEMBER SCHULTZ: That's what I expect.

10          MR. LEE: We've already begun to hear from  
11          some of them. So silence is not intended as implied  
12          consent, and we expect to hear a lot from them in the  
13          near future.

14          MR. ESH: And I would even say -- this is  
15          Dave Esh -- I would even say that silence is a  
16          mischaracterization.

17          MR. LEE: Yes.

18          MR. ESH: So we have received feedback  
19          from agreement states. The problem is this process  
20          has been pretty long with lots of steps. So we've  
21          heard from them at different steps, so it depends on  
22          which step of the process, what we may have heard.

23          In the areas I'm responsible for, they've  
24          given some very good feedback that in some cases has  
25          caused us to change rule language and things like

1 that. So with the agreement-state regulators, it's  
2 not like they've been unresponsive, but they are  
3 selectively responsive. But their feedback has been  
4 good.

5 MEMBER SCHULTZ: That's important.

6 CHAIRMAN RYAN: Real quickly, I'd add,  
7 Steve, just as an example of the low-level waste  
8 forum, which met in Charleston, South Carolina just a  
9 week ago, and had a very good participation by the NRC  
10 staff. And that's, you know, really the state  
11 representatives who were there at that meeting. So  
12 that was a very positive interaction.

13 MEMBER SCHULTZ: Okay.

14 CHAIRMAN RYAN: It's right along the lines  
15 that you were asking about.

16 MEMBER SCHULTZ: For this year's meeting.


17 CHAIRMAN RYAN: Low-Level Waste Forum  
18 Meeting.

19 MEMBER SCHULTZ: Good. That's important,  
20 especially in the area that you've described, that  
21 you're getting feedback specifically on that, and I  
22 appreciate this. That, I'm sure, has been helpful for  
23 you.

24 That's all I have.

25 CHAIRMAN RYAN: Okay.

1 Let's see; Sam?

2  MEMBER ARMIJO: Yes. I just wanted to ask  
3 -- and maybe it's in the rule the way you've got it  
4 structured -- is there any way to separate depleted  
5 uranium from low-level waste in this rule in such a  
6 way that -- it seems to me it's confusing everything,  
7 and it appears to put requirements on the whole  
8 community when it's a very special type of waste,  
9 especially for this long-life issue.

10 Is there, in the regulations that you're  
11 currently writing, is there a way to separate that and  
12 make that a special case? And if you don't have, do  
13 you -- or if you have it in just one location in your  
14 facility, you could treat it in a very different way  
15 and assess it in a very different way and the rest?  
16 Is that built into your regulations, or is that your  
17 intent?

18 MR. ESH: This is Dave Esh.

19 At this point in time, we didn't intend  
20 that. As I explained in our presentation, we  
21 considered it. The feedback from stakeholders was,  
22 don't do that.

23 MEMBER ARMIJO: Why?

24 MR. ESH: Because, they basically said,  
25 you may have new waste streams in the future that look

1 and smell similar to this waste stream, that if you  
2 want to get some stability to the regulatory  
3 environment with requirements that are going to be  
4 able to take any waste stream that may have those  
5 sorts of characteristics, and have the analysis done  
6 for them.

7 And as I sat in my talk, sure, depleted  
8 uranium is a much bigger step technically than  
9 traditional low-level waste, but you still have this  
10 issue with traditional low-level waste as to how much  
11 long-lived radioactivity is in it, and is it safe or  
12 not? That still applies, whether it's traditional  
13 low-level waste or depleted uranium.

14 MEMBER ARMIJO: Right.

15 MR. ESH: The other issue that you'd run  
16 into if you tried to specify something for depleted  
17 uranium is something Dr. Ryan has talked about many  
18 times in the past, and I agree with him  
19 wholeheartedly, which is quantity matters.

20 People focus on concentrations. But, say,  
21 I want to take 1,000 pounds of DU counterweights.  
22 Well, I'd have to be really careful about how I wrote  
23 that DU rule, so to speak, or DU requirements that  
24 from a risk perspective, I wasn't drawing people into  
25 it that I don't intend.

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1 MEMBER ARMIJO: Yeah.

2 MR. ESH: And all those things considered,  
3 we reviewed it and said, look, the issue is probably  
4 better handled by putting in the requirements that  
5 apply for the traditional low-level waste that might  
6 have long-lived radioactivity for the depleted uranium  
7 and then explain very clearly in our guidance document  
8 how people should be smart about how they do these  
9 analyses and justify their analyses.

10 It's not like in some cases, you might  
11 need a primary school analysis for your site. And in  
12 other cases, you might need the equivalent of the PhD  
13 analysis. You know, you have to structure what you  
14 need for the problem, and we think specifying the  
15 requirements that capture all of those but then  
16 allowing some people the flexibility in what they do  
17 to show how they meet them is probably the right way  
18 to go.

19 MEMBER ARMIJO: And quantity being one of  
20 the things that would scream out.

21 MR. ESH: Quantity being one of those  
22 things. So, if I'm a licensee and I say, look, I have  
23 long-lived isotopes, but I only have this amount, and  
24 it's limited to these quantities and concentrations,  
25 my problem is much problem is much simpler than the

1       guy over here who really wants to take a lot of long-  
2       lived waste.

3               CHAIRMAN RYAN:   And I guess, David, I may  
4       have put words in your mouth.  It's much easier to  
5       revise guidance or amend guidance than it is to revise  
6       or amend a rule.  We can handle those case issues, I  
7       think, more straightforwardly than you could by trying  
8       to make a comprehensive rule.  Is that right?

9               MR. ESH:   Yes.  And I'm excited that we  
10      did not even intend to -- we need to make requirements  
11      that we believe are adequately protective for any low-  
12      level waste that people want to dispose of.  But if  
13      you made a special rule for depleted uranium, you  
14      might do some things different than we have in this  
15      regulation because we can be more specific for that  
16      particular problem.  So depleted uranium is unique in  
17      that you get this radon problem over time, and the  
18      radon problem can be pretty lard.

19              So, in our home, many of us deal with  
20      radon in our homes, and it's driven by concentrations  
21      in the environment surrounding our homes.  It's many,  
22      many orders of magnitude lower than what you have  
23      here.

24              Mike likes to bring up the example of the  
25      Fernald facility, where they disposed of some radium-

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1 and thorium-based waste in the silos there. And  
2 they're estimated to have created some pretty large  
3 doses some pretty large distances away from the  
4 facilities before remedial action were put into place.  
5 We have to deal with those sorts in the rulemaking  
6 process, too.

7 I understand the comment. We did think it  
8 through thoroughly, and we think this is the best  
9 approach to go with.

10 CHAIRMAN RYAN: Dick.

11 MEMBER SKILLMAN: Four comments:

12 First, excellent presentation -- thank you  
13 for a very thorough and comprehensive presentation  
14 today.

15 Second, I'm with Dr. Armijo on DU. I've  
16 spent time at two field plants, and I see that forest  
17 of exit containers setting on the back lot. And I'm  
18 not talking hundreds; I'm talking thousands. And I  
19 know that for the LES application, the greatest  
20 concern by the public was, what's going to happen to  
21 all that stuff? That's what we're talking about here.

22 So it seems to me that the magnitude, in  
23 terms of kilograms of waste and curies of waste,  
24 deserves its own treatment. And if that were  
25 extracted from 61 through its own rule or its own

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1       portion, then maybe some of the other issues that  
2       you're dealing with would not be as complex. So it  
3       seems to me that there may be some value to  
4       considering that.

5               I have a difficult time grasping an  
6       intruder at 10,000 or 5,000 years. I really don't  
7       know what I'll be doing the day after tomorrow, or I  
8       think I know. I'm not trying to be facetious. It  
9       just seems like that is such an extension of our  
10      thinking that we may be on thin ice, and I don't know  
11      how to resolve that really, but it certainly causes me  
12      pause.

13             And finally, I want to thank Derek for  
14      doing a very good job in dealing with SR homework  
15      packages and reading materials.

16             MR. WIDMAYER: I'm going to write that  
17      down.

18             (Laughter.)

19             MEMBER SKILLMAN: Because you really did  
20      get us prepared.

21             MR. WIDMAYER: Thank you.

22             MEMBER SKILLMAN: And I thank you.

23             MEMBER ARMIJO: I just want to go back.

24      I may have --

25             (Simultaneous speaking.)

1 MEMBER ARMIJO: -- bridge line.

2 MEMBER SKILLMAN: I really thought you  
3 guys did a really good job.

4 → MEMBER ARMIJO: I did, too. I think  
5 intruders as archeologists or grave robbers. That's  
6 what got to the pyramids. This is sort of our  
7 pyramid. And I really couldn't care less about what  
8 happens to those guys. But I don't have a problem  
9 with an assessment of an intrusion event, albeit  
10 unlikely.

11 But to kind of put flesh and bones on an  
12 intruder, a human being or group of human beings, far  
13 out into the future, it gets so artificial that I just  
14 can't accept it. Whereas, in today's world, we say  
15 this is how we're going to assess this site, we're  
16 going to just assume there's an intrusion event, and  
17 what would happen? A what-if. That, I could live  
18 with. I mean, you put in some conservatisms, and  
19 you're done with it.

20 And I got the impression that's what you  
21 actually are thinking about; I'm not sure. Maybe it's  
22 semantics.

23 CHAIRMAN RYAN: Maybe it's a  
24 recommendation.

25 MEMBER ARMIJO: Maybe the label is

1 intrusion assessment rather than intruder protection.  
2 It gets across the reality of what you're doing as  
3 opposed to someone in the public saying, this stuff is  
4 so dangerous that we have to worry about human beings  
5 somehow wandering onto this area and getting harmed,  
6 and it's so unrealistic, so unlikely, and everything  
7 else.

8 But as a conservative engineer, you do an  
9 assessment of a what-if in the licensing process, you  
10 put it to bed, and you're done with it.

11 MR. LEE: The NRC deserves credit for  
12 first introducing the intruder analysis to the waste  
13 management community, so I think it would be hard for  
14 us to walk away from it right now because, again, it  
15 represents an acute situation.

16 We're looking at way to try to make it  
17 more realistic. With that being said, we were kind of  
18 --

19 MEMBER ARMIJO: But it's clearly a policy  
20 issue. I just think it's language in your rule that  
21 will make a big difference in the way that it's  
22 perceive, even though you do nothing different.

23 MR. LEE: Yeah, and segueing into the  
24 policy issue, again, the direction from the staff was  
25 to try to come up -- the staff was to develop a

1 regulation that is a one-size-fits-all. We weren't  
2 given a direction to develop a DU-specific rule, even  
3 though that might in some quarters be viewed as a  
4 better way of dividing and conquering the issue.

5 But given the limitations we have right  
6 now, we're trying to make it fit within the Part 61  
7 context. You're certainly free to make that  
8 recommendation to the Commission.

9 CHAIRMAN RYAN: All right, I'd like to  
10 open the bridge line from any participants on the  
11 bridge line.

12 Are there any questions or comments from  
13 participants? I assume the bridge line is open.

14 (No response.)

15 CHAIRMAN RYAN: Okay, hearing none, we  
16 will move to adjourn.

17 Thank you very much.

18 (Whereupon, the Subcommittee was adjourned  
19 at 12:07 p.m.)  
20  
21  
22  
23  
24  
25

# Low-Level Radioactive Waste Disposal (10 CFR Part 61)

**Deborah Jackson, Deputy Director**

Division of Intergovernmental Liaison and Rulemaking  
Office of Federal and State Materials and Environmental  
Management Programs

Advisory Committee on Reactor Safeguards  
Meeting of the Radiation Protection and Nuclear  
Materials Subcommittee

April 9, 2013

# Why are we here today:

- Provide update of Part 61 rulemaking
- ACRS briefing
  - ❖ Subcommittee (December 2009, June 2011, and August 2011)
  - ❖ Full Committee (March 2010, July 2011, and September 2011)
- ACRS 2011 Comment Letter
  - ❖ Four recommendations
  - ❖ Staff's responses

# Commission Directions:

- **SRM-SECY-08-0147 and SRM-SECY-10-0043**  
Require site-specific analysis for disposal of large quantities of DU, specify criteria needed for analysis, develop supporting guidance, and incorporate blending issue into the existing rulemaking for DU.
- **SRM-COMWDM-11-0002/COMGEA-11-0002**
  1. Allowing licensees the flexibility to use ICRP dose methodology;
  2. A two tiered approach that establishes a compliance period that covers the reasonably foreseeable future and a longer period of performance that is not a priori;
  3. Flexibility for disposal facilities to establish site-specific waste acceptance criteria based on the results of the site's performance assessment and intruder assessment;
  4. A compatibility category...that ensures alignment between the States and Federal government on safety fundamentals, while providing the States with the flexibility to determine how to implement these safety requirements.

# ***Today's topics and presenters:***

## **Topic**

## **Presenter**

Disposition of Earlier ACRS 2011 Comment

Mike Lee, DWMEP

2012 Public Outreach Initiative

2012 Regulatory Basis Document: *Options Considered and Staff's Proposed Approach*

Dave Esh and  
Chris Grossman,  
DWMEP

2012 Preliminary Proposed Rule: *Summary of Preliminary Proposed Rule Language*

Andrew Carrera,  
DILR

Current Status and Next Steps

Aby Mohseni,  
DWMEP



# **Disposition of Earlier 2011 ACRS Comments**

**Michael P. Lee**

Division of Waste Management and Environmental  
Protection

Office of Federal and State Materials and Environmental  
Management Programs

Mike.Lee@NRC.gov, (301) 415-6887

Advisory Committee on Reactor Safeguards  
Meeting of the Radiation Protection and Nuclear Materials  
Subcommittee  
April 9, 2013

# Background & Context

- **Rulemaking direction initially provided in SRM-SECY-08-0147 (March 18, 2009)**
- **ACRS letter dated September 22, 2011**
  - Reflects series of earlier 2011 meetings
  - Committee issued four recommendations
- **Staff response dated November 3, 2011**

# ACRS 2011

## Recommendation #1

<b>Recommendation</b>	<b>10 CFR Part 61 should not be amended in accordance with the staff's recommendations.</b>
<b>Staff Response</b>	The staff's draft proposed rule is consistent with Commission direction for a limited scope Part 61 rulemaking in SRM-SECY-08-0147.
<i>Implementation</i>	<i>Staff proposed new explicit performance assessment and intruder analysis requirements consistent with earlier Commission direction.</i>

# ACRS 2011

## Recommendation #2

Recommendation	Implementation guidance for 10 CFR Part 61 should not specify an a priori <u>period of performance</u> .
Staff Response	The staff agrees and did not originally specify a longer-term performance period. However, the staff believes that it is important to specify a compliance period in the rule.
Implementation	<i>Consistent with earlier stakeholder feedback (and Commission direction), staff originally proposed a requirement for calculation of peak dose within 20,000-years. In the December 2012 version of the draft rule text, the staff is now proposing 10,000 years for the length of the <u>time of compliance</u>.</i>

# ACRS 2011

## Recommendation #3

<b>Recommendation</b>	<b>The approaches in Recommendations 1 and 2 are equally applicable to the disposal of depleted uranium as well as other LLW.</b>
<b>Staff Response</b>	The staff agrees that development of a risk informed, performance based LLW site assessment methodology using realistic characterizations of disposed radioactive materials; the features, events, and processes that can disrupt disposed waste; natural and engineered barriers; environmental transport mechanisms; and subsequent human exposure scenarios is appropriate for DU and other LLW.
<i>Implementation</i>	<i>See 2011 edition of proposed rule text.</i>

# ACRS 2011

## Recommendation #4

<b>Recommendation</b>	<b>Compliance with performance objectives of the disposal system after the institutional control period ends, as well as the possible doses to hypothetical intruders, should be evaluated considering the natural features, events, and processes for a given site for a period of time commensurate with the risk for a specific facility and site.</b>
<b>Staff Response</b>	The staff agrees. The staff believes that it has developed a proposed rule that considers the natural features, events, and processes for a given site for a period of time commensurate with the risk for a specific facility and site
<b><i>Implementation</i></b>	<b><i>See 2011 edition of proposed rule text.</i></b>

# 2012 Public Outreach Initiative

**Michael P. Lee**

Division of Waste Management and Environmental Protection  
Office of Federal and State Materials and Environmental  
Management Programs

Mike.Lee@NRC.gov, (301) 415-6887

Advisory Committee on Reactor Safeguards  
Meeting of the Radiation Protection and Nuclear Materials  
Subcommittee

April 9, 2013

# 2012 Commission Direction

- **Seek stakeholder feedback on four expanded regulatory requirements**
- **Staff initiatives**
  - Issued Federal Register notices
  - Both participated in and hosted public meetings
  - Contacted NRC Agreement States



# 2012 Public Outreach Efforts

LOCATION	DATE	EVENT
Phoenix	March 2	NRC-Sponsored Public Meeting #1* (following WM2012 Meeting)
San Francisco	April 23	LLW Forum Spring Meeting
Orlando	May 7	CRCPD/OAS Annual Meeting
Dallas	May 15	NRC-Sponsored Public Meeting #2*
Tucson	June 22	EPRI Annual LLW Meeting
Rockville	July 19	NRC-Sponsored Public Meeting #3*

# Letters ...

## **~200 comments**

- Council of Radiation Control Program Directors
- Council on Radionuclides and Radiopharmaceuticals
- EnergySolutions
- Electric Power Research Institute
- Norman Eisenberg
- NSF Environmental
- Heal Utah
- Health Physics Society
- LLW Forum
- Nuclear Energy Institute
- Neptune & Associates
- Howard Pope
- State of Utah
- State of Texas
- State of Washington
- Waste Control Specialists

# Written Comment Distribution

• <b>TOC/POP Definition*</b>	<b>20%</b>
• “Other”	10%
• Waste Classification Tables	10%
• Site-Specific Performance Assessment	9%
• <b>ICRP*</b>	<b>9%</b>
• <b>Compatibility Issues*</b>	<b>9%</b>
• Disposition of Depleted Uranium	8%
• <b>WAC*</b>	<b>6%</b>
• Human Intrusion	6%
• Duration of Institutional Controls	5%

# Response Summary

- Generally no disputing need for rulemaking
- Differing views on scope and details
- Not all Agreement States expressed an opinion
  - Budget constraints
  - Some limited comments
    - Extend duration of active institutional control period to 300 years
    - States should not be compelled to receive depleted uranium

# Commission Direction

## *Proposal #1*

<b>Commission Proposal</b>	<b>Allowing licensees the flexibility to use ICRP dose methodologies</b>
Stakeholder Response	The majority of stakeholders expressing a view on this topic at the 2012 public meetings were mostly in support of this Commission proposal
Agreement State Response	Those Agreement States expressing a view on this topic were mostly in support of this Commission proposal.
<i>Preliminary Staff Observation</i>	<i>Allowing licensees the flexibility to use more up-to-date ICRP recommendations would align with past agency practice</i>

# Commission Direction

## *Proposal #2*

<b>Commission Proposal</b>	<b>Implement a two-tiered approach to performance assessment that establishes a compliance period that covers the reasonably foreseeable future and a longer period of performance that is not defined <i>a priori</i></b>
<b>Stakeholder Response</b>	The majority of stakeholders expressing a view on this topic at the 2012 public meetings were mostly in support of this Commission proposal
<b>Agreement State Response</b>	Not all Agreement States expressed an opinion on the merits of a two-tiered approach proposed by the Commission at this time. Comments received thus far are mixed.
<b><i>Preliminary Staff Observation</i></b>	<i>Staff have previously advocated the adoption of a two-tiered approach to the conduct of a LLW performance assessment</i>

# Commission Direction

## Question #2 (continued)

- **Two-tiered approach ...**
  - General support
  - *Time of Compliance* concept
    - Mixed responses
    - “Foreseeable Future” term undefined
    - <1000 yrs; 1000-10,000 yrs; >10,000 yrs
  - *Period of Performance* concept
    - Should not be defined in regulation
    - Technically challenging
    - Questionable decision-making value
    - Shouldn’t be based on dose to receptor

# Commission Direction

## *Proposal #3*

<b>Commission Proposal</b>	<b>Flexibility for disposal facilities to establish a site-specific WAC based on the results of a site's performance assessment and intruder analysis</b>
<b>Stakeholder Response</b>	The majority of stakeholders expressing a view on this topic at the 2012 public meetings were mostly in support of this Commission proposal.
<b>Agreement State Response</b>	<p>For those Agreement States expressing a view on this topic, most were in support of this Commission proposal. However, in voicing their support, some States acknowledged the need to verify that the waste generators complied with the disposal sites' WAC (a new burden).</p> <p>Also, some of the Agreement States cautioned against the NRC compelling them to accept large quantities of DU.</p>
<b>Preliminary Staff Observation</b>	<i>In practice, most Agreement States already impose some form of a site-specific WAC</i>



# Commission Direction

## *Proposal #4*

<b>Commission Proposal</b>	<b>A compatibility category for elements of the revised rule that ensures alignment between States and the Federal government on safety fundamentals while providing the States with some flexibility</b>
<b>Stakeholder Response</b>	The majority of stakeholders expressing a view on this topic at the 2012 public meetings were mostly in support of this Commission proposal so long as it does not introduce some unintentional complete advantage
<b>Agreement State Response</b>	Some Agreement States expressed concerns about maintaining flexibility in implementation of new requirements.
<b><i>Preliminary Staff Observation</i></b>	<i>This comment is noted.</i>

# Miscellaneous Comments

## See SECY-13-0001

Updating the existing waste concentration tables at §61.55 to reflect the latest ICRP dose conversion factors and methodologies	<i>Staff has current direction to begin to address in FY2015</i>
Revisiting the current regulatory basis for the duration of 100-year active institutional control period	<i>Should revisit this issue in context of any §61.55 table update in FY2015</i>
Revisit earlier assumptions concerning the minimum reporting requirements for certain isotopes cited in the Part 20 Appendix G LLW shipping manifest	<i>Staff agrees. Held its first public meeting in March 2013</i>
Developing criteria for the disposal of greater-than-class C LLW	<i>DOE must first address GTCC disposition through its NEPA process</i>
Developing clearance criteria for low-activity radioactive waste	<i>In 2005, Commission decided to defer any decision on LAW</i>

# **10 CFR Part 61: 2012 Regulatory Basis**

**David Esh**

**Christopher Grossman**

Division of Waste Management and Environmental Protection  
Office of Federal and State Materials and Environmental  
Management Programs

david.esh@nrc.gov, (301) 415-6705

christopher.grossman@nrc.gov, (301) 415-7658

Advisory Committee on Reactor Safeguards  
Meeting of the Radiation Protection and Nuclear  
Materials Subcommittee

April 9, 2013

# ***Main Topics***

- Key concepts
- Site-specific LLW technical analyses
- Analysis timeframes
- Dose assessment – ICRP recommendations
- Waste acceptance

# ***Key Concepts***

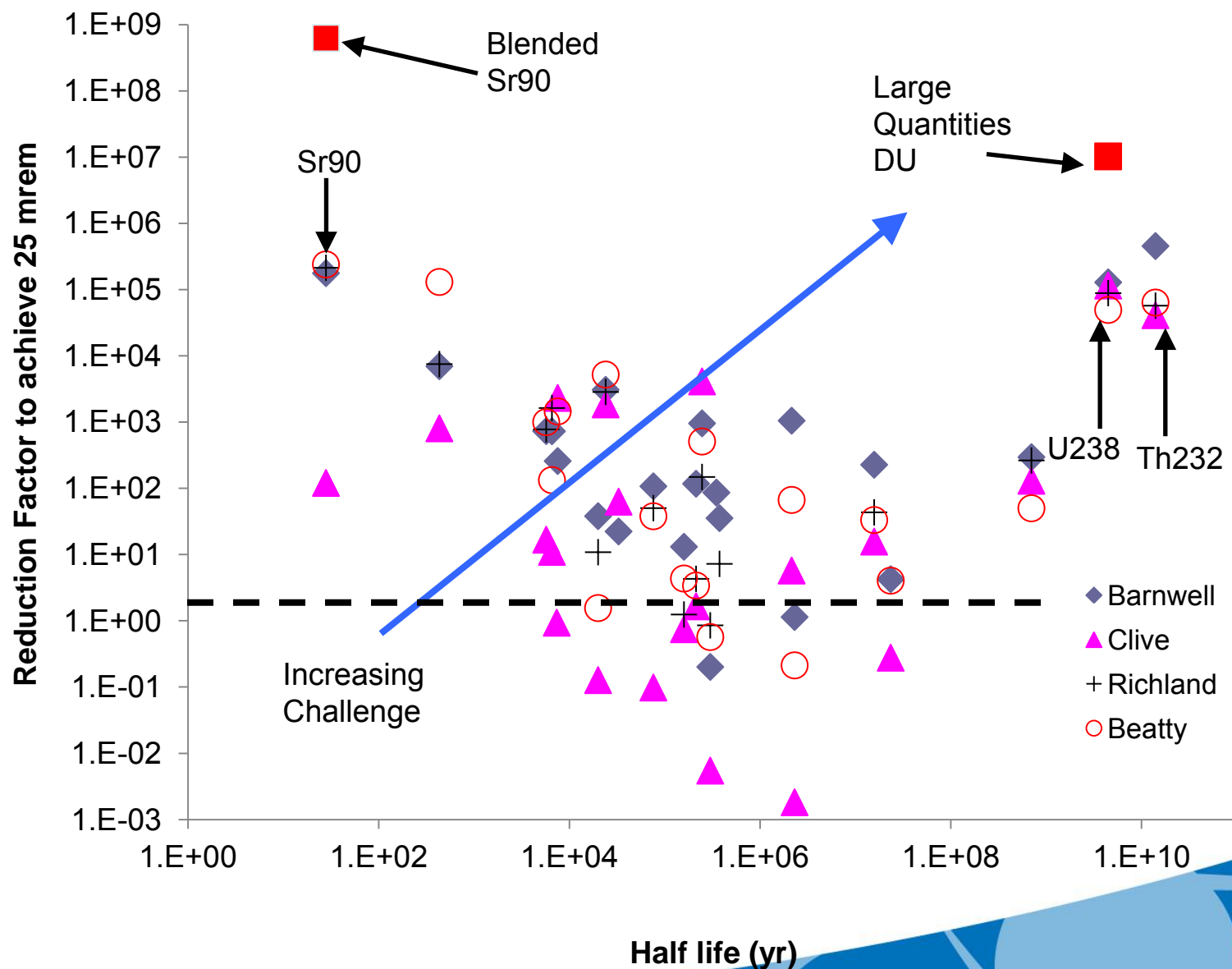
- LLW - hazard vs. risk
- Inventory
- Delays – barriers and transport
- Generic waste classification
- Inadvertent intruders

# ***LLW – Hazard vs. Risk***

- > 90% of the hazard from short-lived isotopes:
  - Co-60, Cs-137, Sr-90, H-3
- > 90% of the risk (61.41) from long-lived isotopes:
  - Tc-99, I-129, C-14, Cl-36, U-isotopes, Np-237

Risk  $\neq$  Hazard

# LLW Inventory Analysis



# ***Inventory Analysis***

- All existing LLW facilities contain sufficient inventory that could result in unacceptable radiological risk (61.41).
  - Many orders of magnitude reduction needed for some isotopes
- Commission directed the staff to:
  - Perform limited rulemaking to require a site-specific analyses prior to the disposal of significant quantities of depleted uranium and blended waste.
  - Identify technical requirements of the site-specific analyses.
  - Develop guidance.
- Extensive stakeholder interaction -> do not limit technical requirements to these waste streams



# ***Delays – Barriers and Transport***

- Engineered and natural barriers reduce and delay risk

## Reduce

Release from wasteform

Solubility limits

Dilution during transport

Dispersion

## Delay

Resistive barrier failure

Waste package

Sorption – transport

Site control

Technical requirements must account for both types.

- Limits concentration suitable for near-surface disposal
- Constrains societal uncertainty
- Embedded assumptions – inventory, waste disposal
- Combined short- and long-lived isotopes
- Focused on inadvertent intruder protection (61.42)
- Does not ensure that 61.41 will be met
- Not all isotopes important for 61.41 are reflected in Tables 1 and 2 of 61.55

# ***Inadvertent Intruders***

- Not based on assumption of failure of society
- Based on the assumption of error of government
- Relieves licensees of financial responsibility after the institutional control period
- No adequate technical basis for the long-term robustness of active controls
- Commission assumed intruders were unlikely albeit possible
- Conditional probability of 1; intruder dose limit implies a probability of 5%.

# ***LLW Technical Analyses***

- Technical requirements must apply to all sites and inventories.
- LLW disposal sites may have vastly different:
  - Inventories
  - Engineered barriers
  - Natural barriers
  - Environmental conditions
- If technical requirements are not established for the most challenging inventory/site, public health and safety will not be protected.
- Best approach is to risk-inform the technical analyses.

# ***Regulatory Requirements - Technical Analyses***

- Tiered approach to analysis timeframe.
- Site-specific technical analyses vs. generic waste classification.
- Avoid unnecessary speculation about societal uncertainties.
- Higher dose limit for intruder scenario.
- Site-stability based on impacts to 61.41 and 61.42 performance objectives.
- Site-suitability characteristics only exclusionary for hydrological characteristics for 500 years.
- Dose modeling (ICRP)

Risk-informed

# ***Analyses Timeframes - International***

- Staff performed an extensive review of international experience – different approaches used.
- Approaches included:
  - Long-term analyses (numerical or general (e.g. “peak”))
  - Regulatory-defined limits on near surface disposal of long-lived  $\alpha$
  - Prohibition of near surface disposal
  - Multiple
- The staff recommended approach is consistent with the international experience.

# ***Analyses Timeframes – Domestic LLW***

- All currently operational LLW disposal facilities are located in Agreement States.
- Different interpretations of NRC regulations:
  - Washington: 10,000 years (longer in EIS)
  - Texas: Analyses to 50,000 years
  - Utah: 500 years, 10,000 years for uranium (under review)
  - South Carolina: 2,000 years
- In 2000, NRC staff performed a detailed technical analysis of a LLW disposal facility at a humid site and recommended 10,000 years (NUREG-1573).

# ***Analyses Timeframes - Technical***

## Traditional Waste

- All current LLW disposal facilities contain long-lived waste.
- Long-lived waste is the driver of projected doses for 61.41.
- Three of four facilities project peak doses to occur after 1,000 years for 61.41.

## Depleted Uranium

- At 1,000 years, only 1/1000<sup>th</sup> of the potential impact would be assessed.
- At 10,000 years, approximately 1/10<sup>th</sup> of the potential impact would be assessed.
- Second tier captures the other 9/10<sup>th</sup>.



# ***Site-specific Analyses***

## ***Timeframes***

- ACRS 2011 (based in part on ACNW 1997):
  - Two tiered approach:
    - 1) Time at which more mobile radionuclides produce peak dose to designated receptor
    - 2) Avoid catastrophic impacts after
  - Consider geohydrology, waste isolation technology, other controls

# Site-specific Analyses

## Timeframes

- What are **more mobile radionuclides**? How to define?
  - Radionuclide A may be more mobile at site 1 and less mobile at site 2
  - Radionuclide A may be less mobile than radionuclide B at one site and more mobile at another site
- What are **catastrophic impacts**?
- Why not list **waste characteristics**?
- For WCS the projected time of peak dose from the more mobile radionuclides was  $> 30,000$  years.
- Material can be transported in many different pathways.

# ***Site-specific Analyses Timeframes***

- Disposal practices and selection of sites.
- Commission policy regarding stability and waste isolation.
- Consistency with international approaches.
- ALARA – national.
- Obligations to future generations regarding protection from waste disposal.

# DOSIMETRY

# Commission Direction

Provide an expanded proposed rule...which includes the following issues, along with staff's analysis of the issues and stakeholder feedback and the pros and cons of the specific revisions:

- Allowing licensees the flexibility to use ICRP dose methodologies in a site-specific performance assessment for the disposal of all radioactive waste.

# Context



- NRC regulations based on various methodologies
- Commission policy<sup>1</sup> presently allows exemption for current methodology

# Staff Analysis

- Commission direction
- ICRP methodologies
  - Updates provide holistic evaluation of radiation risks
  - Account for radiosensitivity of the organ
  - Consider a wider range of organs and tissues
- Public feedback

# Options Considered

- Specifying ICRP methodology in regulation
- Adopting ICRP methodology-neutral approach
- Address in guidance



# Public Views

- Supportive:
  - Directly cited vs. flexibility
  - Periodically revisit PA dosimetry
- Critical:
  - Safety significance in removing critical organ limits

# Proposal

- Adopt ICRP methodology-neutral approach
  - Consistent with Commission direction
  - Current science
  - Precedence: 10 CFR Part 63 approach
  - Minimize future revisions to 10 CFR Part 61

# WASTE ACCEPTANCE

# Commission Direction

Provide an expanded proposed rule...which includes the following issues, along with staff's analysis of the issues and stakeholder feedback and the pros and cons of the specific revisions:

- Flexibility for disposal facilities to establish site-specific waste acceptance criteria based on the results of the site's performance assessment and intruder assessment.

# 10 CFR 61 Today

- Existing “waste acceptance” requirements include:
  - 61.55 – Waste classification
    - Allowable concentration limits; Class A, B, C.
    - Total activity limits site-specific and derived from 61.13(a)
  - 61.56 – Waste characteristics
  - 61.58 – Alternative classification and characteristics

# Waste Classification

## Long-lived

TABLE 1

Radionuclide	Concentration, curies per cubic meter
C-14 .....	8
C-14 in activated metal .....	80
Ni-59 in activated metal .....	220
Nb-94 in activated metal .....	0.2
Tc-99 .....	3
I-129 .....	0.08
Alpha emitting transuranic nuclides with half-life greater than 5 years .....	<sup>1</sup> 100
Pu-241 .....	<sup>1</sup> 3,500
Cm-242 .....	<sup>1</sup> 20,000

<sup>1</sup> Units are nanocuries per gram.

## Short-lived

TABLE 2

Radionuclide	Concentration, curies per cubic meter		
	Col. 1	Col. 2	Col. 3
Total of all nuclides with less than 5 year half-life .....	700	( <sup>1</sup> )	( <sup>1</sup> )
H-3 .....	40	( <sup>1</sup> )	( <sup>1</sup> )
Co-60 .....	700	( <sup>1</sup> )	( <sup>1</sup> )
Ni-63 .....	3.5	70	700
Ni-63 in activated metal .....	35	700	7000
Sr-90 .....	0.04	150	7000
Cs-137 .....	1	44	4600

<sup>1</sup> There are no limits established for these radionuclides in Class B or C wastes. Practical considerations such as the effects of external radiation and internal heat generation on transportation, handling, and disposal will limit the concentrations for these wastes. These wastes shall be Class B unless the concentrations of other nuclides in Table 2 determine the waste to be Class C independent of these nuclides.

# Waste Classification

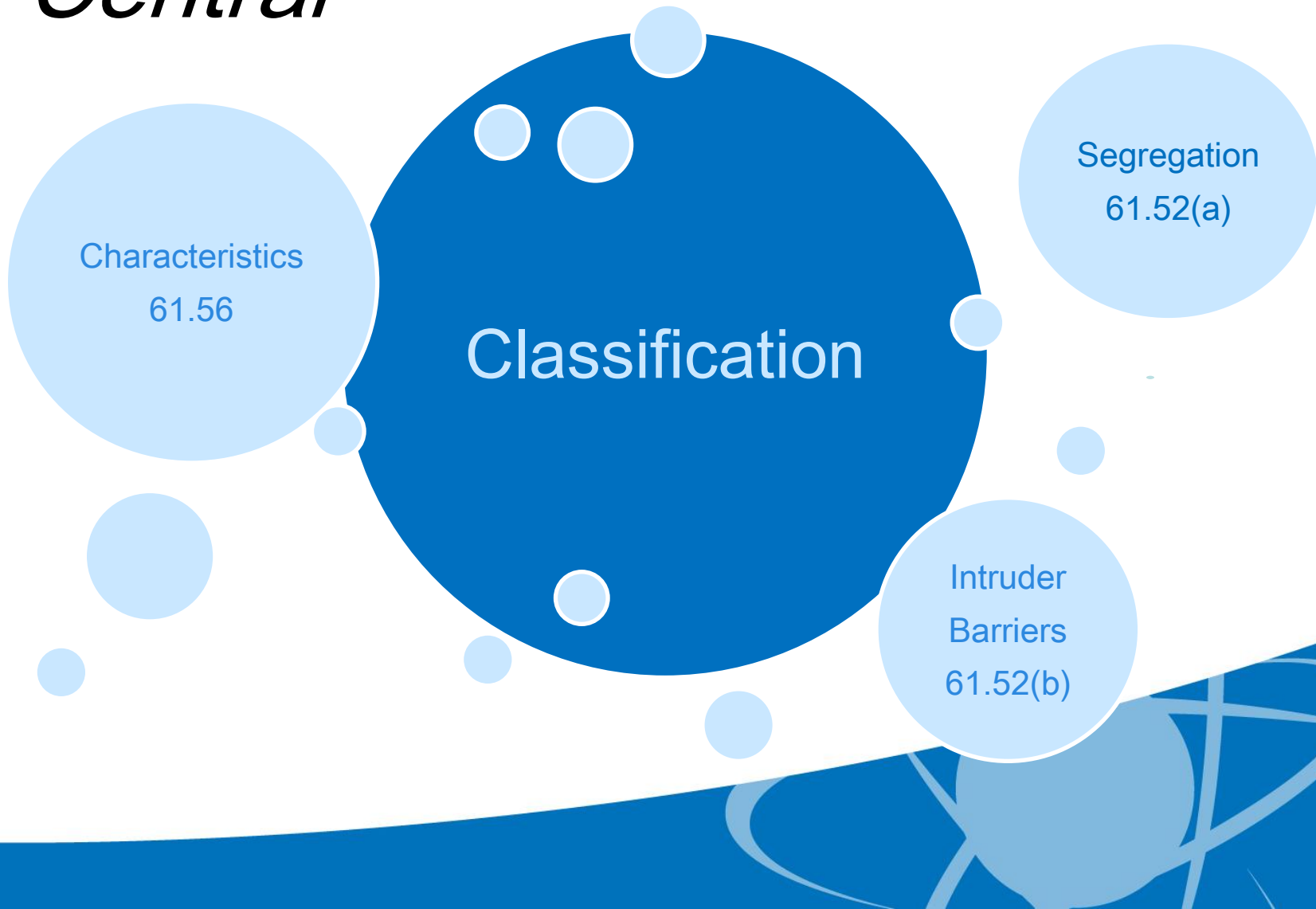
- Derived from NUREG-0782 analysis
  - Inadvertent intruder scenarios
    - Intruder-Construction
    - Intruder-Discovery
    - Intruder-Agriculture
  - 500-mrem Dose limit (implies 5% likelihood)
  - Ineffective institutional controls after 100 yr.
  - Recognized need for site-specific analysis for water-dependent pathways
    - 61.13(a) analysis

# Waste Characteristics

- Minimum (all waste)
  - Facilitate handling
  - Protection of public health and safety
- Stability (stable waste)
  - Minimize water infiltration
  - Limit intruder exposures (recognizable, non-dispersible)



# Waste Classification is *Central*



# Waste Acceptance Guidance

- Waste form
- Concentration averaging and encapsulation

# Staff Analysis

- Commission direction
- Domestic and international regulatory approaches
- Public feedback

# Options Considered

- Continue with existing waste classification system
- Replace classification system with site-specific WAC
- Maintain classification system with flexibility for site-specific WAC

# Goals

- Ensure protection of public health and safety
- Risk-informed, performance-based regulatory processes
- Provide flexibility for site-specific WAC per Commission direction
- Minimize disruptions to existing Part 61 framework
- Minimize resource burdens

# Supportive Viewpoints

- Recognizes improvements
  - site selection, facility design, and disposal methods
- Mixed views on scenarios
  - hypothetical vs. site-specific
- Some concern about abandoning classification
  - LLRWPA: Federal-State Responsibilities
- 61.58, case-by-case
  - Transboundary concerns
- Mixed views on waste acceptability requirements
  - Performance-based (not prescriptive)

# Critical Viewpoints

- Additional resource burden on Agreement States
- Impact on State law
- Negative effects on public confidence
- Emphasize conservatism rather than maximizing capacity
- Economic incentives
- Complexity and lack of transparency of analyses

# Proposal

## Waste Acceptance

Criteria

Characterization  
Methods

Certification  
Program

- Apply to all licensees
- Adapted from U.S. DOE
- Consistent with international approaches



# Waste Acceptance Criteria

- Allowable limits
  - 61.55 concentration limits or
  - 61.13 analyses
- Acceptable wasteform characteristics and container specifications
- Restrictions or prohibitions

# Waste Characterization Methods

- Identify parameters and acceptable uncertainty
- Minimum characterization information

# Waste Certification Program

- Administrative procedures to ensure waste is acceptable for disposal
  - Designate authority
  - Identify documentation and records
    - Characterization
    - Shipment
    - Certification
  - Approaches for maintaining certification

# Accommodating Changes

- LLW Manifests – App. G to 10 CFR Part 20
- Concepts – 10 CFR 61.7
- Standards – 10 CFR 61.23
- Performance Objectives – 10 CFR 61.42
- Labeling – 10 CFR 61.57
- Operations – 10 CFR 61.52
- Records – 10 CFR 61.80

# 10 CFR PART 61 Preliminary Proposed Rule Language

**Andrew Carrera**

Division of Intergovernmental Liaison and Rulemaking  
Office of Federal and State Materials and Environmental  
Management Programs

Advisory Committee on Reactor Safeguards  
Meeting of the Radiation Protection and Nuclear  
Materials Subcommittee

April 9, 2011

# Working group

Office	Working Group Members
FSME/DILR/RB-A	Andrew Carrera, Gary Comfort
FSME/DILR/RB-B	Robert MacDougall
FSME/DWMEP/EPPAD	Priya Yadav, Mike Lee,
FSME/DWMEP/EPPAD	Christopher Grossman, David Esh
FSME/DWMEP/ERB-A	Stephen Lemont
ADM/DAS/RADB	Anthony DeJesus
OGC	Lisa London, Sarah Price, Tison Campbell
NRR	Shawn Harwell
OIS	Kristen Benney
NMSS	Timothy McCartin
Agreement States	Mark Yeager (South Carolina)

# ***Purpose of the Rule***

- Specify site-specific technical analyses requirements.
- Permit development of criteria for waste disposal based on the results of these analyses.
- Better align the requirements with current health and safety standards.

# ***Preliminary Amendments to Part 61 Regulations (Dec. 2012)***

- Site-Specific Analyses:
  1. Performance assessment
  2. Intruder assessment
  3. Performance period analyses
  4. Update technical analyses
- Waste acceptance
- Other Supporting Changes:
  1. Adding new definitions and concepts
  2. Implementing changes to Appendix G to 10 CFR Part 20
  3. Allowing the use of up-to-date ICRP recommendations



# ***Site-Specific Analyses: Performance Assessment***

- § 61.41 Protection of the general population from releases of radioactivity.

Revised requirements:

§ 61.41(a)—Added requirement to demonstrate compliance through analyses that meet the requirements specified in §61.13(b).

§ 61.41(b)—Added requirement to demonstrate that reasonable effort should be made to maintain releases of radioactivity from a disposal facility to the general environment as low as reasonably achievable at any time during the performance period. Compliance with this paragraph must be demonstrated through analyses that meet the requirements specified in §61.13(e).

# ***Site-Specific Analyses: Intruder Assessment***

- § 61.42 Protection of inadvertent intruders.

Revised requirements:

§ 61.42(a)—Added annual dose of 500 mrem and requirement to demonstrate compliance through analyses that meet the requirements specified in § 61.13(b).

§ 61.42(b)—Added requirement to demonstrate reasonable effort should be made to maintain exposures to any inadvertent intruder as low as reasonably achievable at any time during the performance period. Compliance with this paragraph must be demonstrated through analyses that meet the requirements specified in § 61.13(e).

# ***Site-Specific Analyses: Long-Term Analyses***

- § 61.13 Technical analyses.

New requirements:

§ 61.13(e)—Added requirement for analyses that assess how the disposal facility and site characteristics limit the potential long-term radiological impacts, consistent with available data and current scientific understanding. The analyses shall only be required for land disposal facilities with long-lived waste that contains alpha-emitting radionuclides with average concentrations exceeding 10 nCi/g or radionuclides with average concentrations exceeding one tenth of the values listed in Table 1 of § 61.55, or if necessitated by site-specific factors including engineering design, operational practices, and site characteristics. The analyses must identify and describe the features of the design and site characteristics that will demonstrate that the performance objectives set forth in §§ 61.41(b) and 61.42(b) will be met.

# ***Waste Acceptance:***

- § 61.58 Waste acceptance.

New requirements:

§ 61.58(a)—Added requirement for waste acceptance criteria to be developed from the technical analyses required by either § 61.13 for any land disposal facility or the waste classification requirements set forth in § 61.55 for a near-surface disposal facility.

§ 61.58(b)—Added requirement for waste characterization.

§ 61.58(c)—Added requirement for waste certification.

# ***Site-Specific Analyses: Updated Analyses***

- § 61.28 Contents of application for closure.

New requirement:

§ 61.28(a)(2)—Added requirement to submit revised analyses for §61.13 using the details of the final closure plan and waste inventory.

# ***Other Supporting Changes:***

- § 61.2 Definitions and § 61.7 Concepts.

New definitions and concepts:

Compliance period, intruder assessment, long-lived waste, performance assessment, waste acceptance, and implementation of dose methodology.

- Appendix G to 10 CFR Part 20.

Revise requirements:

Section II, “Certification,” and  
Section III, “Control and Tracking.”

# Current Status and Next Steps

**Aby Mohseni, Deputy Director**

Division of Waste Management and Environmental Protection  
Office of Federal and State Materials and Environmental  
Management Programs

Aby.Mohseni@NRC.gov, (301) 415-6686

Advisory Committee on Reactor Safeguards  
Meeting of the Radiation Protection and Nuclear Materials  
Subcommittee

April 9, 2013

# Current Plans ....

- **Second ACRS Subcommittee briefing: June 2013**
  - Discuss rule text and guidance document currently in concurrence
  - Changes reflect Commission's 2012 SRM
  - Focus on changes made in response to December 2012 public comments
- **ACRS Committee briefing: July 2013**
  - Anticipating Committee letter report
- **Draft rule text and guidance document due to Commission: July 2013**



# Next Steps ...

- **If Commission approves of rulemaking package ...**
  - Publish in *Federal Register* later in calendar year (Fall/Winter 2013)
  - Conduct public meetings in 2014 (locations and dates yet to be determined)
  - Deliver final rulemaking package to Commission in late calendar year 2014