



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

April 15, 2014

MEMORANDUM TO: ACRS Members

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

SUBJECT: CERTIFIED MINUTES FOR THE ACRS RADIATION PROTECTION AND  
NUCLEAR WASTE SUBCOMMITTEE MEETING, JANUARY 16, 2014 –  
ROCKVILLE, MARYLAND

The minutes of the subject meeting have been certified on February 21, 2014, as the official record of the proceedings for that meeting. Copies of the certification letter and minutes are attached.

Attachment: As stated

cc w/o Attachment: E. Hackett  
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, JANUARY 16, 2014 – ROCKVILLE, MARYLAND

I hereby certify, to the best of my knowledge and belief, that the minutes of the subject meeting on January 16, 2014, are an accurate record of the proceedings of that meeting.

/ RA / 2/21/2014  
Michael T. Ryan, Chairman Date  
Radiation Protection and Nuclear  
Materials Subcommittee

**ADVISORY COMMITTEE ON REACTOR SAFEGUARDS  
RADIATION PROTECTION AND NUCLEAR MATERIALS  
SUBCOMMITTEE MEETING MINUTES  
January 16, 2014  
Rockville, MD**

The Advisory Committee on Reactor Safeguards (ACRS) Subcommittee on Radiation Protection and Nuclear Materials (RPNM) met on January 16, 2014, at 11545 Rockville Pike, Rockville, MD, in Room T2-B1. The meeting was convened at 8:30 am and adjourned at 2:43 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 requests for time to make an oral statement or written comments were received from the public concerning this meeting.

**ATTENDEES**

**ACRS**

M. Ryan, Chairman  
H. Ray, Member  
J. Rempe, Member  
J. Stetkar, Member  
R. Ballinger, Member  
D. Widmayer, ACRS Staff

D. Skillman, Member  
S. Armijo, Member  
D. Bley, Member  
S. Schultz, Member  
P. Riccardella, Member  
J. Clarke, Consultant

**NRC Staff**

L. Camper, FSME/DWMEP  
D. Lowman, FSME/DWMEP  
A. Schwartzman, FSME/DWMEP  
J. Shaffner, FSME/DWMEP  
C. Grossman, FSME/DWMEP  
M. Heath, FSME/DWMEP  
C. McKenney, FSME/DWMEP

B. Abu-Eid, FSME/DWMEP  
A. Carrera, FSME/DLIR  
D. Esh, FSME/DWMEP  
J. Kennedy, FSME/DWMEP  
G. Suber, FSME/DWMEP  
A. Gross, FSME/DWMEP

**Others**

J. Lieberman, Talisman LLC  
R. Seitz, SRNL  
D. D'Arrigo, NIRS  
D. Schulthiesz, EPA

D. Shrum, EnergySolutions  
J. Greeves, Talisman, LLC  
S. Goldston, EnergySolutions

**SUMMARY**

The purpose of the meeting was to hear presentations summarizing the RPNM Subcommittee Meetings held on November 19, and December 3, 2013 on the proposed revisions and technical basis for revisions to 10 CFR Part 61, *Revisions to Low-Level Radioactive Waste Disposal Requirements (10 CFR Part 61)* published in December 2012, which were transmitted to the Commission as SECY-13-0075 in July 2013. Chairman Ryan provided the presentations. NRC Staff also provided a presentation concerning the history and background of the rulemaking efforts to revise Part 61.

The Subcommittee planned to gather information, analyze relevant issues and facts, and formulate proposed positions and actions, as appropriate, from this Subcommittee meeting in conjunction with the November 19, and December 3, 2013, Subcommittee meetings for deliberation by the Full Committee at its February 2014 meeting.

<b><i>SIGNIFICANT ISSUES</i></b>	<b><i>Reference Transcript Pages</i></b>
<p>Dr. Michael Ryan, Chairman of the Subcommittee, introduced the meeting and its purpose and then proceeded to present a summary presentation on the RPNM Subcommittee meetings held on November 19, 2013 with representatives of the US Department of Energy and on December 3, 2013 with stakeholders.</p> <p>Members of the Subcommittee had no issues during this presentation:</p>	<p>4 – 26 (Slides Pgs 237 – 269)</p>
<p>Mr. Larry Camper, Director of the Division of Waste Management and Environmental Protection (DWMEP) in FSME provided a presentation on the history and background of the rulemaking for the revisions of Part 61 and how the staff determined the set of technical requirements they proposed in the revisions.</p> <p>Members of the Subcommittee addressed the following issues during this presentation:</p> <ul style="list-style-type: none"> <li>• How the limited rulemaking became so complex and whether the magnitude of depleted Uranium (DU) which required disposal had any impact on the complexity, and why the staff did not conclude that a separate rule for disposal of DU was preferred. (Armijo and Skillman)</li> <li>• Clarifying how the disposal of the large quantities of DU became an issue for revising Part 61 when it had been evaluated previously and not classified as A, B, or C. (Ray)</li> <li>• Why staff incorporated ALL LLW into the revisions when the problem was so extraordinary when compared to other LLW, and how a separate DU rule would resolve some of the issues. (Armijo, Ray, and Ryan)</li> <li>• Why the Commission asked staff not to work on both rulemakings on Part 61 at the same time. (Ray)</li> <li>• How other LLW got incorporated into the new requirements which were intended to address the DU problem. (Ray, Armijo, Ryan)</li> </ul>	<p>26 – 164 (Slides Pgs 270 – 298)</p> <p>28 – 33</p> <p>42 – 44</p> <p>48 – 51</p> <p>65</p> <p>66 – 68</p>

<ul style="list-style-type: none"> <li>Establishing whether a site who had disposed LLW when this revision takes effect and did not plan on disposing large quantities of DU would have to do anything to meet the revised requirements. (Ray)</li> </ul>	72 – 79
<ul style="list-style-type: none"> <li>Clarifying the reasons the limited rulemaking was expanded beyond just DU to cover potential future waste streams not evaluated in the original Part 61. (Ray, Schultz)</li> </ul>	82 – 85
<ul style="list-style-type: none"> <li>Why there is any extra regulatory burden on current LLW disposal sites that have disposed LLW in accordance with Part 61 and whether the Agreement States can grandfather existing facilities on their own. (Armijo)</li> </ul>	90 – 96
<ul style="list-style-type: none"> <li>What “stable” waste forms mean and how it is accomplished. (Armijo)</li> </ul>	117 – 119
<ul style="list-style-type: none"> <li>Clarifying that the intruder assessment is the primary requirement that would add burden to existing facilities. (Armijo)</li> </ul>	124 – 125
<ul style="list-style-type: none"> <li>Clarifying what additional analyses might be needed that would add burden in the performance assessment calculations. (Armijo)</li> </ul>	127 – 128
<ul style="list-style-type: none"> <li>Clarifying the dose metric of 25 mrem/yr for the first-tier “compliance” analysis and that the long-term analysis has no similar metric and no identified time to which that analysis has to be carried out. (Armijo)</li> </ul>	142 – 147
<ul style="list-style-type: none"> <li>What an appropriate metric would be for the long-term analysis in order to provide some indication that the analysis has been “completed.” (Armijo)</li> </ul>	156 – 161
<p>Chairman Ryan facilitated a discussion of the results of the two Subcommittee meetings and the staff’s presentation to lead to conclusions and recommendations that the Subcommittee may decide to include in a Letter Report on this matter.</p> <p>Members of the Subcommittee addressed the following issues during this discussion:</p>	164 – 234
<ul style="list-style-type: none"> <li>Whether DU should be handled separately and independently from other LLW. (Skillman)</li> </ul>	165
<ul style="list-style-type: none"> <li>Whether to “grandfather” facilities that are at the end of their operating period. (Bley)</li> </ul>	169
<ul style="list-style-type: none"> <li>That DU should be handled separately from other LLW, that LLW meeting current Part 61 requirements should be grandfathered, and the intruder assessment should</li> </ul>	171 – 174

<p>be re-thought (Armijo)</p> <ul style="list-style-type: none"> <li>• That DU should be handled separately. (Ballinger)</li> <li>• Perhaps a compliance period of “a few hundred years” makes sense to reduce uncertainties, plus an emphasis on ongoing monitoring to ensure things are going as planned. A separate rulemaking for DU also seems warranted. (Clarke)</li> <li>• That DU is the driver of issues and segregating DU from other LLW makes sense. (Ryan)</li> <li>• That a process that handles DU separately from other LLW would still be a multi-year process. (Ryan, Schultz)</li> <li>• An understanding from FSME staff on what would be required to separate out DU into a separate part of the rule and add a codicil for grandfathering existing disposed waste. (Skillman)</li> <li>• The need for a metric for the second tier performance period. (Armijo)</li> </ul>	<p>178</p> <p>179 – 182</p> <p>188</p> <p>198 – 199</p> <p>201 – 204</p> <p>205 – 207</p>
<p>Members of the public in attendance at the meetings provided some comments on the revision to Part 61, and also answered questions from Subcommittee members:</p> <ul style="list-style-type: none"> <li>• Bobby Abu-Eid, FSME staff</li> <li>• John Greeves, Talisman</li> </ul> <p>Members of the Subcommittee addressed the following issues during this discussion:</p> <ul style="list-style-type: none"> <li>• That perhaps using the site-specific analyses is the appropriate method instead of a separate handling of DU, with the two-tiered compliance period approach and simpler requirements in the rule. (Bley)</li> </ul>	<p>212 – 215</p> <p>216 – 224</p> <p>224 - 225</p>
<p>Chairman Ryan provided closing remarks and adjourned the meeting.</p>	<p>233 – 234</p>

<b>ACTION ITEMS</b>	<b>Reference Transcript Pages</b>
None	

## **ATTACHMENT**

Official Transcript of Proceedings, Meeting of ACRS Radiation Protection and Nuclear Materials Subcommittee, January 16, 2014, Rockville, MD.

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

1. Official Transcript of Proceedings, Meeting of ACRS Radiation Protection and Nuclear Materials Subcommittee, November 19, 2013, Rockville, MD.
2. Official Transcript of Proceedings, Meeting of ACRS Radiation Protection and Nuclear Materials Subcommittee, December 3, 2013, Rockville, MD.

# 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: Thursday, January 16, 2014

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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 THURSDAY  
11 JANUARY 16, 2014  
12 + + + + +  
13 ROCKVILLE, MARYLAND  
14 + + + + +  
15 The Subcommittee met at the Nuclear  
16 Regulatory Commission, Two White Flint North, Room  
17 T2B1, 11545 Rockville Pike, at 8:30 a.m., Michael T.  
18 Ryan, Chairman, presiding.  
19 COMMITTEE MEMBERS:  
20 MICHAEL T. RYAN, Chair  
21 J. SAM ARMIJO  
22 RONALD G. BALLINGER  
23 SANJOY BANERJEE  
24 DENNIS C. BLEY  
25 HAROLD B. RAY  
26 JOY REMPE  
27 PETER C. RICCARDELLA

1           STEPHEN P. SCHULTZ

2           GORDON R. SKILLMAN

3           JOHN W. STETKAR

4

5   CONSULTANTS TO THE SUBCOMMITTEE PRESENT:

6           JAMES C. CLARKE

7

8   NRC STAFF PRESENT:

9           DEREK WIDMAYER, Designated Federal Official

10          BOBY ABU-EID

11          LARRY CAMPER

12          DAVID ESH

13          CHRIS MCKENNEY

14

15   ALSO PRESENT:

16          DIANE D'ARRIGO

17          JOHN GREEVES

18

19

20

21

22

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

2 (8:31 a.m.)

3 → CHAIR RYAN: If I could ask everybody to  
4 come to order please. This is a meeting of the  
5 Advisory Committee on Reactor Safeguards,  
6 Subcommittee on Radiation Protection and Nuclear  
7 Materials. I'm Mike Ryan, chairman of the  
8 subcommittee.

9 ACRS members in attendance are Sam Armijo,  
10 Dick Skillman, Steve Schultz, John Stetkar, Harold  
11 Ray may be joining us.

12 MR. RAY: Right here.

13 CHAIR RYAN: Oh, there he is. I'm  
14 sorry, Harold. Excuse me, Ron Ballinger. Is Dr.  
15 Riccardella here yet?

16 MALE PARTICIPANT: No, he --

17 CHAIR RYAN: He's not? He may join.  
18 Also in attendance is Jim Clarke, a consultant to  
19 the subcommittee. Welcome Jim.

20 CHAIR RYAN: The purpose of this meeting  
21 is to --

22 MR. RAY: What about Joy?

23 CHAIR RYAN: I'm sorry. And Joy Rempe.  
24 I'm sorry, Joy.

25 MEMBER REMPE: Thanks, Harold.

26 MEMBER SKILLMAN: And Dick.

27 CHAIR RYAN: And Dick Skillman. My list  
28 is flawed, I'm sorry. I apologize.

1                   The purpose of this meeting is to  
2 discuss the presentations from and hold discussions  
3 about the subcommittee meetings held on November  
4 19th and December 3rd of 2013 and the proposed  
5 provisions to 10 CFR 61.

6                   Subcommittee members will recall that in  
7 the committee's last letter to the Commission under  
8 proposed revisions of Part 61 dated July 10th, 2013,  
9 the ACRS said it would conduct additional meetings  
10 on the subject proposed by the staff.

11                  The subcommittee met on November 19th  
12 with representatives from the Department of Energy  
13 in the first of two subcommittee meetings. The  
14 subcommittee met on December 3rd with  
15 representatives from the Agreement States, the low-  
16 level waste disposal facilities and other  
17 stakeholders in the second, first of two  
18 subcommittees.

19                  Also at today's subcommittee meeting we  
20 will hear from staff responsible for the Part 61  
21 revisions who have additional information they would  
22 like the subcommittee to consider. The subcommittee  
23 will gather information, analyze relevant issues and  
24 facts, and formulate proposed positions and actions  
25 as appropriate. Then the subcommittee plans on  
26 proposing a letter report on this matter for  
27 consideration of the full committee at the February  
28 2014 full committee meeting.

1                   Today's meeting is open to the public.  
2   We have not received any requests from members of  
3   the public to provide comments. However, I  
4   understand that there are folks on the bridge line  
5   who will be listening in on today's proceeding. An  
6   opportunity will be provided at the end of the  
7   proceedings for anyone listening to make a comment.

8                   A transcript of the meeting is being  
9   kept. It is requested that speakers first identify  
10  themselves and speak with sufficient clarity and  
11  volume so that they can be readily heard. Derek  
12  Widmayer is the designated federal official for this  
13  meeting.

14                  Thank you, and we'll now proceed with  
15  the meeting.

16                  The first item on the agenda is a  
17  summary of the November 19th and December 3rd, 2013  
18  committee meetings. On November 19th we had some  
19  input from DOE, and on December 3rd we had items  
20  from other stakeholders.

1                   While we've been trying to revisit the  
2   entire transcripts, I'm going to, for those members  
3   who did not participate in the subcommittees, give  
4   some highlights and overview of who participated,  
5   what organization and what people, and maybe a  
6   thought or two about what their main points were so  
7   you'll at least have the benefit without coming  
8   through a foot of transcripts to get some idea where  
9   the subcommittee has been.

10                  Our first effort was -- let's see. On  
11   November 19th, the DOE Office of Environmental  
12   Management, Christine Gelles representing them, is  
13   the associate deputy assistant secretary for Waste  
14   Management, and talked a little bit about how DOE is  
15   managing their radioactive waste.

16                  They have an integrated systems  
17   approach. They use a defense-in-depth strategy for  
18   assessment. And the performance assessment is just  
19   one input into the decision making process. They've  
20   had 25 years of implementation. Their time of  
21   compliance is 1,000 years, and they want to  
22   transition to a risk-informed system considering  
23   peak dose. Their site will be under federal  
24   ownership in perpetuity.

25                  MEMBER STETKAR: So they say.



1                   CHAIR RYAN: Fair enough. So they did.  
2 The DOE Office of Environmental Management, Roger  
3 Seitz, was the senior advisory scientist at the  
4 Savannah River Laboratory, and we heard about some  
5 of the activities there. The performance  
6 assessments involved just one contributor to  
7 decision, built in conservative bias.

8                   The intruder consideration is only for  
9 design optimization and allows for limits and  
10 conditions of a time of compliance of 1,000 years.  
11 Different time frames for near-surface disposal  
12 rather than geologic disposal.

13                  The example of time of compliance in the  
14 international community, a good example is the  
15 United Kingdom Low-Level Radioactive Waste located  
16 near Drigg, which guided their thoughts.

17                  There's a conservative bias built into  
18 the calculations. The dose constraint is 25 percent  
19 of the 100 millirem standard. It assumes  
20 institutional control is lost at 100 years, and a  
21 maximally exposed individual, a dose at 100 meters,  
22 not at the DOE site border.

1                   And so the various parameters and things  
2   that they use to assume in their performance  
3   assessment vary a little bit from others, but try  
4   and reach a conservative but not overly biased  
5   approach. So I don't know if that's exactly  
6   something John can look at from a PRA standpoint,  
7   but it's interesting how they vary and how they  
8   sometimes are the same.

9                   We also heard briefings from the DOE  
10   Office of Health, Safety and Security. Andy Wallo,  
11   the deputy director came. He's with the Office of  
12   Environmental Protection. We discussed with him  
13   several orders, DOE Order 5820, 435.1, which  
14   combines technical requirements with administrative  
15   requirements to ensure decision making is effective.

16                  And other strategies for their time of  
17   compliance involved 1,000 years to maintain an  
18   internal consistency consistent with the National  
19   Academy studies, the NAPA Study. A few hundred  
20   years or a thousand years order of magnitude, that  
21   was also, guided them.

22                  The dose limit is likely to have a  
23   different meaning at different times that they were  
24   examining. There's no long-term care fund in the  
25   annual budget decision on how much to continue  
26   spending is how they guide their financial matters  
27   of the plant.

1                   We also had additional input from Roger  
2     Seitz, the senior advisory scientist at Savannah  
3     River Laboratory. And in their considerations of  
4     their performance objective for an intruder analysis  
5     they limited the exposure to one person or a small  
6     group. They used a very stylized scenario to reduce  
7     the probability it occurs and consequences if it  
8     does occur. It's the international optimization  
9     tool not a dose constraint. DOE used this to  
10    establish their Waste Acceptance Criteria.

11                  DOE Order 435.1 is the implementation at  
12    the Nevada National Security Site. It's been  
13    disposing of low-level waste since 1961. They did a  
14    performance assessment that evaluates post-1988 low-  
15    level waste, and the PA assumes that the site will  
16    close in 2028. It's currently under Revision 10 of  
17    their Waste Acceptance Criteria.

18                  The conditions at the site are 700 feet  
19    to groundwater, five inches of rainfall a year. A  
20    very high evapotranspiration rate, a large buffer  
21    zone, and no attractive resources. So it's pretty  
22    much an isolated situation.

1                   The PA conservatively assumes a 100-  
2 meter exposure point, no credit for transport to  
3 that location, and no credit for containers. It's  
4 assumed that they're all gone. Some additional  
5 conservatism is the intruder scenario used to  
6 establish the WAC.           The basement construction  
7 and the acute drilling with exposure to drilled  
8 materials is also part of that scenario for the  
9 exposure of the intruder, and so on.

10                   We next heard again from the DOE at  
11 Savannah River Field Office, and their  
12 implementation has similar characteristics  
13 addressed. I won't go through them all, but they're  
14 addressed specific for the more humid environment,  
15 the higher rainfall environment and the closer  
16 proximity of other activities to the site.

17                   On December 3rd we also had some  
18 discussions with other participants. The South  
19 Carolina Department of Health and Environmental  
20 Control, Susan Jenkins, gave a presentation. She's  
21 in the Infectious and Radioactive Waste Management  
22 Section.

23                   As I'm sure all the members at the table  
24 know that the Barnwell site has been in operation  
25 since 1971, and it serves currently as the Southeast  
26 Regional Compact Site. The Atlantic Compact  
27 disposal begins, there's no DU waste to deal with.

1                   They have 42 years of operating  
2   experience, 26 more years to go, and they have a  
3   million cubic feet more waste expected over the life  
4   of the site. It's 120 acres. It has an enhanced  
5   cap. And that's all we need to cover there.

6                   And their view is that a 1,000 years is  
7   a more reasonable approach for a time of compliance  
8   for low-level waste. One thousand to ten thousand  
9   years is perhaps reasonable to predict natural  
10   processes, but not human activities.

11                  Its flexibility for implementation is  
12   good so rule language should be generic, however, if  
13   it become ambiguous that's not so good. A case-by-  
14   case implementation is problematic, what metrics  
15   should be used to decide whether to remediate or not  
16   is another issue they're wrestling with in South  
17   Carolina.

18                  The Utah Department of Environmental  
19   Quality, the director Rusty Lundberg came and spoke  
20   with us. They're dealing with depleted uranium at  
21   EnergySolutions, the Clive facility, right now.  
22   Utah Radiation Control Board is using 61.13 in a  
23   case-by-case implementation of current Part 61 in a  
24   progressive fashion, they're currently using.

1                   Utah DU rules are similar to NRC  
2 proposed revisions. They have established a time of  
3 compliance of 10,000 years with further qualitative  
4 analysis which leans towards conservatism. They  
5 cannot accept low-level waste above Class A, but  
6 proposed revisions call for an intruder assessment  
7 for all low-level waste.

8                   Waste Acceptance Criteria add  
9 responsibility to the Agreement State program which  
10 is not fully in place now, but it's not necessarily  
11 a negative. Uranium mill tailings is a slightly  
12 different problem.

13                  No specific technical requirements in  
14 the Utah depleted uranium regulation because of the  
15 site characteristics are not considered favorable.  
16 Our Compatibility C would allow Utah to keep 10,000  
17 years in the DU regulation, but Compatibility B  
18 would make them change it, so there's a bit of a  
19 conflict over the regulation to support time of  
20 compliance of 10,000 years for DU.

21                  The Texas Commission on Environmental  
22 Quality, Brad Broussard, came and spoke with us.  
23 Are similar to the proposed revisions of the two-  
24 tiered system. They have a time of compliance of  
25 1,000 years, or when peak dose occurs.

1                   Actual performance assessment being  
2   evaluated truncates the analysis at 50,000 years  
3   based on modeling results. Support of 500 millirem  
4   per year performance objective for the intruder  
5   assessment.                   Support the WAC approach,  
6   but acceptance of waste should not be based solely  
7   on performance assessment results and Part 61  
8   classification tables should be retained. He had no  
9   comments on compatibility because the existing Texas  
10  rule covers any kind of compliance proposed by NRC.

11                  There has not been a legal challenge to  
12  the 50,000 year results because the truncation is  
13  not in the regulation. The 50,000 year truncation  
14  was based on the results of the limited inventory  
15  submitted in the original Waste Control Specialist  
16  license application. The Waste Control Specialist  
17  submittal had more sophisticated modeling to account  
18  for the larger inventory of DU.

19                  Earl Fordham from the Washington State  
20  Department of Health came and spoke about their  
21  activities. The Hanford facility is exclusively a  
22  disposal facility for the Northwest Compact. It's  
23  similar to Barnwell for waste receipts, only 20,000  
24  cubic feet per year presently.

1                   The DOE ERDF is on land originally  
2 leased from DOE but given back. The Hanford low-  
3 level waste disposal facility land will also be  
4 given back to DOE. It might be a strategy to have  
5 exactly the same methodology for evaluating both of  
6 these facilities due to the proximity of the  
7 facilities to each other and DOE's ownership.

8                   They support a two-tiered approach,  
9 10,000 years consistent with the landscape of  
10 Washington and a second tier of no dose limit to  
11 measure compliance. They look at a 25 millirem per  
12 year as appropriate for a public dose performance  
13 objective, and a 500 millirem per year as  
14 appropriate for an intruder dose objective in  
15 Washington.

16                  The long-term analysis should be  
17 qualitative rather than quantitative. Cautioned  
18 that some values will change and some will not.  
19 They use the example of the Columbia River as  
20 something that will retain its historical and  
21 present values into the future. They tend to prefer  
22 1,000 years versus a 10,000 year performance  
23 interval.



1                   Waste Control Specialists in Andrews  
2   County, Texas, James Scott Kirk is the vice  
3   president who came and spoke with us. It's the only  
4   new licensed low-level waste disposal facility in  
5   the United States for receipt of all classes of  
6   waste, low-level waste, and their first low-level  
7   waste was received in 2011.

8                   There's a separation between the Compact  
9   and DOE disposal facilities. Texas takes title to  
10   commercial waste at receipt. The Compact facility  
11   will undergo state care at closure. The DOE  
12   facility will undergo DOE care at closure.

13                  They support a 10,000 year performance  
14   interval. They have a multiple layer design for  
15   intrusion barriers mandated by the Texas  
16   legislature. They include an intruder scenario,  
17   drilling for oil at 500 to 600 years after closure.

18                  They have an amendment submitted for  
19   disposing of 400,000 cubic meters of DU submitted in  
20   August 2013, with an update PA, and doses calculated  
21   to the 100,000 to 1 million year time period. It's  
22   a deterministic analyses, it's not probabilistic.

1                   The long term analysis did not make WCS  
2 change any design features, and they have been  
3 gaining insights from evaluation as opposed to  
4 compliance. Rule would help WCS because a rule that  
5 adds site-specific analysis would be supportive of  
6 the approach already used in their licensing of the  
7 site.

                  EnergySolutions' Clive, Utah  
8 facility uses a reasonably foreseeable closure of  
9 1,000 years. A thousand years does not capture DU,  
10 but neither does 10,000 or 20,000. Everybody will  
11 recall that the uranium-238 half-life is 10 to the  
12 ninth years, so it's not going to decay very much in  
13 any time frame that's being discussed.

14                   Performance period should look at  
15 catastrophic events, and the metric should be one to  
16 ten rem from those catastrophic effects. Also you  
17 should take credit for natural processes,  
18 suitability of the site prevails.

1                   Intruder scenario is being looked at,  
2 are questionable as far as reasonably foreseeable as  
3 the criteria. Site-specific Waste Acceptance  
4 Criteria is a good approach and it's consistent with  
5 DOE. There's a need that Part 61 revisions be  
6 finished so that there's certainty in the current  
7 regulatory framework.                   So in additional  
8 discussions, the archeology provides examples of  
9 metals lasting for periods of 1,000 years and  
10 greater. Maybe rebar and concrete would be a  
11 different story. There's a need to align the  
12 inventory of radionuclides that would be left with  
13 how long the materials need to last.

14                   And they should have made perhaps a  
15 separate rule for depleted uranium or separate  
16 requirements for depleted uranium, and one rule for  
17 all low-level waste might be an appropriate way to  
18 address them.

19                   Mike Benjamin from EnergySolutions at  
20 the Barnwell, South Carolina facility gave us an  
21 update on their facts and figures, and they expect  
22 to receive 7,000 to 11,000 cubic feet per year from  
23 now on, with added space used at the end for  
24 decommissioning of reactor components.

1                   They agree with the ACRS July 2013  
2 Letter Report. Added imposed requirements by  
3 revisions may impact continued operations. They see  
4 no technical justification for a time of compliance  
5 period of 10,000 years.

6                   They currently have an extended care  
7 fund of \$144 million and they use about \$2.2 million  
8 of that per year for ongoing monitoring maintenance  
9 and routine operations. And it would be very non-  
10 ALARA to exhume previously disposed waste.

11                   It's unclear whether a new analysis  
12 would show the site is either okay or not okay, and  
13 there is a ten year or so disposal waste pre-Part 61  
14 that, you know, would have to be considered. That  
15 is waste that was disposed prior to the  
16 implementation of Part 61. At a minimum, this  
17 analysis would be speculative and it's hard to  
18 understand what the results really would be  
19 indicating.

20                   Next, we had some input from the  
21 Electric Power Research Institute, EPRI. Lisa  
22 Edwards came and she's the senior program manager  
23 for Nuclear Chemistry, Radiation Management and Low-  
24 Level Waste group. EPRI focuses on minimization,  
25 safe storage and disposal flexibility.

1                   The time of compliance for low-level  
2 waste should be less than that for geologic  
3 disposal. Public understanding of uncertainty is  
4 low. That's a difficult thing that needs to be  
5 addressed. More uncertainty with time, but this is  
6 balanced with designing a more robust facility.

7                   The principles from the NAPA study for  
8 DOE acknowledge that NRC staff may have reached  
9 different conclusions than EPRI. And they provide  
10 some additional information regarding nuclear power  
11 plant waste and what specifically was involved  
12 there. DU is not a big issue for them, and tech-99  
13 and I-129 were not included, and those are two of  
14 the longer lived fission products that are of  
15 interest.

16                  They had additional discussions on the  
17 understanding of uncertainty in qualitative terms,  
18 and they see a conundrum with the assumptions chosen  
19 as "conservative" versus "realistic," and difficulty  
20 in explaining and defending these terms when  
21 discussing it with the public.

22                  New materials and operating practices  
23 are not likely to introduce additional important  
24 radionuclides. Behavior and characteristics of DU  
25 are atypical of low-level waste and should not drive  
26 the analysis to longer times.

1                   Christine Gelles from the Department of  
2 Energy came and gave us pictures and data indicating  
3 that the magnitude of the UF cylinder storage  
4 situation, the storage at Portsmouth and Paducah  
5 facilities. There's very large quantities of, you  
6 know, UF6 in tanks at these facilities.

7                   Also the facilities will receive newly-  
8 generated UF6 from de-conversion facilities and any  
9 other new enrichment facilities that may be  
10 developed. De-conversion facilities both  
11 transitioning from hot startup to full operation  
12 will begin in 2014.

13                  A summary of the 2000 ORNL Report  
14 provides the documentation of the assessment of  
15 preferred depleted uranium options of disposal  
16 forms. A summary of NRC letters documenting a  
17 preference for U3O8 was also discussed, not  
18 finalizing site-specific EIS supplements addressing  
19 disposal until Part 61 revisions are completed.

20                  DOE supports near-surface disposal for  
21 DU. NNSA has disposed of DU, and Waste Control  
22 Specialists and Energy Solutions at Clive are  
23 performing studies on the disposal of DU.

1                   Other stakeholders spoke to us. John  
2   Greeves from Talisman, John Tauxe from Mercury and  
3   Company and Arjun Makhijani from IEER, with a  
4   variety of points and used them on the various  
5   issues discussed. So I won't try and summarize  
6   those again, so we'll push ahead and make comments  
7   later on as we need to.

8                   So with that I just wanted to give the  
9   members who had not participated a brief rundown on  
10  some of the key issues that are impacting time of  
11  compliance considerations and other details that  
12  maybe is not as meaningful as reading the  
13  transcripts, but I was trying to save you a little  
14  time and at least get some insights as to what the  
15  key issues were.

16                  MEMBER ARMIJO: I would like to also  
17  add, recommend that the members get hold of the  
18  notebooks that we received from DOE and also from  
19  the Agreement States. There's a lot of material in  
20  there. And just flipping through that gives you a  
21  lot more information than --

22                  CHAIR RYAN: Than we can do with it.

23                  MEMBER ARMIJO: -- possibly do here.

1                   CHAIR RYAN: But I just wanted to give  
2 you a broad spectrum of, you know, and summarize  
3 some of the really key issues. But I would  
4 recommend that you all take a little time to get the  
5 transcripts and the briefing materials and just have  
6 a look.

7                   So I guess, Jack, we can maybe -- I  
8 don't know who would like to get the set and you and  
9 I can work out what that might be.

10                  MEMBER ARMIJO: Were they ever put, the  
11 stuff that was in the briefing books, did we ever  
12 get them in CDs?

13                  MR. WIDMAYER: No.

14                  MEMBER ARMIJO: Yes, because, you know,  
15 I had to ship them physically. But there's an awful  
16 lot of good material in there, and including some of  
17 the attachments that we just didn't have a chance to  
18 discuss. And I think it would be useful before the  
19 next meeting for the members who couldn't attend to  
20 take a look at those.

21                  CHAIR RYAN: Do any of the members have  
22 any burning questions or comments at this point, or  
23 should we press on with the rest of the briefing?

24                  MEMBER ARMIJO: Well, I think at some  
25 point we need to discuss among ourselves exactly how  
26 we condense these things and start planning for the  
27 letter. But, you know, --

28                  CHAIR RYAN: Right --



1 MEMBER ARMIJO: -- want to get to it.

2 CHAIR RYAN: Yes, we have quite a lot of  
3 time allotted. We have all day. So I'm thinking  
4 that some of the other sections might not take as  
5 much time and we'll probably take that as the last  
6 activity of the day, if that's satisfactory with  
7 you.

8 MEMBER ARMIJO: Sure, that's fine.  
9 We've got to do it some time.

10 CHAIR RYAN: All right. Well, hearing  
11 no questions that you'd like to put on the table or  
12 put in the parking lot for our later discussions,  
13 we'll go ahead and proceed. And I'll ask --

14 MEMBER STETKAR: Mike, I was just  
15 thinking. Before we, I know everybody else probably  
16 has all of this right at their fingertips. I don't.  
17 Could you print out our letter from whenever it was,  
18 June, April? July. And distribute it also before  
19 we, just so we recall what we said then before we  
20 get started discussing --

21 (Simultaneous speaking)

22 MEMBER STETKAR: Make a hard u-turn or  
23 something like that.

24 MR. WIDMAYER: Maybe have the other  
25 letters too, the --

26 MEMBER STETKAR: That would be as fully,  
27 ought to see the --

28 MR. WIDMAYER: Back to when? 1987?

1 MALE PARTICIPANT: No, no.

2 CHAIR RYAN: How about the last three?

3 MEMBER STETKAR: The last two. Yes,  
4 three or four.

5 CHAIR RYAN: Three will be enough.

6 MEMBER STETKAR: No, I think that would  
7 be useful so we don't get off.

8 MEMBER REMPE: While you're doing that  
9 if you'll just send them to us electronically for  
10 some of us who would rather not have it in hard  
11 copy, I think that would be helpful too. Please, if  
12 it's possible, while you're looking at the files.

13 MR. WIDMAYER: Paperless?

14 MEMBER REMPE: Paperless, yes.

15 CHAIR RYAN: I'll go with that.

16 MR. WIDMAYER: Anybody want paper?

17 (Show of hands)

18 MEMBER STETKAR: For this afternoon,  
19 yes, because I'm only going to go in there and print  
20 it out.

21 MALE PARTICIPANT: You might as well get  
22 it on paper.

23 (Simultaneous speaking)

24 MR. WIDMAYER: Well, that didn't take  
25 very long.

26 CHAIR RYAN: That didn't take as long as  
27 I thought it was going to.

1                   MEMBER REMPE: If you'd gone up front we  
2 would have been more likely to ask questions because  
3 we're used to picking on the people who go up front.

4                   MEMBER STETKAR: This afternoon when we  
5 get into the meat, you know, I had some notes made  
6 from before and making notes again, so --

7                   CHAIR RYAN: Very good.

8                   MR. WIDMAYER: You could ask me  
9 questions. I know --

10                  MEMBER REMPE: That's true. We could  
11 pick on you.

12                  CHAIR RYAN: With that, you know, rather  
13 than take a break, seeing as how it's not that far,  
14 why don't we go ahead and ask the NRC staff to  
15 provide their presentations and observations from  
16 the subcommittee? I have Larry Camper and Chris  
17 McKenney as names for this activity.

18                  Gentlemen.

19                  MR. CAMPER: Good morning.

20                  CHAIR RYAN: Good morning.

1                   → MR. CAMPER: Thanks for the opportunity  
2 to be with you. For those of you who may not know  
3 me, I'm Larry Camper. I'm the director of the  
4 Division of Waste Management, Environmental  
5 Protection. And of course, the programmatic  
6 responsibility for this rulemaking comes within my  
7 division. Chris McKenney is my branch chief for the  
8 Performance Assessment Branch. Has been a key role  
9 in working with the working group that has developed  
10 the rulemaking language, and we value the  
11 opportunity to be with you. Next slide.

12                   We asked for this meeting because we  
13 felt that, you know, Dr. Ryan and his comments  
14 conveyed much information and much information has  
15 been shared with you. You've asked a lot of very  
16 good questions. And we felt from the staff's  
17 perspective it was an important juncture within your  
18 process to appear before you now and share some  
19 information about this particular rulemaking.

20                   This is a complex topic. We have met  
21 with all of the commissioners. We have met with the  
22 commissioners' staff. And again and again you hear,  
23 this is really a complex thing we're doing here, and  
24 so it is. And so we think it's important to just  
25 give you some final thoughts as you head towards  
26 preparation of your report.

1                   And what we want to cover is the purpose  
2 of the rulemaking; why DU, depleted uranium, is an  
3 issue, is near-surface disposal of depleted uranium  
4 appropriate? The pathway of disposal for this  
5 particular material? We want to share with you an  
6 overview of the staff's approach. That includes the  
7 problem definition, existing considerations, risk  
8 management considerations, the rulemaking framework,  
9 and then some thoughts of conclusion. Next slide.

10                   → MEMBER ARMIJO: Larry, before you go,  
11 you know, I keep going back to the term "limited  
12 rulemaking."

13                   MR. CAMPER: I'm going to talk --

14                   MEMBER ARMIJO: And this is, to me, more  
15 than a limited rulemaking. It's extremely --

16                   MR. CAMPER: I'm going to give you a  
17 perspective on that.

18                   MEMBER ARMIJO: -- complicated. And I  
19 know that you've gotten a lot of guidance on this  
20 subject, so limited in one letter but then a whole  
21 bunch of other stuff in other letters.

22                   So I'd like your thoughts on what we're  
23 really trying to accomplish in a limited rulemaking.  
24 Because my basic going-in position is that currently  
25 licensed low-level waste facilities are safe,  
26 handling the materials safely, and there needs to be  
27 some special provisions perhaps for DU. So what's  
28 wrong with that as just an overall?

1                   MR. CAMPER: Yes.

2                   MEMBER ARMIJO: And then, if so, why is  
3 this thing getting so complicated, and to a certain  
4 extent very confusing to people who aren't doing  
5 this all the time?

6                   MR. CAMPER: Well, I have some points  
7 along the way that get at, I think, the essence of  
8 your question. And if I don't, you know, flesh it  
9 out, you can certainly tell me and we'll try to do  
10 more.

11                  MEMBER SKILLMAN: Larry, let me build on  
12 Dr. Armijo's question and in doing that ask you to  
13 back up one, please. Your second bullet seems to me  
14 to invite an illustration why is it an issue. And I  
15 would like to ask you if you have shown those who  
16 are involved in this an image of the DU containers  
17 at Hobbs, at Capenhurst, at Paducah and other  
18 places.

19                  It seems that one glimpse of the  
20 magnitude of that image of the material that's  
21 contained in those containers rivets one's attention  
22 to how large this issue really is. One can say,  
23 well, that's just the physical. We're going to  
24 handle the material, the hex and the uranium,  
25 through some process.

1                   But when one sees how many, I'm going to  
2 guess hundreds of thousands of containers, there  
3 are, all of a sudden there's a practical recognition  
4 of what this problem really is. And it's a  
5 different problem than how Part 61 is written.  
6 There's a real physical problem we've got to deal  
7 with. So my question is, have you ever considered a  
8 set of visuals that shows that?

9                   MR. CAMPER: Well, the answer as to  
10 whether we consider it, I can tell you this and I'll  
11 be quite candid with you. When the staff received  
12 this assignment, going back following the LES  
13 proceedings from the Commission, we started to talk  
14 about how we were going to proceed to deal with it.

15                   We recognized on one hand that it is not  
16 our responsibility to ensure that there is disposal  
17 capacity. That's not our job. Our job is to ensure  
18 that there's a safe disposal pathway for low-level  
19 waste in this instance.

20                   But certainly in my own mind I will tell  
21 you, I was very aware of the fact that we were  
22 dealing with it. And our analysis showed, as you  
23 were talking, something in the order of 1.3 million  
24 metric tons of depleted uranium.

1                   When you consider the DOE stockpile plus  
2 what would be developed through licensed commercial  
3 enrichment over a 30-year period, 1.3 million metric  
4 tons of depleted uranium. I would submit to you  
5 that I felt that was a significant public health and  
6 safety issue. And you're right. It's sitting there  
7 in canisters, on pads, over time and that's not a  
8 good thing.

9                   And I think we all would agree, that I  
10 recall the reaction from some of the committee  
11 members when you saw the picture of the pad at  
12 Paducah and Portsmouth there was, you know, kind of  
13 a sigh. And I thought, wow, that they really do  
14 appreciate the magnitude of the problem, and your  
15 comments witness that.

16                  So yes. So on one hand we don't have  
17 responsibility for ensuring capacity, but is it a  
18 real public health and safety problem? You bet.  
19 You bet.

20                  MEMBER SKILLMAN: My comment was not  
21 intended to be pejorative or suggest there's  
22 something wrong. What I'm trying to say is when the  
23 participants recognize how much material is there,  
24 at least in my mind it adds an element of urgency  
25 for dealing with this. And that's simply my point.

26                  MR. CAMPER: I appreciate that.

27                  MEMBER SKILLMAN: Thank you.



1                   MR. CAMPER: But I think these two  
2 questions thus far, I have some comments I think  
3 that will touch on both of them that will give some  
4 insight.

5                   Dr. Ryan?

6                   CHAIR RYAN: If you take it to the  
7 disposal part of it and, you know, building on  
8 Dick's observations that large DU, it's not going to  
9 be buried as a hexafluoride or as a gas or as some  
10 tank material under pressure. It's going to have to  
11 be converted to some form.

12                  So there's a conversion step, and then  
13 once you get it all converted to whatever the  
14 disposal form is, okay, where's it going?

15                  MR. CAMPER: Correct.

16                  CHAIR RYAN: That's not clear at this  
17 point. So correct me if I'm wrong, but so I think  
18 it's not just the fact that there's a lot amount of  
19 material stored in tanks that, you know, have --

20                  MEMBER SKILLMAN: What do you do with  
21 it?

22                  CHAIR RYAN: Well, let's say there's a  
23 disposal pathway to turn it into a solid form of  
24 uranium and bury it. Okay, where are we going to do  
25 that, convert it? Where are we going to bury it? I  
26 don't know. So it's a long process without many  
27 steps clearly being defined or set, and I think  
28 that's your point.

1                   MEMBER SKILLMAN: Thank you. Thanks  
2 Larry.

3                   MEMBER ARMIJO: You know, I think DOE  
4 made it very clear what procedure they're going to  
5 use, the converting to U308. And why they chose  
6 U308, it's a very stable form. And unless I'm  
7 wrong, DOE is pretty much going to handle DU for the  
8 nation whether it comes from LES or whether it comes  
9 from other sites. And getting at this issue  
10 of the huge amounts of material involved, it just  
11 begs the question why isn't the regulation of DU a  
12 totally separate rule so that the requirements and  
13 issues don't affect bonafide low-level waste in any  
14 way?

15                  MR. CAMPER: Well, I'm going to share  
16 with you the staff's logic as we step through this,  
17 attacking this problem, and the analysis that we did  
18 to examine that logic. And it may not be perfect  
19 logic, but at least we thought at this juncture  
20 primarily because of that questioning, and actually  
21 you asked a similar question during the December 3  
22 meeting.

23                  MEMBER ARMIJO: Yes, I keep coming back  
24 to that.

1                   MR. CAMPER: And that's a very fair  
2 question. And I think the point I hope you go away  
3 with today, after we finish our presentation, is we  
4 did consider that. We did think about that, and  
5 share with you the path of logic and analysis that  
6 we used to reach the position that we did. It may  
7 not be perfect, but at least you'll understand the  
8 staff's logic. Okay. Next slide.

9                   All right, as I just said, I want to  
10 share with you the staff's analysis and logic that  
11 we went through in tackling this particular problem.  
12 We felt that observing the meetings that you've had  
13 thus far, particularly the December 3 meeting, so  
14 much of the discussion in the presentations focused  
15 upon the radionuclides that are, in fact, a non-  
16 problem at 1,000 years or even less at that matter.

17                   And we felt it was important therefore  
18 to kind of bring back and put at the forefront the  
19 central issue that we were asked to deal with and  
20 that's the disposal of large quantities of depleted  
21 uranium.

22                   This question of an alternate regulatory  
23 approach was discussed during the December 3 meeting  
24 and it's been raised again this morning, and so we  
25 felt it was important again to try to explain the  
26 staff's logic and this analysis.

1                   Depleted uranium is the issue. There's  
2 lots of it, point well made. It's in high  
3 concentrations. And it's not something that was  
4 examined when the Part 61 rule was put in place in  
5 the '79 to '81 period. In fact, in those days the  
6 assumptions where there would be very little of  
7 uranium to be disposed of and no concentration value  
8 was put in the tables, therefore, the screening  
9 value tables of 61.55. So this problem has  
10 certainly emerged.

11                   MEMBER ARMIJO: I want to see if you can  
12 fill us in of why was that assumption made that  
13 there would be very little DU? When people were  
14 enriching and creating a lot of DU, what was the  
15 assumption that how was it going to be handled? Was  
16 it going to be --

17                   MR. MCKENNEY: Chris McKenney. At that  
18 time, remember that almost it all was to be owned by  
19 DOE.

20                   MEMBER ARMIJO: Right.

21                   MR. MCKENNEY: First of all, almost all  
22 that DU was considered a resource and there was no  
23 intention to make it a waste in any time period that  
24 was foreseen.

25                   MEMBER ARMIJO: Fast reactor fuel.

1                   MR. MCKENNEY: For advanced reactor  
2 fuel, for various other purposes, possibly laser  
3 enrichment to pull out. It was not designated as  
4 waste, which is what's true in other countries why  
5 you don't hear of what are they doing with DU?  
6 They're like, we have no DU waste because it's  
7 considered a resource, still.

8                   MEMBER ARMIJO: Well, there's some of us  
9 who still believe it's a resource, so let's --

10                  MR. MCKENNEY: Yes. So I'm just saying  
11 that each person has -- yes. And we get to that in  
12 a few slides away. But the other thing is at the  
13 time DOE did not dispose of it offsite in any  
14 substantial amounts.

15                  MEMBER ARMIJO: They had tanks.

16                  MR. MCKENNEY: They had their own, well,  
17 not just DU, but I'm just talking about other waste.  
18 Waste coming from their facilities went to their  
19 onsite disposals and their own disposals. There  
20 wasn't substantial, they weren't the majority  
21 disposer of waste into the commercial market so that  
22 was taken into account.

23                  Yes, they had a lot of waste, but those  
24 waste streams were not really taken into account in  
25 the commercial market because those weren't coming  
26 to the commercial market. They were being handled  
27 within the DOE complex.

1                   MEMBER ARMIJO: Right. But you answered  
2 my question. It really was considered a resource,  
3 and the only DU that might be coming into low-level  
4 waste facilities would be small amounts that might  
5 not be suitable for --

6                   MR. MCKENNEY: It was filings from the  
7 weapons plants. It was --

8                   MR. CAMPER: But as you will see in a  
9 moment, you know, the slide, that philosophy changed  
10 over time which led to some of the issues that we're  
11 wrestling with today.

12                  MR. RAY: Well, but the key is going to  
13 be why was it when that change took place, change  
14 takes place all the time, but why was it married to  
15 the low-level waste that was covered by Part 61?  
16 That's the key question.

17                  MR. CAMPER: We're going --

18                  MR. RAY: I know you're going to get to  
19 it, so that's why I'm going to patiently wait.

20                  MR. CAMPER: So again, step through the  
21 logic. Okay, so the next question that the staff  
22 began to wrestle with as we got this assignment from  
23 the Commission was, is this material suitable for  
24 near-surface disposal?

1                   And you're going to see the assignment  
2   that we got in a moment and it'll just remind you of  
3   the exact direction we got from the Commission. But  
4   when we got the assignment we started asking  
5   ourselves a lot of questions, the same kinds that  
6   you're asking out loud right now.

7                   You know, should we run a classification  
8   on this material to determine what it is? There  
9   were problems with doing that if you used the exact  
10  analysis that was used back when the rule was put in  
11  place, because that was a very wet, humid site, and  
12  if you did that the exact same way you would find  
13  very limiting numbers for disposal as compared to an  
14  arid site in the western United States, for example.

15                  But we asked ourselves, is that  
16  something we should do? Should there be a unique,  
17  regulatory regime for this? I mean, we went through  
18  all those kinds of questions. And so we asked  
19  ourselves, what's the best way to approach this with  
20  all those questions in mind?

21                  And the final question we settled on  
22  was, is this material suitable for near-surface  
23  disposal? And the reason that we centered on that  
24  question after considering the various alternatives  
25  is because during the LES proceedings a contention  
26  had been filed that this material was not suitable  
27  for near-surface disposal.

1                   And because of some other information  
2   that we were aware of, that's the question that we  
3   started to attack as we went through our analysis.  
4   And if it was suitable for near-surface disposal,  
5   what would be those conditions?

6                   And I'll come back in a moment to what  
7   the other material was that we were aware of around  
8   that question that had been raised during the  
9   proceedings. And what regulatory requirements are  
10   necessary to ensure safety if it is suitable for  
11   near-surface disposal? Next slide.

12                  Now why is it an issue? DU. We touched  
13   upon this somewhat already, there's no specific  
14   limit in Part 61. There was a value for uranium in  
15   the draft of the document but not in the final  
16   document, because the framers of the document at the  
17   time felt that the amount of material was so small  
18   it didn't even warrant a specified value in the  
19   screening tables.

20                  Well, history has shown that obviously  
21   to not have been a correct assumption. I don't  
22   fault those who did what they did at the time, but  
23   that was the logic and the reason. Obviously this  
24   material is quite different because it's very long-  
25   lived as compared to the other radionuclides in Part  
26   61, and it of course has numerous progeny with  
27   ingrowth in over time commencing at about 8,000  
28   years.



1                   The national policy for depleted  
2 uranium, particularly under DOE auspices, goes from  
3 being a resource to waste. This was a key  
4 development along the way, and of course given that  
5 it's viewed as waste there will be more commercial  
6 disposal of depleted uranium by the Department of  
7 Energy.

8                   And they still want to have the capacity  
9 to dispose of depleted uranium in commercial  
10 facilities. Huge amounts of depleted uranium.  
11 We've talked about that already. Our analysis  
12 showed, as I said, it's north of one million metric  
13 ton, something on the order of 1.3 million metric  
14 ton if you consider current stockpiles, plus that  
15 which will be produced over 30 years of commercial  
16 operation.

17                  So clearly those volumes of depleted  
18 uranium were not considered in Part 61. Next slide.

19                  MEMBER SCHULTZ: Larry, the national  
20 policy change, was that evolutionary or was there a  
21 pronouncement?

1                   MR. CAMPER: That is from what we're  
2 going to on the next slide, to the environmental  
3 impact statements that were cited as part of the  
4 creation of the de-conversion of facilities was that  
5 DOE went through an evaluation of various options of  
6 what to do with the UF6. Do you just store it in  
7 places with no-action alternative? Do you upgrade  
8 the storage facilities? Do you transform it into a  
9 stable product but keep it as a resource? Do you  
10 transform it into metal? Or do you do the de-  
11 conversion with an intent to send it for disposal?

12                   In the end, the final option was the  
13 final one selected was, the intention was they  
14 convert it to U308 with the major intention for  
15 disposal if uses did appear they could take material  
16 out that was headed for disposal, but it was  
17 primarily a for-disposal path is what DOE selected.

18                   With all that having been said, I would  
19 say it was evolutionary as opposed to one singular  
20 pronouncement. It moved over time.

1                   MEMBER ARMIJO: Well, not to get into  
2 national policy history, but during the Carter years  
3 when the nuclear non-proliferation became the big  
4 deal, and de-emphasizing breeder reactors and  
5 anything that's producing plutonium, all of that  
6 sort of stuff, it just started changing. What  
7 formerly was the right thing for a breeder became a  
8 potential problem with NPT, but long term it's still  
9 a resource. Someday somebody will be digging this  
10 stuff up.

11                   → MR. RAY: Well, I have looked ahead to  
12 see if this question gets answered. I don't think  
13 it does. If you go back to the prior slide, you  
14 know, my framework isn't why is DU an issue. We  
15 understand what you're saying and we've been over it  
16 all enough.                   The question is, why is it  
17 an issue for the other categories of low-level waste  
18 that were already being handled by Part 61? In  
19 other words, why wasn't it a separate problem from  
20 the beginning?

21                   Now you've referred to a Commission  
22 decision, I think, in your earlier comment that  
23 drove it that way, but that's the key thing.  
24 Because if we're going to challenge that decision so  
25 I would write it, why is DU an issue for Class A, B,  
26 and C waste already covered under 61? Why are these  
27 two things combined?

1                   MEMBER SCHULTZ: Because originally it  
2 was not. Originally it was very clear. Maybe very  
3 small portions of it might be included, but  
4 otherwise it would be treated separately and would  
5 be treated separately because it was a resource.

6                   MR. MCKENNEY: No, no, no.  
7 Unfortunately, if there is no value in the table --  
8 remember, first of all, we go back to the definition  
9 of low-level waste. Low-level waste is what it is  
10 not. Low-level waste is not high-level waste. Low-  
11 level waste is not TRU. Low-level waste is not  
12 uranium mill tailings. And --

13                  MR. RAY: Well, call it low-level waste  
14 then, but it's low-level depleted uranium waste as  
15 opposed to low-level Class A, B, and C waste.

16                  MR. MCKENNEY: But legally, if you're  
17 not in the table, if you're not an element that's in  
18 the tables you are Class A by default low-level  
19 waste.

20                  MR. RAY: Okay, if this turns ultimately  
21 to be a legal question, and I'm not coming at this  
22 without us having had a lot of discussion about  
23 this. At the end of the day, if this is a legal  
24 question let's say so. And say as you're just now  
25 trying to do, we're bound by a legal problem here  
26 and so we can examine that.

27                  MR. CAMPER: But the Commission weighed  
28 in on this matter during the LES proceedings.

1                   MR. RAY: Okay, that's where I want you  
2 to say, by the way I'm answering your question now.

3                   MR. CAMPER: Right. I'll have a point  
4 in a moment. The Commission addressed that during  
5 the LES proceeding.

6                   MR. RAY: Okay.

7                   MR. CAMPER: We have a bullet about  
8 that.

9                   MR. RAY: All right.

10                  MR. CAMPER: All right, so next slide.  
11 So remember a moment ago I said that a contention  
12 had been filed that this material was not suitable  
13 for near-surface disposal. Well, the piece of  
14 information that we were aware of that took a  
15 contrary view to that is what you see articulated on  
16 this slide.

17                  And this is a programmatic environmental  
18 impact statement that was performed by the  
19 Department of Energy in the 1999 to 2000 year  
20 period. Let me show you what they concluded. They  
21 said that PEIS evaluated the potential environmental  
22 impacts including potential health risks associated  
23 with the disposal of depleted uranium oxide at a  
24 generic low-level waste disposal facility.

1                   Two forms of uranium oxide were in the  
2 completion of the PEIS as documented by Oak Ridge.  
3 They were U3O8 and UO2. Now the conclusion was that  
4 these materials were found to be acceptable for  
5 near-surface disposal. The actual risk from  
6 disposal of depleted uranium would depend upon the  
7 form of the uranium as well as the characteristics  
8 of the disposal facility.

9                   During the licensing authorization  
10 process for such a disposal facility, which includes  
11 an opportunity for public review, analyses are  
12 conducted to evaluate risks and demonstrate that the  
13 facility meets established performance criteria and  
14 so forth and so on.

15                  So on one hand you have a contention  
16 that says it's not suitable for near-surface  
17 disposal. You have a programmatic environmental  
18 impact statement that says it is. So my charge to  
19 the staff was, is it or is it not suitable for near-  
20 surface disposal?

21                  And if the conclusion the staff had  
22 reached was no, it's not suitable for near-surface  
23 disposal, then my plan would have been to go back to  
24 the Commission and communicate that fact and discuss  
25 the alternatives for further Commission  
26 consideration. And as you'll see, the staff  
27 analysis determined that it was suitable albeit  
28 under certain conditions.

1                   Go ahead.

2                   CHAIR RYAN: Larry, I think that's a  
3 useful discussion but it's boxed in. You know,  
4 under what conditions is it acceptable and not  
5 acceptable? What was the assessment that they used?  
6 Did they look at a variety of environments? You  
7 know, all that kind of stuff.

8                   And I think it's going to be, yes,  
9 sometimes it is, and no, sometimes it's not, and  
10 there are other times we really don't know what it's  
11 going to be.

12                  MR. CAMPER: And we concluded the same  
13 thing.

14                  CHAIR RYAN: So it's not something where  
15 you can get a determinative answer in a --

16                  MR. CAMPER: Well, in our analysis which  
17 I'll step through here in a moment, we did reach  
18 some conclusions about those very points. I mean,  
19 there were those who criticized this and said, well,  
20 look, all this does is allow for carte blanche  
21 disposal of depleted uranium.

22                  Au contraire, that's not the case. In  
23 fact, the conditions under which it can be disposed  
24 are indeed limiting. Certain types of sites with  
25 certain types of condition, and our analysis  
26 demonstrated that for us.

1                   CHAIR RYAN: So let's assume you get  
2 over that first hurdle. Now we've got something  
3 that's got a radioactive half-life of ten to the  
4 ninth years, and I have no idea what the estimate of  
5 the life of our planet is, but, you know, it's going  
6 to be around forever.

7                   So how do you determine the performance  
8 interval for that? And that's the next big question  
9 with uranium. It's primordial. It's going to be  
10 there in the same activity level that it's there  
11 now.

12                  MR. CAMPER: Now the conclusion and what  
13 the last point there makes, it was in a dry, arid  
14 environment which it was found to be most suitable  
15 for disposal, not in a humid, wet --

16                  CHAIR RYAN: I wonder if it's going to  
17 be dry and arid for ten to the ninth years times  
18 ten?

19                  MR. MCKENNEY: That was, remember, the  
20 DOE's analysis was run 1,000 years and a little bit  
21 longer, so that's what they considered. They didn't  
22 consider changes in climate.



1                   ➔ MEMBER ARMIJO: To get back to the  
2 question of suitability of DU. In the existing Part  
3 61, staff concluded it was suitable for disposal in  
4 limited quantities because you were, you know, it's  
5 being disposed in limited quantities, and I don't  
6 know what chemical forms were acceptable or not, but  
7 it wasn't huge amounts.

8                   The question here is, is it suitable for  
9 near-surface disposal in very large quantities? And  
10 if that's the case, that's what we need to focus on.  
11 And again, I will keep coming back. This is a very  
12 special case and has nothing to with what I call  
13 classic low-level waste.

14                   And I'd tell you, as far as I'm  
15 concerned I would have a much easier time working on  
16 this rulemaking and understanding what you're doing  
17 if low-level waste hadn't been dragged in to meet,  
18 basically forced to meet the requirements of --

19                   MR. MCKENNEY: But I mean, so you're  
20 suggesting that we require the creation of brand-new  
21 facilities only for DU?

22                   MEMBER ARMIJO: No. No.

23                   MR. MCKENNEY: Because then if you're --

24                   MEMBER ARMIJO: No, you have your two  
25 regulations.

26                   MR. MCKENNEY: You're going to get this  
27 confluence anyways.

1                   MR. RAY: Yes, but you don't always need  
2 to co-mingle it is the point. You don't need to,  
3 but if it's present then it's got to subject to  
4 whatever rules are deemed appropriate. If it's not  
5 present, that's the case that we're trying to  
6 consider here, okay. Why must it be assumed to be  
7 present if it's not?

8                   MR. MCKENNEY: Because it's in their  
9 brief, all three sites already.

10                  CHAIR RYAN: Well, that's not --

11                  (Simultaneous speaking)

12                  CHAIR RYAN: If you had a new site and  
13 we made a clean decision that we're not going to  
14 take uranium at this facility for the reasons that  
15 it's, you know, too hard to assess in the presence  
16 of all the other short-lived materials, why does it  
17 have to be there?

18                  MEMBER ARMIJO: Or if you have an old  
19 site and they wanted to get in the DU disposal  
20 business, the rule would say okay, if you're going  
21 to do that this is what you're going to have do and  
22 it's not the same rules that you have for your  
23 existing low-level waste site.

1                   You're going to have to make a new area  
2 in your facility and bury it deeper, protect it  
3 different ways and what all. But make it easy for  
4 people to do the job and know what rules they have  
5 to comply with. And for people who have no interest  
6 in DU, they shouldn't be at all affected by new  
7 rulemaking at all. It's simply not applicable.

8                   That's what I'm looking for, a simple  
9 way to structure the rule so that people can comply  
10 if they want to get into the DU business, which  
11 seems to be a large business.

12                  MR. CAMPER: Well, there's a lot of  
13 questions in your comments, but let me just react to  
14 a couple things. Certain of the conditions that  
15 would facilitate the disposal of this material are  
16 fairly straightforward and obvious. Deeper burial,  
17 on the order of eight to ten meters. More robust  
18 radon barrier.

19                  The remainder of the conditions for the  
20 disposal are going to be driven by what your site-  
21 specific performance assessment tells you about that  
22 site. And sites behave remarkably differently.

1                   And so that is that point of the  
2 performance assessment in the final analysis that  
3 the staff recommended to the Commission and it's  
4 contained in this proposed rule. How much of this  
5 material can go into that particular site and under  
6 what configurations considering all waste forms that  
7 are disposed there?

8                   So some of it's straightforward and  
9 obvious what has to be done. Deeper, better  
10 barrier. Some of it is driven more specifically by  
11 the conditions of that particular site.

12                   MEMBER SCHULTZ: Larry, were the  
13 conclusions reached by the staff, technical  
14 conclusions reached by the staff, different from  
15 those reached by the Department of Energy supporting  
16 their record of decision, 1999?

17                   MR. CAMPER: I would say not. I don't  
18 think so.

19                   MR. MCKENNEY: They're very similar.

20                   MEMBER SCHULTZ: Very similar, okay.

21                   MR. CAMPER: Very similar. See, this is  
22 the point I made a moment ago, and thanks for  
23 reiterating that question.

1                   Had our analysis led us to a different  
2 place, then my view was it would be necessary to go  
3 back to the Commission and convey that. Because as  
4 you'll see, the Commission direction that we were  
5 given coupled with certain -- you know, anytime the  
6 Commission gives the staff direction and you have to  
7 head down the pathway of creating a complex rule you  
8 try to ask yourself what indicators, what signals  
9 has the Commission sent to the staff about where  
10 they are on this particular issue? And I'm going to  
11 share a couple of those with you that helped for us  
12 to frame what ultimately became the proposed rule.

13                   But a key consideration certainly in my  
14 mind was if this material is not suitable for near-  
15 surface disposal I want the Commission to be told  
16 that. But that's not what we concluded in our  
17 analysis.

18                   MEMBER SCHULTZ: Right.

19                   MR. CAMPER: Albeit under certain  
20 conditions.

21                   MEMBER SCHULTZ: That was going to be my  
22 next point. Had you found something different you  
23 would be obligated to bring this forward to both the  
24 DOE and the --

1                   MR. CAMPER: I would have gone back to  
2 the Commission immediately, we would have, and we  
3 would have said, Commission, here we've done  
4 analysis, here's what we have, we would like more  
5 specific direction. Here are some options.

6                   MEMBER SCHULTZ: But the conclusion by  
7 both organizations, and this was some time ago, was  
8 that yes, suitable for but different than low-level  
9 waste disposal facilities, some low-level waste  
10 disposal facilities. Because the conclusions were,  
11 yes, under certain conditions.

12                  MR. MCKENNEY: But under certain  
13 conditions applies to low-level waste. You can't  
14 just put it anywhere. You need to have barriers  
15 around it. You need to have controls so it isolates  
16 the waste stream --

17                   (Simultaneous speaking)

18                  MR. MCKENNEY: -- during the period of  
19 performance of the hazard.

20                  MEMBER ARMIJO: But that's already  
21 defined for low-level waste. You've already defined  
22 it and people have been handling it adequately for  
23 years and years and years. So the low-level waste  
24 system is working.

25                  MR. RAY: Well, I think you can tell the  
26 solution direction that we keep referring to is know  
27 by the issue, and we're going to want to get there  
28 and examine that in more detail.

1                   MEMBER ARMIJO: Well, you know, there's  
2 all these legal questions. I'd like to stick with  
3 just the technical issue. If this stuff, you know,  
4 if DU has to be disposed of in a different way  
5 that's fine.

6                   MR. CAMPER: Well, and the answer is it  
7 does.

8                   MEMBER ARMIJO: And it does. And I  
9 don't think anybody's arguing with that. But then  
10 why in the world would you ever have the DU special  
11 requirements affect low-level waste, the Class A, B,  
12 C stuff at all?

13                  MR. CAMPER: Well, when you say affect  
14 it, I assume you mean by the imposition of a --

15                  MEMBER ARMIJO: Performance, even doing  
16 one day's of paperwork to say I have to reanalyze my  
17 site because I'm going to take something --

18                  MR. CAMPER: Well, I will continue to  
19 share with you certain Commission direction along  
20 the way that I think at least in part answers your  
21 question. I mean there was specific Commission  
22 direction along the way that continued to initially,  
23 in the next slide, initially, the first bullet that  
24 you see answers the question, Dr. Ray, that you  
25 brought up about this question of Class A waste.

1                   This issue specifically surfaced during  
2 the proceeding, and the Commission determined that  
3 depleted uranium is classified as Class A waste by  
4 default in 61.55(a)(6), but acknowledged that the  
5 regulatory basis did not explicitly analyze large  
6 quantities of, and then subsequently directed the  
7 staff to address that very question.

8                   Outside of the adjudication, consider  
9 whether the quantities of depleted uranium at issue  
10 in the proceeding warranted amending section  
11 61.55(a)(6) or section 61.55(a) of the waste tables.  
12 The staff's conclusion was that yes, it does warrant  
13 change.



1                   MR. RAY: Okay, but we are here for one  
2 primary reason and that's to give advice to the  
3 Commission, not to just comment on things that you  
4 guys bring in, as interesting and useful as that is.  
5 And, you know, if that's the key point in decision  
6 making, I just want us to be clear so we don't wind  
7 up -- I know it's a legal issue, Sam, but the point  
8 is, if that was the decision point that now has got  
9 us pinned in this box, we need to be clear among all  
10 the members here so we don't then get confused later  
11 on.               Yes, that decision was made. I can  
12 understand how it was made. The consequences of it  
13 weren't fully appreciated perhaps, and therefore our  
14 role here might be to say you had unintended  
15 consequences going forward and this is what -- we  
16 think you ought to revisit that decision. And  
17 that's our job.

18                  MR. CAMPER: Of course.

19                  MR. RAY: Okay. So just keep that in  
20 mind. I mean, there are many other issues here, but  
21 that happens to be the one I'm mostly focused on. I  
22 think some of the rest of us are as well.

23                  MR. CAMPER: And keep in mind that our  
24 purpose today is to try to explain the staff's logic  
25 and analysis given the assignments and direction  
26 that we had.

27                  MR. RAY: Yes.

1                   MR. CAMPER: Because I think this  
2 question about an alternate regulatory regime is  
3 something that prompted us to say, at least let's  
4 give the committee the benefit of our logic. That's  
5 all.

6                   MR. RAY: Yes, if that's a bad idea tell  
7 us. Tell us. But I haven't heard it in the  
8 argument that well, everybody does it. Well, of  
9 course everybody does it because it's a large source  
10 of revenue and anybody running a site is going to  
11 want to be able to dispose of depleted uranium. We  
12 understand that.

13                   But the consequences of that may change  
14 their mind or somebody's mind if, in fact, they are  
15 significant as apparently they are. And so please,  
16 go ahead. I'm sorry for the --

17                   MR. CAMPER: That's all right. Next  
18 slide. All right, so in answering the question as  
19 to whether or not it was appropriate, we did generic  
20 calculations of both arid and humid site conditions  
21 in reaching our determination that yes, it was  
22 suitable albeit under certain conditions.

1                   And, for example, shallow disposal of  
2   large quantities of DU or disposal at humid sites  
3   with potable groundwater pathways would likely  
4   result in the performance objectives in Part 61 not  
5   being met, and therefore you were going to be headed  
6   toward disposal in an arid site, arid at least for  
7   the foreseeable future. Next slide.

8                   MEMBER SCHULTZ: Larry, I'm sorry.

9                   MR. CAMPER: Sure.

10                  MEMBER SCHULTZ: Shallow and near-  
11   surface?

12                  MR. CAMPER: Three meters or less.

13                  MEMBER SCHULTZ: Yes, near-surface means  
14   30 meters or less.

15                  MR. CAMPER: Shallow is three meters.  
16   The term is near-surface which is 30 meters or less.  
17   In this case, shallow was three meters or less.

18                  MEMBER SCHULTZ: So that bullet said  
19   shallow --

20                  MR. CAMPER: Right. Shallow.

21                  MEMBER SCHULTZ: -- humid sites.

22                  MR. CAMPER: Three meters or less or a  
23   humid site, potable water.

24                  MR. MCKENNEY: The humid site's  
25   completely different because of the fact that the  
26   shallow is affecting possible radon release and  
27   stuff, like to either somebody who comes onto the  
28   site, or the other one is a groundwater problem.

1                   MR. CAMPER: Next slide. Actually the  
2 third bullet of the slide gets at most of these  
3 questions. Okay. Near-surface disposal of large  
4 quantities of DU may not be appropriate under  
5 certain conditions. You're going to have to bury it  
6 deeper, more robust radon barrier as I mentioned  
7 earlier. Unfavorable conditions include shallow  
8 disposal, we just described shallow, humid sites and  
9 so forth.

10                   And because of the ingrowth of progeny,  
11 the analysis time periods of 1,000 years or less  
12 result in a significant truncation of estimated  
13 risk. That was a staff conclusion early on from the  
14 analysis that we did way back for 08-0147.

15                   Now with that in mind go to the next  
16 slide. All right, when we completed our analysis we  
17 provided the Commission with four options. Option 1  
18 was a generic communication to clarify the need to  
19 demonstrate compliance with the performance  
20 objectives.

1                   It would be a generic communication,  
2 would carry no regulatory clout, but would reiterate  
3 the fact to the community, the regulating community  
4 and to the public that remember that if you're  
5 operating a site you've got to satisfy the  
6 performance objectives.           Option 2 was a  
7 proposal for a rulemaking to specify requirements  
8 for a site-specific analysis from 61.55(a)(6). That  
9 was our recommendation in the final analysis. Now  
10 in reaching that conclusion there's a couple pieces  
11 of information that I want to share with you.  
12 Because as I said, when the staff goes through the  
13 process of coming out with a rule, what you try to  
14 do is what signals has the Commission sent you about  
15 where it wants to go on a matter?

16                   And with regards to the Option Number 2,  
17 the rulemaking too requires site-specific  
18 performance assessment. The Commission said a  
19 couple of interesting things along the way. And let  
20 me just read with you, so bear with me. This was  
21 during the LES proceedings.

1                   The Commission gave considerable weight  
2 to the authority and ability of Agreement States  
3 during the LES national enrichment facility  
4 hearings. In a certain order of June '06, the  
5 Commission states, "The NRC does not regulate any of  
6 the five near-surface waste disposal facilities  
7 identified in the final environmental impact  
8 statement as potential locations for the disposal  
9 for the LES depleted uranium.

10                   "These potential disposal sites are  
11 either regulated by the state authorities under  
12 NRC's Agreement State program or by DOE. If LES  
13 ultimately chooses one of these waste disposal  
14 facilities it will fall within the purview of one of  
15 these authorities, not the NRC, to approve and  
16 regulate the disposal."           The Commission says,  
17 "We would expect the appropriate regulatory  
18 authority to conduct any site-specific evaluations  
19 necessary to confirm that radiological dose limits  
20 and standards can be met at the disposal facility in  
21 light of the quantities of depleted uranium  
22 envisioned."

23                   That's said to the staff that the  
24 Commission seems to recognize that these sites are  
25 operated by Agreement States and the Department of  
26 Energy and the Commission prefers to see a site-  
27 specific performance assessment completed to ensure  
28 that this material can be safely disposed of.

1                   And that was a key consideration in the  
2 staff's reaching the conclusion to recommend that a  
3 site-specific performance assessment be conducted.  
4 Also in the same Order, it's CLI-05-05, again in the  
5 same proceeding.

6                   The Commission stated that indeed when  
7 Part 61 was issued, its environmental impact  
8 statement explicitly acknowledged that the NRC might  
9 receive license applications involving disposal of  
10 low-level radioactive waste requiring either an  
11 enhanced near-surface disposal method or  
12 intermediate land disposal methods.

13                  It was and remains the NRC's intent to  
14 retain the flexibility to be able to address these  
15 license applications in the existing framework of  
16 the Part 61 rule, and in the end, the bottom line  
17 for disposal of low-level radioactive waste are the  
18 performance objectives in Subpart C of Part 61.

19                  So those two Commission positions led  
20 the staff to be comfortable with the idea of  
21 proposing that a site-specific performance  
22 assessment be required for the disposal of large  
23 quantities of depleted uranium, because the  
24 Commission has specifically said it recognizes there  
25 could be unique materials to be disposed of.

1                   The preference would be for it to be  
2   disposed of within the existing Part 61 framework,  
3   and that there was a preference for ensuring that  
4   there was site-specific analysis performed by the  
5   operating entity. In this case, for the commercial  
6   side that would be the four sites operated by  
7   Agreement States.           So the staff believed that  
8   its recommendation was consistent with the signals  
9   that the Commission had been sending during the LES  
10   proceedings.

11                  The third option that we recommended was  
12   to determine the classification for depleted uranium  
13   within the existing regulatory framework. We felt  
14   that that wasn't necessary. The appropriate way to  
15   go --

16                  CHAIR RYAN: Stop, Larry. Stop.

17                  (Telephonic interruption in proceedings)

18                  MR. CAMPER: So with regard to Option  
19   Number --

20                  CHAIR RYAN: I'm just going to make it.  
21   For those on the bridge line, if you'd put your  
22   phones on mute that would be helpful. Thank you.

23                  MR. CAMPER: The other two options that  
24   we addressed in the paper were, Option 3 was to  
25   determine the classification for depleted uranium  
26   within the existing classification framework.



1                   The bottom line on that was that when  
2 the classification table was completed during the  
3 rulemaking, '79 to '81, those classification tables  
4 and screening values were derived from a humid, wet  
5 site. And we didn't feel that given that the  
6 majority of the disposal of this material would most  
7 likely take place in the western United States,  
8 whether it be Utah or Texas, that was really an  
9 appropriate path to even go down.

10                   And then last but not least there was an  
11 option to re-examine the existing waste  
12 classification framework. We recommended to the  
13 Commission Option Number 2 for the reasons that I  
14 shared with you a moment ago. Next slide. And then  
15 the Commission gave us direction, and it said  
16 specify a requirement for a site-specific analysis,  
17 technical parameters and so forth.

18                   And it also had a Part 2 assignment in  
19 that SRM which said that in a future budget request  
20 the staff should propose the necessary resources for  
21 a comprehensive revision to risk-inform the Part 61  
22 waste classification framework, with conforming  
23 changes to the regulations as needed, using the  
24 updated assumptions and referencing the latest ICRP  
25 methodology. The effort should explicitly address  
26 the waste classification of depleted uranium.

1                   That was Option 4, if you will, in the  
2 paper that we presented to the Commission. So the  
3 staff got two assignments out of this. Proceed to  
4 require site-specific performance assessment, and at  
5 a later time re-examine the waste classification  
6 table.

7                   That latter assignment is still out  
8 there. It has been delayed and specifically  
9 directed by the Commission that we not do anything  
10 on that assignment until this rulemaking is  
11 completed, the ongoing rulemaking. But it's still  
12 out there to be dealt with at some point in time.

13                   And following the completion of this  
14 rulemaking, the staff does intend to circle back and  
15 communicate further with the Commission about that  
16 particular direction.

17                   → MR. RAY: Do you know why they said  
18 don't do anything about that until you've done the  
19 first thing?

20                   MR. CAMPER: Yes. I believe that there  
21 was a preference by the existing Commission that  
22 staff efforts not be diluted or distracted in any  
23 way from this ongoing rulemaking because the  
24 Commission believed it important to find a  
25 completely viable, safe, adequate pathway for the  
26 disposal of large quantities of depleted uranium,  
27 getting back to the point raised earlier, and that  
28 it didn't want the staff to be distracted.

1                   → MR. RAY: Yes. And I think we could all  
2 share that too. It's still comes to the question  
3 though why that solution to that urgent problem has  
4 to apply to low-level waste sites that don't use  
5 depleted uranium, don't --

6                   MEMBER ARMIJO: Don't accept large  
7 quantities.

8                   MR. RAY: Large quantities of depleted  
9 uranium. That's the thing that is so puzzling. And  
10 the one answer I've heard is, well, there aren't any  
11 such sites. But that's an issue that can change  
12 with time.

13                  MR. CAMPER: Well, with regards to the  
14 disposal of large quantities of depleted uranium, I  
15 mean that is the driving, I mean that was the 800-  
16 pound gorilla in the room, of course. But all sites  
17 have disposed of depleted uranium in quantities, and  
18 in some cases fairly large quantities that  
19 contribute to source term, of course.

20                  MEMBER ARMIJO: But they were disposed  
21 of in meeting existing regulations, and if they met  
22 those regulations that's a done deal. You're  
23 certainly not proposing that they reanalyze the site  
24 again.

1                   MR. MCKENNEY: Performance assessment is  
2 an iterative process and with new knowledge you do  
3 take account of your own source term into it.  
4 Unfortunately with some of the records we have high  
5 uncertainties in some of that source term.

6                   But you don't just do the safety  
7 analysis when you license a facility and never look  
8 at it again. So those sort of analyses do happen  
9 over time.

10                  MR. CAMPER: Also under Part 61 as it  
11 exists today there is a closure analysis that's  
12 going to have to consider that source term which has  
13 been disposed of already, aside from this ruling.

14                  MEMBER ARMIJO: Sure, but this  
15 rulemaking will add additional analysis requirements  
16 and I just don't understand why.

17                  CHAIR RYAN: I think if we're going to  
18 recognize that every performance assessment for  
19 every waste facility that I'm aware of is updated on  
20 a routine basis based on inventory, based on, you  
21 know, environmental data that fully informs what  
22 should be assumed for the behavior of that site and  
23 so on --

24                  MEMBER ARMIJO: Mike, I'm not arguing  
25 about existing requirements. I'm talking about  
26 additional requirements.

1                   CHAIR RYAN: Well, I guess what I'm  
2 trying to get to the point of is that, you know, I  
3 don't see what the additional requirement is. It's  
4 just accommodating additional waste that you're  
5 putting into the site in the same way you did the  
6 original analysis.

7                   MR. RAY: To me that's another issue,  
8 legitimate issue. I'm just simply wanting to have a  
9 path available to somebody who says, I reject large  
10 quantities of depleted uranium. I want to license a  
11 site for disposal of other low-level waste. I  
12 shouldn't be subject to rules that are only in  
13 existence because I might have wanted to dispose of  
14 depleted uranium. That's my simple point. What's  
15 done is done. You know, what the rules are for  
16 existing sites and all of that is another debate in  
17 my mind. Anyway, please proceed.

18                  MR. CAMPER: Yes, sir. Next slide. So  
19 how and when did this rule become more complicated  
20 other than just being a limited rulemaking, is a  
21 very intriguing and interesting question. And  
22 that's because certain things emerged along the way.  
23 For example, the issue of blended waste emerged.

1                   There was a desire by at least one  
2   organization to blend Class A, B, and C waste into  
3   Class A waste at or near the limits of Class A  
4   waste. And by the way, when Part 61 was developed,  
5   the limits for Class A, B, and C waste were not the  
6   driving factor that determined the concentration  
7   values in those tables. It was the 26 or so waste  
8   streams that were identified for analysis at that  
9   time.

10                   And so now you have this issue that  
11   emerged that you may have waste at or near the  
12   limits of Class A, and the Commission directed the  
13   staff -- pardon me?

14                   MR. MCKENNEY: Sorry, significant  
15   amounts.

16                   MR. CAMPER: Significant amounts.

17                   MR. MCKENNEY: And again there's always  
18   been right at-Class canisters, but once you get,  
19   like, a large section of disposal sites all at a  
20   Class limit, that wasn't really analyzed in the EIS.

21                   MR. CAMPER: So the staff was directed  
22   by the Commission to include that consideration  
23   within the rulemaking, limited waste. Along the way  
24   additional Commission direction emerged, and you see  
25   it here in this slide.

1                   And this direction was provided to the  
2 staff just before we were going to provide our  
3 proposed rule to the Commission which was in January  
4 of a year ago, in '13. So in that direction the  
5 Commission directed us to provide flexibility to use  
6 the current International Commission on Radiological  
7 Protection, ICRP.

8                   We were going to do that anyway in our  
9 proposed rule because currently it requires that you  
10 seek an amendment. We planned to do that. The  
11 Commission expressed a two-tiered period of  
12 performance. We had planned to do that in our  
13 proposed rule anyway.

14                  But the operative term in that direction  
15 is "reasonably foreseeable future." The Commission  
16 was aware at the time that the staff's proposed  
17 period of compliance was going to be 20,000 years  
18 because of the depleted uranium issue. And we had  
19 what we thought were valid, technical reasons for  
20 that, but it was clear the Commission was not  
21 enamored with that particular period of compliance  
22 and directed the staff to proceed in a different  
23 way.

1                   That's fine. The Commission does that.  
2 The Commission makes policy. And so we did. We  
3 moved away from where we were going in a proposed  
4 rule and came up with the ones you see today that's  
5 under consideration by the Commission, which is  
6 10,000 years.

7                   The Tier 2 was something that we had  
8 already had in there for a longer period of  
9 evaluation for a site. The next direction,  
10 flexibility to establish site-specific waste  
11 acceptance criteria based on the results of the  
12 site-specific performance assessment was new  
13 direction. It was new direction provided to the  
14 staff by the Commission.

15                  Provide an alternate or pathway in Part  
16 61 that would rely upon the use of waste acceptance  
17 criteria. All of these sites already have  
18 established waste acceptance criteria, but what the  
19 Commission asked us to do here, or directed us to  
20 do, I should say, was ensure that the WAC pathway,  
21 the waste acceptance criteria alternative was  
22 codified in Part 61.

23                  And then the last direction from the  
24 Commission at that time was to balance federal-state  
25 alignment and flexibility. The staff was aware of  
26 that, and of course that translates into  
27 compatibility assignment.



1                   So that concludes my points at this  
2 time, and Chris is going to pick up and talk about  
3 some more of the technical parameters that have  
4 already been raised by several of members of the  
5 committee already, and maybe he can help provide  
6 some additional clarification.

7                   So my point was to share with you the  
8 staff's logic and analysis and why we reached the  
9 conclusions that we did on about how to proceed. I  
10 hope that's helpful to you. I recognize that  
11 depleted uranium raises a number of unique  
12 challenges and questions. We understand that. But  
13 I thought we would benefit from having that logic  
14 shared with you at this point in time.

15                 → MR. RAY: Well, it is helpful and I do  
16 appreciate it, and thank you for it. I'm still  
17 struggling though with why, with the way I framed  
18 the question earlier, if somebody came in and said I  
19 forego ever taking large quantities of depleted  
20 uranium, why aren't the existing Part 61  
21 requirements sufficient for my site, why that isn't  
22 a path that can be followed?

1                   And maybe there's no direct answer to  
2   that because maybe the question hasn't been raised.  
3   But perhaps we'll raise it. I don't know. But it's  
4   one that I wouldn't want to raise it if it had  
5   already been raised and addressed and we were simply  
6   ignorant of the answer. But at this moment in time  
7   it's still a legitimate question in my mind.

8                   CHAIR RYAN: Harold, I agree with you.  
9   It's a very good question. I think the practical,  
10   and correct me if I'm wrong, but I think the  
11   practical reality is that every low-level waste site  
12   has taken DU. So this would be a new site, is that  
13   right?

14                  MR. MCKENNEY: Yes, it is. It is. I'll  
15   get into some --

16                  (Simultaneous speaking)

17                  MR. MCKENNEY: -- later. But the other  
18   part of it is that fundamentally with the rule what  
19   we're trying to do is establish everything to be  
20   dependent upon a site-specific analysis so they can  
21   take credit for their revised engineering.

1                   So we're not talking about being hooked  
2 to a humid site, a generic humid site modeled back  
3 in the '80s. And so if you had a site that didn't  
4 have DU to these things, even if we had some of  
5 these long-term things like some of these additions  
6 we've had, like the whole long-term analysis, the  
7 post-10,000 year thing, if you had conventional low-  
8 level waste you wouldn't even have to do it, because  
9 it's got a discriminator in it that says you don't  
10 need to do it. You won't have enough long-lived  
11 waste.

12                   MR. RAY: Okay, now you're getting right  
13 to the heart of my question.

14                   MR. MCKENNEY: And then the only other  
15 two things is we already required a site-specific  
16 analysis for the environment anyways, now we can  
17 discuss time of compliance issues.

1                   But the other addition we have to the  
2 rule is, instead of just relying on the waste  
3 acceptance criteria in 61.55 to protect the intruder  
4 we've said you just do an analysis. Again that will  
5 allow you to take credit for what you have like  
6 engineered barriers, depth and some other things,  
7 management controls, if you put waste in certain  
8 configurations.                   But then if they're not DU,  
9 then they're not going to have the DU thing there  
10 and they can now take credit for that if they wanted  
11 to develop it with site-specific WAC for low-level  
12 waste.

13                   MR. RAY: Okay, simple question to boil  
14 down what I think you're saying. If I come in and  
15 do what I hypothesize somebody should be able to do,  
16 to say I will not take large quantities of depleted  
17 uranium, are you telling me that I wouldn't then  
18 face any new requirements that are more difficult to  
19 meet than exist today?

20                   MR. MCKENNEY: Not that what certain  
21 sites have already licensed under, no. Certain  
22 sites have been licensed under, allowed the criteria  
23 --

24                   MR. RAY: Is the answer yes?

25                   MR. MCKENNEY: Yes.

26                   MR. RAY: Okay. So deplete -- I --

27                   MR. MCKENNEY: I just can't say for  
28 every site because every site --

1                   MR. RAY: You're not requiring me to  
2   assume large quantities of depleted uranium --

3                   MR. MCKENNEY: No.

4                   MR. RAY: -- and to make provision for  
5   large quantities of depleted uranium.

6                   MR. MCKENNEY: No. The waste stream you  
7   need to put in your PA and you need to assess is  
8   what you expect.

9                   MALE PARTICIPANT: That's right.

10                  MR. MCKENNEY: And how you expect to  
11   manage it.

12                  MR. RAY: And I'm not going to have to  
13   do things under the revised Part 61 that I wouldn't  
14   have had to do before you revised it if I'm not  
15   taking large quantities of depleted uranium, right?

16                  MR. MCKENNEY: Right, right. There is -  
17   -

18                  MR. RAY: Okay, that's very helpful.

19                  MR. MCKENNEY: Some things have changed  
20   from guidance into the regulation, but as a practice  
21   as what people have done and what people have done  
22   in licensing, it's very similar.

23                  MR. RAY: Okay, but it's not that clear  
24   in what you've said.

25                  MEMBER STETKAR: Larry, I think, had --

26                  MR. CAMPER: Well, no, the point I want  
27   to make is, there's two ways to think about your  
28   question. One is the point that Chris just made.

1                   I mean, your performance assessment for  
2 your site considering your source term and your  
3 projected waste receipt is going to drive you to  
4 what it is you need to do to be compliant. Now some  
5 states like South Carolina say they're not going to  
6 take anymore. Well, that's quite a different  
7 situation than what's going to happen in Utah, most  
8 likely, or certainly WCS.

9                   Well, let me answer the Part 2  
10 philosophically. I don't think the staff knows or  
11 should know, or could possibly prophesize what's  
12 going to happen in South Carolina or Utah or Texas  
13 or Washington or some other state where a site might  
14 be developed, and what might happen 50 years from  
15 now. We don't know.

16                  What we do know is depleted uranium has  
17 been disposed of in the four commercial operating  
18 sites right now. There's a great deal of it.

19                  MR. MCKENNEY: Three. Not Texas.

20                  MR. CAMPER: Three. Not Texas yet. But  
21 there's a great deal of it to be disposed of. Some  
22 of it has been disposed of, and what we have to do  
23 is to make sure that there's a regulatory regime to  
24 allow for it to be disposed of safely. What will  
25 happen beyond that we don't know.

1                   MR. RAY: Wait a minute now. Hold on  
2 guys. When the Clive, Utah facility person came in  
3 and talked to us, one of the suggestions was what I  
4 interpret to be what I'm just asking you, from at  
5 least a pragmatic standpoint.

6                   He said, let's have a separate rule for  
7 depleted uranium or a separate requirements for  
8 depleted uranium and one rule for all low-level  
9 waste. It sounds to me like because of what you're  
10 saying, effectively you believe that's what's  
11 happening. In other words, if I don't take depleted  
12 uranium then I'm not having to do anything that I'm  
13 not.

14                  MEMBER STETKAR: I think you're right,  
15 Harold. You're understanding, if I had a site and  
16 wasn't burying depleted uranium, I'd go to the  
17 regulator and say I want to put a big X through this  
18 section because I don't need it, plan on using it.

19                  MR. RAY: But, you know, I'm telling you  
20 that people don't have that picture clearly enough,  
21 I think. I didn't, this person didn't that listen,  
22 you don't have to do anything more than you're doing  
23 now or you did in the past if you forego depleted  
24 uranium.                   And I don't want to talk about  
25 existing sites because that's a complicated problem  
26 that isn't going to go away.

27                  MR. MCKENNEY: Unfortunately, yes, we  
28 face it. But yes.

1                   MEMBER ARMIJO: But I do want to make  
2 sure. If you forego additional disposal of large  
3 quantities of depleted uranium if you've already  
4 disposed of depleted uranium, are you okay?

5                   CHAIR RYAN: No.

6                   MEMBER ARMIJO: The answer is no.

7                   MR. MCKENNEY: The levels, I believe  
8 we've done some basic assessments, and the current,  
9 I think the current volumes for the long-term  
10 analysis, the post-10,000 year analysis in our third  
11 term, the currently disposed of waste may be very  
12 close to not requiring the long-term analysis,  
13 because that is averaged over the entire site  
14 inventory is those concentrations in that table,  
15 which makes it a little bit complex, but I'm not  
16 sure if they are going to be affected by long-term  
17 analysis at all.

18                  MR. CAMPER: And you do understand --

19                  MR. MCKENNEY: And they already have PAs  
20 that they do analyze right now.

21                  MR. CAMPER: And you do understand,  
22 let's take South Carolina directly, for example,  
23 because that's the most problematic. The state of  
24 South Carolina as a regulator can grant an  
25 exemption.



1                   If they determine that the amount of  
2 material that's been disposed of there has been  
3 properly analyzed, properly disposed of and no more  
4 depleted uranium is going to be disposed of in the  
5 state of South Carolina, that regulator can grant an  
6 exemption to this requirement.

7                   CHAIR RYAN: That's an additional  
8 process to go through and, in fact, when it was  
9 disposed of it was viewed as being disposed of  
10 safely. And you're reopening the question --

11                  MR. CAMPER: Then the regulator might  
12 argue that's a basis for granting --

13                  MR. RAY: I want to get, stick on this.  
14 Because these rules that they seem like they're not  
15 going to cause additional work with no safety  
16 benefit, but they will cause additional work, and I  
17 believe there will be no safety benefit. But there  
18 will be a lot of administrative work and analyses  
19 and exemptions and documentation and nothing  
20 physical will change.

21                  CHAIR RYAN: Okay, but we can --

22                  MR. RAY: -- just to raise that.

23                  CHAIR RYAN: That's fine. Raise that.  
24 But that's for existing sites.

25                  MR. RAY: No, this --

26                  CHAIR RYAN: Wait a minute.

27                  MR. RAY: Okay.

1                   CHAIR RYAN: Listen to me, if you would,  
2 please. This guy was complaining about there not  
3 being a separate rule for depleted uranium and  
4 recommended that there be one. As I read, he  
5 doesn't make any reference here to existing sites,  
6 like you are, and I just want to make sure that  
7 what's driving the problematic parts of this Part 61  
8 limited revision are just associated with the  
9 receipt of large quantities of depleted uranium and  
10 not with anything else.

11                  MR. MCKENNEY: Not exclusively. Because  
12 when we, again we were already part of the way down  
13 of saying we're going to do site-specific analyses,  
14 enhance the site-specific analyses that already were  
15 in the rule, but also add an intruder assessment  
16 rather than just reliance on the classification  
17 table.                   Because of that, that's when  
18 the Commission said just incorporate the effects of  
19 the blending, because one of the things about  
20 blending was that you had large quantities of at-  
21 Class limit material potentially right next to each  
22 other, okay, on a generic basis.

23                  That becomes a different intruder issue  
24 than was evaluated in the EIS space back in time.  
25 Because they had assumed you would have high and low  
26 next to each other, so the average waste that the  
27 intruder would see would be nowhere near the Class  
28 limit at the time for the generational.

1                   So that intruder part of it does cover  
2 not only that but also any other potential waste  
3 forms like we've also had, so earlier discussions of  
4 reprocessing. So it was like, by allowing site-  
5 specific analyses of these things we can allow for  
6 innovation and design of the facilities, waste forms  
7 or even waste streams that could come in and they  
8 could evaluate them on a need basis. And some of  
9 those may have more conventional radionuclides at  
10 different concentrations than normal, but --

11                   → MR. RAY: Okay. But I think the thing  
12 we've been focused on is the extremely long-lived  
13 depleted uranium and the intruder of analysis that  
14 becomes so problematic when you're talking way, way  
15 out in time.

16                   MR. MCKENNEY: Right.

17                   MR. CAMPER: The other point that hasn't  
18 been mentioned is with regards to how this went from  
19 being a limited rulemaking to more complex, and  
20 Chris just touched upon it. And that is, the staff  
21 in its deliberations wanted to make sure that, there  
22 might be other waste streams that emerged, for  
23 example, from reprocessing. Let's not try to open  
24 up this rule again for some waste stream that we  
25 don't know what it is yet.

26                   MEMBER SCHULTZ: But why not?

27                   MR. CAMPER: But by requiring a site-  
28 specific --

1                   MR. MCKENNEY: That was a suggested by a  
2 lot of stakeholders and in the public meetings we  
3 had in '09 to '10.

4                   MEMBER SCHULTZ: We're talking about the  
5 last 20 years, and much of what we're discussing is  
6 the last five or six years. Why do we have to  
7 pronounce and create a system that's going to be so  
8 difficult to apply even to current processes in  
9 order to protect against something that we don't  
10 know about in the future? Because that's exactly  
11 what we're doing. We're imposing all kinds of what-  
12 ifs on a process for the purposes of not having to  
13 consider this again.

14                  MR. CAMPER: Well, no, you're --

15                  MEMBER SCHULTZ: That's what you just  
16 said that we're going to try to make sure we don't  
17 have to revisit this.

18                  MR. CAMPER: This is driven primarily by  
19 depleted uranium as we have said.

20                  MEMBER SCHULTZ: Exactly.

21                  MR. CAMPER: Along the way there was a  
22 recognition that other waste streams might emerge,  
23 and the question is does this regulatory approach  
24 encompass those potential waste streams to the  
25 maximum extent that we can forecast, and the answer  
26 is yes.

1                   MR. MCKENNEY: I mean, we're comparing  
2 here a difference between if we have a rule that is  
3 focused on allowing site-specific analyses to take  
4 account and to analyze the situation at the site  
5 what the waste streams are going to encompass,  
6 that's one solution to the issue.

7                   Of course, the other solution would be a  
8 specific section on DU that said you can only have  
9 this much, you can only have this quantity. You  
10 have to have it at this depth, those requirements.  
11 Prescriptively or something similar to that.

12                  And when we were already saying that we  
13 were thinking about going on the risk-informed with  
14 a site-specific analyses, that's when we're like, if  
15 we do it that way, one of the pros of that way is it  
16 accommodates for anything and has a less likelihood  
17 of having to do specific prescriptive rules in the  
18 future for specific new waste streams.

19                  And that the sites can be dynamic in  
20 their running of their sites by being able to take  
21 credit for their engineering, being able to take  
22 credit for their waste streams and their management  
23 of the waste, rather than having to come and ask the  
24 NRC, well, or the state regulator, now, this new  
25 waste stream we've talked about with this client  
26 doesn't fit within the scheme, and what are you guys  
27 going to do about it?

1                   MEMBER SCHULTZ: That's Paragraph 2.  
2 That's Part 2 to address later. That's what I  
3 understood from what you said earlier.

4                   MR. MCKENNEY: Well, once you do a site-  
5 specific analysis though, we can, then the site,  
6 especially now that we have the direction for WAC,  
7 the site has the ability to address those issues as  
8 they decide to take that type of waste and work with  
9 the regulator then, rather than having to wait for a  
10 rulemaking to establish the parameters.

11                  And that was why we talked about a lot  
12 of the other things, was because we decided on, with  
13 that solution path in mind of a site-specific  
14 analyses it started to, without any additional --

15                  MEMBER SCHULTZ: But I'm going back to  
16 Slide 10 which is, in a future budget request  
17 propose the necessary resources for a comprehensive  
18 revision. Now suddenly we're talking about that  
19 now.

20                  MR. MCKENNEY: No. We have not talked  
21 about comprehensive revision. Revision would be  
22 going through every part of the rule and seeing  
23 whether we still need siting criteria, we still need  
24 the various other parts of what is the assumption  
25 for institutional control, those sort of things.

1                   CHAIR RYAN: I guess I'm stuck with a  
2 very basic thing here. If a site's licensed it's  
3 got a waste profile that it can take. These are the  
4 things you can take, these are the quantities, these  
5 are the physical and chemical forms, et cetera,  
6 done.

7                   All right, now you'll maybe want to  
8 change that. How does that process work? I go to  
9 the state regulator. There's no federal license on  
10 this or anything, so I go to the state regulator and  
11 I say this is what I want to do different. Here's  
12 why I think it's okay. A couple of sentences but,  
13 you know.

14                  MR. CAMPER: Right. Based on PA.

15                  CHAIR RYAN: So I'm based on the  
16 performance assessment that I used to license the  
17 facility, now adding these materials and these forms  
18 under these conditions packaging all the rest, what  
19 do you think? And it's a yes or a no answer.

20                  MR. CAMPER: Right.

21                  CHAIR RYAN: It's not tough. It's not  
22 going to take, you know, hundreds of thousands of  
23 pages or calculations to figure it out. How much is  
24 it, what's the physical form, what's the chemical  
25 form, what's the mobility?

1                   That pretty much gets you there, so it's  
2 not a complicated process to add a waste or to add a  
3 limited quantity of a waste or one package of a  
4 special waste that, you know, for whatever reason  
5 has to be, you know, from a clean-up of some  
6 situation at a licensed facility or whatever it  
7 might be. That's done all the time. There's  
8 nothing unique there.

9                   MEMBER ARMIJO: Well, Mike, you've  
10 described the current --

11                  CHAIR RYAN: Right.

12                  MEMBER ARMIJO: -- regulatory  
13 environment. And what I'm worried about is that the  
14 Part 61 proposed regulations is going to create work  
15 where there's really no benefit, and that's really  
16 what I'm -- for example, let's say I have a site,  
17 and I'm only interested in existing sites not new  
18 sites because I very much doubt that there's  
19 commercial incentive for a new site.

20                  But anyway, existing site. I've  
21 disposed of depleted uranium in reasonably, a few  
22 tons, let's say. I don't know. Pick a number. But  
23 I did it under the existing regulations. It's  
24 disposed of, it's safe, and I don't intend to take  
25 anymore in the future.



1                   Now, and based on the discussion I got  
2 the impression that well, these new regulations  
3 aren't going to bother you at all. You just keep  
4 doing what you've been doing in the past. But I  
5 don't think so. Because the new regulations also  
6 put in intruder assessment requirements for depleted  
7 uranium that might bleed back into the existing site  
8 to have to do something different, and which I would  
9 argue why should I? You know, I've done it. I've  
10 met the requirements. There is no safety problem.  
11 Why should I have to do anymore? And that's what  
12 I'm worried about.

13                   CHAIR RYAN: And I agree with you 100  
14 percent with one caveat. If the monitoring data  
15 shows there's some deviation from what the expected  
16 behavior was then that door would be open. And I  
17 guess I can't think of any other reason why it would  
18 be open other than that.

19                   (Simultaneous speaking)

20                   CHAIR RYAN: Because you've done an  
21 environmental monitoring program on the site, at the  
22 site, you know, within the site and around the  
23 periphery of the site.

24                   MEMBER SCHULTZ: Practically. But under  
25 these new regulations is that the case?

1                   CHAIR RYAN: As far as I can read, yes.  
2 I mean I don't see anything that says thou shalt  
3 take, you know, extraordinary measures to further  
4 control beyond your monitoring program.

5                   MR. MCKENNEY: Right. And also, I mean,  
6 if they've disposed of mostly to the classification  
7 limits, again, most of these sites are on average  
8 for their inventory are at a relatively low  
9 percentage of the class limit of the previous  
10 disposed of waste, except for, of course, the DU is  
11 a different issue because of course it just is by  
12 default. But all of the rest of the radionuclides  
13 are at a very small percentage.

14                   So an intruder assessment of looking at  
15 that inventory would say, hey, we've got a well done  
16 margin. That's what, like when Washington re-did  
17 their analysis and they did intruder assessments  
18 back out in, for even the old waste in 2003. And,  
19 you know, they were showing that the peak intruder  
20 risk was a little over 100 millirem and for a 500  
21 millirem limit.

22                   So, you know, it was like, they looked  
23 at their waste streams, looked at pretty much some  
24 areal activities on where some stuff was disposed  
25 together and stuff not --

1                   CHAIR RYAN: So existing sites have all  
2 of this kind of performance assessment analysis that  
3 Chris just described, done, finished, and available  
4 as a reference for anything they might want to --

5                   MR. CAMPER: That's the point I was  
6 going to make. I'm not as convinced that there's  
7 this additional regulatory burden that's being  
8 referred to. I'm not sure that I'm convinced of  
9 that at all. I mean already under 61.12 and 13  
10 they're required to do a technical analysis.  
11 Already in Part 61 they're required to do a closure  
12 analysis.

13                   The states that operate these sites  
14 already have periods of compliance. South Carolina  
15 2,000 years, Washington 10,000 years, Utah is going  
16 to 10,000 years. Texas, 1,000 or 10,000 --

17                   (Simultaneous speaking)

18                   MR. CAMPER: -- in peak dose. I think  
19 that those sites that have large quantities of  
20 depleted uranium disposed on them will have  
21 additional regulatory burden to deal with it. But  
22 that's for those sites that are going to be  
23 disposing of large quantities of depleted uranium.  
24 Aside from that I don't think there's a huge  
25 increase in regulatory burden.

1                   → MEMBER ARMIJO: Why do you use huge?  
2 Why don't you say, hey, those guys that aren't going  
3 to take large quantities of depleted uranium will  
4 have no additional regulatory burden imposed as a  
5 result of this rulemaking? That to me would be  
6 satisfactory. Because if I'm not in that business  
7 why should I be affected?

8                   MR. CAMPER: I didn't say no, I said a  
9 lot.

10                  MEMBER ARMIJO: You said huge, huge  
11 regulatory burden. Why any?

12                  MR. CAMPER: I mean, clearly the  
13 requirement to assess for an intruder at 500  
14 millirem is something they will have to do.

15                  MEMBER ARMIJO: Which they don't do now?

16                  MR. MCKENNEY: Some have, some haven't.

17                  MR. CAMPER: There's not a requirement  
18 for a dose limit at 500 millirem. Five hundred  
19 millirem was the driving number that was used in  
20 Part 61 when it was created. There's no regulatory  
21 requirement at 500 millirem. This rule would impose  
22 that they'd have to ensure that that's being met.

23                  MEMBER ARMIJO: Why? Why do you have to  
24 ensure that's being met if you didn't have to ensure  
25 it in the existing regulation?

1                   MR. CAMPER: Along the way, along the  
2 way in the course of staff meeting with various  
3 groups and the public, it was recommended and  
4 suggested by a certain group that there be an  
5 intruder dose limit set forth in the regulations.  
6 It was implied when we did the rule way back when in  
7 Part 61, the staff felt that was a reasonable  
8 recommendation and chose to include it in the  
9 regulation proposed.

10                  MEMBER ARMIJO: You could have chosen  
11 not to include it.

12                  MR. CAMPER: Sure.

13                  MEMBER ARMIJO: And so I'm challenging  
14 why include it? If it was satisfactory --

15                  CHAIR RYAN: Are you recommending taking  
16 it out?

17                  MEMBER ARMIJO: Why 500? Why not the  
18 same as a worker dose, annual worker dose?

19                  MR. RAY: Mike, there's a request to  
20 comment over here.

21                  MR. ESH: This is Dave Esh from the FSME  
22 staff. On this issue of why you needed to do this,  
23 I think we've covered this before and I don't know  
24 if they covered this this morning. I was in some  
25 required training and I just got here, so if they  
26 already covered it just stop me.

1                   But the existing regulation assumed a  
2     certain type of waste was going to go into low-level  
3     waste facilities. Based on that, NRC did an  
4     analysis to develop the waste classification tables.  
5     The waste classification tables are a substitute for  
6     a site-specific intruder assessment. Basically they  
7     said there weren't going to be a lot of waste sites  
8     so NRC can just do that analysis itself, develop a  
9     table, and that ensures protection for 61.42.

10                  When we move forward to today, I think  
11     what they're talking about is we have one new waste  
12     stream, depleted uranium, another blended waste, and  
13     then potentially others from fuel cycle changes or  
14     what have you that may have profiles and isotopes  
15     that are not reflected in the waste classification  
16     table development.

17                  So the only thing you really need to do  
18     for this rulemaking is make sure an intruder  
19     assessment is done. That's the essential piece that  
20     you need. Other stuff was all recommended by  
21     stakeholders and they said, look, we have different  
22     approaches for time of compliance in our states, we  
23     want to make sure that's uniform -- features, events  
24     and processes -- to get the scope of the analysis  
25     right.

1                   Right now the regulation doesn't say  
2 anything about uncertainty, but I think we've talked  
3 about with you, and the committee has discussed  
4 uncertainty a lot, all different types. So those  
5 are things we put in because of all the early  
6 feedback we got in the process.

7                   But the reality is the intruder  
8 assessment to deal with these different waste  
9 streams is the essential part that you needed to do  
10 in the rulemaking. And as I think they covered in  
11 the slides before I got here, we proposed different  
12 approaches to the Commission to handle that issue.  
13 One was to just use the waste concentrations for  
14 uranium that were already developed in the DEIS.

15                   But they said no, we don't want to do  
16 that because that was done for specific site  
17 condition and specific assumptions, and if you have  
18 a different site with different conditions and  
19 assumptions it may not be valid and you may be  
20 handcuffing yourself or you may be more liberal than  
21 what you should be doing.

22                   So the site-specific analysis was the  
23 right way to go is how they directed us, and where  
24 we got to now is the result of that.

25                   CHAIR RYAN: Thanks, David.

1                   MEMBER ARMIJO: Just to make sure I  
2 understood that. The existing waste classification  
3 tables have built into them an intruder assessment  
4 done by the staff to some dose limit?

5                   MR. MCKENNEY: To 500 millirem.

6                   MR. CAMPER: Five hundred millirem or  
7 the --

8                   MEMBER ARMIJO: So that was already --

9                   MR. CAMPER: That's built in.

10                  MEMBER ARMIJO: That's built into the  
11 classification table.

12                  MR. CAMPER: For the waste streams  
13 evaluated at the time the tables were developed.

14                  MEMBER ARMIJO: Which included limited  
15 quantities of DU.

16                  MR. MCKENNEY: Included limited  
17 concentration of uranium, yes.

18                  MEMBER ARMIJO: Limited concentrations  
19 or quantities.

20                  MR. MCKENNEY: Yes.

21                  MEMBER ARMIJO: So again I'm getting  
22 back to the thing for people that met and used the  
23 waste classification tables and met those  
24 regulations and say I'm not going to take tons and  
25 tons of DU, I'm not in that business, are they  
26 grandfathered? Can they just walk away and say the  
27 new rule requirements other than some administrative  
28 improvements don't really apply to me?



1                   MR. MCKENNEY: No. We aren't  
2 grandfathering on this basis.

3                   MEMBER ARMIJO: And I'm just asking you  
4 --

5                   MR. MCKENNEY: The Agreement States can  
6 choose to do that on their own with their own  
7 powers, on specific parts of the site or a specific  
8 --

9                   MEMBER ARMIJO: They can be  
10 grandfathered? Can they be grandfathered?

11                  MR. MCKENNEY: They can do an exemption  
12 process to parts of the license or to the whole  
13 site.

14                  MR. CAMPER: If an Agreement State wants  
15 to exempt its operator from the dose requirements  
16 for an intruder they may do that. But we're not  
17 grandfathering them, whatever that means.

18                  MEMBER STETKAR: Would they ever do that  
19 in practice if there was federal lawmaking to the  
20 contrary?

21                  MR. CAMPER: I don't know, but my guess  
22 would be unlikely.

23                  MEMBER STETKAR: Right.

24                  MEMBER ARMIJO: And so effectively the  
25 exemption would be a real uphill struggle even  
26 though technically there would be a merit to it in  
27 argument that it was reasonable to do that.

1                   MR. CAMPER: Well, our conclusion as a  
2 staff, for the reasons that Dr. Esh has already  
3 articulated and that I said earlier, we reached a  
4 conclusion that requiring the intruder dose at the  
5 500 millirem limit, which was the value that was  
6 used when the tables were created all those years  
7 ago, was an appropriate course of action to include  
8 within this regulation. That was our final  
9 conclusion.

10                   If the state wanted to exempt they  
11 could. Do I think they would? Probably not. I  
12 think they would find themselves, frankly, in  
13 considering such an exemption, fraught with  
14 considerable criticism by the stakeholders.

15                   MEMBER ARMIJO: They'd be criticized  
16 because the NRC had taken a different position. So  
17 you really are in the lead, and that's why I'm  
18 concerned that --

19                   CHAIR RYAN: As the chairman I'm going  
20 to make a suggestion.

21                   MEMBER ARMIJO: Okay. I'm not the  
22 chairman anymore.

23                   CHAIR RYAN: It's now three minutes past  
24 our break time and I don't want to challenge  
25 anybody's biology here. So I'm going to suggest we  
26 take our scheduled break which is about ten minutes  
27 or so, and we'll make it 15. And we'll come back at  
28 25 of, okay?

1                   MR. CAMPER: And we'll finish up the  
2 slides then at that point?

3                   CHAIR RYAN: We'll continue.

4                   (Whereupon, the foregoing matter went  
5 off the record at 10:19 a.m. and went back on the  
6 record at 10:39 a.m.)

7                   CHAIR RYAN: Okay, I guess I'm asking  
8 you to come to order please and we'll reconvene the  
9 meeting. And Larry?

10                  MR. CAMPER: Yes, sir. Chris?

11                  MR. MCKENNEY: Well, let me talk mostly  
12 about these so this will go. At present there's a  
13 little over 700,000 metric tons of concentrated  
14 depleted uranium in the country and it's growing as  
15 production grows, and we've said that there's  
16 upwards of 1.3 if you look at the next 30 years of  
17 enrichment processes. So you have a large amount.

18                  Depleted uranium is really known in the  
19 short term as like a chemical. Toxicity is usually  
20 the main hazard. But because of the growth in  
21 progeny over time the material will have an  
22 increased radiological hazard. Obviously the  
23 uranium really doesn't change, it's just that you  
24 get progeny with it.

1                   The activity profile is very different  
2   from conventional low-level waste or mill tailings.  
3   And on this I've got Barnwell's inventory and I've  
4   got a similar amount, I think they're both at right  
5   about 1.4 million metric tons, right?

6                   MR. ESH: Yes, they're about the same.

7                   MR. MCKENNEY: They're about the same  
8   volume of depleted uranium.

9                   MEMBER SKILLMAN: Same volume or same  
10   mass?

11                  MR. ESH: They're the same volume.

12                  MR. MCKENNEY: Same volume.

13                  MEMBER SKILLMAN: Metric tons sounds  
14   like --

15                  MR. MCKENNEY: Sorry. I take back the  
16   one million metric tons. That's a different site.  
17   I'm sorry. This is on a volume basis too, so we can  
18   compare. Because we have Barnwell based on volume  
19   not on the actual mass of material actually disposed  
20   of at Barnwell.

21                  MR. ESH: It's based on comparing like  
22   an equal size facility which is volume not mass.

23                  MEMBER SKILLMAN: Thank you.

24                  MR. ESH: Of course if your waste is  
25   much more dense you'll fit more in and if it's less  
26   dense you'll fit less.

1                   MR. MCKENNEY: So this is considering  
2 with 80 percent by volume depleted uranium disposal.  
3 Again, just like with the EPRI calcs and everything  
4 else, on the low-level waste site you see the large  
5 reduction in activity of the various radionuclides.

6                   Now in performance assessment space most  
7 of those radionuclides, especially with the waste  
8 classification table, are not really considered by  
9 the performance assessment people to be much of  
10 anything. You know, cesium and cobalt-60 are more,  
11 in actuality is more of an operation space, now with  
12 the fact that we have the waste tables in the thing  
13 and that's how the system works right now.

14                  PAs just don't include cobalt-60 or  
15 cesium or strontium because they are gone in a few  
16 hundred years and they don't move fast enough. So  
17 therefore they're not really anything for the large  
18 outside area.

19                  MR. ESH: One correction. They include  
20 them, they just don't get out and cause any risk.

21                  MR. MCKENNEY: Right.

22                  MR. ESH: So they're in the inventory,  
23 they just don't cause risk.

24                  CHAIR RYAN: Right, and unassessed.

25                  MS. D'ARRIGO: Could you say that again  
26 please? I couldn't hear you.

1                   MR. ESH: The performance assessments  
2 include those isotopes. They're in the inventory.  
3 They are assessed. But they don't get out and cause  
4 risk.

5                   MR. MCKENNEY: Yes. They don't ever get  
6 to a receptor location or anything like that. So  
7 when the performance assessment practitioners  
8 usually talk about what are the radionuclides of  
9 concern and some other stuff like that, you won't be  
10 hearing cesium or cobalt-60 or stuff like that just  
11 because of their characteristics.

12                  However, you do note that at a certain  
13 point then it starts to stabilize at the thing,  
14 which is the current disposed actinides and long-  
15 lived wastes, and the actinides include uranium at  
16 the site. And it actually has a very similar curve  
17 to the upper curve, to the DU curve in the long  
18 term.

19                  So a site that takes a predominant  
20 amount of waste from the depleted uranium could have  
21 a significantly larger amount of long-lived waste  
22 than conventional.

23                  Now the curve I showed you before is the  
24 activity present in the disposal site, so this is  
25 what's would be in the inventory itself which is  
26 sort of more like just a hazard. Because if it  
27 stays in its barrier it has no risk to the public.  
28 I mean, it's an attempt to be isolated.

1                   What you see when you do a risk curve is  
2 what you allow it to, the barriers to degrade and  
3 the material to move through the environment, then  
4 you'll have an increasing risk over time which is,  
5 or with some sort of peak and then it trails off  
6 again. Because at first, at some point it shows up  
7 at the receptor.

8                   MEMBER ARMIJO: Chris, could you just go  
9 back to Slide 13? I just had a quick question now.

10                  MR. MCKENNEY: Yes.

11                  MEMBER ARMIJO: Looking at the purple  
12 curve, from a dose standpoint for a depleted uranium  
13 site there's not much difference between 1,000 years  
14 and 10,000 years.

15                  MR. MCKENNEY: There's not much --

16                  MEMBER ARMIJO: This is curies, but it's not -  
17 -

18                  MR. MCKENNEY: Actually, what the next  
19 slide will show that even with the limited ingrowth  
20 is that you start seeing all those other ones which  
21 could be driving depending on the chemistry at the  
22 site.

23                  MR. ESH: Total activity can communicate  
24 something, but it can communicate a very misleading  
25 picture.

26                  MR. MCKENNEY: It doesn't show risk.

27                  MR. ESH: So you have to look at --

1                   MEMBER ARMIJO: That doesn't show the  
2 dose because it may be you can get more dose from --

3                   MR. ESH: All the isotopes have  
4 different dose conversion factors, and when --

5                   MEMBER ARMIJO: This is just strictly  
6 inventory then.

7                   MR. ESH: All the isotopes have  
8 different dose conversion factors, so it depends  
9 what the mix of the isotopes are at each of those  
10 points in time how much risk propensity it has.

11                   And so what we say is that a good rule  
12 of thumb when you're looking at depleted uranium is  
13 at 1,000 years you're at about 1/1000th of the peak  
14 risk where it's going to end up at. At 10,000 years  
15 you're at about 1/10th, more or less.

16                   It depends on the ratio of the isotopes,  
17 especially the uranium isotopes that you have in the  
18 depleted uranium. So how much U-234 you have  
19 compared to U-238 compared to U-235. That shifts  
20 those numbers around a bit.

21                   Utah had some good comments on that when  
22 they sent some comments on maybe our early draft  
23 regulatory language that I would encourage the  
24 committee to look at. They explained it pretty  
25 well.



1                   MEMBER ARMIJO: Okay, what I'm trying to  
2 get at it somewhere when it's convenient, at what  
3 dose would someone be exposed to, you know, for the  
4 same amount of time or whether it's breathing it or  
5 whatever, what's the increased dose if you were  
6 exposed at 1,000 years or 10,000 years? Is it like  
7 a factor of 2 or is it a factor of 100? That's what  
8 I'm looking for.

9                   MR. ESH: Yes. Probably the best I  
10 should do is say it depends, but I know that's not  
11 going to be satisfying.

12                  MEMBER ARMIJO: It won't for me.

13                  MR. ESH: But the reality is it would be  
14 quite a bit less at 1,000 years for a number of  
15 reasons. First, as I just noted about the ingrowth  
16 phenomena, you're looking at roughly about 100 times  
17 difference in risk propensity at 1,000 compared to  
18 10,000. That's for the intruder.

19                  But if you put all of that material in a  
20 system that's protective for an intruder then either  
21 one of them could not cause risk. I can't say to  
22 you the difference is 100 times more because maybe  
23 both of them are effectively zero.

24                  MEMBER ARMIJO: I understand that. I  
25 understand that. But then, you know, everybody  
26 recognizes that things degrade with time and so you  
27 can't really assume that --

1                   MR. ESH: From a material standpoint  
2 there's a pretty significant difference between the  
3 1,000 years and 10,000 years for the depleted  
4 uranium. And as Chris is going to talk to here, I  
5 mean, it has uranium on it, but this general  
6 behavior is what we see in all sorts of performance  
7 assessments.

8                   We put a lot of these, not a lot, but a  
9 number of these charts in our Regulatory Basis  
10 Document in the appendix. I know the committee  
11 asked about it in the last meeting, like, where can  
12 I find these performance assessment things? And  
13 they're big. There's a number of them. They're all  
14 over the place.                   We pulled out some of that  
15 information and put it in the back of the Regulatory  
16 Basis Document so you could just see how they  
17 generally behave. But if you took them all and  
18 overlaid them you get this sort of behavior, the  
19 curve shift back and forth in time.                   But  
20 generally you have a lag at the beginning until  
21 material is released, because your waste has to  
22 leach and water has to get into the system and then  
23 transport through the geosphere. But then  
24 eventually you get a breakthrough. When that  
25 breakthrough is and the magnitude of it is what you  
26 look at in the performance assessment process.

1                   So, and our opinion is you have to look  
2 at least as long as generally you expect those  
3 results to come out to see what the magnitude is.  
4 Because there was something quite a bit inaccurate  
5 that was presented at the last meeting, which is you  
6 can just look at the waste classification table and  
7 that ensures the safety of low-level waste. Not  
8 accurate at all.

9                   61.41, the performance objective for  
10 protection of public health and safety, is all about  
11 releases to the environment -- water pathway, air  
12 pathway -- which generally isn't very important in  
13 most low-level waste facilities. Generally, water  
14 pathway. That has a different assessment and  
15 different valuation than 61.42 for the intruder.

16                  So just because you meet 61.42 and  
17 you've met the waste classification tables has  
18 little bearing on whether you would meet 61.41.  
19 61.41 is all about your site and design and how  
20 things are released and come out into the future.

21                  So that presentation that okay, you can  
22 just look at decay and look at 61.42 is pretty  
23 misleading for what goes on in a low-level waste  
24 analysis.

25                  MEMBER SCHULTZ: On that chart why is  
26 the arrival time for U-234 different than for U-238?  
27 I mean what's causing that difference?

1                   MR. ESH: Yes, this isn't a performance  
2 assessment NRC did. I believe it's one of DOE's,  
3 but --

4                   MR. MCKENNEY: It's SRS.

5                   MR. ESH: Yes, that's at the Savannah  
6 River Site. But basically that's at a common  
7 concentration level and they aren't at the same  
8 concentration. So there's different picocuries in  
9 the source term which will shift when you reach,  
10 say,  $1E$  to the minus 6, I think, is that first  
11 number.

12                  MR. MCKENNEY: Right.

13                  MR. ESH: So the arrival time is going  
14 to be affected by both the distribution coefficient  
15 or the sorption and the media.

16                  MR. MCKENNEY: If you look vertically on  
17 the slide that the peaks are printed at the same  
18 side. The curves are just, in the rest of the curve  
19 are parallel.

20                  MEMBER SCHULTZ: Right.

21                  MR. MCKENNEY: But it's just at the  
22 bottom edge because the bottom leading edge would  
23 show you the difference, because --

24                  MEMBER SCHULTZ: Yes, I would just  
25 expect the bottom edge to be coincident.

26                  MR. MCKENNEY: If we went down to  
27 negative 30 or something like that they would be  
28 probably closer, but --

1                   MEMBER BALLINGER: What report is this  
2 out of?

3                   MR. MCKENNEY: This is out of the report  
4 on Area Es for the, on their result in Area E of the  
5 Savannah River Site. And we have the citation in  
6 the technical basis. This is in the back of our  
7 technical basis document, this picture.

8                   MR. ESH: We put a number of them that  
9 we thought would illustrate kind of how performance  
10 assessments work for people that weren't familiar  
11 with it.

12                  MEMBER ARMIJO: Right. But the  
13 assumption in here must be that this uranium is  
14 soluble somehow.           MR. MCKENNEY: Or it is  
15 partially, just a small amount. Even U3O8 could  
16 have some fairly high distribution factors, but that  
17 was still a small amount that would be getting in  
18 water even when something is considered insoluble.

19                  MR. ESH: Generally these results  
20 reflect the solubility limit of some sort, but  
21 they're not insoluble. So there is some finite  
22 solubility. It depends on the uranium phases,  
23 uranophase or schoepite or whatever it is that  
24 you're assuming, or calculating about, say, the  
25 geochemistry of your system and the mineral phases  
26 and everything else.

1                   MR. MCKENNEY: And the delay is also due  
2 to barriers and also how the environment treats the,  
3 how the uranium or whatever can move through the  
4 material, environment.

5                   In this case, you know, one of the other  
6 points in this one is, is that again the Savannah  
7 River Site was dealing with more of uranium without  
8 its progeny present, in any extreme amount. But  
9 even with the relatively small ingrowth of radium  
10 and lead, you are seeing those as already being  
11 there and at certain points they are the only dose  
12 drivers.

13                  And depending on the situations, the  
14 uranium may even be delayed further while the radium  
15 is not as delayed in time. And so while there's not  
16 that much, necessarily, progeny growth in the  
17 ultimate state between the a 1 to 10,000 years  
18 compared to what it would be after a few million  
19 years when it gets into equilibrium, from a  
20 performance standpoint you see a lot of that from  
21 those progeny even on, say, in what the risk is over  
22 that time period. There is a lot more information  
23 of what could be into the environment.

1                   And because of the barriers, and  
2 especially with the enhanced barriers that people  
3 build today and good site conditions, the delay  
4 curve to a receptor only 100 meters away can be well  
5 after 1,000 years so that you just have zeros in a  
6 calculation that went only to 1,000 years.

7                   And that's all it's saying, and that's  
8 why for a lot of performance assessments though for  
9 a mix of environments, usually for your fast movers,  
10 there are going to be at least some indications of  
11 them between 1,000 and 10,000 years. So you can  
12 have evaluation of behavior of what the natural  
13 environment and the engineering do.

14                  So back, you know, we touched on this a  
15 bit. There's only limited amounts. There's only  
16 about 200 metric tons of concentrated depleted  
17 uranium per million cubic meters disposed of waste.  
18 Total waste disposal at the facility was assumed in  
19 the DEIS back in the '79 to '81.

20                  But in actuality, a combination of site  
21 conditions and disposal operations will determine  
22 the site suitability and inventory allowances. You  
23 know, some sites may have lower and some sites may  
24 have higher. We have a condition right now where we  
25 have two basic analyses where we, well, one analyses  
26 and one volume.

1                   We have the 200 metric tons was the  
2 analyzed in DEIS per million cubic feet, and then  
3 you have out there, sitting out there with 750,000-  
4 plus metric tons of uranium, and you're having to  
5 identify where inside of that or all the way up to  
6 750,000 can a site actually accept. And would we do  
7 it on a generic basis or would we allow a site-  
8 specific analysis to establish that on their own  
9 basis?

10                  The other existing considerations was  
11 that all the currently licensed sites are in  
12 Agreement States. They all have different  
13 environmental conditions. The fact that you say we  
14 have three that are arid, all three have vastly  
15 different environmental conditions even in an arid  
16 state situation.

17                  They have different operational  
18 characteristics. You have the much greater  
19 engineered facilities in Texas versus the design and  
20 approach of EnergySolutions Clive, or how they bury  
21 waste out in, say, Washington, which is still fairly  
22 much old school. It's packages in sand.



1                   And then of course you have some  
2 currently disposed of uranium, so if you go the  
3 site-specific analysis and you include the entire  
4 inventory, those have to be considered. Now again,  
5 we have 200 metric tons per million cubic meters was  
6 in the DEIS. Now this is totally uranium. This is  
7 not just DU. This is total uranium that they have  
8 reported.

9                   And some of these values may be low  
10 because these values are a couple years old, but  
11 both Barnwell and Richland are not taking any real  
12 new uranium anyways. But you have well over 200  
13 metric tons per million cubic feet, yes, million  
14 cubic meters of waste at each of the sites.

15                  It's not large. I mean it's not  
16 extremely large. It's nowhere near what we're  
17 talking about here for the DU that needs to be  
18 disposed of, but they do have substantial volume.

19                  Now a lot of this stuff is not at the  
20 cut. This is actually at lower concentrations than  
21 depleted uranium is expected to. A lot of this  
22 stuff was filings from weapons or was just soils  
23 that they got, and stuff over time, but there have  
24 been some serious shipments of depleted uranium.

1                   So also we have the structure that  
2   existed in Part 61 when we started to phase what we  
3   were going to do, and, you know, we were told that  
4   we were going to be trying to do a limited  
5   rulemaking, we were not going to be trying to  
6   rebuild the framework.

7                   We have as a structure the performance  
8   objectives, which are then supported by prescriptive  
9   and defense-in-depth requirements throughout the  
10  rest of the rule. We have siting criteria that are  
11  partially prescriptive or defense-in-depth that you  
12  just can't put it in a marshland, you can't put  
13  where there's a certain fault rate. We have waste  
14  characteristics that are also partially  
15  prescriptive.                   And state and federal  
16  ownership which is a defense-in-depth for the  
17  intruder to try to ensure that the site is not, and  
18  the environment, so the site is not impacted by  
19  future human activity, if possible.                   And a  
20  long-term funding mechanism is another one where  
21  allowance to make sure that the state or fed try to  
22  take care of the site over time. And then we have  
23  the five meter/engineered barrier which is defense-  
24  in-depth for Class C to reduce the probability again  
25  of intrusions.

1                   Then we have performance based portions  
2 of the Part 61, which is we don't have any  
3 requirements for waste form in the rule other than  
4 you need to stabilize B and C. That's up to the  
5 licensee applicant to evaluate their chosen waste  
6 forms and to decide on how they want to run their  
7 facility and how it would make sense in their  
8 facility, their chemistry, their waste streams.  
9 What sort of engineered features, if they're going  
10 to use the Class C one, we don't have anything  
11 there. But again they are allowed to create the  
12 system that works and can meet the performance  
13 objectives with the engineering they want to.

14                   Operational considerations. How do they  
15 actually operate at the site? Are they doing  
16 borehole disposal or are they doing stacks or are  
17 they just taking all the waste as they put it in and  
18 just put in all of it next to each other and  
19 continue to dispose or do they plan out their  
20 disposal?

21                   Those are all site-specific  
22 considerations they can take care of, and that goes  
23 into the defense and stacking and areal activity  
24 which is an issue for especially the blending waste,  
25 which was in the generic situations since we don't  
26 have a rule about operations.

1                   That was one of the reasons for the, was  
2 the worry, is they get in large shipments of this  
3 at-Class material and they just place it all next to  
4 each other in a disposal track. Now operationally  
5 they could just choose to checkerboard it and that  
6 would get it much closer to what the DEIS evaluated,  
7 but we don't have any regulations about how you  
8 place waste in the trench. We don't say if you have  
9 so many canisters of Class waste you must place min  
10 Class waste next to it. We don't have any of that  
11 stuff.

12                   MEMBER ARMIJO: But do the Agreement  
13 States have their own --

14                   MR. MCKENNEY: They're having  
15 regulations but they could have, usually --

16                   MEMBER ARMIJO: They could say, okay,  
17 look, as far as stacking or depth this is the way  
18 you're going to do it.

19                   MR. MCKENNEY: Yes. They could in  
20 general forms, but usually they just have the  
21 licensees say this is how we're going to do it, and  
22 they say, okay, we're going to inspect you against  
23 you doing it that way.

24                   MR. ESH: Or they can have license  
25 conditions that specify how they're supposed to put  
26 the waste in or how they're not supposed to.

1                   CHAIR RYAN: I think the idea of  
2     stacking all the hot waste in one, is just not  
3     credible for this reason. It's an operational  
4     radiation protection program that's going to be just  
5     as important as the Part 61 program.

6                   So spacing waste or covering waste as  
7     it's, you know, as it's placed and all that, there's  
8     a hundred different operational techniques that are  
9     captured in the operational procedures that the  
10    regulator also has oversight and approval for.

11                  MR. MCKENNEY: Right. Right. And we  
12    didn't want to get into prescribing anything like  
13    that because there could be innovations that would  
14    occur that if you all of a sudden would say you must  
15    do it this way, well, then maybe with a new canister  
16    or a new design that would be suboptimal to do it  
17    that way.

18                  MR. ESH: Where you will see conditions  
19    sometimes is with potentially enriched material  
20    because there's a concern about redistribution that  
21    could result in criticality. So if you specify some  
22    areal limits that prevent somebody from putting the  
23    material in a way that could cause it to become  
24    redistributed and result in a criticality.

1 CHAIR RYAN: And there's lots of  
2 practical ways that's dealt with. For example, it  
3 can't be in a box less than X dimension of its  
4 quantity, so you're forcing the box to be your  
5 spacer. And there's lots of ways it's done. It's  
6 not a hard problem to solve.

7 MR. MCKENNEY: Right, but we didn't want  
8 to establish those in a rule. We wanted those to be  
9 able to be worked out on a case-specific basis with  
10 the site on how they do other things. Because you  
11 don't want to assume that everybody uses a crane to  
12 put stuff in because, you know, that sort of thing.

13 → MEMBER ARMIJO: Just for education, when  
14 you call for stabilization of B and C waste, what  
15 exactly does that mean?

16 MR. MCKENNEY: Okay. One of the  
17 precepts, the cornerstone of the system was, and  
18 this is based on the fact that we had some problems  
19 with the early low-level waste sites where we had  
20 subsidence over time of the waste areas.

21 And so the cover would subside, which  
22 would allow more water in and cause bathtubbing in  
23 one case and some other issues. Because these are  
24 the wastes that have, at least for also intruders, a  
25 hotter area, hotter waste types, we required them to  
26 do stabilize so that the cell will have low chance  
27 to have subsidence over that period of time.

1                   And it doesn't mean the waste itself has  
2 to be subsided. They can be in a canister that is  
3 considered to be stable for that 500 year period of  
4 time. And a lot of stuff is disposed of right now  
5 that way in HICs, which are high-integrity  
6 containers --

7                   (Simultaneous speaking)

8                   MR. MCKENNEY: The container provides a  
9 stabilization rather than it being stabilized in  
10 concrete or something like that.

11                  MR. ESH: So something we said earlier,  
12 we don't have anything in the rule on waste form.  
13 We do have a Branch Technical Position on waste form  
14 that addresses, like, how you do leach testing and  
15 develop waste forms for disposal.

16                  And as Chris noted, for the waste form  
17 and stabilization for B and C you're primarily  
18 stabilizing so you don't create a problem for those  
19 short-lived isotopes that if you don't keep them in  
20 the system they can cause a problem.

21                  So strontium-90 with a 30-year half-life  
22 doesn't cause a problem if you can keep it in for  
23 300 or 500 years. But if you let it get out in the  
24 first ten years it causes a problem in groundwater  
25 because it has such a high dose conversion factor  
26 per unit activity.

1                   So it doesn't take a lot of it. A good  
2 example is look at West Valley. I think they  
3 estimate somewhere around 50 curies of strontium-90  
4 got out of the process building in a leak/accident  
5 that ran down some joints in the walls, went into  
6 the aquifer, created a big strontium-90 plume there  
7 that they spent a lot of energy on addressing. So  
8 that's a good example. You know, that's only 50  
9 curies of strontium-90 that caused a big problem.

10                  So you have to make sure you get the  
11 engineering and the waste form and all that stuff  
12 right for the short-lived. I didn't want to give  
13 the impression that it's an oh-never mind. But the  
14 good news is that everybody seems to be getting that  
15 right. That's a good thing to reiterate.

16                  MEMBER ARMIJO: Right. Thank you.



1                   MR. MCKENNEY: So, you know, with those  
2 existing conditions we were faced when we started  
3 the rules and discussions with, do we really want to  
4 go with a risk-informed/performance-based approach  
5 which continues to give the flexibilities, or do we  
6 want to add prescriptive requirements because of the  
7 waste?                   But taking into consideration  
8 the fact that this is Agreement States  
9 implementation and they do have their own powers of  
10 exemption, which we already talked about, to deal  
11 with some of the possible issues with the closed  
12 facilities or areas that weren't maybe in pre-Part  
13 61 waste or other situations that occur.

14                   So we decided that, you know, the risk-  
15 informed/ performance-based of enhanced site-  
16 specific analyses would be the appropriate way to  
17 continue to provide all of the flexibilities and,  
18 but also provide additional support to the overall  
19 safety case.

1                   And this was, we wanted to use the two-  
2 tier system where we had a time of compliance which  
3 we would specify, and we were requested to by a wide  
4 range of stakeholders when we first started this  
5 that we specify in the rule a time of compliance to  
6 allow a consistency between the different Agreement  
7 States.                   Also, to specify that you need  
8 to do an intruder assessment and specify the dose  
9 limit, again for consistency across the national  
10 program. And then of course later we got added by  
11 the Commission the ability to develop your own waste  
12 acceptance criteria or concentrations of waste that  
13 would come into the facility based on your analyses.

14                   Now the benefits of approach are of  
15 course that the inventory limitations are based on  
16 the safety case for the site. They are that your  
17 engineering, your site conditions, everything's  
18 taken into account. It's not built on some generic  
19 case that the NRC has done at one time, and because  
20 of innovations your site is now quite different than  
21 that.

1                   The rule becomes accommodating by doing  
2   that versus the prescriptive model to accommodate  
3   for new waste streams which is like blending,  
4   reprocessing or anything else. And of course it  
5   leaves the door open in a large range of ways for  
6   innovation in the industry to continue to address  
7   either potential issues or to improve safety and  
8   continue to reduce risks ALARA.

9                   Yes, as has been discussed a lot today,  
10   there are some cons about the fact that a licensee  
11   may need to revise and enhance a safety case  
12   declaration. Now we've put the timing of that to  
13   the next renewal anyways, which they would have to  
14   justify that their safety case is no different than  
15   before at each time they get a license renewal  
16   anyways.

17                  So we've tried to minimize that. We're  
18   not saying in the rule, in the currently, version of  
19   the proposed rule that we're not just doing that  
20   once the rule becomes active you must immediately do  
21   a new safety case and send that to the regulator.  
22   We are saying that they have time until their next  
23   renewal point.

24                  MEMBER ARMIJO: Educate me a little bit  
25   on what the safety case declaration is. You know,  
26   the word is "may need" --

27                  MR. MCKENNEY: Right.

1                   MEMBER ARMIJO: But before he decides he  
2 may need to do it, he's got to do an analysis,  
3 right. He's got to do something. He can't just  
4 simply say --

5                   MR. MCKENNEY: Well, that safety case  
6 declaration is the entire concept of all of the  
7 analyses that you, it's the whole envelope of  
8 analyses. So you have your performance assessment,  
9 your intruders, but you also have your operations,  
10 that your operations are doing stuff safely.

11                  The safety case is not just the  
12 performance assessment. But it's also how you're  
13 accepting waste, how you're verifying that the waste  
14 is what you're getting, and everything on the whole  
15 scale. And that's why we use safety cases because  
16 it's a good catch-all.

17                  MEMBER ARMIJO: Yes, Chris, what I'm  
18 trying to do is the delta between what a licensee  
19 currently needs to do --

20                  MR. MCKENNEY: Right.

21                  MEMBER SCHULTZ: And we only have a  
22 handful of these, so we --

23                  MEMBER ARMIJO: We've got four of them  
24 and they're really through Agreement States. So  
25 there's four of these guys, and they're going to  
26 have to do, at license renewal they have to do  
27 something anyway, right?

1                   MR. MCKENNEY: Well, they always have to  
2 still say that their previous licensing basis is no  
3 different --

4                   MEMBER ARMIJO: Been updated.

5                   MR. MCKENNEY: Yes, they've been  
6 updating it. They've been updating stuff.

7                   → MEMBER ARMIJO: So I'm looking for the  
8 added work that this new rulemaking framework, or  
9 new framework would place on the licensees that they  
10 wouldn't have to do otherwise.

11                  MR. ESH: Added work would be if they  
12 didn't do an intruder assessment they would have to  
13 do an intruder calculation, or if they're within the  
14 range of what was considered in the previous EIS  
15 they could probably make some sort of argument of,  
16 look, we meet the waste classification tables.  
17 We're within the range of what was analyzed for the  
18 EIS, therefore, you know, even if we did an intruder  
19 calculation it would show we can demonstrate  
20 compliance.

21                  And one thing that I think we don't talk  
22 about enough on here, is the way we tried to  
23 structure this is if your risk is high you're going  
24 to have some burden. Because your calculations are  
25 going to be more difficult, you have to demonstrate  
26 all the details that go into those calculations  
27 more. If your risk is low this should not be  
28 difficult, especially the intruder assessment.

1                   When we do performance assessments and  
2 intruder assessments, maybe 90:10 ratio in terms of  
3 effort for a performance assessment for 61.41  
4 compared to the calculations for 61.42. 61.42 is a  
5 much more straightforward calculation, the type of  
6 thing if your inventory isn't too challenging you  
7 could do on a spreadsheet.

8                   You don't need special software or  
9 computer models, et cetera. You're basically having  
10 somebody, an intruder disturb waste, calculating  
11 some concentrations and then estimating a dose that  
12 results from those concentrations. It's kind of a  
13 boom, boom, boom type of calculation.

14                  There's not submodels that are  
15 interacting with feedbacks or anything like that.  
16 That's the type of thing that you can have in the  
17 61.41 calculation. So I don't know if that answered  
18 your question.

19                  MEMBER ARMIJO: It does.

1                   MR. ESH: The intruder assessment would  
2 be the part they would have to do different. And  
3 three out of four of our sites, at least if what the  
4 staff had proposed for a two-tiered analysis with  
5 10,000 years and a longer performance period, where  
6 the longer performance period only kicks in if  
7 you're above certain concentration levels, I think  
8 only if you were taking depleted uranium would that  
9 second tier kick in. Because right now all the  
10 sites are below those concentrations that we put in  
11 that Table A of our draft language.

12                   MR. MCKENNEY: And three of them have  
13 time frames that would be consistent with that. So,  
14 you know, as we've said before, Barnwell may need  
15 to, would be one that would have to consider whether  
16 there's any impact, and also, but they may not show  
17 much for the 2,000-plus years if they've already got  
18 their mobiles already captured in the 2,000 they've  
19 already done.

20                   MR. CAMPER: And two sites, the Clive  
21 site and the Texas site will have to do additional  
22 analyses obviously, if they want to add, which we  
23 presume they will.

24                   → MEMBER ARMIJO: Yes, the license renewal  
25 frequency is what, 20 years?

26                   MR. MCKENNEY: Five years.

27                   MEMBER ARMIJO: Five years.

1                   MR. WIDMAYER: Okay, David, I think this  
2 answers -- Derek Widmayer with the NRC staff, sorry.  
3 I think the answer to Dr. Armijo's question is very  
4 important. Is there anything else they would have  
5 to do in addition to this intruder assessment?

6                   MR. ESH: Well, as I stated early that's  
7 like the primary thing that we needed to do in this  
8 rulemaking effort, because of the way it was  
9 developed and the assumptions, the hard wiring of  
10 the assumptions about what the inventory was going  
11 to be.                   But then in the rulemaking  
12 process we received other things that we felt people  
13 should do. They noted about Barnwell and possibly  
14 whether they would need to look at that 2,000 to  
15 10,000 year period at their site and make sure  
16 they're still okay. That would be an example.

17                   In addition, in the technical analysis  
18 section, we put information in there on features,  
19 events and processes and uncertainty. I really  
20 don't think much else. We added some language, but  
21 for the most part the sites already in their  
22 technical analyses would meet what the new material  
23 that we put in there.



1                   If somebody did a poor job with setting  
2 up the scope of their analyses, then maybe they  
3 would have some burden or some effort associated  
4 with the FEPS process, which is trying to develop  
5 the scope of your analyses and what's going to drive  
6 the site at that particular location or not, and/or  
7 if they did a poor job with uncertainty.

8                   So if they did a deterministic analysis,  
9 they didn't look at any sensitivity or uncertainty  
10 analyses, then that would be an additional burden  
11 that would come in too. But both of those things we  
12 felt were modern performance assessment things that  
13 any performance assessment group does.

14                   So if we're going to have the  
15 opportunity to bring that up to a more modern  
16 analysis those are things that shouldn't be  
17 debatable too much.

18                   MR. MCKENNEY: We're trying to ensure a  
19 quality safety case for each of these decisions by  
20 putting in a little bit more of the specificity of  
21 what type of things should be considered.

22                   MR. CAMPER: Interestingly enough too,  
23 when we were as a staff considering a 10,000 year  
24 period of compliance we did talk with the state of  
25 South Carolina and the other operating states as  
26 well, and we asked South Carolina what the  
27 implications were with 10,000 years.

1                   Now they did do an initial analysis,  
2   albeit probably not as extensive as they would like,  
3   and maybe they would have liked to have more time.  
4   But their analysis did demonstrate that they were  
5   okay on the 500 millirem dose of the intruder within  
6   a 10,000 year period of compliance. That dose was  
7   being exceeded of something on the order of 13,000  
8   years. So their quick analysis did demonstrate to  
9   them even at 10,000 years on the intruder they would  
10  meet the dose criteria.

11                  MEMBER ARMIJO: If you've never done a  
12  performance assessment at a site, what are we  
13  talking about as far as time, money? Is this a  
14  \$100,000 analysis? Is it a million dollar analysis?

15                  MR. ESH: I think that's a very good  
16  question and important point, because as I tried to  
17  say, it should be commensurate with your problem and  
18  your risk. So if your site is complex, you know,  
19  take West Valley, for instance. It has very strong  
20  geomorphological concerns there and some other  
21  things.                   If you were trying to site a  
22  low-level waste facility there now, and say you  
23  wanted to put all the depleted uranium in it, well,  
24  then you're in for it. You know, that's going to be  
25  a complicated analysis kind of like what the  
26  Department of Energy is doing right now for  
27  decommissioning.

1                   They have erosion models that they use  
2   that they forecast forward very long periods of  
3   time. They also run them backwards to try to show  
4   that they can represent what's been there in the  
5   past as like a validation basis or a verification  
6   basis. That would be a high burden type of thing.

7                   What's the number? I don't know. I  
8   think it would millions of dollars at least for that  
9   sort of thing. If you're low risk or you're kind of  
10 common source term, you should be pushing much more  
11 in the other direction.

12                  And for, you know, a simple intruder  
13 analysis, if you spent more than \$100,000 on that I  
14 don't know whether you should be doing that as your  
15 profession. But even myself, if I was a consultant  
16 I'd be ashamed to charge that for that sort of  
17 analysis.

18                  (Laughter)

19                  MEMBER ARMIJO: All the consultants I've  
20 hired have no shame.

21                  MR. ESH: You can recalibrate me.

1                   MR. CAMPER: But I do want to emphasize  
2 that's important that I alluded to earlier. None of  
3 these sites start at zero or anything that's close  
4 to being zero around a performance assessment. I  
5 mean, the concept of a PA has morphed over time, and  
6 we know a lot more than we used to, but if one looks  
7 at the criteria of 61.12 or 61.13 or closure  
8 analysis that's required on another part of 61,  
9 these sites have already done a rather extensive  
10 performance assessment. It may not have been called  
11 that at the time, but they did.

12                   MEMBER ARMIJO: But the performance  
13 assessment didn't necessarily include an intruder  
14 assessment. But it is not a big deal unless you  
15 have a bad site, like a site that you shouldn't be,  
16 you know.

17                   MR. ESH: Even, I mean the intruder  
18 assessment should always be, or generally always be  
19 a fraction or proportion of the total cost for the  
20 technical analysis. If it's not, something is not  
21 right. So that unto itself is not necessarily the  
22 burden.

1                   But, you know, we heard from some  
2 stakeholders, they gave their estimate for what they  
3 thought it would cost and they said a million  
4 dollars for an analysis. But then they also said,  
5 well, we spent \$2 million a year doing site  
6 maintenance, you know, grass mowing and tree removal  
7 type of activities.

8                   So, you know, you're spending \$2 million  
9 on tree removal and grass mowing, but you think a  
10 million dollar analysis to demonstrate the safety is  
11 overly burdensome? I don't know. I don't  
12 necessarily agree with that. I think it needs to be  
13 balanced and it needs to be smart, and certainly we  
14 shouldn't be imposing unnecessary regulatory burden.

15                  But only for the difficult, high-risk  
16 sites do I think what we proposed would be a high  
17 burden, and it should be because it's a high-risk  
18 situation. And we did the calculations in 2008 to  
19 kind of look at this issue of whether depleted  
20 uranium should be disposed of in the near-surface,  
21 and we said it can but only under certain  
22 conditions.

1                   And that's the part that seems to get  
2 lost is the under certain conditions. How do you  
3 determine what those conditions are? You do the  
4 analysis. Otherwise the NRC would have to do  
5 something prescriptive to say, well, here's a  
6 prescriptive requirement that we think will  
7 demonstrate safety. But then that's going to  
8 be, especially for depleted uranium you have to  
9 understand it behaves differently at all different  
10 sites because of the geochemistry for the water  
11 component and then for the radon and the air  
12 component.

13                   So, you know, to try to come up with a  
14 generic, prescriptive standard for depleted uranium,  
15 technically it's totally not the right thing to do.

16                   CHAIR RYAN: And I think, David, you hit  
17 on a key point. To me the key point is that all the  
18 various sites, they're not going to behave in a  
19 performance assessment space the same. It's just  
20 not going to happen.

21                   So, you know, if you're in the  
22 Southeast, the Northwest, the desert Southwest, you  
23 know, you've got very, very different problems to  
24 solve in the performance assessment space. And I  
25 think that's the key. There's no turnkey way to get  
26 at this.

1                   So, you know, if you use this handbook  
2 and do these calculations and get the numbers that  
3 are in the green zone you're all set. Well, no,  
4 that's not quite right.

5                   MR. ESH: Which is exactly why they took  
6 the approach they did in the '80s for 61.41 versus  
7 61.42. 61.42, they said this is the type of  
8 calculation that everybody's going to be kind of  
9 doing the same way.

10                  Okay, we understand there's differences  
11 in environmental conditions and stuff that will  
12 affect these calculations. We're going to do a  
13 conservative or reasonably conservative calculation  
14 for the 61.42 and assign that to everybody. The  
15 61.41 is a site-specific calculation and you should  
16 use the site-specific calculation to determine when  
17 you need some inventory limits for what you want to  
18 dispose of.

19                  MR. CAMPER: Let me jump to the last  
20 slide with these comments as a segue because it's  
21 perfect, frankly. Go to the next slide.

1                   We've already talked about, this was a  
2   limited rulemaking, albeit adjusted along the way by  
3   Commission direction as we have shared with you.  
4   But as these things go, we would still argue that  
5   it's a limited and rather focused regulatory  
6   adjustment as opposed to something much broader,  
7   more comprehensive that might occur if we don't  
8   produce something later, although the Commission has  
9   ruled out a comprehensive review of Part 61.

10                  We've tried very hard to consider the  
11   existing rule and situation, but the third point is  
12   really what I want to focus on in this slide. For  
13   all the reasons that Dr. Ryan, you just said, and  
14   Dr. Esh, that you just said, I would add two points  
15   to the third bullet.

16                  The staff did focus upon a risk-  
17   informed/performance-based approach for the reasons  
18   just articulated, the difference in the sites. And  
19   furthermore, the Commission, in addition to the  
20   guidance that I gave you along the way, specifics,  
21   the Commission, in its strategic planning initiative  
22   which it did several years ago, had a direction-  
23   setting initiative that directed the staff to pursue  
24   a risk-informed/performance-based approach to its  
25   regulatory efforts in its rulemaking.



1                   And I think that's exactly what we did  
2 here for precisely the reasons we just talked about.  
3 Yes, you could have gone on a prescriptive approach  
4 and said, so deep, do this, do that, do this, do  
5 this, these barriers and so forth and so on.

6                   But these sites behave so remarkably  
7 different that it's appropriate then and consistent  
8 with Commission direction that each site be  
9 evaluated and determined to what extent it can or  
10 cannot accept the disposal of large quantities of  
11 depleted uranium or blended waste for that matter.

12                  And then of course along the way, as I  
13 said, it kind of ties back to Point Number 1.  
14 Certain other things came along, blended waste. We  
15 did try to consider what might happen in  
16 reprocessing.

17                  And going back to the question that was  
18 asked earlier about that, I mean, opening up  
19 rulemakings is an extremely costly, time consuming  
20 initiative. And to the extent that we could at  
21 least create performance-based, risk-informed  
22 pathway for future considerations of waste streams  
23 we thought was an appropriate thing to do within the  
24 limits of knowledge that we have at this point in  
25 time.

26                  So we stop there and entertain  
27 additional questions or dialogue.

28                  CHAIR RYAN: Any questions?

1                   MEMBER SCHULTZ: Dave, just to go back  
2 to a quick point. It wasn't exactly in the slide,  
3 but you had indicated with regard to current  
4 inventories of depleted uranium which are in  
5 existing sites, that what is being proposed covers  
6 those. In other words we're not going to run into a  
7 difficult problem associated with what already  
8 exists because we're imparting new regulations.

9                   MR. ESH: Yes, let me clarify. If I did  
10 say that that's not exactly what I meant.

11                  MEMBER SCHULTZ: That's what I heard,  
12 but I want to know exactly what you meant.

13                  MR. ESH: Yes. So with respect to  
14 depleted uranium, the depleted uranium that was  
15 analyzed in the DEIS was around 200 metric tons, as  
16 Chris McKenney indicated in one of the slides. The  
17 amount that has been taken at each of the sites is  
18 more than that except for Texas, and so then in that  
19 situation, basically, if they did an intruder  
20 assessment it would depend on their site-specific  
21 conditions where it falls out, okay.

1                   Where they place the waste in the  
2   facility, what concentration was it, what form it's  
3   in, all that sort of stuff that would go into that  
4   sort of analysis. So this slide here, exactly.  
5   Because they kind of already went outside the  
6   envelope of the DEIS analysis, then the intruder  
7   assessment would be something that they would need  
8   to perform if they haven't already. But some of  
9   them have. Some of them did in an intruder  
10  assessment already.

11                  So what I was trying to communicate was  
12  in some cases they would need to do the analysis,  
13  but based on these quantities I don't think it would  
14  be necessarily a problem. It would be a matter of  
15  they need to do the analysis but they aren't going  
16  to run into something that -- sorry, go ahead.

17                  MR. MCKENNEY: Also I think that what  
18  you were also hearing was our statement about the  
19  second tier. We talked a lot about the intruder in  
20  the 61.41 during the first tier which is where we're  
21  saying do a performance assessment and everything  
22  else.

1                   We have a discriminator in the rule for  
2 the second tier which is the long-term analysis, and  
3 what we have in there is a facility-wide average  
4 concentration of a long-lived radionuclide. And if  
5 you have that, are above that concentration on a  
6 facility-wide basis average then you have to do the  
7 long-term analysis.

8                   If you aren't at that level you don't  
9 have to do the second tier. You don't have to do a  
10 second analysis. These three values for these three  
11 sites would not make it through that filter to  
12 require you to do a long-term analysis.

13                  MEMBER SCHULTZ: That's what I had  
14 heard, okay.

15                  MR. MCKENNEY: So you still have to do  
16 the intruder assessment and the performance  
17 assessment during the time of compliance, but you  
18 don't have to do the second long-term analysis. And  
19 the only people who have to do this much longer  
20 analysis, this qualitative analysis that we have in  
21 the rule is basically if you were wanting to take  
22 large amounts of depleted uranium.

1                   MR. ESH: So we were trying to focus the  
2 burden on the risk by doing that so trying to  
3 identify a point where it would trigger you to do  
4 the analysis. It doesn't mean by all means that you  
5 would fail an analysis, it would just require you to  
6 do that longer term analysis, which then we also  
7 structured with no dose limit. You know, you could  
8 look at cost-benefit. There's all sorts of things  
9 you could do to make that case about the very long  
10 term because people are concerned about the value of  
11 information associated with those results.

12                  MR. CAMPER: We were very definitive in  
13 defining that long-lived waste for that very  
14 purpose.

15                  MEMBER BALLINGER: Do you have any idea  
16 of where the trip-wire would be for these sites to  
17 do the long-term analysis?

18                  MR. ESH: Well, the issue with the  
19 uranium especially is two-fold. One at a humid site  
20 can cause trouble in the water pathway.

21                  MEMBER BALLINGER: That's at Barnwell,  
22 right?

23                  MR. ESH: Barnwell, I would expect if  
24 there's a limiting situation it would either be due  
25 to the water pathway or due to erosion depending on  
26 your erosion control --

27                  MEMBER BALLINGER: But they now have  
28 14,000 metric tons, right?

1 MR. ESH: Right, yes.

2 MEMBER BALLINGER: How much could they  
3 take?

4 MR. MCKENNEY: He's saying before you  
5 had to do the second tier.

6 MEMBER BALLINGER: Before you had to do  
7 the second tier.

8 MR. ESH: Oh, I don't know. I don't  
9 know the answer to that.

10 MR. MCKENNEY: Off the top of my head,  
11 no, I'm sorry.

12 MR. ESH: I'd have to estimate it for  
13 you.

14 MEMBER BALLINGER: I mean, are they way  
15 under it or are any of these people kind of --

16 MR. ESH: I think it's certainly  
17 somewhere between 10,000 and 750,000 so --

18 MR. MCKENNEY: The problem is, is that  
19 we are doing a million cubic meters, but we don't  
20 have authority right now. The table in that one is  
21 meant for that. And it's not just for uranium but  
22 there's other long-lives, because under a  
23 reprocessing case you can have a lot more  
24 technetium-99 not even going to the site.

1                   → MEMBER ARMIJO: I have a question and  
2 actually a request for a little tutorial. For both  
3 the compliance period and the performance period,  
4 could you just summarize for those two periods, the  
5 duration of that period, what kind of requirements  
6 need to be met, whether those requirements can be  
7 met with a qualitative analysis or a quantitative  
8 analysis, and in the requirements I'm talking about  
9 like an intruder dose, acceptable intruder dose, and  
10 how do you prove that you've met that?

11                   Can you do that with a qualitative  
12 analysis? Because we're talking way out in time.  
13 Or can you do it with a quantitative analysis, and  
14 who decides whether it's acceptable or not? And so  
15 it's kind of those --

16                   (Simultaneous speaking)

17                   MEMBER ARMIJO: Because I tend to get,  
18 to me, compliance is a really hard, hard  
19 requirement.

20                   MR. MCKENNEY: Yes. In 61 and in waste  
21 disposal we have, first, we have, the criteria is we  
22 do have the performance objectives. However, the  
23 whole thing is based on reasonable assurance that  
24 you will meet those objectives is what it says right  
25 before.

1                   While we have the specific objectives in  
2 61.41, 42, 43, 44, and say you just be 25 millirem  
3 to the environment, you must protect the intruder,  
4 blah, blah, blah. The one right before that says  
5 you need to have reasonable assurance that you will  
6 meet the following POs.

7                   So that statement "reasonable assurance"  
8 is the criteria. It's similar to reasonable  
9 expectations which is used in the high-level waste  
10 project. So it's first of all, any decision by the  
11 regulator is based off of a mass of information.  
12 It's not one calculation. It's not that you need to  
13 have for these time periods, do you have multiple  
14 lines of reasoning on why you believe that you've  
15 captured the risk you want to capture and you can  
16 get that information out.

17                   So that's the concept behind the  
18 decision making, you need to have that on for any  
19 time of compliance. I mean, even if we're talking,  
20 you know, a few hundred years to 1,000 years to  
21 10,000 years, it's still the same thing.

22                   We're in uncertain time periods so you  
23 have to have multiple lines of reasoning. You can't  
24 have, oh, the code ran out with this number,  
25 therefore, yea or nay. Sometimes it's much more  
26 important to be what are the lines of reasoning  
27 behind the assessment than what is the assessment's  
28 value they came out with.



1                   MR. ESH: So for 10,000 years it's a  
2 quantitative compliance with 25 millirem.

3                   MEMBER ARMIJO: Ten thousand years,  
4 that's compliance period is 10,000 as proposed.

5                   MR. CAMPER: As proposed by the staff.

6                   MR. ESH: With a 25 millirem dose limit.  
7 After that is the performance period, which is only  
8 triggered if you meet the concentration values that  
9 we've put in the table. And that has no dose limit  
10 associated with it after the 10,000 year period,

11                   But we tried to structure it as they  
12 could do a variety of different things to  
13 demonstrate the safety of their facility here, or  
14 why the impacts are acceptable after that time  
15 frame. And so after that all of it is going to be  
16 based on quantitative information, but some of it is  
17 going to be a more qualitative interpretation of  
18 that quantitative information.

19                   So you're probably going to be doing  
20 calculations of some sort in that performance  
21 period. If I was faced with that I would extend my  
22 dose analysis, first off, and see what it looked  
23 like. And if the dose analysis was appropriate I'd  
24 just use that as my argument.

1                   I've already made the model. I already  
2 have the calculations. That's a pretty simple  
3 approach. If I didn't, or maybe if I wanted more  
4 weight to my argument, I might look at cost-benefit  
5 analysis and show like, look, I've put everything I  
6 can into this design. It would cost this much more  
7 to go to, you know, the Cadillac of waste forms and  
8 the Cadillac of engineered barriers, and it's not  
9 really going to buy me anything out here when I look  
10 at the risk.

11                   It might shift it, you know, later in  
12 time, but the magnitude is still going to be  
13 basically the same. So you'd look at, like, those  
14 sorts of things, and geologic repository programs  
15 they'll commonly do, like a multiple barrier  
16 analysis, and you'll add and subtract barriers and  
17 try to get a feel for how your system is working  
18 that way.

19                   So in this later phase, if you had a  
20 large quantity of, say, long-lived waste that was  
21 kicking you into the second tier, you'd do those  
22 sorts of evaluations kind of to understand how your  
23 system is working.

1                   Could you do things to improve it in a  
2 cost effective way, or are my impacts already  
3 acceptable? That's kind of what the second tier  
4 would look like. So it would involve quantitative  
5 information but you would be interpreting that in a  
6 qualitative sense.

7                   MR. CAMPER: Exactly. There's a NUREG-  
8 1573 where it talks about the fact that if you do  
9 the long-term performance assessment you're looking  
10 at it qualitatively and you're evaluating it in  
11 terms of environmental impacts and the like, but  
12 obviously quantitative analysis supports that  
13 obviously, as Dave said. But it's qualitative and  
14 described in that NUREG.

15                  MEMBER ARMIJO: In the case of the  
16 performance period it used to be or maybe still is  
17 out to a period of peak dose or such, which is a  
18 long time with uranium. Now it's not specified.

19                  MR. MCKENNEY: You're talking about peak  
20 activity is a long time. Peak hazard from a site  
21 could be a lot shorter of where it will achieve that  
22 because --

23                  MEMBER ARMIJO: No specified duration.

24                  MR. MCKENNEY: No, there isn't. But --

1                   MR. ESH: We don't even say you have to  
2 go out to peak in the proposal for the performance  
3 period. It basically is you do analysis that  
4 justifies your decision for that longer time frame.

5                   And the reason why we did that is, say  
6 you're making a cost-benefit type of calculation.  
7 You may be able to argue from that standpoint that  
8 any impacts after a certain period of time, number  
9 one, technically, you can't do much about it.  
10 Number two, maybe they're not large enough to  
11 justify you needing to do anything about it.

12                   So you can make an argument that's based  
13 on the science of your problem, where I'm calling  
14 science not just the physics, chemistry and  
15 engineering, but also kind of the more socioeconomic  
16 aspects of the problem.

17                   MEMBER ARMIJO: Okay.

18                   MEMBER SCHULTZ: Is treatment of  
19 uncertainty built into the regulatory guidance?

20                   MR. ESH: Yes, we added uncertainty in  
21 the requirements for the technical analysis  
22 consideration of uncertainty, and then in the draft  
23 guidance document that we have, we have whole  
24 sections on uncertainty. Because there's lots of  
25 different types of uncertainty that come into play,  
26 and the technical analysis, and we talk about them  
27 all pretty liberally. So there's a fair amount of  
28 guidance is developed about uncertainty.

1                   MEMBER SCHULTZ: Is guidance also  
2 provided, you mentioned cost-benefit analysis during  
3 the performance period, is there guidance related to  
4 that? Because that's not a --

5                   MR. ESH: Yes.

6                   MEMBER SCHULTZ: Your doing a cost-  
7 benefit analysis beyond 10,000 years is a bit  
8 tricky.

9                   MR. MCKENNEY: Beyond 20 is, yes.

10                  MR. ESH: Yes, what we were looking for  
11 there, and we do have some guidance in there. It's  
12 extremely detailed because we wanted to afford some  
13 flexibility as to how somebody might go about that  
14 and I don't think there's necessarily a right way to  
15 do that.

16                  So for probably a lot of things that  
17 would come to mind to you, consideration of discount  
18 factors over long periods of time, whatever the case  
19 may be, we kind of say, well, if you're going to go  
20 the cost-benefit approach maybe you should look at  
21 present-day dollars and kind of look at a comparison  
22 of present-day dollars and how that would change  
23 your output, and make your argument based on that  
24 instead of trying to get into some of these  
25 arguments that could be very time consuming and not  
26 very productive in the long run.

1                   MR. MCKENNEY: We chose consistent with  
2 already NRC's guidance on discounting for rulemaking  
3 and stuff in our -- I can't remember it. There's a  
4 NUREG-BR that talks about how you discounting it at  
5 long periods of time you should assume, don't assume  
6 the constant three percent, but you change to it, or  
7 whatever percentage it is, really, and then you  
8 change and you also get zero percent discounting to  
9 see if you can make a decision that way so that you  
10 avoid the complication of discounting.

11                   And if you're making a decision without  
12 discounting then you don't need to include this kind  
13 of as a factor, and that may, if you can make a  
14 decision there.

15                   MR. WIDMAYER: Hey, David?

16                   MR. ESH: Yes.

17                   MR. WIDMAYER: While we're on it, what  
18 other analyses do you have in the guidance to meet  
19 this long term besides cost-benefit? What other  
20 suggestions are in there?

21                   MR. ESH: Yes. Well, we definitely  
22 have, one consideration can be to extend your  
23 analysis from the earlier time frame and consider  
24 those results in the evaluation. We have cost-  
25 benefit analyses. I think we indicated like some  
26 form of, like, barrier type of analyses would be  
27 useful.

28                   MR. CAMPER: Could be useful.

1                   MR. ESH: It could be useful. Yes, we  
2 basically left that kind of open to interpretation  
3 with some examples. And I think we had like, maybe  
4 five or six things that are there.

5                   MR. MCKENNEY: Comparison to  
6 environmental conditions at that point, you know,  
7 are you looking at your source term? At what point  
8 is it getting closer to natural environmental  
9 conditions? I mean, when you're talking uranium and  
10 some other stuff, compared to the rest of the whole  
11 system.

12                  MR. ESH: Yes, I'll tell you just a  
13 second here.

14                  MR. MCKENNEY: So that, you know, the  
15 whole question's about, like, doses, out in space of  
16 course, out in time are really hard. And, you know,  
17 or do you, instead of comparing a dose at that point  
18 do you just compare to the release to what would be  
19 present in the environment already?

1                   MR. ESH: So we had a number of things  
2 in there. First, we had that you probably would  
3 want to start with a screening analysis and just do  
4 something simple where you have the list of the  
5 exposure pathways, a description of the pathways  
6 expected to be most significant, some conservatism  
7 in that analysis, how you did the parameterization  
8 and things like representing uncertainty and  
9 variability.                   Descriptions of the  
10 barriers and processes that reduce or mitigate  
11 releases, and basically do that screening analysis.  
12 If you pass the screening analysis you're done.  
13 There's no need to do anything else. You've done  
14 kind of a simple, technical analysis with some  
15 conservatism and it demonstrates your case.

16                   If you don't pass the screening analysis  
17 then you could do a more thorough quantitative  
18 analysis. That would be one way to demonstrate the  
19 second tier, the performance period.

20                   But if you didn't want to take that  
21 approach you could do a minimized radioactive  
22 releases to the extent reasonably achievable. So  
23 this would be an ALARA-like concept where you'd kind  
24 of demonstrate what I was talking about earlier.



1                   You know, what could I do differently  
2 with my design? How would that impact the results?  
3 Is it financially reasonable to do that? You know,  
4 if it cost me \$100,000 to have a big performance  
5 benefit, well, then yes, you should probably do that  
6 considering the total cost of one of these  
7 facilities and designs.

8                   But if it's going to be, you know,  
9 triple the cost of your facility for all the other  
10 risks you're mitigating, well, maybe that's not  
11 warranted. You know, so that would be the type of  
12 kind of analysis that you might see in that second  
13 tier, and that would be different than a dose  
14 analysis. And then as I indicated, we also have  
15 barrier analyses so you'd look at all the components  
16 of your system, how they're working. I think that's  
17 kind of it for the examples.

18                  MEMBER ARMIJO: If there's no dose  
19 limitation for the intruder in the performance  
20 period, there's no acceptable dose criteria or  
21 unacceptable dose, what do you use to say you've  
22 passed your screening analysis? I'm looking for,  
23 say, how do I know I'm finished?

24                  MR. ESH: Yes.

25                  MEMBER ARMIJO: You know, I could say  
26 okay, you've done an analysis for the compliance  
27 period and it makes sense, you've just extended in  
28 time and see what's happening, but --

1                   MR. MCKENNEY: Very dissimilar to what  
2 you've already seen in your peaks earlier, because  
3 again those could be driven by different  
4 radionuclides.

5                   ut if your overall peaks and stuff like  
6 that were caused, were similar to, not necessarily  
7 the same, I mean, you know, they were in orders of  
8 magnitude higher releases all of a sudden after  
9 10,000 years, you know, that might be your  
10 comparison on the, as a comparison point without a  
11 dose limit in play.

12                  MR. ESH: Basically we did not provide a  
13 dose limit there, and you'll ask somebody to make  
14 the argument as to what they would think would be  
15 appropriate.

16                  So the starting point, if I was doing a  
17 screening analysis, I would just use the limit from  
18 the compliance period. And if I can meet that with  
19 a screening analysis, my life is easy. If I can't  
20 meet that then I'd look at what my results are and  
21 compare them to other things.

22                  So, you know, maybe if I was over 25 but  
23 under 100 I could say, well, that's within the Part  
24 20 public dose limits, so considering the time  
25 frames and everything maybe make an argument for  
26 that. Or, you know, get into --

1                   MEMBER ARMIJO: Okay, those are all good  
2 arguments, but then who decides whether that's good  
3 enough?

4                   MALE PARTICIPANT: The regulator.

5                   MR. ESH: The regulator, any of these,  
6 the regulator is going to make a regulatory decision  
7 based on the information presented to them, and --

8                   MEMBER ARMIJO: That's where I think it  
9 gets very subjective and that's what really bothers  
10 me. Because, you know, I could make an argument the  
11 dose limit should be equivalent to what a nuclear  
12 worker annual dose is. That's order of magnitude  
13 higher.

14                  MR. ESH: But if it's subjective and  
15 somebody can make the argument for what they think  
16 is appropriate for that time frame, what's the  
17 alternative? Are you saying it should be  
18 prescriptive? And if so, what limit would you put?

19                  MEMBER ARMIJO: Well, I'm not sure. I'm  
20 not sure. I'm just saying, rather than keep it too  
21 fuzzy --

22                  MR. MCKENNEY: But any limit is  
23 supported by, also is subjective analysis.

24                  MEMBER ARMIJO: Putting a big number on  
25 a dose --

1                   CHAIR RYAN: Sam, I'd have to disagree  
2 with you. I think that a PA is a fairly well  
3 accepted tool by all the radiological regulators I'm  
4 familiar with. And it's not about, necessarily, a  
5 particular number being selected. To me it's about  
6 the process that David and --

7                   (Simultaneous speaking)

8                   CHAIR RYAN: -- have described today  
9 that this is how you make these assessments. And,  
10 you know, if you do the assessments right and the  
11 assessment is robust, then the number you get is  
12 reliable for decision making. So it's not  
13 necessarily the exact dose that somebody's going to  
14 get or not get. It's a tool for reliability in the  
15 --

16                  MR. ESH: And you're 100 percent  
17 correct. The analysis does not make the decision.  
18 The analysis provides the information to a decision  
19 maker. The decision maker has to make the decision.  
20 And for these performance periods what we got was  
21 the strong opinions all over the map about what  
22 should be done about the long-term impacts.

1                   So our criteria should probably be  
2 reflecting of that world that we operate in. It  
3 should allow some flexibility for interpretation and  
4 evaluation in different ways. And as we noted, that  
5 performance period should only come into play in  
6 some pretty limited circumstances. It shouldn't be  
7 applying to everybody.

8                   If we developed ten new low-level waste  
9 sites and they were all taking kind of traditional  
10 low-level waste, they're not doing the performance  
11 period analyses. It's only going to be a few  
12 decisions where that's going to come into play, and  
13 we thought it was appropriate to leave that as a  
14 subjective, regulatory decision that's kind of more  
15 in line with the IAEA safety case thing than in a,  
16 you know, your drinking water standard is five  
17 picocuries per liter and your at 5.1, you fail.  
18 Given the time frames and uncertainties that didn't  
19 seem like a smart approach.

20                   → MEMBER ARMIJO: Well, you know, what I  
21 worry about is that the 25 millirem criterion which  
22 you have for the compliance period would be viewed  
23 as something that's applicable in the performance  
24 period, and if you didn't have some way of making it  
25 clear that the NRC staff at least viewed a much  
26 larger number as acceptable, then somebody in some  
27 Agreement State could decide 25 rem's the number.

1                   MR. MCKENNEY: We already have examples  
2 where we've been dealing with those sort of issues  
3 in our monitoring activities with the Department of  
4 Energy, where we've been analyzing for our  
5 responsibilities under the National Defense  
6 Authorization Act.

7                   For waste incidental to reprocessing we  
8 use the performance objectives in Part 61. And  
9 we've been looking at their performance assessments  
10 of 10,000 years or greater, and, you know, we see  
11 doses that are around or under 25 under the 10,000  
12 years and they rise beyond 25 after that. And in  
13 those cases we have looked at what are they doing to  
14 do that to control.

15                  We have not said, oh, you're over 25 at  
16 40,000 years, therefore it's unacceptable. It's our  
17 decision making has taken in the bulk of the  
18 information into the value to establish what is,  
19 have they been trying control releases in an  
20 appropriate way considering what's there, or should  
21 we get in some new information about something to  
22 try and tighten the uncertainty about the solubility  
23 of plutonium?

24                  I mean our comment on --

25                  MEMBER ARMIJO: I guess --

26                  (Simultaneous speaking)

1                   MEMBER ARMIJO: -- way far apart. I'm  
2 just saying, when you're talking way out in those  
3 time frames why don't you set very, very open limits  
4 where you know it's safe?

5                   MR. ESH: Well, Part 63 has a limit out  
6 there a million years of 100 millirem, so should you  
7 raise that?

8                   MEMBER ARMIJO: Yes. Way too  
9 conservative.

10                  MR. ESH: Well, and if you should, I  
11 think, especially within NRC we should at least  
12 definitely be consistent. It doesn't make sense to  
13 me if somebody lives near a low-level waste facility  
14 at some future time that they should have a standard  
15 of X, but if they happen to live near a high-level  
16 waste facility they should have a standard of Y.

17                  If you're saying the standard should be  
18 whatever at some point in time, they should be  
19 comparable.

20                  MEMBER ARMIJO: Should be based on  
21 safety of humans.

1                   MR. ESH: Yes, but what we see is that  
2 in the, you know, let's say, the regulated community  
3 internationally that does the performance assessment  
4 approaches, I don't think you'll find too many cases  
5 where they have long-term dose limits, if any. And  
6 I'm guessing the number is zero, where they have,  
7 say, a rem dose limit or more. In many cases they  
8 go the opposite direction.

9                   MEMBER ARMIJO: There's an implied dose  
10 limit though. That's what worries me. That there's  
11 --

12                  MR. ESH: Well, what happens  
13 internationally is many times they go the opposite  
14 direction. So they say because of the uncertainty  
15 associated with the long time frames, because when  
16 you are estimating risk it's a matter of your dose  
17 and a product of your uncertainty, so if your  
18 uncertainty is large you want your dose to be  
19 smaller so that you don't have a risk of a bad, you  
20 know, high outcome. So they drive it in the  
21 opposite direction of what you're talking.

22                  MR. MCKENNEY: By eliminating, usually,  
23 the long-lived materials. A lot of countries might  
24 have a shorter time of compliance, but then they  
25 also have a stipulation that you don't get more than  
26 400 becquerels per gram uranium, which is a lot  
27 lower than the concentrated depleted uranium we're  
28 talking about.



1                   MR. ESH: Yes, usually it's a long-lived  
2 alpha concentration limit more generally. But they  
3 put a concentration limit in place and they say,  
4 we're going to manage this uncertainty by if you're  
5 above that you're going to dispose of it deeper.

6                   A simple solution to managing this  
7 problem that we've debated endlessly for years in  
8 multiple forums and everything, just do that. In  
9 some countries they're so uncomfortable with the  
10 near-surface environment that they just say always  
11 should be disposed of deeply. Even what we would  
12 consider Class A waste, they're going to put it in  
13 some deep disposal.

14                  MR. CAMPER: You know, what's going to  
15 be going on 10,000 years from now obviously none of  
16 us knows. It's why we deal with uncertainty. But  
17 there is an underlying principle that you afford the  
18 same level of protection to future generations that  
19 you do to the current generation.

20                  And so what you run into to is you're  
21 going to have a number of 25 millirems now versus  
22 5,000 for later, it's --

23                  MEMBER ARMIJO: I disagree with  
24 principle. I don't think that's a regulatory  
25 principle.

26                  MR. CAMPER: It's an international  
27 established protection.

1                   MEMBER ARMIJO: A lot of people believe  
2 that but, you know, I think we do not have, other  
3 than catastrophic kind of risks, I don't believe  
4 that one generation has the responsibility to  
5 protect future generations ad infinitum from what  
6 are very low risks.           And I've read the NAPA  
7 study and it does not, I thought it was very  
8 reasonable, and they do make that distinction  
9 between catastrophic risk and very low risk. And  
10 the weight of responsibility is to protect current  
11 generations and maybe one or two.

12                  MR. CAMPER: The NAPA study represents a  
13 weak anthropocentric approach, whereas many other  
14 groups take a strong approach. And the U.S. has  
15 signed up to the Joint Convention on Management of  
16 Spent Nuclear Fuel and Radioactive Waste, and in  
17 there there are elements that basically say we're  
18 going to strive to protect future generations.

19                  Now it's strive to protect, so you can  
20 have some interpretation on it, but I'd say the U.S.  
21 Government right now differs from where you're  
22 coming from. So --

1                   MEMBER ARMIJO: That's not unusual.  
2 But, you know, the real principle here is, you know,  
3 are we going to spend enormous amounts of time,  
4 money and effort and deprive current generations  
5 from accessibility to medical treatment and  
6 everything else because our waste disposal  
7 facilities simply just choose not to be in that  
8 business, or make it so expensive to protect some  
9 guy 10,000 years out? Hypothetical intruders.

10                   And that to me, it doesn't make any  
11 sense. I don't believe that's what the U.S.  
12 Government has signed up for.

13                   MR. ESH: It doesn't make sense, but our  
14 three, or two and a half, or three of our facilities  
15 that are operating right now are already using the  
16 criteria that we're proposing in this rulemaking.  
17 So I don't know what burden we're talking about.  
18 This enormous burden that's lurking out there, where  
19 is it? Because --

20                   MEMBER ARMIJO: Where I really think the  
21 problem will come up, if this ever gets challenged  
22 in court that you're meeting these criteria, I think  
23 they'll take you to the cleaners.

1                   MR. ESH: But all of those actions are  
2 challenged in court. They have a hearing process  
3 that they go through. It's not like they're  
4 unchallengeable. And we're smarter than the people  
5 that have challenged to date, or that this room is  
6 smarter than the people that have challenged to  
7 date.                   There's very smart people that  
8 have worked on those past licensing actions and have  
9 challenged them both, okay. And I don't think we  
10 should be throwing those past licensing decisions  
11 under the bus because we're concerned about what  
12 criteria we're trying to develop today.

13                   I think those licensing actions speak  
14 for themselves and those decisions were as robust as  
15 you can do those sorts of things. And whether  
16 there's an enormous burden associated with them or  
17 not, I don't think that's accurate. Because we have  
18 the actual data on operating facilities that have  
19 gone through the licensing process.

20                   MEMBER ARMIJO: Okay, hear you.

21                   Mike?

22                   CHAIR RYAN: All right. Well, thank  
23 you, Sam. Thank you, David. Appreciate the  
24 discussion. We're probably at a good place, I  
25 think, where we could break for lunch and come back  
26 at 1:00. Any other comments before we close for a  
27 lunch break? Thank you.

1 MEMBER ARMIJO: You want to come back.

2 We're going to reconvene, so I guess --

3 CHAIR RYAN: At 1:00, yes.

4 MEMBER ARMIJO: Okay.

5 CHAIR RYAN: All right, so we'll

6 reconvene at 1:00.

7 (Whereupon, the foregoing matter went

8 off the record at 11:55 a.m. and went back on the

9 record at 1:13 p.m.)

10

11

12

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14

15

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

17 (1:13 p.m.)

18 → CHAIR RYAN: All right, the meeting will  
19 come back to order. I don't think we have any other  
20 materials to present. Is that correct?

21 MR. WIDMAYER: Correct.

22 CHAIR RYAN: Okay.

23 MR. WIDMAYER: Not planned anyway.

24 CHAIR RYAN: Not planned. So I'll go  
25 around and look for comments and questions and  
26 follow-up, and maybe even some suggestions for what  
27 some bullets might be in our letter.

28 Who would like to go first?

1                   MEMBER ARMIJO: Start with Skillman.

2                   CHAIR RYAN: Dick, next?

3                   ➔ MEMBER SKILLMAN: I'm measuring my words  
4 here. I appreciate the conversation that the  
5 presenters provided relative to the intruder  
6 assessment and the recognition of the importance of  
7 the tables of Part 61 in driving the DU to low-level  
8 waste.

9                   But it seems to me that there is so much  
10 complication around inclusion of those two issues  
11 that DU warrants at least independent, not special  
12 treatment but independent treatment. It's different  
13 than the other waste because of its toxicity and  
14 because of the awesome amount that's going to be  
15 produced over the next several decades.

16                   So it seems to me that the magnitude of  
17 the problem warrants sufficient treatment that  
18 perhaps we as the ACRS should recommend to the  
19 Commission about-face. Let's take another look at  
20 the DU issue in all of its complications, and to  
21 deal with independently --

22                   (Off the record comments)

23                   MEMBER SKILLMAN: Deal with it  
24 independently from the other waste forms that we are  
25 dealing with from a nuclear waste perspective.

1                   CHAIR RYAN: And I think you've  
2 mentioned this, but I just want to confirm that the  
3 half-life of ten to the ninth years is obviously a  
4 key issue because it is primordial. It's here on  
5 the planet for maybe as long as the planet's going  
6 to be here. I don't know.

7                   MEMBER BALLINGER: That's how they  
8 determined the age of the earth by the way.

9                   CHAIR RYAN: I know.

10                  MEMBER BALLINGER: They used --

11                  CHAIR RYAN: Professor, I appreciate the  
12 --

13                   (Simultaneous speaking)

14                  MEMBER SKILLMAN: That would be the sum  
15 of my reaction and comment.

16                  CHAIR RYAN: Okay, great.

17                  MEMBER SKILLMAN: Thank you.

18                  CHAIR RYAN: Yes.

19                   Steve?

20                  MEMBER SCHULTZ: And I have similar  
21 comment to Dick's, just again, just perhaps to start  
22 off the discussion, and I expect we might go around  
23 the table more than once on an issue-by-issue basis.

1                   But it just strikes me that one needs to  
2   examine those two curves that were presented, the  
3   two pages of curves showing the DU and its  
4   performance versus low-level waste and its  
5   performance. And it seems to me for three primary  
6   reasons, one ought to treat DU separately and  
7   differently.

8                   And rather than stick within an approach  
9   that's been defined previously under a totally  
10  different set of conditions and even policy where,  
11  as was stated, DU was considered a resource not a  
12  waste, and perhaps there might be a small amount of  
13  it that might go into a facility so that was the  
14  basis of establishing the rules and conditions.

15                  Moving forward, it just seems  
16  technically logical to move to a position of  
17  treating it separately, handling it separately. I  
18  would still want to consider it as a resource not a  
19  waste.

20                  I found it peculiar and amusing that the  
21  intruder analysis, one of the comments made -- and I  
22  wasn't at the two previous meetings, but I'm sure it  
23  comes from a reasonable logic -- but in Texas, the  
24  intruder analysis was based upon someone perhaps  
25  exploring for oil 500, 600 years from now. I don't  
26  think there will be oil in 500 or 600 years.

27                  MEMBER ARMIJO: That's what Malthus  
28  said.



1                   MEMBER SCHULTZ: I think an intruder  
2 might be looking for depleted uranium 500 or 600  
3 years from now. So again, I think, for those  
4 reasons it's quite technically logical to develop a  
5 facility for depleted uranium and move in that  
6 direction as a pulse map.

7                   It would solve the issues that we're  
8 discussing as well as retaining it as a separate,  
9 potential resource in the future.

10                  CHAIR RYAN: Thank you. Well thought  
11 through.

12                  Dennis?

13                  MEMBER BLEY: I really liked the last  
14 things Steve said. I hadn't thought much about  
15 that. But I guess, you know, we've said this  
16 before, the 10,000 year period just doesn't make  
17 sense to me because it doesn't deal with the DU. I  
18 mean, it seems almost orthogonal to that issue.

19                  I personally like the idea. I'm almost  
20 wedded to the idea of plant-specific performance  
21 assessments as a way to look at these facilities.  
22 And that kind of gets over DU versus other things  
23 because you look at what's going to be there and  
24 analyze it.

25                  CHAIR RYAN: I'm sorry, you said plant-  
26 specific. You mean disposal facilities?

1                   → MEMBER BLEY: Facility-specific.

2 Because each facility is going to be different and  
3 that's what you've got to look at.

4                   The part that I'm not comfortable with  
5 is I'm not sure why some idea of grandfathering for  
6 facilities that are near the end of their, you know,  
7 life of bringing in new materials wouldn't be a  
8 reasonable thing to do. They've met all the  
9 requirements, you know, that probably come through  
10 in an analysis, okay. I don't know.

11                  But I think that's something we ought to  
12 talk about a little bit and --

13                  CHAIR RYAN: If I understand that right,  
14 you're saying that disposal facilities that have  
15 operated for some time and might be near the end of  
16 their useful life, you really shouldn't try to  
17 retrofit something into those?

18                  MEMBER BLEY: That's what I'm thinking,  
19 because it seems reasonable to me and we do that in  
20 other areas as well.

21                  MS. D'ARRIGO: I'm sorry. That they  
22 should not let the stuff in or that they should?

23                  MEMBER BLEY: I said nothing about  
24 letting stuff in. What I said was, facilities that  
25 are near their life, end of life of bringing new  
26 material in.

27                  MS. D'ARRIGO: What about those?

1 CHAIR RYAN: They should continue  
2 operating under the current licensing arrangement  
3 rather than try to refit them with a new setup.

4 MS. D'ARRIGO: Thank you. Sorry.

5 CHAIR RYAN: Yes, that's all right.

6 MEMBER BLEY: This isn't a general  
7 discussion.

8 MEMBER REMPE: You have to come up and  
9 use the mic, say your name and your organization.

10 MS. D'ARRIGO: Diane D'Arrigo with  
11 Nuclear Information and Resource Service.

12 CHAIR RYAN: Thank you.

13 What else, Dennis?

14 MEMBER BLEY: The two periods, the  
15 compliance and performance periods, I'd like us to  
16 talk more about that some. I'm not sure what I  
17 think about that although the vagueness of what you  
18 do in the performance period may be troublesome, but  
19 I guess I have to look at that some more.

20 CHAIR RYAN: Okay, fair enough.

21 Sam?

1                   ➔ MEMBER ARMIJO: Yes, I think I agree  
2 with Dick's comments about DU. I had written a few  
3 comments without, that I sent to Mike and Derek  
4 before the meeting. And the one thing that is  
5 probably the most important one is it reads, "In  
6 view of its extremely long half-life, a separate  
7 section of Part 61 is needed to deal with the  
8 anticipated disposal of large quantities of depleted  
9 uranium. The unique requirements applied to  
10 disposal of DU should not be applied to other  
11 wastes."

12                   We've got to put an iron wall between  
13 those requirements whether it's a separate section  
14 or appendix or whatever, but it's a DU problem.  
15 Let's focus on DU. And I think that's evidently, I  
16 think all the other recommendations we've made in  
17 the past, we should look at them again and see if  
18 there's any of those we'd want to modify.

19                   (Simultaneous speaking)

20                   MEMBER ARMIJO: Yes, based on everything  
21 we've learned over the time, we say that okay, we  
22 maybe have gone a little too far here or not far  
23 enough there. But we should go over them and say  
24 those are still, and so we should do that.

25                   This has turned into much more than a  
26 limited rulemaking. That's just a comment, and  
27 everybody, I think, agrees that it's gotten very  
28 complicated and with lots of issues.

1                   I think there should be something like a  
2 grandfathering stated by the Commission, because the  
3 Agreement States aren't going to provide exemptions  
4 unless it's in the rule in some way that encourages,  
5 or discourages people to force the regulations on  
6 people that don't handle large quantities of DU, the  
7 change in regulations.

8                   I have problems with the inadvertent  
9 intrusion, and that's a broader thing and I doubt  
10 that I could get much support on that, but it's just  
11 my view.

12                  The costs associated with the analysis  
13 of risk to a small number of hypothetical,  
14 inadvertent intruders is disproportionate to the  
15 risk, and there's no reasonable scenario which waste  
16 disposed of under Part 61 regulations would produce  
17 a catastrophic radiation exposure to thousands of  
18 years in the future. At most, a handful of  
19 individuals might be exposed to nuisance levels of  
20 radiation. That's really, and that's already been  
21 built in. It's almost a given, but I still believe  
22 that's the case.

1                   But I haven't really seen anything that  
2 shows that this new regulation, except for DU which  
3 is special, provides any additional safety benefit  
4 over the existing Part 61. And in the presentations  
5 we had more than one person said, and particularly  
6 Mr. Greeves, or Dr. Greeves who used to run the  
7 waste program in NRC or division, I think he was --

8                   MALE PARTICIPANT: That's right. That's  
9 fine.

10                  MEMBER ARMIJO: He used that terminology  
11 and I believe he's right. It's done a good job for  
12 many, many years and it's working. And so Part 61,  
13 where there's a need it is large quantities of DU  
14 and that's what we should focus on. And I think it  
15 would simplify everything related to that.

16                  I personally think there should be some  
17 sort of very open, very large dose limit if you're  
18 going to analyze beyond the so-called, what is it,  
19 the compliance period? Yes. That instead of 25  
20 millirem make it 100 millirem or 500.

21                  And I think one person testified to us  
22 or presented to us, talked intruder in the order of  
23 one rem for these way-out scenarios. So it's easy  
24 to pass. Because it's still safe it's easy to pass,  
25 and if it ever gets into a situation where there's  
26 disputes, you don't have to justify that you've met  
27 25 millirem when there's no technically justifiable  
28 way you can do it, in my opinion.

1                   But that's a minor compared to the main  
2 one, is DU is really a different beast in large  
3 quantities? Let's separate it and focus on that.  
4 That's it.

5                   CHAIR RYAN: Okay, thanks.

6                   Joy?

7                   MEMBER REMPE: Well, I came here -- I  
8 was at the subcommittee meeting in November as you  
9 know, but I missed the one in December, and I did  
10 read the information ahead of time. But I haven't  
11 got a final opinion yet.

12                  I guess I would like us to spend a  
13 little more time if we can today talking about -- I  
14 mean I'm well aware that DU is different, and I also  
15 sympathize with what Dennis is saying about that the  
16 performance-based option could address it. And so I  
17 guess I'd like to help our letter --

18                  MEMBER ARMIJO: We did.

19                  MEMBER REMPE: Well, our past ones. But  
20 I mean this one we're going to write, well, maybe we  
21 could agree on some of the topics we think should be  
22 discussed and the pros and cons or whatever, and  
23 then I would like to reserve making any hard opinion  
24 or firm opinion at this time.

25                  CHAIR RYAN: So what topics do you think  
26 ought to be in that letter?

1                   MEMBER REMPE: Well, I think what we've  
2 talked about already about the differences of DU, a  
3 little bit more history. I mean, perhaps the  
4 Commission's well aware of it, but how that the  
5 history, you know, why we're where we are today.  
6 I'd like to see that included in the letter.

7                   And that, you know, maybe the discussion  
8 at the performance-based option and how it can  
9 address it or maybe where it would be, you know,  
10 some of the disadvantages because of the uncertainty  
11 that Sam's mentioning. But I guess I'd like more  
12 discussion amongst ourselves before I can snap to an  
13 opinion.

14                  CHAIR RYAN: Okay. There is a long  
15 history of letters, not just ACRS, but the ACNW&M,  
16 and ACNW before that.

17                  MEMBER REMPE: But I guess I think if  
18 we're going to impact what, I mean, the Commission  
19 is going to do on this, I think we need to really  
20 focus on what we want to emphasize and what the  
21 letter should have at this time.

22                  CHAIR RYAN: All I'm trying to say is  
23 that there's a rich body of previous letters from  
24 which you can, what we can, you know, pick and  
25 choose kind of, well, as you recall from this letter  
26 back in the Dark Ages we offered these comments.  
27 Because a lot of that's been plowed already.



1                   MEMBER REMPE: But I think we need to  
2 focus carefully what topics we want to put in this  
3 letter.

4                   CHAIR RYAN: I'm not disagreeing with  
5 you. I'm just saying there's a rich history to pick  
6 from.

7                   MEMBER REMPE: That's true. So that's  
8 why I hope we spend some time on that today.

9                   CHAIR RYAN: Well, I don't know that  
10 we're prepared to do that today.

11                  MEMBER ARMIJO: Well, we really should  
12 have an outline of key points that we all would like  
13 to --

14                  MEMBER REMPE: That's what I'd like to  
15 see happen.

16                  CHAIR RYAN: Okay, we'll start with  
17 that.

18                  MEMBER ARMIJO: -- see addressed in the  
19 letter. Well, not necessarily my outline, but so  
20 that we, you know, we had to do something like that  
21 on the expedited fuel thing. In order to break the  
22 log jam we had to -- which way do you want to go.

23                  MEMBER REMPE: That's what I'd like to  
24 see is avoid the log jam this time.

1                   MEMBER ARMIJO: Right. Because then we  
2 don't have a, we're effectively, you know, this is  
3 supposed to be a committee of the whole, but in fact  
4 everybody can't attend all the meetings. So at the  
5 next full committee meeting is when we'll talk about  
6 this, and I think we really have to have some sort  
7 of outline that at least we agreed would be the  
8 basis for a draft letter.

9                   CHAIR RYAN: Well, I'm hoping to come to  
10 the next full committee letter with a draft that we  
11 can all --

12                  MEMBER ARMIJO: Yes, well, that's what  
13 I'm saying. We need to give you an outline of the  
14 points that need to be addressed.

15                  MEMBER REMPE: This group ought to try  
16 and, to what we can at least points, you know, again  
17 we're only the subcommittee. Our consensus doesn't  
18 mean much if we could come to it, but at least  
19 things that we would like to see happen.

20                  CHAIR RYAN: Well, the good news is  
21 we're a quorum even if everybody votes against us.

22                  MEMBER REMPE: But some of the people  
23 might have stronger opinions and tend to sway those  
24 who are here, so --

25                  MEMBER ARMIJO: Well, normally we don't  
26 need to have a court reporter for a letter writing  
27 process. Because that's almost what we're in there,  
28 in the discussion to prepare an outline.

1 CHAIR RYAN: Yes, I think from this  
2 point on. Yes.

3 MEMBER REMPE: Let the other people --

4 CHAIR RYAN: Let's finish our first go  
5 around and then --

6 MEMBER ARMIJO: Yes, sure.

7 MEMBER BALLINGER: Yes, I agree a lot  
8 with a lot of what Dick is saying and I'm not  
9 persuaded by the argument so far that the cost to  
10 comply with the new regulations and stuff is not  
11 going to be very high for places, you know, in spite  
12 of the fact that they said --

13 CHAIR RYAN: You're thinking it's going  
14 to be high or you're thinking it's not going to be  
15 high?

16 MEMBER BALLINGER: I think it's going to  
17 be high.

18 CHAIR RYAN: Yes, okay.

19 MEMBER BALLINGER: I'm not persuaded  
20 it's not going to be high. Let's put it that way.

21 CHAIR RYAN: Okay.

22 → MEMBER BALLINGER: And I'm new to this  
23 so I've read everything from scratch. And what  
24 struck me was just what Dick was alluding to, is  
25 this DU has got to be treated separately, and I  
26 don't understand why that hasn't been done before  
27 now other than just inertia in the system.

28 CHAIR RYAN: Fair enough.

1 Dr. Clarke?

2 CONSULTANT CLARKE: I should identify  
3 myself.

4 CHAIR RYAN: Yes, please.

5 → CONSULTANT CLARKE: My name is Jim  
6 Clarke. I'm at Vanderbilt University. I was a  
7 member of the former ACNW&M that Mike chaired. I  
8 have very fond memories of that experience. It's  
9 good to be back.

10 MEMBER ARMIJO: You haven't been on the  
11 ACRS -- fond memories.

12 CONSULTANT CLARKE: And I'm a consultant  
13 to the ACRS. I just had a couple of things. I went  
14 through the documents that were provided to me.  
15 I've been trying to keep up with this and there's  
16 been a lot to keep up with. And the SECY-13-0075,  
17 July 19, has a comparison of the current 10 CFR 61  
18 to the proposed 10 CFR 61, and it's in a text and  
19 you kind of go back and forth.

20 It struck me that, and you folks may be  
21 planning on doing this, that there might be merit to  
22 more of a flow chart or a decision tree, actually --  
23 if this, then that -- when you're, you know, for  
24 each of them, actually.

1                   So what we did and what we're proposing  
2 to do in the future, oh, just some graphical  
3 representation of that, I think, in addition to  
4 what's in the text which is just fine. That might  
5 be helpful. So I just wanted to, perhaps these guys  
6 may already have done it. I don't know.

7                   Now the other is this very controversial  
8 time of compliance which has, you know, been  
9 controversial for as long as I think I've been  
10 following this stuff. And it's interesting when you  
11 compare it to hazardous waste or Superfund sites,  
12 which may be a lot more serious in some cases where  
13 you're into five-year reviews in one case and 30  
14 years of post-closure monitoring and maintenance in  
15 another.                   But it struck me that in Dr.  
16 Ryan's summary of the last meetings I saw 10,000  
17 years, I saw 1,000 years and I saw a few hundred  
18 years. And as you go from 10,000 to 1,000 to a few  
19 hundred, I hope you would all agree you reduce a lot  
20 of some uncertainties.

1                   Okay, I liked the two-tiered approach  
2 but I'm not sure I totally understand it. So I'm  
3 wondering if you were to adopt a compliance period  
4 of a few hundred years, and just think back a few  
5 hundred years and think of all the changes that  
6 we've seen, they were totally unanticipated, and  
7 somehow you worked the rest of the uncertainty under  
8 the Tier 2.                   I don't know if that makes  
9 sense or not. But clearly we're going to need some  
10 ongoing monitoring. We're going to need to see, you  
11 know, if things are going as planned. And the other  
12 thing that I think is important is this is near-  
13 surface disposal. This isn't a repository.

14                   So there's a little bit of if something  
15 goes wrong we can probably fix it. That's not  
16 getting into cost, but at least these decisions are  
17 not irreversible. I think we'd like them to be. I  
18 think we'd like to get out of monitoring and have  
19 something designed and implemented and feel  
20 confident enough in it that we can stop. But I'm  
21 not sure that it's going to go that way. So I throw  
22 that out as maybe a shorter compliance period.

1                   And the other, you know, Larry showed a  
2   slide, Slide 11, that said Tier 1 "reasonably  
3   foreseeable futures." And I just don't think 10,000  
4   years is a reasonably foreseeable future. So I'm  
5   wondering if that is the intent, reasonably  
6   foreseeable future. Maybe a few hundred years might  
7   have merit and then we can deal with the rest of it  
8   perhaps in Tier 2, depending on how we define Tier  
9   2.               And then I just want to close by saying  
10   that I'm definitely persuaded that a separate  
11   rulemaking for DU makes a lot of sense. I mean, you  
12   know, it wasn't anticipated, the other stuff that  
13   wasn't anticipated, the blending can be handled, I  
14   think, under the current approach, you know, with  
15   caution. Because you hit the limits pretty fast  
16   depending on --

17               CHAIR RYAN: Blending of?

18               CONSULTANT CLARKE: A, B, and C to get  
19   to A. And, you know, so those are my comments.  
20   Thanks for inviting me. It's a pleasure to be here.

21               CHAIR RYAN: Oh, sure. Absolutely, Jim.  
22   Thanks for being here. We appreciate your insights  
23   and your comments. Thanks very much.

24               Okay, I guess the one that jumps out at  
25   me is the DU, you know, by itself you can deal with,  
26   but in the context of low-level waste it becomes  
27   very complicating with no real benefit of having it  
28   together.

1                   You could, for example, just as an  
2     example, have a disposal facility and off in one  
3     place have a DU cell. DU, that's it. And the rest  
4     of it could be low-level waste that doesn't involve  
5     DU, and make a pretty bright line there so you sort  
6     of create a different strategy for managing DU  
7     versus something else.

8                   The other part of the DU segregation is  
9     you could deal with it in a waste form way. Maybe  
10    it's all metal. That would be an easier situation  
11    than if it's dry, finely divided powder, you know,  
12    which could create a different set of challenges.

13                  So I'm thinking more and more that DU  
14    should be a category of material and ultimately as a  
15    waste that's separate and deals with the fact it's  
16    primordial. It's going to be here forever. It's  
17    not going to decay to any appreciable amount at  
18    least from the foreseeable life of our planet. And  
19    it makes a heck of a lot of sense to me.

20                  MEMBER SKILLMAN: Mike, let me add onto  
21    that comment just to open up a little bit more in my  
22    own thinking. I've got a friend who worked on a  
23    contract down at Aberdeen, and the task was to  
24    destroy the nerve gas projectiles. There were many  
25    of them. It was the United States equivalent of --

26                  MEMBER BLEY: They were ton cylinders  
27    actually.



1                   MEMBER SKILLMAN:  -- sarin.  And they  
2  actually built a process where they fired this stuff  
3  into a high temperature boiler and they used it as  
4  fuel along with petrochemical.  They burned it.  And  
5  there was proof that once it was subjected to high  
6  heat its chemical form changed.  It became  
7  incinerated and was part of the fuel, and it was  
8  disposed of basically as flue gas.

9                   That was a very dangerous --

10                  MEMBER ARMIJO:  Yes, if the temperature  
11  wasn't high enough.

12                  MEMBER SKILLMAN:  -- compound, and that  
13  work was done successfully.  It seems to me that  
14  that's the kind of thinking that we ought to be  
15  using for DU.  And probably there's a way to do it  
16  to treat it as a future resource instead of  
17  destroying it as a waste form.  There's probably a  
18  way to make it into something that can be set aside,  
19  put in a safe place, left for a long time that poses  
20  neither chemical nor radiological hazard of any  
21  great degree, and as you say, it's got a ten to the  
22  ninth half-life.  It's going to be around for a  
23  long, long time.

1                   MEMBER ARMIJO: What DOE is doing  
2 turning it into U3O8 is perfect feedstock to turn it  
3 into depleted UO2, or ultimately, if you want, a  
4 metal form. So what DOE is doing is what they  
5 believe is the most stable chemical form as U3O8 and  
6 it will be a resource someday. Who knows when, but  
7 it will have value. And so I think that's going to  
8 happen. You know, we're not destroying it.

9                   MEMBER SCHULTZ: Well, that's true. But  
10 we get into this whole discussion about what we're  
11 going to do with Part 61, because treat it as a  
12 waste it's a long, long-lived material, therefore  
13 suddenly we have a performance period that's out  
14 there beyond 10,000 years and we're going to do an  
15 evaluation, technical evaluation inside 10,000 years  
16 instead of a few hundred, which does make more sense  
17 for low-level waste.

18                   So we seem to have created boundaries or  
19 lack of boundaries that puts us into a process  
20 that's really, technically untenable. And so we  
21 still need to continue to ask ourselves and the  
22 Commission, why are we doing it this way? Why are  
23 we defining something in the wrong way? We're  
24 calling it a waste instead of a resource. We're  
25 trying to plan in case it is not U3O8, we need to  
26 plan for that. Well, why do we? Because we're not  
27 making policy decisions about how it ought to be  
28 treated as a material.

1                   MEMBER ARMIJO: Yes, if it was treated  
2 as a resource it would be, you'd have a one tier  
3 period of compliance where you stored it as a  
4 resource. And you wouldn't worry about 10,000 years  
5 because you'd figure maybe in the next hundred years  
6 somebody will be using that in fast reactors or --

7                   CHAIR RYAN: I'm sorry, I have to react  
8 to that. I just don't see that a resource is going  
9 to sit around under some kind of a program and  
10 spending lots of money to give it care and feeding  
11 for hundreds of years until we're ready to use it.

12                  MEMBER ARMIJO: There would be no more  
13 care and feeding than what you would do as you put  
14 it in the ground in a concrete cask. I mean, it's  
15 the same thing. It's accessible. Whether we call  
16 it a waste or whether we call it a resource it's  
17 still going to be accessible.

18                  CHAIR RYAN: Well, I'm not sure I would  
19 do it that way.

20                  MEMBER ARMIJO: We might do it a  
21 different way, Mike. I'm just saying --

22                  CHAIR RYAN: Let me know when I can  
23 finish.

1                   MEMBER ARMIJO: Analyzing for this  
2 second tier, analyzing for far into the future is  
3 interesting. It's probably fun for people that know  
4 how to do it, but I don't think it provides any  
5 safety benefit. You wouldn't change the design of  
6 the facility as a result of that. You already know  
7 how to design these facilities, been doing it for a  
8 long time. So, you know --

9                   CHAIR RYAN: Yes, but the point is, is  
10 that if you take DU out of low-level waste, that's  
11 the premise on which I'm making these comments.  
12 It's not in low-level waste. If it's in some other  
13 category dealt with in some other way that's  
14 appropriate for something that's primordial in terms  
15 of its lifetime, okay, then low-level waste makes  
16 really very good sense with the near-surface, you  
17 know, multi-barrier kind of technology approach  
18 that's in use today.

19                  MEMBER SCHULTZ: But then my point was,  
20 so why create a Part 61 that's at 10,000 years?

21                  CHAIR RYAN: That's what I'm saying.  
22 Make the performance interval in 61 appropriate to  
23 the half-lives of the waste that you're dealing  
24 with.

25                  MEMBER SCHULTZ: Because I think the way  
26 we got to the 10,000 years is, well, look at DU.

1                   → CHAIR RYAN: Well, you know, my central  
2 case which I shared with most of you is I decayed  
3 down the inventory of the South Carolina site, and  
4 in a hundred years you have bits, tidbits of, you  
5 know, a little bit longer-lived radioactive  
6 material. There's eight radionuclides involved at  
7 that time. Eight, in very small quantities. You  
8 know, the case is proven by what's exactly buried in  
9 the low-level waste sites now.

10                   So, you know, I think to me that's a  
11 central issue that we've got to get across to the  
12 Commission that this is a problem that's very  
13 quickly reduced and clarified on both sides of the  
14 ledger if you have low-level waste minus DU and DU  
15 over here by itself.

16                   MEMBER SCHULTZ: Right.

17                   CHAIR RYAN: That's the letter. I mean  
18 that's the driver of the letter as far as I'm  
19 concerned.

20                   David?

1                   MR. ESH: Dave Esh with the NRC staff.  
2 Just one point of information for you on this topic  
3 that you're discussing right now. Prior to DU  
4 coming into existence in the NRC system, the  
5 technical staff, even before I was at NRC, developed  
6 NUREG-1573 which is on doing low-level waste  
7 performance assessment. So that was for what you'd  
8 call traditional low-level waste, not a DU waste  
9 stream.

10                   That group had up to 20 people on it and  
11 they looked at the problem for, I don't know, seven  
12 or eight years or something like that. They did  
13 computational models. The people that did that work  
14 had probably 300 or 400 years of technical  
15 experience in performance assessment in associated  
16 fields.

17                   And they said in their guidance document  
18 that was issued in 2000 to use a time of compliance  
19 of 10,000 years for low-level waste, without  
20 depleted uranium.

21                   MEMBER SCHULTZ: What drove them to that  
22 conclusion?

1                   MR. ESH: That's because the low-level  
2 waste in the U.S. is not classified by half-life.  
3 So our Class A waste has long-lived waste in it just  
4 like our Class B or C has long-lived waste in it.

5                   Internationally, I would say they're  
6 smarter than we are. They make their classification  
7 system by both concentrations and half-lives, which  
8 then allow you to tailor your criteria to the  
9 material better.

10                  But in the U.S. because the long-lived  
11 is part of the traditional waste stream, the  
12 analysis to look at when you get the impacts and how  
13 big they are, they felt has to go out long enough to  
14 capture what those impacts are. That's from  
15 technetium-99, iodine-129, the transuranic elements  
16 that are present in low-level waste.

17                  And if you go back to some of the old  
18 presentation materials that we gave to you, there's  
19 a figure that we have that has the ratio of what you  
20 need to do to reduce low-level waste down to 25  
21 millirem. There was one that included geochemistry  
22 and one without geochemistry.

1                   But it basically shows that a  
2 traditional low-level waste stream still has a lot  
3 of risk in it. It's not a riskless endeavor that  
4 within 300 years all the risk is gone. There's  
5 risks that persist, and if you put it in a bad site  
6 it's going to show up. If you put it in a good site  
7 it won't, or the concentrations will be limited.

8                   So just that point of clarification as  
9 you go on this. Should we have a separate DU rule?  
10 What should be the time for low-level waste, et  
11 cetera?

12                  CHAIR RYAN: Yes. Well, it's hard  
13 sometimes to take a look at the traditional makeup  
14 of low-level waste, particularly with the issues  
15 you've just gone over. You know, it's intimate to  
16 the waste. It comes out in a reactor waste stream,  
17 and, you know, are you going to take out the atoms  
18 of the one that's a little bit longer lived and try  
19 and do something like that? No. So you've got to  
20 deal with it as a waste as a whole.

21                  But I think we've got an opportunity to  
22 take one that's really a problem, because it's not  
23 mixed in with low-level waste, and do something else  
24 with it.



1                   MR. ESH: You don't necessarily want to  
2 confound or pollute your system by this one thing if  
3 you think it is, in fact, separate. What we felt  
4 was, we looked at what was done in the previous  
5 staff in low-level waste guidance, and then how  
6 different is this material?

7                   We've acknowledged that it is different,  
8 but we felt that the criteria we came up with and  
9 the approach of only triggering the very long term,  
10 if you're in that box, basically would assure that  
11 whatever waste streams we get in the future, the  
12 regulation would handle it and we wouldn't have to  
13 go through, you know, perpetual rulemaking and all  
14 that that's very time consuming and -- so anyway.

15                  MEMBER SCHULTZ: But if we started off  
16 30, 40, 50 years ago and we set up a system that is  
17 not as smart as what others have done in Europe,  
18 let's say, because we didn't consider and separate  
19 half-life from toxicity and what have you, why would  
20 we want to perpetuate that? Why would we not want  
21 to, if we're going to change anything, be smarter?

1                   MR. ESH: Yes, I think the answer to  
2 that is in this case it was supposed to be a limited  
3 scope rulemaking and that was outside what was  
4 supposed to be limited scope, which is why we had in  
5 2015, and I don't remember the time frame, to do the  
6 comprehensive changes where we would look at  
7 something like that. Because the waste  
8 classification we kind of talk about it as a  
9 technical thing, but it's a real-world thing.

10                You know, there's legislation written that's  
11 tied to the waste classifications system. There's  
12 all sorts of processes and real-world management  
13 that goes on based on it. It's not a small deal to  
14 change the waste classification system.

15                To change the requirements for the  
16 technical analysis impacts the few, the site  
17 operators that we have and the Agreement States that  
18 they are in. That's a small change. But the change  
19 in classification system changes it for the whole  
20 country.

21                And so that's why we kind of came out  
22 where we did with that would be a good thing to look  
23 at in a comprehensive revision, but in this limited  
24 scope thing, which the intention was to get it done  
25 rather quickly, because there is this material  
26 waiting, sitting out there ready to go. That was  
27 the thinking that went into it.

1                   MEMBER BALLINGER: But if things got  
2 complicated as they have, and we go along, there's  
3 no reason, if you realize it now, it's gotten  
4 complicated to the point where you realize you've  
5 made a mistake, in effect. There's no reason to  
6 simply keep going and try to patch things up. You  
7 stop, you reconsider, and if necessary do something  
8 different.

9                   MEMBER SCHULTZ: And the one example  
10 would be so it's limited in scope. Why would we  
11 codify 10,000 years? Why? If you're saying no,  
12 what we're going to do is we're going to move  
13 forward and we're going to do a more detailed and  
14 rulemaking and --

15                  MR. ESH: The reason why is because we  
16 got that as strong feedback from the stakeholders  
17 when we started the process, and three of the four  
18 sites already did that or are doing that in process.  
19 We didn't view that as such an enormous sticking  
20 point as what it has become.

21                  So we viewed it as, hey, the staff  
22 already had that guidance out there in 2000 that  
23 said this, and we never had a peep about it from the  
24 ACRS. And that's been, you know, ten years it's  
25 been sitting out there, the staff guidance that was  
26 previously developed. So we didn't see it as such a  
27 big deal as what it has become.

1 MEMBER BALLINGER: I mean, it sounds to  
2 me like if we get the U out of the discussion then  
3 it makes your life easier on the low-level waste  
4 disposal issue with the 10,000 years effects, right?

5 MR. ESH: I think that the depleted  
6 uranium is definitely a challenge, and that was the  
7 reason for the rulemaking, okay. So I don't see a  
8 need to do the rulemaking if you're not including  
9 depleted -- it wasn't like we felt like, oh, well,  
10 the low-level waste regulation has problems and we  
11 need to change it.

12                   We only needed to change it for the  
13 waste streams that were outside of the scope because  
14 you basically have an unanalyzed safety condition.  
15 You have something that wasn't analyzed before  
16 that's different now so we need to make sure the  
17 analysis gets done to correct that condition.  
18 That's the bottom line. So yes, it would make it a  
19 lot easier because I don't think you'd need a  
20 rulemaking. That's my opinion.

21 MEMBER ARMIJO: Well, that's even  
22 better. (Simultaneous speaking)

23 MEMBER ARMIJO: That's even better.  
24 Whether it's a new paragraph or a --

25 MR. ESH: No, it would not solve the DU  
26 problem. No, that's why we did the rulemaking to  
27 solve the DU problem. But you'd still need  
28 something done with the DU problem.

1                   CHAIR RYAN: It solves the DU problem as  
2 long as it's still part of low-level waste. If it's  
3 the DU problem in a whole different space then it's  
4 probably a lot more straightforward to solve.

5                   MEMBER BALLINGER: That's what I meant.

6                   CHAIR RYAN: That's what you're saying,  
7 I'm thinking. So that sounds to me like a good  
8 thing.

9                   MEMBER BALLINGER: It is. Yes. And I'm  
10 not sure we need to call it a resource. We can just  
11 call it whatever it is.

12                  CONSULTANT CLARKE: You know, it seems  
13 to come down to a storage versus disposal, and I  
14 think you can store it in a way that accommodates  
15 disposal, as was mentioned.

16                  MEMBER ARMIJO: It just seems that we  
17 have a working Part 61. Maybe it isn't perfect but  
18 it's worked very well for what Dave calls  
19 traditional low-level waste, and even though it has  
20 small, maybe, amounts of long-lived stuff in it, it  
21 isn't the dominant stuff. The dominant stuff is the  
22 shorter half-life.

1                   So leave that alone. Leave that part  
2 alone. Address DU with all of its complications  
3 separately. Make requirements specifically for DU  
4 that address those issues and don't let the  
5 requirements for DU, whether it's intruder  
6 assessment or times of compliance or everything  
7 else, leak back into the existing regulation.

8                   It seems to me that would be the easiest  
9 thing. And if you have waste site and you don't  
10 want to get into the large quantity DU disposal  
11 business, then you're just going on about your  
12 business and you're not affected at all. If you  
13 want to go into that business there's a price to  
14 pay. You meet the new DU requirements.

15                  MEMBER REMPE: If you do something like  
16 that, didn't I hear you say there's a lot of  
17 material waiting that's DU come in? So how long  
18 would it take to come up with new requirements for  
19 DU?

20                  MEMBER ARMIJO: Well, he's got the  
21 requirements. The staff has created those. And  
22 there's the Texas facility that it's all set up for  
23 it, and I think Utah is too. They could meet the DU  
24 requirements.

25                  CHAIR RYAN: The western sites are  
26 looking at DU as an opportunity because their  
27 geohydrologic environment and all of that is better  
28 suited.

1                   MEMBER REMPE: But does the Commission  
2 have requirements other than to try and fit it into  
3 what the current framework is? I mean, I thought we  
4 were talking about having something different for DU  
5 that doesn't have as long lead time or anything, or  
6 a compliance time.

7                   CHAIR RYAN: I'm not as clear as Sam as  
8 everything's up and ready to roll. I think it's not  
9 quite --

10                  MEMBER REMPE: That's what I'm  
11 wondering, is how long would it take to get, I mean  
12 --

13                  MEMBER ARMIJO: What is it? It's just a  
14 matter of writing it up, the staff --

15                  → CHAIR RYAN: Well, it's a rulemaking  
16 cycle, Sam. It's going to take a year or more with  
17 public comment and all the rest.

18                  MEMBER ARMIJO: No matter what we do  
19 it's going to take time.

20                  CHAIR RYAN: Yes. So I mean it's not  
21 something that's going to pop off the shelf and be  
22 ready to go tomorrow. But it's a multi-, probably,  
23 I'm going to guess a few years to get it done, would  
24 be my guess.

25                  MEMBER ARMIJO: But I think it'd be  
26 shorter if you separated the DU issue from the low-  
27 level waste issue.

1                   CHAIR RYAN: I'm saying with the DU  
2 issue on the side by itself, getting it up and  
3 rolling would be a multi-year process.

4                   MEMBER SCHULTZ: Either way, right?

5                   CHAIR RYAN: Either way. You all  
6 agreed, I think. The one point we agreed on is that  
7 it seems a lot clearer to have DU in this arena and  
8 the rest of low-level waste in this arena to deal  
9 with the issues that are not so widely different.

10                  MR. WIDMAYER: Does a grandfathering  
11 clause do the same thing? We can leave this  
12 rulemaking alone, let it go into effect for DU but  
13 have a grandfathering clause. I don't know what it  
14 exactly would say.

15                  CHAIR RYAN: What would the  
16 grandfathering clause accomplish --

17                  MR. WIDMAYER: Then you've left the  
18 already disposed of low-level waste alone or, and if  
19 you word it properly you don't have to include  
20 something that needs the classification --

21                  CHAIR RYAN: Oh. Oh yes. And I think  
22 you'd have to have some recognition that waste that  
23 had been previously disposed under appropriate  
24 requirements at the time --



1                   MR. WIDMAYER: Okay, but then you don't  
2 need to separate if, you know, I don't know how  
3 comfortable you are with this handling the DU  
4 situation as long as you leave, you know, regular  
5 low-level waste alone.

6                   CHAIR RYAN: I would say that people  
7 that are counting on DU disposal probably are going  
8 to look for, where else am I going to take it?

9                   MR. WIDMAYER: Okay. What I'm asking  
10 you as a committee is, does that achieve the same  
11 thing as a recommendation that says do DU  
12 separately? Are you comfortable with this, handling  
13 DU as long as it leaves other low-level waste alone?

14                  MEMBER ARMIJO: I don't think you can  
15 actually accomplish that grandfathering. Somehow or  
16 another when the rule finally got written up I don't  
17 think it would actually, you know, I think you've  
18 got to write specifically, this is for disposal  
19 sites handling large quantities of DU, period.

20                  MEMBER SCHULTZ: Yes, I think just  
21 grandfathering doesn't accomplish the whole --

22                  MEMBER ARMIJO: Before you know it there  
23 would be some leakage back, and you're back in the -  
24 - that's what I think. But 99 percent of the  
25 discussion we've had in all of the meetings I've  
26 been in relate to DU.

1                   And that's why I think we've got a DU  
2 problem and we should recommend something that  
3 addresses the DU problem. It's unique, and trying  
4 to force it into some general framework that also  
5 treats low-level waste, it can lead to confusion and  
6 a lot of work by people who are not in the DU  
7 disposal business.

8                   → MEMBER SKILLMAN: Sam, let me ask a  
9 question, if I could, to Dr. Esh.

10                  Dr. Esh, if you were asked to retain all  
11 of the best that's presently in your updated Part 61  
12 and to add to it a codicil for a couple of  
13 paragraphs that effectively forgive the presently  
14 buried DU, and point to a different set of  
15 acceptance criteria for the 1.3 million metric tons  
16 that are coming down the pike, is that something  
17 that could be done? And that's number one, could it  
18 be done? In other words, a couple of paragraphs.  
19 And number two, in your judgment could that be  
20 something that OGC would be willing to support?

21                  MR. ESH: Let me go in reverse order. I  
22 can't speak for OGC, what they would or wouldn't  
23 support on this topic.

24                  MEMBER SKILLMAN: Fair enough.

1                   MR. ESH: The issue of grandfathering  
2 came up and they weren't supportive of it when it  
3 was discussed, but you'd have to get that answer  
4 from them. You know, it's a complicated issue.  
5 From a technical standpoint it sounds good, but then  
6 it's very challenging.

7                   And the reason why it's challenging is  
8 because take a site that has 50,000 metric tons of  
9 uranium in it already. So how do you define -- say  
10 I'm a future site or a site in the future and I  
11 wanted to take 10,000. Well, why would I need to do  
12 a special analysis when the 50,000 ton site didn't  
13 need to do one? How does that make sense basically?

14                  But the strongest problem from a  
15 technical standpoint is you have to understand that  
16 depleted uranium or uranium especially is very, very  
17 site-dependent as to what risk it poses. So, you  
18 know, at one site, especially an arid site with very  
19 low moisture content in the soil, radon can be a  
20 really severe problem.

21                  And I'd ask you to put your mathematical  
22 hats on and just think about radon in people's homes  
23 today and what the driving force for that is.  
24 Uranium in soil around our homes is like part per  
25 million levels, you know, five, seven, three,  
26 something like that.

1                   A few parts per million uranium in the  
2   soils around your home, and that generally  
3   translates into 200 millirem, more or less, what the  
4   average person has in their home from radon. The  
5   source of depleted uranium as disposed can be as  
6   much as 500,000 parts per million uranium.

7                   And so it's not a trivial problem from a  
8   technical standpoint. The big solution to that is  
9   to put it deeper, okay, but then how deep to you put  
10   it? And if we were, NRC, to develop, say, special  
11   DU criteria, how would we get the depth right for a  
12   particular site? Because the depth that you need at  
13   the NTS site in Nevada, because it's so dry, might  
14   be much deeper than what you need at Washington, for  
15   instance, which has a little more soil moisture and  
16   different properties for its soil.

17                  So the radon has that issue going on  
18   with it, and then technically on the other side, the  
19   uranium in the water is just as bad from a  
20   complexity standpoint because you can have all sorts  
21   of different solubility limits depending on what the  
22   uranium phases are and the geochemistry and, you  
23   know, you hear people say, well, we're going to  
24   grout the facility. Well, when you grout it you  
25   drive the pH way up and drive the uranium solubility  
26   up with it.

1                   So you can have this kind of competing  
2 influences that go on technically within the system.  
3 So then once again then, how would we set, like, a  
4 limit to say what's large for depleted uranium? You  
5 know, what would that number be, and how would we  
6 determine it?

7                   That seemed like a really difficult  
8 problem for us to do. Not that we couldn't. We  
9 could come up with something and vet it through your  
10 committee and through the public stakeholders and  
11 everything.

12                  But we thought the better approach was  
13 just to let people rely on their specific analyses  
14 to make those determinations and to develop  
15 inventory limits. That's a fundamental concept  
16 that's used in Part 61 right now for the long-lived  
17 isotopes that could cause problems sometime in the  
18 distant future. Why would we treat uranium any  
19 different? We'll just treat it the same as we have  
20 for the past 30, 40 years.

21                  So that's my kind of long answer to your  
22 question to give you some insights into, it's not  
23 that we didn't think about it and that we didn't  
24 discuss it, but it's a pretty difficult problem to  
25 come up with a clean answer to. The approach we  
26 took was a cleaner answer to the problem.

27                  MEMBER SKILLMAN: Thank you.

28                  CHAIR RYAN: Anything else?

1                   → MEMBER ARMIJO: There was one other  
2 thing that was raised by John Greeves in his  
3 presentation. He talked about, you know, you need  
4 two tiers. The time of compliance should be 1,000  
5 years. And then the second tier, he said, there  
6 must be a second tier. He didn't say what it should  
7 be.

8                   And it must have a metric, it can't be  
9 just open-ended. And there was somebody else that  
10 said, yes, there ought to be a metric but it ought  
11 to be one rem for that. It's very long term so it  
12 makes, so it wouldn't be impossible to meet.

13                  And we may want to discuss the issue of,  
14 or think about whether we would want to recommend  
15 for traditional low-level waste a shorter time of  
16 compliance and only one term, not a performance  
17 period. So low-level waste would be handled no  
18 different than it is today, but only DU would have  
19 the longer term treatment and have some sort of  
20 metric.

21                  But, you know, again that's something I  
22 don't feel that strongly about, but I think, I just  
23 can't see the benefit of mixing DU and the  
24 traditional low-level waste in one process that  
25 makes people do work where there's no safety  
26 benefit. That's the only new thing.

1                   And David, I don't think anybody is  
2   disagreeing with the idea you've got to do a site-  
3   specific design for your facility and take into  
4   account the water and the radon and all the things  
5   you talked about. We wouldn't skip that. We  
6   wouldn't propose skipping that.

7                   It would just say, hey, if you're doing  
8   this unique material with it's unique properties,  
9   it's a separate beast and you treat it this way.  
10  All the stuff we've been doing up to now under Part  
11  61 is just fine, but it's constrained by these  
12  limits, the waste acceptance criteria and everything  
13  else, and that's it. It seems to me an easier job.

14                  CHAIR RYAN: It sure tightens up the  
15  problem to me, and maybe I'm wrong, but where, you  
16  know, you've got a relatively -- well, not a  
17  relatively, I mean a much, much smaller span of time  
18  over which you're trying to make predictions, or  
19  make assessments.

20                  So that to me is a huge win. Because,  
21  you know, it's just you're primordial and then  
22  you've got something that's a few hundred years,  
23  give or take, and with a few radionuclides that are  
24  in small quantities that are going to be around for,  
25  you know, a little bit longer.

1                   So to me the simplification of, quote,  
2 whatever low-level waste is without uranium in it is  
3 something to think a lot about maybe having some  
4 benefit. I'm not saying let's jump in the wagon  
5 today and start taking DU to somewhere else, but it  
6 sure seems to me like that's worth thinking through  
7 a little bit more in detail.

8                   Now I've done some calculations for one  
9 site, and there's eight radionuclides that are left  
10 after 300 years in curie quantities in the whole  
11 site, not megacuries. Curies. So I'm struggling  
12 with why that's not a good thing to think through a  
13 little bit and see what that's like for other, you  
14 know, inventories, or at least make the assessment  
15 of, if we examine this what do we see as a profile  
16 or a picture of this situation?

17                  MR. ESH: Yes, the problem that we run  
18 into and have run into and will continue to run into  
19 is that the hazard profile and the risk profile are  
20 quite a bit different. And the hazard profile, you  
21 know, in the low-level waste performance assessment,  
22 it's then mitigated by all the things that  
23 scientists and engineers put in place to try to  
24 ensure that public health and safety are protected.  
25 And they do a good job at that and they shouldn't be  
26 penalized for it.



1                   So with all the activity that you talked  
2 about, Dr. Ryan, as not being there in a few hundred  
3 years, the good thing is the systems take that risk  
4 away, or we feel like they're going to take that  
5 risk away, with a high degree of confidence. The  
6 analysis process is trying to see what remains after  
7 that risk has been taken away, and is that level of  
8 material that remains appropriate or not.

9                   CHAIR RYAN: All I'm saying is we're  
10 taking the bright red light of the uranium that's  
11 there forever and it's now taken away. I'm not  
12 saying we change anything else we're doing for low-  
13 level waste. In fact, I would suggest you don't  
14 need to change anything else.

15                  But you are getting a much more  
16 definable period of risk, if you will, where there  
17 is a risk to manage, down to something that's a  
18 whole lot less. And I'm agreeing with the  
19 colleagues who said don't change anything else.  
20 Same techniques, same technology, same depth of  
21 burials, all that stuff. Same site selection  
22 criteria, everything else stays the same.

23                  But it really solves that, you know,  
24 really, really forever half-life risk assumption  
25 that's well within a reasonably predictable time  
26 frame.

1                   MR. ESH: Yes, and understand something  
2 that we didn't make the determination that depleted  
3 uranium was low-level waste. That was done in the  
4 proceedings that then initiated our rulemaking. We  
5 were given the task of, given that this is low-level  
6 waste, what criteria do you need to use or  
7 requirements that you need to have to ensure that's  
8 it's disposed of safely.

9                   CHAIR RYAN: Oh yes. Don't take any of  
10 the suggestions as to criticism of what you've done.  
11 Not in the least.

12                  MR. ESH: No. Yes, so that's, you know,  
13 the task we were given, and the approach we tried to  
14 go about it is we looked at this issue of the  
15 variability and the environment sites and designs,  
16 et cetera, and said, well, everybody seems to, to  
17 date, be comfortable with this analysis-based  
18 approach. Let's make the requirements for an  
19 analysis-based approach to solve this problem.

20                  Because the reason why we got in this  
21 situation is when the original EIS was developed  
22 they didn't anticipate this waste stream being a  
23 waste. Well, why do we believe we're so smart today  
24 that there isn't going to be a waste stream ten  
25 years from now that somebody says, now this is a  
26 waste, now dispose of it?

1                   I can see that happening, you know, as  
2   technology changes and we change our fuel cycle and  
3   what not, there could easily be something that is  
4   radiologically/isotopically much different than we  
5   had anticipated today that needs to go in a low-  
6   level waste facility.

7                   The analysis-based approach would solve  
8   that problem. It would take away that risk of  
9   needing to do this again in the future. It's a  
10   matter of getting people to agree to what are the  
11   criteria that you need to solve that problem for  
12   these different things that somebody could look at  
13   and one person's going to say that's a cat and  
14   that's a dog and there's a zebra in there too. You  
15   know, they're not things that you should be  
16   comparing at all.

17                  Well, as long as it meets the  
18   legislated, verbal definition of low-level waste  
19   then it's all low-level waste that should be managed  
20   by our technical requirements.

21                  Could you be smart enough to develop  
22   something that says, hey, if you have, you know,  
23   this amount or this concentration of long-lived  
24   waste at this point in time then you use these  
25   criteria instead of the other criteria? Yes, maybe  
26   you could do something like that.

1                   We tried to do it the best we could,  
2   give them what we had, and there might be another  
3   way around it, but this was a pretty big activity  
4   with a lot of time put into trying to come up with a  
5   way to solve the problem.

6                   CHAIR RYAN: Yes. Well, I appreciate  
7   that, and it's that good work that's kind of  
8   stimulated the conversation around this table, I  
9   think.

10                  MEMBER ARMIJO: What do you want to do,  
11   Mike?

12                  CHAIR RYAN: You're the boss.

13                  MEMBER ARMIJO: I'm not the boss. I  
14   used to be.

15                  MEMBER SKILLMAN: Is there anybody on  
16   the phone line?

17                  CHAIR RYAN: Is there anybody on the  
18   bridge line?

19                  MALE PARTICIPANT: We had 17 people  
20   signed on it seemed like.

21                  MALE PARTICIPANT: We need to open it, I  
22   think.

23                  MR. WIDMAYER: It has to be open.

24                  (Off the record comments)

25                  CHAIR RYAN: Okay, we have one comment  
26   from a member of the staff.

1                   → MR. ABU-EID: I would like to present  
2 certain things just to make you think outside of the  
3 envelope and to help you in achieving some kind of  
4 conclusion. And certain things they present my  
5 personal view. It's not necessarily to present the  
6 view of the presentations today, so I hope I'll keep  
7 this as personal.

8                   Number one. First of all, we need to  
9 look at the international counterparts, what they  
10 are doing in regarding DU. First of all, we look at  
11 the safety requirement that I worked with, with the  
12 IAEA, actually developing the safety requirements  
13 and what are the requirements they say.

14                  Number one, for short-lived  
15 radionuclides, the performance period should be  
16 within several hundred years. That's the safety  
17 requirement. And I believe I gave a copy of that  
18 safety requirement to Mike Reese at the ACRS and  
19 they have that requirement.

20                  Number two, for long-lived  
21 radionuclides, the performance period should be  
22 within several thousand years. It did not define  
23 the period but they said several thousand years.  
24 That's very important to take, you know, to consider  
25 that aspect. This is the thing that we need to  
26 think outside of the envelope until the source term,  
27 what we have, short-lived or long-lived.

1                   And then as you know, as they have  
2 mentioned that the waste classification system by  
3 IAEA is based on two things, which is the half-life  
4 and the cut for the half-life is 30 years and they  
5 use cesium, and the other factor they use, of  
6 course, is the inventory, total inventory.

7                   CHAIR RYAN: Inventory.

8                   MR. ABU-EID: Yes. That's number one.  
9 Number two, regarding the dose and the safety  
10 requirement, in the safety requirement, IAEA  
11 standards which is most countries they agreed with,  
12 they give a range of 1 to 20 millisieverts, 1 to 20  
13 millisieverts with optimization.

14                  The safety requirement says if the dose  
15 for the members of the public is one millisievert,  
16 which is 100 millirem, there is no need for  
17 optimization. If the dose above 20 milliseiverts,  
18 so the site is unacceptable for to be closed down  
19 for disposal.

20                  So this is the range that they give.  
21 However, if it is between 1 to 20, you need to  
22 optimize in order to achieve the level of 1  
23 millisiever which is 100 millirem. That's what we  
24 are talking about in terms of acceptability. So  
25 that's number two.

1                   Number three. Now regarding the  
2 international community, how they regard DU, most  
3 European countries and Japan as well as U.K. because  
4 their DU as a results. And nobody asks the question  
5 why because as a result what they're going to do  
6 with it.

7                   Well, there are lots of issues. There  
8 are lots of possibilities for use of DU in the  
9 future. As an example, it is for fast breeder  
10 reactor. Maybe their resources will be depleted and  
11 maybe it can be used for fast breeder reactor.

12                  So that's one aspect of its use and the  
13 rationale for it, and could be other uses that we  
14 are not aware of. Therefore, they store it and they  
15 pay money for storage in France, and you could visit  
16 those facilities, in order to keep it for potential  
17 resources.

18                  Therefore, the question is because we  
19 have large quantities of DU and we need to dispose  
20 it, and because the risk could be very high for  
21 keeping it, just in these drums we need to do  
22 something with it.

23                  And one aspect of thinking outside of  
24 the envelope is we think of Part 61 only the way it  
25 was developed, and the intruder; we need to think of  
26 retrieval.

1                   In Europe, they always think of  
2 retrieval. We always think with the performance  
3 period, and Europe and the international community  
4 use what's called safety case. They say this is  
5 what we think the outline of the regulation should  
6 be, and flexible, and then you go to the safety case  
7 which we call the site-specific assessment. So  
8 there is a correlation between the safety case and  
9 the site-specific analysis, and we need to think  
10 about that.

11                  So in this regard, if we continue to  
12 have as was suggested, a simple disposal cell with  
13 possibility of adding more requirements for disposal  
14 such that we can accommodate retrieval, this way we  
15 could achieve two goals.

16                  First of all, we are taking care of the  
17 risk from DU. And number two, in case of potential  
18 use in the future, can be used in the future. So  
19 those are the areas that I'm proposing today to  
20 think about disposal of DU and to think outside of  
21 the angle. And thank you.

22                  CHAIR RYAN: Thank you, Bobby.  
23 Appreciate your comments.

24                  Is there anybody on the bridge line that  
25 wants to make a comment? Hearing none, do we have  
26 any other comments from our audience here?

27                  MEMBER BLEY: Mike, there's some back  
28 here.



1 CHAIR RYAN: Yes. Hello, John.

2 MR. GREEVES: Good afternoon. Is this  
3 working?

4 CHAIR RYAN: It is.

5 MR. GREEVES: Okay. John Greeves, for  
6 the record. I'm really speaking for myself. Part  
7 61, as I briefed this group earlier last year, Part  
8 61 has been the gold standard. It's really done a  
9 good job. However, as I tried to explain last month  
10 when I spoke, simply put there is a gap in Part 61.

11 Dave called it an unanalyzed safety  
12 condition. It implements regulation my whole  
13 technical career here. It is there. And so, as  
14 currently as it's written and as interpreted by the  
15 NRC, it does not require analysis of some long-lived  
16 low-level waste radionuclides.

17 It's the eight that Dr. Ryan talked  
18 about. Literally you don't have to analyze those,  
19 especially if they're in Class A. DU is the poster  
20 child. It came into play since the 2000 good  
21 guidance the staff put out, but since then we're  
22 smarter. I was responsible for that guidance. I'm  
23 actually smarter than I was in 2000.

1                   So there is a gap, and the staff on  
2 Slide 21, nails the issues. Look at Slide 21. It  
3 covers. There's a fairly simple way to fill this  
4 gap for DU and all the eight radionuclides. And if  
5 you address those issues on Slide 21 and do that, I  
6 think you could amend Part 61 fairly simply and fill  
7 that unanalyzed that Dave addressed, and leave a lot  
8 of the details and guidance that the rule write and  
9 you would fill that gap, in my opinion.

10                   CHAIR RYAN: Thank you.

11                   MEMBER ARMIJO: And Dr. Greeves, could I  
12 ask you a couple questions?

13                   → MR. GREEVES: Sure.

14                   MEMBER ARMIJO: I may have misquoted you  
15 when I referred to your presentation last year. And  
16 in the two-tier analysis system which you agree  
17 with, you pointed out we should specify a time of  
18 compliance for both, and, but you also said there  
19 should be some sort of a, in the performance period  
20 there should be something specified. Did I get that  
21 right? And that there should be --

22                   MR. GREEVES: Yes. Individually I  
23 believe there should be a metric. Without a metric  
24 it's freestyle.

25                   MEMBER ARMIJO: That's what I'm afraid  
26 of.

1                   MR. GREEVES: You could have three or  
2 four Agreement States doing things differently, you  
3 could have the DOE doing something differently, you  
4 could have the NRC staff doing something different.  
5 We need a metric.

6                   MEMBER ARMIJO: Is it a dose metric?

7                   MR. GREEVES: Well, my opinion, it's a  
8 dose metric. The Commission faced this issue with  
9 the high-level waste rule. It was mentioned here  
10 earlier. There's a metric for that second tier in  
11 the high-level waste rule. I don't necessarily  
12 think it's binding for low-level waste, but my view  
13 is you need a metric.

14                  CHAIR RYAN: It is not even close to  
15 binding. It's in a separate part of the reg.

16                  MR. GREEVES: Well, you know what I'm  
17 saying. I'm talking about the raw number, 100  
18 millirem. It's certainly a lot better than 25. If  
19 you put no metric in there, somebody's going to come  
20 along and try and pin you to use 25 millirem, which  
21 is --

22                  MEMBER ARMIJO: Or less.

1                   MR. GREEVES: Put nothing in there,  
2 that's freestyle. Litigation, if I was an  
3 applicant, you know, I'd think long and hard about  
4 investing my money in a case where I'd have to  
5 defend something as, you know, a 25 millirem  
6 standard, if that's what my regulator came up with  
7 and used on it. If there's no metric there's a huge  
8 risk.

9                   MEMBER ARMIJO: It would be the default  
10 metric.

11                  MR. GREEVES: So I've listened and I see  
12 where you're maybe going, separate DU, but I would  
13 invite you to think about is there an elegant way to  
14 do this short of having -- because doing a separate  
15 rulemaking for DU, it's a heavy lift. So thank you  
16 for your question.

17                  CHAIR RYAN: Thank you. Any other  
18 questions or comments from members?

1                   MEMBER ARMIJO: Well, I have a question,  
2 and I guess the way I was thinking is that we're not  
3 talking about a separate rulemaking for DU. It's  
4 almost like an amendment to Part 61 that has a new  
5 DU chapter that has all the goodies that you've  
6 talked about, but those goodies apply to large  
7 quantities of DU, period, and not to traditional  
8 low-level waste.                   The analysis frameworks and  
9 things like that, if people wanted to have the  
10 traditional low-level waste facility and want to  
11 stay that way they could choose to use that but they  
12 don't really have to, whereas someone that really  
13 wanted to be in the DU business would do that kind  
14 of analysis.

15                   So it's like you protect the existing  
16 working system while you address where there is a  
17 gap. So I don't see this as a separate, just DU.  
18 It's an amendment to the current reg that addresses  
19 DU, period. And limited to DU. So is that  
20 impossible?

21                   CHAIR RYAN: I guess I don't know that  
22 it's impossible. I don't think it's a tough reach.

23                   MR. WIDMAYER: David tried to tell you  
24 what the problems were with it.

25                   MEMBER SKILLMAN: Yes, Sam, that was the  
26 question I had. That was exactly --

27                   MEMBER ARMIJO: Yes.

28                   MEMBER SKILLMAN: Excuse me, Derek.

1 MR. WIDMAYER: No, that's okay.

2 MEMBER ARMIJO: You know, the committee  
3 has to come up with a position on that, and the last  
4 thing we want to do is recommend something that's  
5 undoable. But I've yet to see what would make that  
6 undoable. Because I'm a firm believer in only fix  
7 what's not working. Other people don't think that.  
8 Okay.

9 MEMBER SKILLMAN: Well, if I could, and  
10 Dr. Greeves, can I ask you that same question that I  
11 asked Dr. Esh? My question was could there be a  
12 modification to the presently worded Part 61 that  
13 would be constructive in addressing DU in great  
14 quantities without undoing what is in 61?

15 MR. GREEVES: The simple answer is yes.  
16 It's hard to talk to you around the corner here.  
17 I'm not focused on DU. DU's the poster child. It's  
18 what galvanized the staff, the bulk of us, to  
19 recognize this gap. I've written regulations for a  
20 long time, and to me they need to be relatively  
21 simple, set a standard and they need to fill this  
22 gap we've talked about, DU being the poster child.

23 And to answer your question, there is a  
24 fairly simple way to do, is to fill the gap and take  
25 care of DU and at the same time, if in the future  
26 one of the other eight radionuclides becomes large  
27 inventory it would capture that also.

1                   So the simple answer is yes, there's a  
2 way to do it. I've got some ideas on that. I've  
3 expressed them in this meeting and other meetings.  
4 And it doesn't need to be anywhere near as  
5 complicated as the proposed rule that the staff has  
6 out there.                   And I and many others are  
7 waiting to see what the SRM says so that we can get  
8 on with what is the direction that the Commission is  
9 providing on a few of the key -- they're the policy  
10 entity. They need to make a call on time of  
11 compliance, and a few others, and once they make  
12 that I think it can move forward fairly  
13 expeditiously.

14                   And I'll be commenting on it in --

15                   CHAIR RYAN: It's that exact point that  
16 has led us to this conversation among the members  
17 today. That the time of compliance doesn't  
18 necessarily need to be one number. Then if you take  
19 DU and take it out of low-level waste you can come  
20 up with a very straightforward low-level waste time  
21 of compliance.

1                   It makes a lot of sense for the  
2 overpowering quantity of low-level waste that's  
3 left, and then you can structure a time of  
4 compliance or a compliance scheme for its, you know,  
5 treatment and disposal that makes sense for what DU  
6 is. Trying to put them together just doesn't work.  
7 It creates all sorts of conundrums that just don't  
8 work.

9                   MR. GREEVES: And we're all sort of all  
10 speaking individually, and my view is you need a net  
11 that covers the short term. People talk about a  
12 1,000 year time of compliance. I subscribe to that.  
13 That covers the risk, call that the short term.

14                  You're not addressing the gap by only  
15 doing that. You have to allow for the second tier  
16 is the genius of the "and." You've got to do both.  
17 If you have the eight radionuclides that Dr. Ryan  
18 mentioned in, oh by the way Class A waste probably  
19 already has all those in it, then you're going to  
20 have to do the site-specific analysis and look out  
21 to the second tier.



1                   Part 61 does not, as interpreted by the  
2 staff, does not require you to do a site-specific  
3 analysis. It needs to be fixed. It's not that  
4 hard.                   So to me it's the genius of  
5 the "and." You do both of them. You take care of  
6 the poster child, DU, and you're going to grab all  
7 those other eight that Mike talked about too in the  
8 process. A simple rule would require you to cover  
9 that envelope, with two tiers, and I am anxiously  
10 awaiting to see what the SRM says.

11                   MEMBER SKILLMAN: Thank you.

12                   CHAIR RYAN: Aren't we all?

13                   MR. GREEVES: Thank you for your time.

14                   MEMBER ARMIJO: Yes, thank you.

15                   CHAIR RYAN: Anything else? Questions,  
16 comments, thoughts?

17                   → MEMBER BLEY: Just one last thing for  
18 me. And I really like what John had to say there.  
19 I agree with him very much. In many other areas we  
20 have consistently pushed the idea of looking at risk  
21 and looking at facility-specific analysis. And I  
22 think that does allow you to pick these things up.

23                   I kind of think it would be bit of a  
24 shame to -- and up until today I was really focused  
25 on DU as something separate. I think it would be  
26 kind of a shame to push through a separate thing on  
27 DU when this could cover it.

1                   Now John's comment, well, this Slide 21,  
2   which is really saying site-specific analysis and a  
3   two-tier system, but it's got the time of compliance  
4   and the other things in there as well. Dose limits.

5                   You know, the other thing we've talked  
6   about a lot, and not here but in other areas, is how  
7   keeping the regulations simple, and as much as you  
8   can put details off in guidance would help. And I  
9   think that's just a bit of what we just heard.  
10   Anyway that's all.

11                  MEMBER SCHULTZ: With the last shot of  
12   comments I guess the question that comes to my mind  
13   is, I think we need to provide metrics for whatever  
14   periods we're discussing, whether it be compliance  
15   or performance periods, and I don't understand why  
16   we would want to, or what we would use as a  
17   validation to select something that is different  
18   than what IAEA has done or what we would do for  
19   high-level waste. Why would we be more constraining  
20   for low-level waste?

21                  CHAIR RYAN: Well, one country's low-  
22   level waste is another country's intermediate-level  
23   waste, or high-level waste based on what's in it.  
24   So again we're apples and oranges.

25                  MEMBER SCHULTZ: I've heard numbers  
26   suggested that are lower.

27                  CHAIR RYAN: Oh yes. The IAEA are  
28   lower, yes.

1                   MEMBER SCHULTZ: So that's what we have  
2 to think about.

3                   CHAIR RYAN: It's a multi-, you know,  
4 spidered hydra-head we've got to deal with. There's  
5 lots of moving parts.

6                   MALE PARTICIPANT: It's come back.

7                   MEMBER SCHULTZ: Well, I hear 100  
8 millirem and then I hear 25 millirem.

9                   CHAIR RYAN: All right. Give me a 10,  
10 5, 2 and 1 if you listen carefully.

11                  MEMBER SCHULTZ: Right.

12                  CHAIR RYAN: We've had all those numbers  
13 in one form or fashion today, so, or this week, but  
14 I think it's worth us thinking some more about this  
15 and thinking about, you know, what is it we really  
16 want to recommend? What are we trying to fix and  
17 trying to improve or suggest improvements on?

18                  I struggle a lot with it. I'm glad  
19 we've had this conversation and I hope it's been  
20 useful to you all. I'm trying to figure out what  
21 are we trying to accomplish. What we're trying to  
22 accomplish is continued safe management of waste,  
23 but I guess what I'm really asking is, if we did  
24 recommend some separation of the longer lived  
25 radionuclides from the shorter lived radionuclides  
26 would that ultimately be an improvement or not?

1                   My thought is it would be an improvement  
2 because it would at least bin strategies for  
3 managing things that are much longer lived than  
4 other radioactive materials, and we could tailor the  
5 two taking into account all of technical support  
6 work that David Esh and his colleagues have done to  
7 address it, you know, and if you have long-lived  
8 stuff in a separate place than there is some long-  
9 lived questions you could begin to focus better on  
10 in that environment for those wastes.

11                   MEMBER ARMIJO: I'm still trying to  
12 understand the gap in the existing regulations that  
13 Dr. Greeves talked about regarding long-lived  
14 radionuclides in the traditional waste streams. And  
15 I may have had a misimpression that they had been  
16 analyzed and they were a small contributor to the  
17 risk even though they had a long, long half-life.

18                   And what I've been -- my goal is not,  
19 personal goal is to make sure that whatever we do  
20 for DU doesn't create work, burden with no  
21 particular safety benefit on the traditional low-  
22 level waste disposal. And if we have an unanalyzed  
23 safety problem with the existing regulation then,  
24 you know, otherwise --

1                   CHAIR RYAN: This conversation started  
2 with the idea that if we took a long-lived ten to  
3 the ninth year half-life DU out of low-level waste,  
4 what risk profile would it leave behind for the rest  
5 of low-level waste? That's the question.

6                   The question has drifted over the course  
7 of the last couple of hours, you know, as we've been  
8 talking about it, but that's the question I started  
9 with. What happens if DU is managed by a separate  
10 regulation in a way appropriate for bulk DU?

11                  MR. ESH: And Dr. Ryan, this is David  
12 Esh, if I may.

13                  CHAIR RYAN: Yes.

14                  MR. ESH: And like I said, there's a  
15 figure that we developed that kind of conveys this  
16 what you're talking about to give the impression of  
17 how does the DU waste stream compare to the  
18 traditional waste stream?

19                  It's in the Regulatory Basis Document,  
20 I'm pretty sure, or the white paper that we did on  
21 time of compliance, one or the other. It's  
22 definitely in presentation materials that we gave to  
23 you in the past. Look at that figure and it shows  
24 you the problem that you're talking about.

1                   DU is definitely higher up on the chart  
2 but that doesn't mean the other stuff is benign.  
3 There's a lot of other data points on there that you  
4 need two, three, four or five orders of magnitude  
5 reduction by your system in order to get down to the  
6 dose level.

7                   CHAIR RYAN: No, no. I appreciate that.

8                   MR. ESH: Yes.

9                   CHAIR RYAN: But, you know, it's a much  
10 higher bar when the materials tell you the ninth  
11 years as opposed to 150 or some other number.

12                  MR. ESH: It's longer in half-life and  
13 longer in quantity and concentration, but the other  
14 stuff is not trivial, is the point.

15                  CHAIR RYAN: I agree.

16                  MR. ESH: Yes. And so the way we looked  
17 at is, well, yes, it's worse, but it's still from a  
18 technical standpoint within the scope of the problem  
19 we're trying to solve anyway for the other  
20 materials.

21                  MEMBER ARMIJO: David, were those  
22 treated, those long half-life things? Were they  
23 treated in the waste classification tables, and so  
24 it was, you know.

25                  MR. ESH: Some of them, but --

26                  MEMBER ARMIJO: Quantities and  
27 concentrations were low.

1                   MR. ESH: You can look at the waste  
2 classification table and compare it to a list of  
3 long-lived isotopes and you'll see that they are  
4 different lists and waste classification tables are  
5 a more limited list.

6                   As John Greeves said, the primary one  
7 that stands out is the uranium, but it's not the  
8 sole one. There are other long-lived isotopes that  
9 could have the same problem, and that's when we  
10 said, well, we don't want to be doing this again in  
11 three or five years when somebody comes up with  
12 something new and triggers this off again.

13                  MR. WIDMAYER: The notion, Dr. Armijo,  
14 was that for those long-lived radionuclides, the  
15 technical analysis that's required by 61.13 would  
16 possibly result in an inventory limit for those  
17 long-lived radionuclides, okay. So that's kind of  
18 the construct as it stands right now.

19                  MEMBER ARMIJO: Sure. That's perfectly  
20 fine. If somebody wanted to go beyond that they'd  
21 have to come back to the staff or their Agreement  
22 State and put it in a case why it was okay to go  
23 forward.

24                  MR. WIDMAYER: I guess, presumably, yes.  
25 And I don't know if that's happened or not.

1                   MEMBER ARMIJO: Or they just live within  
2 those limitations. And that's up to them. And if  
3 they want to go further they could do, you know,  
4 take Slide 21 and just do it on a voluntary basis.

5                   MR. ESH: The waste classification  
6 tables were primarily derived for 61.42 to protect  
7 the inadvertent intruder. The 61.41 determination  
8 was always to be based on technical analyses as  
9 Derek stated. That if you had too much of whatever  
10 long-lived isotope in your technical analysis for  
11 61.41 that you would develop an inventory limit to  
12 manage that risk.

13                   That was the easy way to manage the risk  
14 from the long-lived isotopes, and you would do that  
15 technical analysis. The rule didn't specify, the  
16 original rule did not specify a time of compliance.  
17 It also did not talk about uncertainty or FEPs, but  
18 there are things to get the scope right in there.

19                   And we just saw a lot of variants in  
20 that when we looked at the Agreement State programs,  
21 and in this rulemaking we said, well, maybe we  
22 should try and clean that up if we're already doing  
23 a rulemaking. And the stakeholders thought that  
24 that was important so that's the way we went.

25                   MR. WIDMAYER: But the unanalyzed safety  
26 issue that you brought up before is specific to  
27 depleted uranium, right?



1                   MR. ESH: Yes. Well, the trigger was  
2 depleted uranium, and I agree with John Greeves.  
3 The trigger was depleted uranium, but it could be  
4 any isotope that is concentrated or is outside of  
5 the table isotopes. Uranium is the one that we have  
6 a practical waste stream. It's massive, sitting out  
7 there to cause that problem.

8                   But it could be something else too.  
9 Selenium-79, it's on the tables. It's long-lived.  
10 If you had some sort of new process that spit off a  
11 whole bunch of selenium-79 it would cause the same  
12 thing.

13                  MR. WIDMAYER: Okay, but that's not a  
14 current unanalyzed safety issue.

15                  MEMBER ARMIJO: Yes, I was just saying  
16 the tables keep you out of an unanalyzed safety  
17 condition as long as you comply with the inventory.

18                  MR. WIDMAYER: You have to do the  
19 technical analysis and come up with an inventory  
20 limit if needed.

21                  MR. ESH: The tables only keep you out  
22 of if the waste stream is sufficiently similar to  
23 what was analyzed in the DEIS. If your waste stream  
24 is different than what was analyzed in the DEIS then  
25 the tables do not keep you out. That's what the  
26 issue is that we needed to solve.

1                   MR. WIDMAYER: So Dr. Armijo, in the  
2 case of the Department of Energy, we gave you a  
3 couple of examples where their initial analyses they  
4 did, did not cover a specific radionuclide or a  
5 specific waste form, waste stream, whatever. They  
6 do a special analysis.

7                   MEMBER ARMIJO: Yes.

8                   MR. WIDMAYER: Okay, I guess it could  
9 work the same in commercial. I don't have an  
10 example.

11                  MEMBER ARMIJO: I would expect if people  
12 had a new waste stream and they really wanted to  
13 handle it, they'd have to come back to their  
14 regulator and present a case.

15                  MR. WIDMAYER: Yes, and like I said, I  
16 don't have an example of one, but the staff is  
17 trying to deal with this big unresolved safety issue  
18 that is laying in front of them.

19                  MEMBER ARMIJO: Okay.

20                  CHAIR RYAN: Any other questions or  
21 comments?

22                  MEMBER ARMIJO: None for me.

23                  → CHAIR RYAN: Okay. I'd like to thank  
24 all of our participants in today's meeting. And  
25 David, I want to thank you especially for your time  
26 and engagement with the committee. It's been a real  
27 help to have you here and had a great dialogue. So  
28 thanks very much, I appreciate it.

1                   MR. ESH:   Sure.   You're welcome.

2                   CHAIR RYAN:   With that, Mr. Chairman,  
3   I'll turn it back to the chairman.

4                   MEMBER ARMIJO:   It's you.   You're it.  
5   This is your meeting.   You're the big chairman.

6                   CHAIR RYAN:   We're adjourned.

7                   (Whereupon, the foregoing matter went  
8   off the record at 2:43 p.m.)

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# **Report of Meeting**

**Radiation Protection and Nuclear Materials Subcommittee  
November 19, 2013**

**US Department of Energy  
Offices of  
Environmental Management and  
Health, Safety and Security**

**Dr. Michael Ryan**  
Chairman  
Radiation Protection and Nuclear Materials Subcommittee  
Advisory Committee on Reactor Safety

January 16, 2014



United States Nuclear Regulatory Commission

*Protecting People and the Environment*

## **DOE, Office of Environmental Management**

**Speaker: Christine Gelles,**

**Associate Deputy Assistant Secretary for Waste Management**

Integrated Systems approach – defense-in-depth

Performance Assessment just one input into decision-making

25 years of implementation

TOC = 1000 years, transition to risk-informed considering peak dose

Federal ownership of site in perpetuity



United States Nuclear Regulatory Commission

*Protecting People and the Environment*

## **DOE, Office of Environmental Management**

**Speaker: Roger Seitz, Senior Advisory Scientist**

**Savannah River National Laboratory**

Performance Assessments just one contributor to decision  
Built in conservative bias

Intruder consideration only for design optimization - allows for limits and conditions

### **Time of Compliance:**

1000 years; longer than this – decreasing relevance and usefulness with  
increasing speculation and uncertainty

Conforms with recommendations from ICRP and IAEA

Different time frames for near-surface disposal than for geologic disposal

Example of TOC in International Community: The United Kingdom LLWR, located near Drigg

### **Conservative Bias Built Into Calculations:**

Dose constraint is 25% of 100 mrem standard

Assume Institutional control is all lost at 100 years;

Maximally exposed individual; Dose at 100 m, not at DOE site border

Limited or No credit for some barriers and processes

Resultant WAC is conservative



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## **DOE, Office of Health, Safety, and Security**

**Speaker: Andrew Wallo III, Deputy Director**

**Office of Environmental Protection,**

DOE Order 5820; revised to 5820.2A,; revised to 435.1

Order 582,2A started PAs for LLW disposal – 1988

435.1 combines technical requirements with administrative to ensure decision-making is effective – LFRG, Disposal Authorizations, Composite Analysis

435.1 Performance Objectives: All Pathways, Air Pathway, and Radon - Undisturbed Intruder analysis used only for design optimization and WAC

DOE will control site in perpetuity – 100 year institutional control is only assumption for analysis

### **Time of Compliance**

1000 years; Maintain internal consistency ; consistent with NAS<sup>1</sup> studies; NAPA<sup>2</sup> Study.

“Few Hundred Years” = 1000 for Order of Magnitude

It is an administrative issue selected to support good decisions

Dose limit is likely to have a different meaning at times we are examining

No long-term care fund – annual budget decision on how much to continue spending

1 National Academy of Science 2 National Academy of Public Administration



United States Nuclear Regulatory Commission

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## **DOE, Office of Environmental Management**

**Speaker: Roger Seitz, Senior Advisory Scientist**

**Savannah River National Laboratory**

Intruder Analysis – Not a Performance Objective

Limited to one person or small group; Very stylized scenarios to reduce probability it occurs and consequences if it does occur

Used internationally as optimization tool, not a dose constraint

DOE uses to establish WAC





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## **DOE, Nevada Field Office**

**Speaker: Robert Boehlecke**

### DOE O 435.1 Implementation at the Nevada National Security Site

Disposing of LLW since 1961. PA evaluates post-1988 LLW. PA assumes 2028 Closure

Currently on Revision 10 of the WAC

Conditions at NNSS: 700 feet to ground water; 5 inches of rainfall/year; High Evapotranspiration  
Large buffer zone; No attractive resources

PA conservatisms include: 100 m exposure point; no credit for transport to that location, no credit for container (assume it is all gone)

Intruder scenarios used to establish WAC; basement construction and “acute” drilling with exposure to drilled materials

Waste certification program includes waste generator “Assessments” similar to audits

PA Maintenance includes monitoring data, results of research on plant roots and cap performance; and annual waste receipts



# U.S.NRC

United States Nuclear Regulatory Commission

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## **DOE, Savannah River Field Office**

**Speaker: Sherri Ross**

### DOE O 435.1 Implementation at the Savannah River Site

Different than NNSS – Humid Site, 49 inches of rainfall/year; 16 inches of infiltration  
Ground water predominant pathway

Includes Tank Closures as well as LLW Disposal  
Tank closures also permitted by South Carolina

PA conservatisms include: 100 m exposure point; peak concentrations in shallowest aquifer

WAC established for LLW disposal, Not for tank closures

Dose “spikes” from “transfer pipelines” seen in results

PA Maintenance includes results of research on Tc-99 and temperature/humidity studies in addition to annual waste receipts

Emphasis on concern of Citizens Advisory Board on “short-term” risk



# **Report of Meeting**

**Radiation Protection and Nuclear Materials Subcommittee  
December 3, 2013**

**Agreement State Representatives  
LLW Disposal Facility Representatives  
Industry and DOE Representatives  
Other Stakeholders**

**Dr. Michael Ryan**  
Chairman  
Radiation Protection and Nuclear Materials Subcommittee  
Advisory Committee on Reactor Safety

January 16, 2014

## **SC Department of Health and Environmental Control**

**Speaker: Susan Jenkins, Manager**

**Infectious and Radioactive Waste Management Section**

July 1, 2008 - Atlantic Compact disposal begins – no DU waste  
- Phase I Closure began

42 yrs operating / 26 more years – only 1 M ft<sup>3</sup> more waste expected, 3% additional  
97% of expected total waste already disposed

120 acres (86%) capped with “enhanced” cap

§ 61.13 does not allow for site-specific flexibility

Support ACRS Statement on grandfathering in July 2013 Letter Report:

- 97% of waste in “Closed” facility
- Source term difficult to estimate
- Should not use “care fund” for digging up waste

Part 61 revisions seem “foreward” directed (new waste streams), so evaluating past disposals seems inconsistent

TOC; 1000 years “more reasonable”

## Discussions

1000 – 10,000 years perhaps reasonable to predict natural processes, but not human activities

Flexibility for implementation is good, so rule language should be generic, however, if it becomes ambiguous, that is not good

“Case-by-case” implementation is problematic – what metric should be used to decide whether to remediate or not

## **UT Department of Environmental Quality**

**Speaker: Rusty Lundberg, Director**

**Division of Radiation Control**

Dealing with DU at EnergySolutions, Clive facility right now

Utah Radiation Control Board doing § 61.13 “case-by-case” implementation of current Part 61 now in a progressive fashion

Utah DU rules similar to NRC proposed revisions:

TOC = 10,000 yrs, further qualitative analysis which leans toward conservatism

Cannot accept LLW above Class A, but proposed revisions calls for intruder assessment for all LLW

Waste Acceptance Criteria adds responsibility to the Agreement State Program which is not fully in place now, but this is not necessarily a negative

## Discussions

U Mill Tailings is a different problem

No specific technical requirements in the Utah DU regulation because the site characteristics are considered favorable

Compatibility “C” would allow Utah to keep 10,000 years in the DU regulation, but Compatibility “B” would make them change it. Support TOC of 10,000 years for DU

## **TX Commission on Environmental Quality**

**Speaker: Brad Broussard, Technical Specialist/Health Physicist  
Office of Waste**

Texas rules similar to proposed revisions – two-tiered time  
TOC = 1000 yrs OR when peak occurs

Actual PA being evaluated truncates analysis at 50,000 years based on modeling results

Supports 500 mrem/yr Performance Objective for intruder assessment

Supports WAC approach, but acceptance of waste should not be based solely on performance assessment results, and Part 61 classification Tables should be retained

No comments on Compability because the existing TX rule covers any TOC proposed by NRC



## **Discussions**

No legal challenge to 50,000 year results because the truncation is not in the regulation

The 50,000 year truncation was based on results of the limited inventory submitted in original WCS license application

WCS submittal has more sophisticated modeling to account for larger inventory of DU

## **WA Department of Health**

**Speaker: Earl Fordham, Deputy Director  
Office of Radiation Protection**

Hanford facility is exclusive disposal facility for the Northwest Compact

Similar to Barnwell for waste receipts – only 20,000 ft<sup>3</sup> per year presently

The DOE ERDF is on land originally leased from DOE, but given back. Hanford LLW disposal facility land will also be given back to DOE. Maybe makes more sense to have exactly the same methodology for evaluating both of these facilities due to proximity and DOE ownership

Supports two-tiered approach, 10,000 years consistent with landscape of WA  
Second tier – no dose limit to measure compliance

25 mrem/yr is appropriate in public dose Performance Objective

500 mrem/yr is appropriate in intruder dose Performance Objective

## Discussions

Long-term analysis should be qualitative versus quantitative

Cautioned that some “values” will change and some will not – used example of the Columbia River as something that will retain its historical and present value into the future

Under questioning, TOC preferred at 1,000 yrs over 10,000 yrs for first tier.

## **Waste Control Specialists, Andrews TX Facility**

**Speaker: James Scott Kirk, Vice President  
Licensing and Corporate Compliance**

Only newly licensed LLW disposal facility (Located in Andrews, TX) in the US for receipt of all Classes of LLW - First LLW received in 2011

Separate Compact and DOE disposal facilities

Texas takes Title to commercial waste at receipt – Compact facility will go under State care at closure

DOE facility will go under DOE care at closure

Supports TOC = 10,000 years

Multiple Layer design for intruder barriers mandated by Texas legislature

Intruder scenario modeled – drilling for oil at 500 – 600 years after closure

Amendment submitted for disposal of 400,000 m<sup>3</sup> DU submitted in August 2013

With updated PA - Doses calculated to 100,000 and 1,000,000 years

## **Discussions**

Deterministic analyses – Not probabilistic

Long-term analysis did not make WCS change any design features

Gaining insights from evaluation as opposed to “compliance”

Rule would help WCS because rule that adds site-specific analysis would be supportive of the approach used already in licensing the site



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## **EnergySolutions – Clive UT Facility**

**Speaker: Dan Shrum, Senior Vice President  
Regulatory Affairs**

“Reasonably foreseeable” is closure to 1000 years

1000 years does not capture DU, but neither does 10,000 or 20,000 years

Performance Period should look at “catastrophic” events, and metric should be in the 1 – 10 rem range

Also, take credit for natural processes (suitability of the site prevails)

Intruder scenarios being looked at are “questionable” as far as “reasonably foreseeable”

Site-specific WAC is good approach – consistent with DOE

Need the Part 61 revisions to be finished – currently regulatory uncertainty

## Discussions

Archeology provides examples of metals lasting for periods of 1000 years and greater  
Maybe rebar in concrete would be a different story

Need to align inventory (of radionuclides that will be left) with how long materials need to last

Separate rule for DU, or separate requirements for DU in one rule for all LLW



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## **EnergySolutions – Barnwell SC Facility**

**Speaker: Michael Benjamin, General Manager**

### **Disposal Operations**

Expect to receive 7000 – 11,000 ft<sup>3</sup> per year from now on  
With added space used at the end for decommissioned reactor components

Agree with ACRS July 2013 Letter Report

Added imposed requirements by revisions may impact continued operations

No technical justification for TOC = 10,000 years

Extended care fund = \$144 M. Using \$2.2 M per year



## Discussions

Would be very “non-ALARA” to exhume previously disposed waste

Unclear whether a “new” analysis would show site is OK or not OK (there is 10 years or so of disposed waste pre-Part 61) At a minimum, this analysis would be very “speculative,” hard to understand what results really “mean”

Can a simple model be used first to show “compliance”

Extended care fund is still being added to through waste receipts

## **Energy Power Research Institute (EPRI)**

**Speaker: Lisa Edwards, Senior Program Manager**

**Nuclear Chemistry, Radiation Management & Low Level Waste Group**

EPRI LLW focus 1) minimization, 2) safe storage, 3) disposal flexibility

TOC for LLW should be less than for geologic disposal

Public understanding of uncertainty is low

More uncertainty with time, but this is balanced with designing a more robust facility

Principles from NAPA Study for DOE – acknowledges that NRC staff may have reached different conclusions than EPRI

CEQ<sup>1</sup> cumulative effects approach from oil and gas industry

Graphs presented with NPP waste only – shows diminishing “risk” with time.

4 years of shipment records used.

DU not included. Also Tc-99 and I-129 not included.

1 Council on Environmental Quality

## Discussions

Uncertainty easier to understand in qualitative terms

Conundrum with assumptions chosen as “conservative” versus “realistic,” and difficulty in explaining and defending them with the public

New materials and operating practices not likely to introduce added important radionuclides

Behavior and characteristics of DU are atypical of LLW and should not drive the analysis to long times

## **Department of Energy**

**Speakers: Christine Gelles, DOE**

**Roger Seitz, Savannah River National Laboratory**

Pictures and data indicating magnitude of  $\text{UF}_6$  cylinder storage situation. Storage at Portsmouth and Paducah facilities

Also will receive newly-generated  $\text{UF}_6$  from de-conversion facilities and any new enrichment facility

De-conversion facilities both transitioning from hot startup to full operation in 2014

Summary of 2000 ORNL Report, "Assessment of Preferred DU Disposal Forms"

Summary of NRC Letters documenting preference for  $\text{U}_3\text{O}_8$

Not finalizing Site-Specific EIS supplements addressing disposal until Part 61 revisions are completed

DOE supports near-surface disposal of DU

- NNSA has disposed of DU
- WCS and EnergySolutions at Clive performing studies



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## **Other Stakeholders**

**Speakers: John Greeves, Talisman**

**John Tauxe, Mercury and Company**

**Arjun Makhajani, IEER**

### **Greeves:**

Performance Objectives are Primary

Staff has identified gaps in Part 61 – DU and blended LLW

Two Tier System should be used

1st Tier - TOC = 1000 years

2nd Tier - Must be included and must have a metric

### **Tauxe:**

Results show risk continues to rise in PAs, not necessarily for an intruder, but for the public due to long-lived waste

### **Makhajani:**

Deep geologic disposal is appropriate for DU

Should consider only 100 to 500 years for shallow disposal, then consider geologic disposal

# BACKUP SLIDES

## **Talisman, LLC**

**Speaker: John Greeves**

Standards: 1) Adequate Protection, 2) Simple, 3) Clear, 4) Implementable

Part 61 is a Gold Standard for LLW disposal

Performance Objectives are Primary

Staff has identified gaps in Part 61 – DU and blended LLW

All waste streams should be evaluated

Two Tier System should be used

1<sup>st</sup> Tier - TOC = 1000 years

2<sup>nd</sup> Tier - Must be included and must have a metric

Sees problems in legal structure with revised 61.13 pointing to the 61.41 and 61.42 Performance Objectives

Much of the specificity in revision language should be in guidance instead

Must have grandfathering for current/older sites

## **Discussions**

“Mimimizing releases” is not implementable. Long-term analysis must have metric



**Neptune and Company**  
**Speaker: John Tauxe**

Start with Features, Events, and Processes, Add Exposure Scenarios (FEPEs)

Separate intruder assessment not needed, incorporate all scenarios for exposure into one analysis

Definition of inadvertent intruder needs to be strengthened and clear that it is site-specific

DOE and NRC methodologies should be the same

Results show risk continues to rise in PAs, not necessarily for an intruder, but for the public due to long-lived waste

Risk “discounting” occurs with PAs performed for long times

## **Discussions**

“Fine line” between regulatory certainty by putting clearer requirements in rule versus flexibility by putting implementation “guidelines” in guidance instead`

## **Institute for Energy and Environmental Research**

**Speaker: Arjun Makhajani**

IEER brought DU issues into LES licensing

If long time frames for compliance makes us uncomfortable, should consider a different way of managing the waste

Discounting risks should not be done. Future generations should be protected as well as current generations

Proposes that 40 CFR 191 should be used to incorporate DU. Characteristics of DU waste similar to TRU. It has been said many times – the waste stream is GTCC under Part 61

Deep geologic disposal is appropriate for DU

Should consider only 100 to 500 years for shallow disposal, then consider geologic disposal

U Mill tailings are not the same problem – nCi/gm ; DU is hundreds of nCi/gm. Analysis conducted for LES proceeding results in 179 to 795 rem/yr

Modeling erosion at WCS independently results in tens or rem/yr

Copy the French who have “intermediate” waste – managed differently

Long-lived waste definition should be tied to institutional control period

## **Public Comments**

**Speakers: Bill Dornsife, WCS, Tom Magette, PWC, Rich Janati, PA, Gary Robertson**

PA is only a tool, not the ultimate measure of compliance – many different analyses provided to TX for decision-making

Gases over short term, Long-lived mobile radionuclides in GW or SW, control doses for LLW disposal

DU is different physically and toxically from LLW disposed, do a separate rulemaking

Could implement “revisions” through procedure changes and guidance, similar to ROP.

Include an exemption to revisions for sites that will not accept DU

1000 year TOC will undermine confidence in TX and UT

DU can be addressed in Part 61 revisions and also be finished now, 1000-year TOC plus implementing new WAC system, allows for inclusion of DU

TOC for DU should be tied to U Mill Tailings standard

# An Overview of the NRC Approach to the Part 61 Rulemaking

Division of Waste Management and Environmental Protection  
Office of Federal and State Materials and Environmental  
Management Programs

January 16, 2013

# Outline

- Purpose of Rulemaking
- Why DU is an issue.
- Near-surface, appropriate?
- Overview of Staff's Approach
  - Problem Definition
  - Existing Considerations
  - Risk Management Considerations
  - Rulemaking Framework
- Conclusion

# Purpose of Rulemaking

- Depleted Uranium is the issue.
- Is it suitable for near-surface disposal?
- If yes, under what conditions?
- What regulatory requirements are necessary to ensure safety?

# Why is DU an Issue?

- No specific limit in Part 61
- Very long lived and numerous progeny
- National Policy: depleted uranium goes from resource to waste
- More use of commercial disposal by DOE
- Large amounts of depleted uranium



# Near-Surface, Appropriate? DOE Record of Decision

- DOE/EIS-0269  
Final Programmatic Environmental Impact Statement for Alternative Strategies for the Long-Term Management and Use of Depleted Uranium Hexafluoride (April 1999)
  - Evaluated various uses including disposal of four types of DU
  - Evaluated “wet” and “dry” sites
- Record of Decision for Long-term Management and Use of Depleted Uranium Hexafluoride (August 1999)

‘In a “dry” environment typical of the Western United States, the analysis indicated that disposal would not exceed regulatory limits for over 1,000 years in the future even if the facility leaked.’

# Near-Surface, Appropriate?

## LES Proceedings

- Adjudicatory proceeding for Louisiana Enrichment Services license application (CLI-05-05), Commission determined that depleted uranium is classified as Class A waste, per § 61.55(a)(6), but acknowledged that the regulatory basis for the current 10 CFR Part 61 did not explicitly analyze large quantities of depleted uranium.
- The Commission directed staff, “outside of the LES adjudication, to consider whether the quantities of depleted uranium (DU) at issue in the waste stream from uranium enrichment facilities warrant amending section 61.55(a)(6) or the section 61.55(a) waste classification tables.” (CLI-05-20).

# Near-Surface, Appropriate?

## SECY-08-0147

- generic calculations of arid and humid site conditions
- “...near-surface disposal of large quantities of DU may be appropriate, but not under all site conditions. Shallow disposal of large quantities of DU or disposal at humid sites with a potable groundwater pathway would likely result in the performance objectives not being met.”

# Near-Surface, Appropriate?

## Results of NRC Analysis

- Near-surface disposal of large quantities of DU may be appropriate under certain conditions.
- Unfavorable conditions include shallow disposal at arid or unstable sites, and disposal at humid sites with potable groundwater.
- Very shallow disposal (< 3 m depth) not appropriate regardless of conditions, except limited quantities.
- Because of in-growth of progeny, analysis time periods of 1000 yrs or less result in significant truncation of estimated risk

# Near-Surface, Appropriate?

## SECY-08-0147

- Option 1 – Generic Communication to Clarify Need to Demonstrate Compliance with Performance Objectives
- **Option 2 – Rulemaking to specify requirement for site-specific analysis in § 61.55(a)(6)**
- Option 3 – Determine classification for DU within existing classification framework
- Option 4 – Re-examine the existing waste classification framework

# Commission Direction

## SRM-SECY-08-0147

- Two tasks:
  - Specify a requirement for a site-specific analysis, technical parameters (i.e., new definitions and performance period) to support such analysis, and develop a guidance document.
  - “... in a future budget request, the staff should propose the necessary resources for a comprehensive revision to risk-inform the Part 61 waste classification framework, with conforming changes to the regulations as needed, using updated assumptions and referencing the latest ICRP methodology ...” “... This effort should explicitly address the waste classification of depleted uranium ...”

# Commission Direction

- SRM-COMWDM-11-0002/COMGEA-11-0002
  - Flexibility to use current International Commission on Radiological Protection (ICRP) dose methodologies
  - Two-tiered period of performance:
    - *Tier 1*: Compliance period covering reasonably foreseeable future
    - *Tier 2*: Longer period based on site characteristics and peak dose to a designated receptor, that is not *a priori*
  - Flexibility to establish site-specific waste acceptance criteria based on the results of the site's performance assessment and intruder assessment
  - Balance Federal-State alignment and flexibility



# Problem Definition

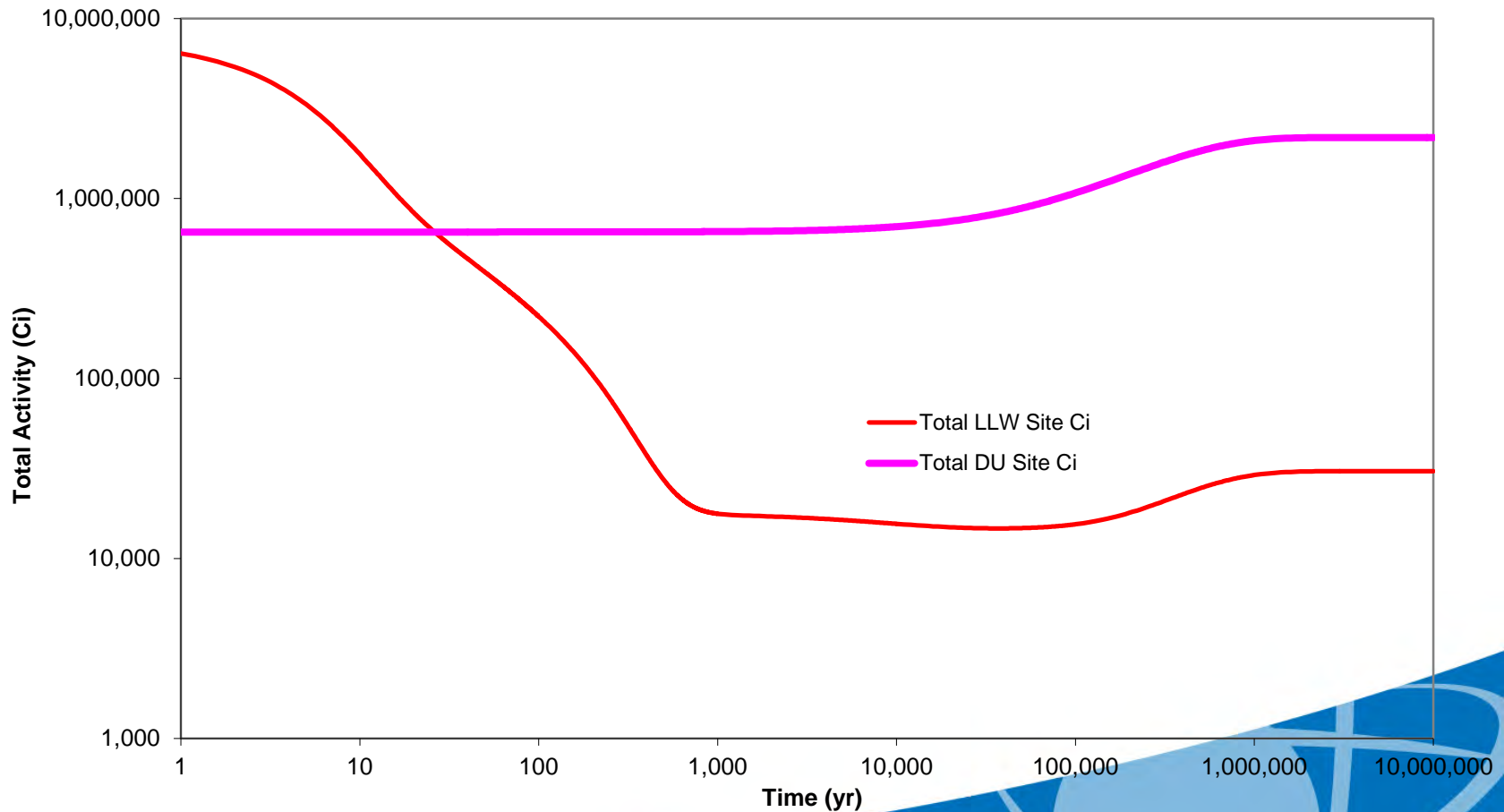
## DU Characteristics

- 750,000 + MT concentrated Depleted Uranium
- Chemical toxicity hazard at present → in-growth of progeny → increased radiological hazard
- Activity profile quite different from conv. LLW or mill tailings



# Problem Definition

## DU vs LLW activity over time



# Problem Definition

## Arrival Times

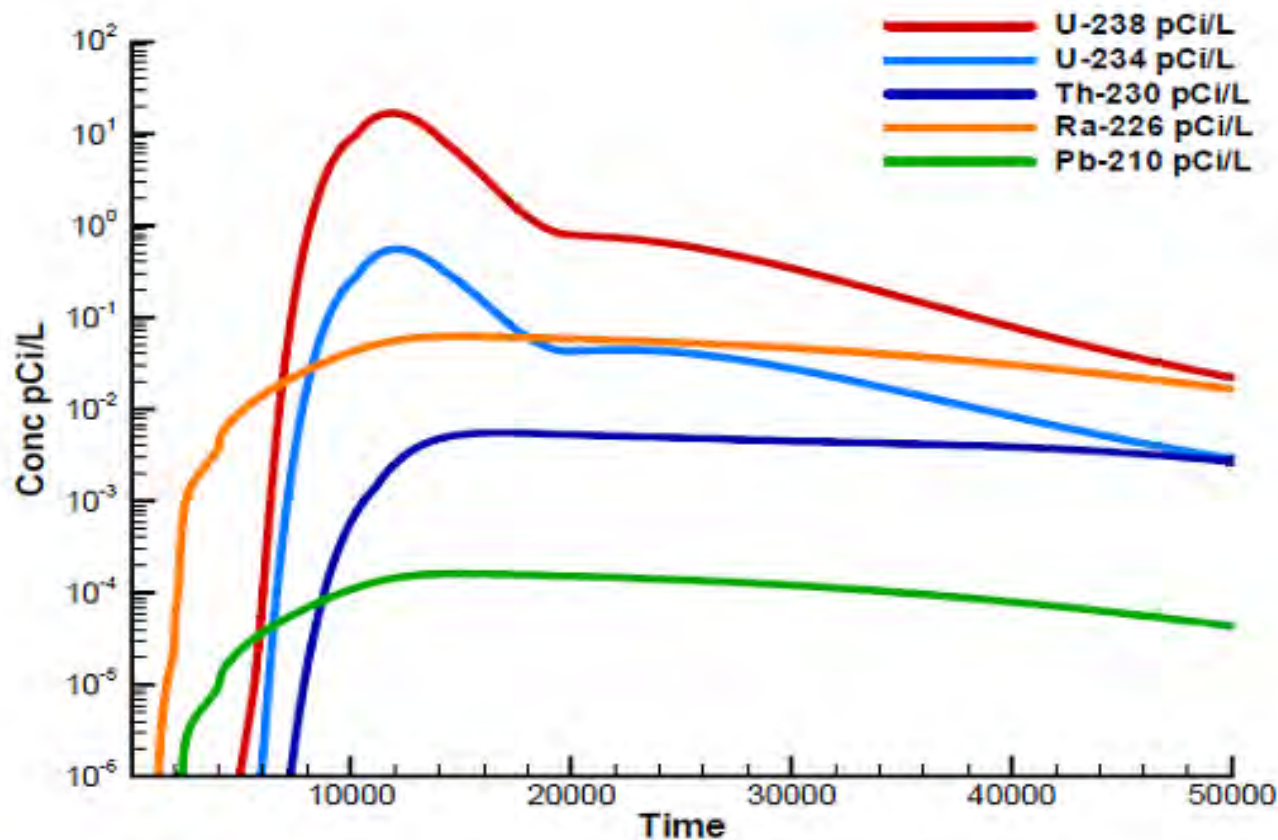


Figure A4A-91. ILV well concentration for U-238

# Problem Definition

## Previous Part 61 Analyses

- DEIS (1981): 17 Ci U-238 & 3 Ci U-235 per million m<sup>3</sup> (~200 MT conc DU)
- Combination of site conditions and disposal operations determine site suitability/inventory allowances
- 200 tons ← ?? → 750,000+ MT

# Existing Considerations Licensed Sites

- Current licensed sites
  - In Agreement States
  - Different environmental conditions
  - Different operational characteristics
  - Currently disposed uranium

# Existing Considerations Previously Disposed U

- Richland, WA  
4,400 MT U/ ~0.4 million m<sup>3</sup> waste
- Barnwell, SC  
14,000 MT U/ ~2.4 million m<sup>3</sup> waste
- Clive, UT  
52,000 MT U/ ~5 million m<sup>3</sup> waste

# Existing Considerations

## Part 61

- Part 61 Structure / Limited Rulemaking
- Performance Objectives supported by prescriptive and defense-in-depth requirements
  - Siting Criteria (Partially Prescriptive/DID)
  - Waste Characteristics (Partially Prescriptive)
  - State or Federal long-term ownership (DID)
  - Long-term funding mechanism (DID)
  - 5 meter/Engineered barrier for Class C (DID)

# Existing Conditions

## Part 61 cont'd

- Performance-based portions of Part 61
  - Waste form (other than stabilizing B&C)
  - Engineering features
  - Operational considerations
  - Depth / stacking or “areal activity”

# Risk Management Considerations

- Risk-Informed/Performance-Based  
AND/OR
- Prescriptive requirements  
-----
- Agreement States implementation



# Rulemaking Framework

## Basic Structure

- Enhanced site-specific analyses
  - Provide additional support to overall safety case
- Use a 2 tier analysis system
- Specify time of compliance
- Specify intruder assessment & dose limit
- Allow site-specific waste acceptance criteria

# Rulemaking Framework

## Benefits of Approach

- Pros:
  - Inventory limitations based on safety case
  - Rule becomes accommodating for new waste streams (e.g., blending, reprocessing, etc.)
  - Allows innovation in addressing potential issues

# Rulemaking Framework

## Potential Issues/Burden

- Cons:
  - Each licensee may need to revise and enhance safety case declaration
  - Approval required at each Agreement State
  - Site-specific waste acceptance criteria could lead to uncertainty at waste generators

# Conclusion

- A limited rulemaking for future DU disposal
- Considered existing rule and situation
- Risk-informed/Performance-based approach
- Addresses other potential LLW innovations (e.g., blending, reprocessing, enhanced engineering, etc.)

# Backup Slides

# NIRS/PC Contention

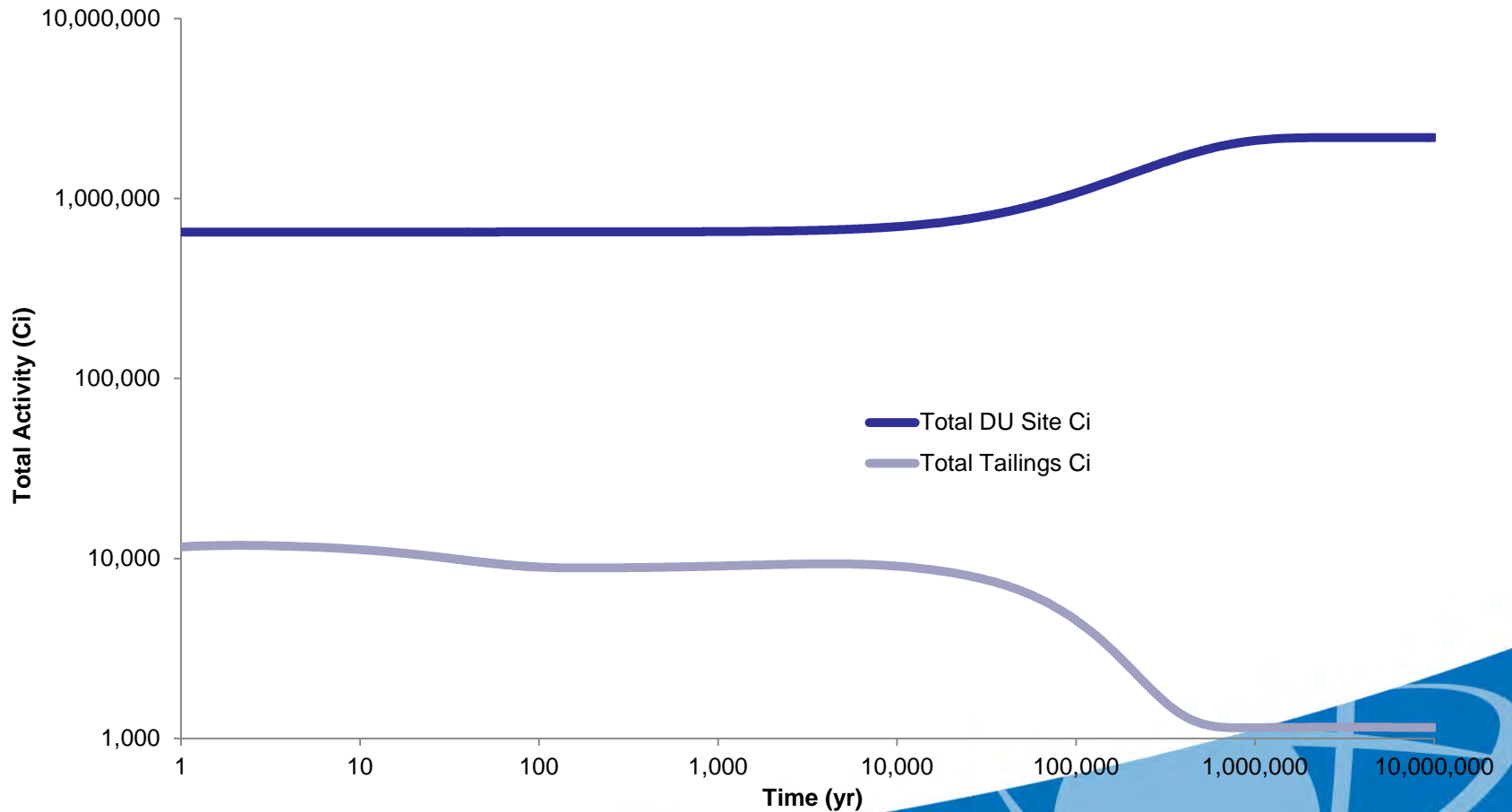
The DEIS states that depleted uranium may be disposed of as Class A low-level waste. (DEIS at 2-27, 2-31). This is erroneous, because the Commission has not ruled that depleted uranium constitutes low-level waste. It is also erroneous, because the Commission's adoption of 10 CFR Part 61 included no analysis of the environmental impact of disposal of depleted uranium as low-level waste, and the Commission could not lawfully decide that such disposal is permissible without undertaking a full environmental impact analysis. Further, NIRS/PC have previously explained, in support of contention NIRS/PC EC-3/TC-1, that depleted uranium should be managed and disposed of in accordance with rules applicable to Greater than Class C waste, not low-level waste.

Nuclear Information and Resource Service  
and Public Citizen, October, 2004

# 2009-2013: Outreach

- Two public meetings in late 2009
- Draft proposed rule text for comment, 2011
- Three meetings with ACRS in 2011
- Three public meetings in 2012
- Draft proposed rule text for comment, 2012
- Three meetings with ACRS in 2013

**~1.4 million MT DU vs  
~1.6 million MT mill tailings**





# Progeny In-growth for Depleted Uranium

