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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

(ACRS)

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RADIATION PROTECTION AND NUCLEAR MATERIALS

SUBCOMMITTEE

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THURSDAY

JANUARY 16, 2014

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ROCKVILLE, MARYLAND

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The Subcommittee met at the Nuclear Regulatory Commission, Two White Flint North, Room T2B1, 11545 Rockville Pike, at 8:30 a.m., Michael T. Ryan, Chairman, presiding.

COMMITTEE MEMBERS:

MICHAEL T. RYAN, Chair

J. SAM ARMIJO

RONALD G. BALLINGER

SANJOY BANERJEE

DENNIS C. BLEY

HAROLD B. RAY

JOY REMPE

PETER C. RICCARDELLA

STEPHEN P. SCHULTZ
GORDON R. SKILLMAN
JOHN W. STETKAR

CONSULTANTS TO THE SUBCOMMITTEE PRESENT:
JAMES C. CLARKE

NRC STAFF PRESENT:
DEREK WIDMAYER, Designated Federal Official
BOBY ABU-EID
LARRY CAMPER
DAVID ESH
CHRIS McKENNEY

ALSO PRESENT:
DIANE D'ARRIGO
JOHN GREEVES

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

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

(8:31 a.m.)

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

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

MR. RAY: Right here.

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

MALE PARTICIPANT: No, he --

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

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

MR. RAY: What about Joy?

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

MEMBER REMPE: Thanks, Harold.

MEMBER SKILLMAN: And Dick.

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

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

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

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

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

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

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

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

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

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

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

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

MEMBER STETKAR: So they say.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

The long term analysis did not make WCS change any design features, and they have been gaining insights from evaluation as opposed to compliance. Rule would help WCS because a rule that adds site-specific analysis would be supportive of the approach already used in their licensing of the site. EnergySolutions' Clive, Utah facility uses a reasonably foreseeable closure of 1,000 years. A thousand years does not capture DU, but neither does 10,000 or 20,000. Everybody will recall that the uranium-238 half-life is 10 to the ninth years, so it's not going to decay very much in any time frame that's being discussed.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

CHAIR RYAN: Than we can do with it.

MEMBER ARMIJO: -- possibly do here.

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

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

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

MR. WIDMAYER: No.

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

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

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

CHAIR RYAN: Right --

MEMBER ARMIJO: -- want to get to it.

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

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

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

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

(Simultaneous speaking)

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

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

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

MR. WIDMAYER: Back to when? 1987?

MALE PARTICIPANT: No, no.

CHAIR RYAN: How about the last three?

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

CHAIR RYAN: Three will be enough.

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

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

MR. WIDMAYER: Paperless?

MEMBER REMPE: Paperless, yes.

CHAIR RYAN: I'll go with that.

MR. WIDMAYER: Anybody want paper?

(Show of hands)

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

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

(Simultaneous speaking)

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

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

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

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

CHAIR RYAN: Very good.

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

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

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

Gentlemen.

MR. CAMPER: Good morning.

CHAIR RYAN: Good morning.

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

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

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

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

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

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

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

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

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

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

MR. CAMPER: Yes.

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

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

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

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

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

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

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

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

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

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

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

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

MR. CAMPER: I appreciate that.

MEMBER SKILLMAN: Thank you.

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

Dr. Ryan?

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

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

MR. CAMPER: Correct.

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

MEMBER SKILLMAN: What do you do with it?

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

MEMBER SKILLMAN: Thank you. Thanks Larry.

MEMBER ARMIJO: You know, I think DOE made it very clear what procedure they're going to use, the converting to U3O8. And why they chose U3O8, it's a very stable form. And unless I'm wrong, DOE is pretty much going to handle DU for the nation whether it comes from LES or whether it comes from other sites. And getting at this issue of the huge amounts of material involved, it just begs the question why isn't the regulation of DU a totally separate rule so that the requirements and issues don't affect bonafide low-level waste in any way?

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

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

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

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

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

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

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

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

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

MEMBER ARMIJO: Right.

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

MEMBER ARMIJO: Fast reactor fuel.

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

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

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

MEMBER ARMIJO: They had tanks.

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

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

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

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

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

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

MR. CAMPER: We're going --

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

In the end, the final option was the final one selected was, the intention was they convert it to U3O8 with the major intention for disposal if uses did appear they could take material out that was headed for disposal, but it was primarily a for-disposal path is what DOE selected.

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

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

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

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

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

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

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

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

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

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

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

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

MR. RAY: Okay.

MR. CAMPER: We have a bullet about that.

MR. RAY: All right.

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

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

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

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

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

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

Go ahead.

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

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

MR. CAMPER: And we concluded the same thing.

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

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

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

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

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

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

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

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

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

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

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

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

MEMBER ARMIJO: No. No.

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

MEMBER ARMIJO: No, you have your two regulations.

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

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

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

CHAIR RYAN: Well, that's not --

(Simultaneous speaking)

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

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

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

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

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

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

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

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

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

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

MR. MCKENNEY: They're very similar.

MEMBER SCHULTZ: Very similar, okay.

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

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

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

MEMBER SCHULTZ: Right.

MR. CAMPER: Albeit under certain conditions.

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

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

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

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

(Simultaneous speaking)

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

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

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

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

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

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

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

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

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

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

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

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

MR. CAMPER: Of course.

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

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

MR. RAY: Yes.

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

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

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

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

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

MEMBER SCHULTZ: Larry, I'm sorry.

MR. CAMPER: Sure.

MEMBER SCHULTZ: Shallow and near-surface?

MR. CAMPER: Three meters or less.

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

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

MEMBER SCHULTZ: So that bullet said shallow --

MR. CAMPER: Right. Shallow.

MEMBER SCHULTZ: -- humid sites.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

CHAIR RYAN: Stop, Larry. Stop.

(Telephonic interruption in proceedings)

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

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

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

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

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

And it also had a Part 2 assignment in that SRM which said that 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 the updated assumptions and referencing the latest ICRP methodology. The effort should explicitly address the waste classification of depleted uranium.

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

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

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

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

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

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

MEMBER ARMIJO: Don't accept large quantities.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

MR. MCKENNEY: Sorry, significant amounts.

MR. CAMPER: Significant amounts.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

(Simultaneous speaking)

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

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

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

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

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

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

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

MR. RAY: Is the answer yes?

MR. MCKENNEY: Yes.

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

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

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

MR. MCKENNEY: No.

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

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

MALE PARTICIPANT: That's right.

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

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

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

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

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

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

MEMBER STETKAR: Larry, I think, had --

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

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

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

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

MR. MCKENNEY: Three. Not Texas.

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

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

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

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

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

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

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

CHAIR RYAN: No.

MEMBER ARMIJO: The answer is no.

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

MR. CAMPER: And you do understand --

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

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

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

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

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

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

CHAIR RYAN: Okay, but we can --

MR. RAY: -- just to raise that.

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

MR. RAY: No, this --

CHAIR RYAN: Wait a minute.

MR. RAY: Okay.

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

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

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

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

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

MR. MCKENNEY: Right.

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

MEMBER SCHULTZ: But why not?

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

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

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

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

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

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

MEMBER SCHULTZ: Exactly.

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

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

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

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

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

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

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

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

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

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

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

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

MR. CAMPER: Right. Based on PA.

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

MR. CAMPER: Right.

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

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

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

CHAIR RYAN: Right.

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

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

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

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

(Simultaneous speaking)

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

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

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

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

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

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

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

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

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

(Simultaneous speaking)

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

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

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

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

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

MEMBER ARMIJO: Which they don't do now?

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

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

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

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

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

MR. CAMPER: Sure.

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

CHAIR RYAN: Are you recommending taking it out?

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

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

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

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

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

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

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

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

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

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

CHAIR RYAN: Thanks, David.

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

MR. MCKENNEY: To 500 millirem.

MR. CAMPER: Five hundred millirem or the --

MEMBER ARMIJO: So that was already --

MR. CAMPER: That's built in.

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

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

MEMBER ARMIJO: Which included limited quantities of DU.

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

MEMBER ARMIJO: Limited concentrations or quantities.

MR. MCKENNEY: Yes.

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

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

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

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

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

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

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

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

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

MEMBER STETKAR: Right.

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

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

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

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

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

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

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

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

CHAIR RYAN: We'll continue.

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

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

MR. CAMPER: Yes, sir. Chris?

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

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

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

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

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

MEMBER SKILLMAN: Same volume or same mass?

MR. ESH: They're the same volume.

MR. MCKENNEY: Same volume.

MEMBER SKILLMAN: Metric tons sounds like --

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

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

MEMBER SKILLMAN: Thank you.

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

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

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

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

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

MR. MCKENNEY: Right.

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

CHAIR RYAN: Right, and unassessed.

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

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

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

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

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

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

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

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

MR. MCKENNEY: Yes.

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

MR. MCKENNEY: There's not much --

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

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

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

MR. MCKENNEY: It doesn't show risk.

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

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

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

MEMBER ARMIJO: This is just strictly inventory then.

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

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

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

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

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

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

MEMBER ARMIJO: It won't for me.

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

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

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

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

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

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

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

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

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

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

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

MR. MCKENNEY: It's SRS.

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

MR. MCKENNEY: Right.

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

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

MEMBER SCHULTZ: Right.

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

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

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

MEMBER BALLINGER: What report is this out of?

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

(Simultaneous speaking)

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

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

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

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

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

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

MEMBER ARMIJO: Right. Thank you.

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

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

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

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

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

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

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

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

MR. MCKENNEY: Right.

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

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

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

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

MR. MCKENNEY: Right.

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

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

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

MEMBER ARMIJO: Been updated.

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

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

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

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

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

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

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

MEMBER ARMIJO: It does.

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

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

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

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

MR. MCKENNEY: Five years.

MEMBER ARMIJO: Five years.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

(Laughter)

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

MR. ESH: You can recalibrate me.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

So we stop there and entertain additional questions or dialogue.

CHAIR RYAN: Any questions?

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

MEMBER BALLINGER: That's at Barnwell, right?

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

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

MR. ESH: Right, yes.

MEMBER BALLINGER: How much could they take?

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

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

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

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

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

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

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

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

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

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

(Simultaneous speaking)

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

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

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

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

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

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

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

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

MR. CAMPER: As proposed by the staff.

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

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

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

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

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

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

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

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

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

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

MEMBER ARMIJO: No specified duration.

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

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

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

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

MEMBER ARMIJO: Okay.

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

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

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

MR. ESH: Yes.

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

MR. MCKENNEY: Beyond 20 is, yes.

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

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

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

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

MR. WIDMAYER: Hey, David?

MR. ESH: Yes.

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

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

MR. CAMPER: Could be useful.

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

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

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

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

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

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

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

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

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

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

MR. ESH: Yes.

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

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

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

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

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

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

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

MALE PARTICIPANT: The regulator.

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

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

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

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

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

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

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

(Simultaneous speaking)

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

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

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

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

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

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

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

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

I mean our comment on --

MEMBER ARMIJO: I guess --

(Simultaneous speaking)

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

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

MEMBER ARMIJO: Yes. Way too conservative.

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

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

MEMBER ARMIJO: Should be based on safety of humans.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

MEMBER ARMIJO: Okay, hear you.

Mike?

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

MEMBER ARMIJO: You want to come back. We're going to reconvene, so I guess --

CHAIR RYAN: At 1:00, yes.

MEMBER ARMIJO: Okay.

CHAIR RYAN: All right, so we'll reconvene at 1:00.

(Whereupon, the foregoing matter went off the record at 11:55 a.m. and went back on the record at 1:13 p.m.)

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

(1:13 p.m.)

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

MR. WIDMAYER: Correct.

CHAIR RYAN: Okay.

MR. WIDMAYER: Not planned anyway.

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

Who would like to go first?

MEMBER ARMIJO: Start with Skillman.

CHAIR RYAN: Dick, next?

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

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

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

(Off the record comments)

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

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

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

CHAIR RYAN: I know.

MEMBER BALLINGER: They used --

CHAIR RYAN: Professor, I appreciate the --

(Simultaneous speaking)

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

CHAIR RYAN: Okay, great.

MEMBER SKILLMAN: Thank you.

CHAIR RYAN: Yes.

Steve?

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

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

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

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

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

MEMBER ARMIJO: That's what Malthus said.

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

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

CHAIR RYAN: Thank you. Well thought through.

Dennis?

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

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

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

MEMBER BLEY: Facility-specific. Because each facility is going to be different and that's what you've got to look at.

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

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

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

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

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

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

MS. D'ARRIGO: What about those?

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

MS. D'ARRIGO: Thank you. Sorry.

CHAIR RYAN: Yes, that's all right.

MEMBER BLEY: This isn't a general discussion.

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

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

CHAIR RYAN: Thank you.

What else, Dennis?

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

CHAIR RYAN: Okay, fair enough.

Sam?

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

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

(Simultaneous speaking)

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

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

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

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

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

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

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

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

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

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

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

CHAIR RYAN: Okay, thanks.

Joy?

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

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

MEMBER ARMIJO: We did.

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

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

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

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

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

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

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

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

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

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

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

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

MEMBER REMPE: That's what I'd like to see happen.

CHAIR RYAN: Okay, we'll start with that.

MEMBER ARMIJO: -- see addressed in the letter. Well, not necessarily my outline, but so that we, you know, we had to do something like that on the expedited fuel thing. In order to break the log jam we had to -- which way do you want to go.

MEMBER REMPE: That's what I'd like to see is avoid the log jam this time.

MEMBER ARMIJO: Right. Because then we don't have a, we're effectively, you know, this is supposed to be a committee of the whole, but in fact everybody can't attend all the meetings. So at the next full committee meeting is when we'll talk about this, and I think we really have to have some sort of outline that at least we agreed would be the basis for a draft letter.

CHAIR RYAN: Well, I'm hoping to come to the next full committee letter with a draft that we can all --

MEMBER ARMIJO: Yes, well, that's what I'm saying. We need to give you an outline of the points that need to be addressed.

MEMBER REMPE: This group ought to try and, to what we can at least points, you know, again we're only the subcommittee. Our consensus doesn't mean much if we could come to it, but at least things that we would like to see happen.

CHAIR RYAN: Well, the good news is we're a quorum even if everybody votes against us.

MEMBER REMPE: But some of the people might have stronger opinions and tend to sway those who are here, so --

MEMBER ARMIJO: Well, normally we don't need to have a court reporter for a letter writing process. Because that's almost what we're in there, in the discussion to prepare an outline.

CHAIR RYAN: Yes, I think from this point on. Yes.

MEMBER REMPE: Let the other people --

CHAIR RYAN: Let's finish our first go around and then --

MEMBER ARMIJO: Yes, sure.

MEMBER BALLINGER: Yes, I agree a lot with a lot of what Dick is saying and I'm not persuaded by the argument so far that the cost to comply with the new regulations and stuff is not going to be very high for places, you know, in spite of the fact that they said --

CHAIR RYAN: You're thinking it's going to be high or you're thinking it's not going to be high?

MEMBER BALLINGER: I think it's going to be high.

CHAIR RYAN: Yes, okay.

MEMBER BALLINGER: I'm not persuaded it's not going to be high. Let's put it that way.

CHAIR RYAN: Okay.

MEMBER BALLINGER: And I'm new to this so I've read everything from scratch. And what struck me was just what Dick was alluding to, is this DU has got to be treated separately, and I don't understand why that hasn't been done before now other than just inertia in the system.

CHAIR RYAN: Fair enough.

Dr. Clarke?

CONSULTANT CLARKE: I should identify myself.

CHAIR RYAN: Yes, please.

CONSULTANT CLARKE: My name is Jim Clarke. I'm at Vanderbilt University. I was a member of the former ACNW&M that Mike chaired. I have very fond memories of that experience. It's good to be back.

MEMBER ARMIJO: You haven't been on the ACRS -- fond memories.

CONSULTANT CLARKE: And I'm a consultant to the ACRS. I just had a couple of things. I went through the documents that were provided to me. I've been trying to keep up with this and there's been a lot to keep up with. And the SECY-13-0075, July 19, has a comparison of the current 10 CFR 61 to the proposed 10 CFR 61, and it's in a text and you kind of go back and forth.

It struck me that, and you folks may be planning on doing this, that there might be merit to more of a flow chart or a decision tree, actually -- if this, then that -- when you're, you know, for each of them, actually.

So what we did and what we're proposing to do in the future, oh, just some graphical representation of that, I think, in addition to what's in the text which is just fine. That might be helpful. So I just wanted to, perhaps these guys may already have done it. I don't know.

Now the other is this very controversial time of compliance which has, you know, been controversial for as long as I think I've been following this stuff. And it's interesting when you compare it to hazardous waste or Superfund sites, which may be a lot more serious in some cases where you're into five-year reviews in one case and 30 years of post-closure monitoring and maintenance in another. But it struck me that in Dr. Ryan's summary of the last meetings I saw 10,000 years, I saw 1,000 years and I saw a few hundred years. And as you go from 10,000 to 1,000 to a few hundred, I hope you would all agree you reduce a lot of some uncertainties.

Okay, I liked the two-tiered approach but I'm not sure I totally understand it. So I'm wondering if you were to adopt a compliance period of a few hundred years, and just think back a few hundred years and think of all the changes that we've seen, they were totally unanticipated, and somehow you worked the rest of the uncertainty under the Tier 2. I don't know if that makes sense or not. But clearly we're going to need some ongoing monitoring. We're going to need to see, you know, if things are going as planned. And the other thing that I think is important is this is near-surface disposal. This isn't a repository.

So there's a little bit of if something goes wrong we can probably fix it. That's not getting into cost, but at least these decisions are not irreversible. I think we'd like them to be. I think we'd like to get out of monitoring and have something designed and implemented and feel confident enough in it that we can stop. But I'm not sure that it's going to go that way. So I throw that out as maybe a shorter compliance period.

And the other, you know, Larry showed a slide, Slide 11, that said Tier 1 "reasonably foreseeable futures." And I just don't think 10,000 years is a reasonably foreseeable future. So I'm wondering if that is the intent, reasonably foreseeable future. Maybe a few hundred years might have merit and then we can deal with the rest of it perhaps in Tier 2, depending on how we define Tier 2.

And then I just want to close by saying that I'm definitely persuaded that a separate rulemaking for DU makes a lot of sense. I mean, you know, it wasn't anticipated, the other stuff that wasn't anticipated, the blending can be handled, I think, under the current approach, you know, with caution. Because you hit the limits pretty fast depending on --

CHAIR RYAN: Blending of?

CONSULTANT CLARKE: A, B, and C to get to A. And, you know, so those are my comments. Thanks for inviting me. It's a pleasure to be here.

CHAIR RYAN: Oh, sure. Absolutely, Jim. Thanks for being here. We appreciate your insights and your comments. Thanks very much.

Okay, I guess the one that jumps out at me is the DU, you know, by itself you can deal with, but in the context of low-level waste it becomes very complicating with no real benefit of having it together.

You could, for example, just as an example, have a disposal facility and off in one place have a DU cell. DU, that's it. And the rest of it could be low-level waste that doesn't involve DU, and make a pretty bright line there so you sort of create a different strategy for managing DU versus something else.

The other part of the DU segregation is you could deal with it in a waste form way. Maybe it's all metal. That would be an easier situation than if it's dry, finely divided powder, you know, which could create a different set of challenges.

So I'm thinking more and more that DU should be a category of material and ultimately as a waste that's separate and deals with the fact it's primordial. It's going to be here forever. It's not going to decay to any appreciable amount at least from the foreseeable life of our planet. And it makes a heck of a lot of sense to me.

MEMBER SKILLMAN: Mike, let me add onto that comment just to open up a little bit more in my own thinking. I've got a friend who worked on a contract down at Aberdeen, and the task was to destroy the nerve gas projectiles. There were many of them. It was the United States equivalent of --

MEMBER BLEY: They were ton cylinders actually.

MEMBER SKILLMAN: -- sarin. And they actually built a process where they fired this stuff into a high temperature boiler and they used it as fuel along with petrochemical. They burned it. And there was proof that once it was subjected to high heat its chemical form changed. It became incinerated and was part of the fuel, and it was disposed of basically as flue gas.

That was a very dangerous --

MEMBER ARMIJO: Yes, if the temperature wasn't high enough.

MEMBER SKILLMAN: -- compound, and that work was done successfully. It seems to me that that's the kind of thinking that we ought to be using for DU. And probably there's a way to do it to treat it as a future resource instead of destroying it as a waste form. There's probably a way to make it into something that can be set aside, put in a safe place, left for a long time that poses neither chemical nor radiological hazard of any great degree, and as you say, it's got a ten to the ninth half-life. It's going to be around for a long, long time.

MEMBER ARMIJO: What DOE is doing turning it into U3O8 is perfect feedstock to turn it into depleted UO2, or ultimately, if you want, a metal form. So what DOE is doing is what they believe is the most stable chemical form as U3O8 and it will be a resource someday. Who knows when, but it will have value. And so I think that's going to happen. You know, we're not destroying it.

MEMBER SCHULTZ: Well, that's true. But we get into this whole discussion about what we're going to do with Part 61, because treat it as a waste it's a long, long-lived material, therefore suddenly we have a performance period that's out there beyond 10,000 years and we're going to do an evaluation, technical evaluation inside 10,000 years instead of a few hundred, which does make more sense for low-level waste.

So we seem to have created boundaries or lack of boundaries that puts us into a process that's really, technically untenable. And so we still need to continue to ask ourselves and the Commission, why are we doing it this way? Why are we defining something in the wrong way? We're calling it a waste instead of a resource. We're trying to plan in case it is not U3O8, we need to plan for that. Well, why do we? Because we're not making policy decisions about how it ought to be treated as a material.

MEMBER ARMIJO: Yes, if it was treated as a resource it would be, you'd have a one tier period of compliance where you stored it as a resource. And you wouldn't worry about 10,000 years because you'd figure maybe in the next hundred years somebody will be using that in fast reactors or --

CHAIR RYAN: I'm sorry, I have to react to that. I just don't see that a resource is going to sit around under some kind of a program and spending lots of money to give it care and feeding for hundreds of years until we're ready to use it.

MEMBER ARMIJO: There would be no more care and feeding than what you would do as you put it in the ground in a concrete cask. I mean, it's the same thing. It's accessible. Whether we call it a waste or whether we call it a resource it's still going to be accessible.

CHAIR RYAN: Well, I'm not sure I would do it that way.

MEMBER ARMIJO: We might do it a different way, Mike. I'm just saying --

CHAIR RYAN: Let me know when I can finish.

MEMBER ARMIJO: Analyzing for this second tier, analyzing for far into the future is interesting. It's probably fun for people that know how to do it, but I don't think it provides any safety benefit. You wouldn't change the design of the facility as a result of that. You already know how to design these facilities, been doing it for a long time. So, you know --

CHAIR RYAN: Yes, but the point is, is that if you take DU out of low-level waste, that's the premise on which I'm making these comments. It's not in low-level waste. If it's in some other category dealt with in some other way that's appropriate for something that's primordial in terms of its lifetime, okay, then low-level waste makes really very good sense with the near-surface, you know, multi-barrier kind of technology approach that's in use today.

MEMBER SCHULTZ: But then my point was, so why create a Part 61 that's at 10,000 years?

CHAIR RYAN: That's what I'm saying. Make the performance interval in 61 appropriate to the half-lives of the waste that you're dealing with.

MEMBER SCHULTZ: Because I think the way we got to the 10,000 years is, well, look at DU.

CHAIR RYAN: Well, you know, my central case which I shared with most of you is I decayed down the inventory of the South Carolina site, and in a hundred years you have bits, tidbits of, you know, a little bit longer-lived radioactive material. There's eight radionuclides involved at that time. Eight, in very small quantities. You know, the case is proven by what's exactly buried in the low-level waste sites now.

So, you know, I think to me that's a central issue that we've got to get across to the Commission that this is a problem that's very quickly reduced and clarified on both sides of the ledger if you have low-level waste minus DU and DU over here by itself.

MEMBER SCHULTZ: Right.

CHAIR RYAN: That's the letter. I mean that's the driver of the letter as far as I'm concerned.

David?

MR. ESH: Dave Esh with the NRC staff. Just one point of information for you on this topic that you're discussing right now. Prior to DU coming into existence in the NRC system, the technical staff, even before I was at NRC, developed NUREG-1573 which is on doing low-level waste performance assessment. So that was for what you'd call traditional low-level waste, not a DU waste stream.

That group had up to 20 people on it and they looked at the problem for, I don't know, seven or eight years or something like that. They did computational models. The people that did that work had probably 300 or 400 years of technical experience in performance assessment in associated fields.

And they said in their guidance document that was issued in 2000 to use a time of compliance of 10,000 years for low-level waste, without depleted uranium.

MEMBER SCHULTZ: What drove them to that conclusion?

MR. ESH: That's because the low-level waste in the U.S. is not classified by half-life. So our Class A waste has long-lived waste in it just like our Class B or C has long-lived waste in it.

Internationally, I would say they're smarter than we are. They make their classification system by both concentrations and half-lives, which then allow you to tailor your criteria to the material better.

But in the U.S. because the long-lived is part of the traditional waste stream, the analysis to look at when you get the impacts and how big they are, they felt has to go out long enough to capture what those impacts are. That's from technetium-99, iodine-129, the transuranic elements that are present in low-level waste.

And if you go back to some of the old presentation materials that we gave to you, there's a figure that we have that has the ratio of what you need to do to reduce low-level waste down to 25 millirem. There was one that included geochemistry and one without geochemistry.

But it basically shows that a traditional low-level waste stream still has a lot of risk in it. It's not a riskless endeavor that within 300 years all the risk is gone. There's risks that persist, and if you put it in a bad site it's going to show up. If you put it in a good site it won't, or the concentrations will be limited.

So just that point of clarification as you go on this. Should we have a separate DU rule? What should be the time for low-level waste, et cetera?

CHAIR RYAN: Yes. Well, it's hard sometimes to take a look at the traditional makeup of low-level waste, particularly with the issues you've just gone over. You know, it's intimate to the waste. It comes out in a reactor waste stream, and, you know, are you going to take out the atoms of the one that's a little bit longer lived and try and do something like that? No. So you've got to deal with it as a waste as a whole.

But I think we've got an opportunity to take one that's really a problem, because it's not mixed in with low-level waste, and do something else with it.

MR. ESH: You don't necessarily want to confound or pollute your system by this one thing if you think it is, in fact, separate. What we felt was, we looked at what was done in the previous staff in low-level waste guidance, and then how different is this material?

We've acknowledged that it is different, but we felt that the criteria we came up with and the approach of only triggering the very long term, if you're in that box, basically would assure that whatever waste streams we get in the future, the regulation would handle it and we wouldn't have to go through, you know, perpetual rulemaking and all that that's very time consuming and -- so anyway.

MEMBER SCHULTZ: But if we started off 30, 40, 50 years ago and we set up a system that is not as smart as what others have done in Europe, let's say, because we didn't consider and separate half-life from toxicity and what have you, why would we want to perpetuate that? Why would we not want to, if we're going to change anything, be smarter?

MR. ESH: Yes, I think the answer to that is in this case it was supposed to be a limited scope rulemaking and that was outside what was supposed to be limited scope, which is why we had in 2015, and I don't remember the time frame, to do the comprehensive changes where we would look at something like that. Because the waste classification we kind of talk about it as a technical thing, but it's a real-world thing.

You know, there's legislation written that's tied to the waste classifications system. There's all sorts of processes and real-world management that goes on based on it. It's not a small deal to change the waste classification system.

To change the requirements for the technical analysis impacts the few, the site operators that we have and the Agreement States that they are in. That's a small change. But the change in classification system changes it for the whole country.

And so that's why we kind of came out where we did with that would be a good thing to look at in a comprehensive revision, but in this limited scope thing, which the intention was to get it done rather quickly, because there is this material waiting, sitting out there ready to go. That was the thinking that went into it.

MEMBER BALLINGER: But if things got complicated as they have, and we go along, there's no reason, if you realize it now, it's gotten complicated to the point where you realize you've made a mistake, in effect. There's no reason to simply keep going and try to patch things up. You stop, you reconsider, and if necessary do something different.

MEMBER SCHULTZ: And the one example would be so it's limited in scope. Why would we codify 10,000 years? Why? If you're saying no, what we're going to do is we're going to move forward and we're going to do a more detailed and rulemaking and --

MR. ESH: The reason why is because we got that as strong feedback from the stakeholders when we started the process, and three of the four sites already did that or are doing that in process. We didn't view that as such an enormous sticking point as what it has become.

So we viewed it as, hey, the staff already had that guidance out there in 2000 that said this, and we never had a peep about it from the ACRS. And that's been, you know, ten years it's been sitting out there, the staff guidance that was previously developed. So we didn't see it as such a big deal as what it has become.

MEMBER BALLINGER: I mean, it sounds to me like if we get the U out of the discussion then it makes your life easier on the low-level waste disposal issue with the 10,000 years effects, right?

MR. ESH: I think that the depleted uranium is definitely a challenge, and that was the reason for the rulemaking, okay. So I don't see a need to do the rulemaking if you're not including depleted -- it wasn't like we felt like, oh, well, the low-level waste regulation has problems and we need to change it.

We only needed to change it for the waste streams that were outside of the scope because you basically have an unanalyzed safety condition. You have something that wasn't analyzed before that's different now so we need to make sure the analysis gets done to correct that condition. That's the bottom line. So yes, it would make it a lot easier because I don't think you'd need a rulemaking. That's my opinion.

MEMBER ARMIJO: Well, that's even better. (Simultaneous speaking)

MEMBER ARMIJO: That's even better. Whether it's a new paragraph or a --

MR. ESH: No, it would not solve the DU problem. No, that's why we did the rulemaking to solve the DU problem. But you'd still need something done with the DU problem.

CHAIR RYAN: It solves the DU problem as long as it's still part of low-level waste. If it's the DU problem in a whole different space then it's probably a lot more straightforward to solve.

MEMBER BALLINGER: That's what I meant.

CHAIR RYAN: That's what you're saying, I'm thinking. So that sounds to me like a good thing.

MEMBER BALLINGER: It is. Yes. And I'm not sure we need to call it a resource. We can just call it whatever it is.

CONSULTANT CLARKE: You know, it seems to come down to a storage versus disposal, and I think you can store it in a way that accommodates disposal, as was mentioned.

MEMBER ARMIJO: It just seems that we have a working Part 61. Maybe it isn't perfect but it's worked very well for what Dave calls traditional low-level waste, and even though it has small, maybe, amounts of long-lived stuff in it, it isn't the dominant stuff. The dominant stuff is the shorter half-life.

So leave that alone. Leave that part alone. Address DU with all of its complications separately. Make requirements specifically for DU that address those issues and don't let the requirements for DU, whether it's intruder assessment or times of compliance or everything else, leak back into the existing regulation.

It seems to me that would be the easiest thing. And if you have waste site and you don't want to get into the large quantity DU disposal business, then you're just going on about your business and you're not affected at all. If you want to go into that business there's a price to pay. You meet the new DU requirements.

MEMBER REMPE: If you do something like that, didn't I hear you say there's a lot of material waiting that's DU come in? So how long would it take to come up with new requirements for DU?

MEMBER ARMIJO: Well, he's got the requirements. The staff has created those. And there's the Texas facility that it's all set up for it, and I think Utah is too. They could meet the DU requirements.

CHAIR RYAN: The western sites are looking at DU as an opportunity because their geohydrologic environment and all of that is better suited.

MEMBER REMPE: But does the Commission have requirements other than to try and fit it into what the current framework is? I mean, I thought we were talking about having something different for DU that doesn't have as long lead time or anything, or a compliance time.

CHAIR RYAN: I'm not as clear as Sam as everything's up and ready to roll. I think it's not quite --

MEMBER REMPE: That's what I'm wondering, is how long would it take to get, I mean --

MEMBER ARMIJO: What is it? It's just a matter of writing it up, the staff --

CHAIR RYAN: Well, it's a rulemaking cycle, Sam. It's going to take a year or more with public comment and all the rest.

MEMBER ARMIJO: No matter what we do it's going to take time.

CHAIR RYAN: Yes. So I mean it's not something that's going to pop off the shelf and be ready to go tomorrow. But it's a multi-, probably, I'm going to guess a few years to get it done, would be my guess.

MEMBER ARMIJO: But I think it'd be shorter if you separated the DU issue from the low-level waste issue.

CHAIR RYAN: I'm saying with the DU issue on the side by itself, getting it up and rolling would be a multi-year process.

MEMBER SCHULTZ: Either way, right?

CHAIR RYAN: Either way. You all agreed, I think. The one point we agreed on is that it seems a lot clearer to have DU in this arena and the rest of low-level waste in this arena to deal with the issues that are not so widely different.

MR. WIDMAYER: Does a grandfathering clause do the same thing? We can leave this rulemaking alone, let it go into effect for DU but have a grandfathering clause. I don't know what it exactly would say.

CHAIR RYAN: What would the grandfathering clause accomplish --

MR. WIDMAYER: Then you've left the already disposed of low-level waste alone or, and if you word it properly you don't have to include something that needs the classification --

CHAIR RYAN: Oh. Oh yes. And I think you'd have to have some recognition that waste that had been previously disposed under appropriate requirements at the time --

MR. WIDMAYER: Okay, but then you don't need to separate if, you know, I don't know how comfortable you are with this handling the DU situation as long as you leave, you know, regular low-level waste alone.

CHAIR RYAN: I would say that people that are counting on DU disposal probably are going to look for, where else am I going to take it?

MR. WIDMAYER: Okay. What I'm asking you as a committee is, does that achieve the same thing as a recommendation that says do DU separately? Are you comfortable with this, handling DU as long as it leaves other low-level waste alone?

MEMBER ARMIJO: I don't think you can actually accomplish that grandfathering. Somehow or another when the rule finally got written up I don't think it would actually, you know, I think you've got to write specifically, this is for disposal sites handling large quantities of DU, period.

MEMBER SCHULTZ: Yes, I think just grandfathering doesn't accomplish the whole --

MEMBER ARMIJO: Before you know it there would be some leakage back, and you're back in the -- that's what I think. But 99 percent of the discussion we've had in all of the meetings I've been in relate to DU.

And that's why I think we've got a DU problem and we should recommend something that addresses the DU problem. It's unique, and trying to force it into some general framework that also treats low-level waste, it can lead to confusion and a lot of work by people who are not in the DU disposal business.

MEMBER SKILLMAN: Sam, let me ask a question, if I could, to Dr. Esh.

Dr. Esh, if you were asked to retain all of the best that's presently in your updated Part 61 and to add to it a codicil for a couple of paragraphs that effectively forgive the presently buried DU, and point to a different set of acceptance criteria for the 1.3 million metric tons that are coming down the pike, is that something that could be done? And that's number one, could it be done? In other words, a couple of paragraphs. And number two, in your judgment could that be something that OGC would be willing to support?

MR. ESH: Let me go in reverse order. I can't speak for OGC, what they would or wouldn't support on this topic.

MEMBER SKILLMAN: Fair enough.

MR. ESH: The issue of grandfathering came up and they weren't supportive of it when it was discussed, but you'd have to get that answer from them. You know, it's a complicated issue. From a technical standpoint it sounds good, but then it's very challenging.

And the reason why it's challenging is because take a site that has 50,000 metric tons of uranium in it already. So how do you define -- say I'm a future site or a site in the future and I wanted to take 10,000. Well, why would I need to do a special analysis when the 50,000 ton site didn't need to do one? How does that make sense basically?

But the strongest problem from a technical standpoint is you have to understand that depleted uranium or uranium especially is very, very site-dependent as to what risk it poses. So, you know, at one site, especially an arid site with very low moisture content in the soil, radon can be a really severe problem.

And I'd ask you to put your mathematical hats on and just think about radon in people's homes today and what the driving force for that is. Uranium in soil around our homes is like part per million levels, you know, five, seven, three, something like that.

A few parts per million uranium in the soils around your home, and that generally translates into 200 millirem, more or less, what the average person has in their home from radon. The source of depleted uranium as disposed can be as much as 500,000 parts per million uranium.

And so it's not a trivial problem from a technical standpoint. The big solution to that is to put it deeper, okay, but then how deep to you put it? And if we were, NRC, to develop, say, special DU criteria, how would we get the depth right for a particular site? Because the depth that you need at the NTS site in Nevada, because it's so dry, might be much deeper than what you need at Washington, for instance, which has a little more soil moisture and different properties for its soil.

So the radon has that issue going on with it, and then technically on the other side, the uranium in the water is just as bad from a complexity standpoint because you can have all sorts of different solubility limits depending on what the uranium phases are and the geochemistry and, you know, you hear people say, well, we're going to grout the facility. Well, when you grout it you drive the pH way up and drive the uranium solubility up with it.

So you can have this kind of competing influences that go on technically within the system. So then once again then, how would we set, like, a limit to say what's large for depleted uranium? You know, what would that number be, and how would we determine it?

That seemed like a really difficult problem for us to do. Not that we couldn't. We could come up with something and vet it through your committee and through the public stakeholders and everything.

But we thought the better approach was just to let people rely on their specific analyses to make those determinations and to develop inventory limits. That's a fundamental concept that's used in Part 61 right now for the long-lived isotopes that could cause problems sometime in the distant future. Why would we treat uranium any different? We'll just treat it the same as we have for the past 30, 40 years.

So that's my kind of long answer to your question to give you some insights into, it's not that we didn't think about it and that we didn't discuss it, but it's a pretty difficult problem to come up with a clean answer to. The approach we took was a cleaner answer to the problem.

MEMBER SKILLMAN: Thank you.

CHAIR RYAN: Anything else?

MEMBER ARMIJO: There was one other thing that was raised by John Greeves in his presentation. He talked about, you know, you need two tiers. The time of compliance should be 1,000 years. And then the second tier, he said, there must be a second tier. He didn't say what it should be.

And it must have a metric, it can't be just open-ended. And there was somebody else that said, yes, there ought to be a metric but it ought to be one rem for that. It's very long term so it makes, so it wouldn't be impossible to meet.

And we may want to discuss the issue of, or think about whether we would want to recommend for traditional low-level waste a shorter time of compliance and only one term, not a performance period. So low-level waste would be handled no different than it is today, but only DU would have the longer term treatment and have some sort of metric.

But, you know, again that's something I don't feel that strongly about, but I think, I just can't see the benefit of mixing DU and the traditional low-level waste in one process that makes people do work where there's no safety benefit. That's the only new thing.

And David, I don't think anybody is disagreeing with the idea you've got to do a site-specific design for your facility and take into account the water and the radon and all the things you talked about. We wouldn't skip that. We wouldn't propose skipping that.

It would just say, hey, if you're doing this unique material with it's unique properties, it's a separate beast and you treat it this way. All the stuff we've been doing up to now under Part 61 is just fine, but it's constrained by these limits, the waste acceptance criteria and everything else, and that's it. It seems to me an easier job.

CHAIR RYAN: It sure tightens up the problem to me, and maybe I'm wrong, but where, you know, you've got a relatively -- well, not a relatively, I mean a much, much smaller span of time over which you're trying to make predictions, or make assessments.

So that to me is a huge win. Because, you know, it's just you're primordial and then you've got something that's a few hundred years, give or take, and with a few radionuclides that are in small quantities that are going to be around for, you know, a little bit longer.

So to me the simplification of, quote, whatever low-level waste is without uranium in it is something to think a lot about maybe having some benefit. I'm not saying let's jump in the wagon today and start taking DU to somewhere else, but it sure seems to me like that's worth thinking through a little bit more in detail.

Now I've done some calculations for one site, and there's eight radionuclides that are left after 300 years in curie quantities in the whole site, not megacuries. Curies. So I'm struggling with why that's not a good thing to think through a little bit and see what that's like for other, you know, inventories, or at least make the assessment of, if we examine this what do we see as a profile or a picture of this situation?

MR. ESH: Yes, the problem that we run into and have run into and will continue to run into is that the hazard profile and the risk profile are quite a bit different. And the hazard profile, you know, in the low-level waste performance assessment, it's then mitigated by all the things that scientists and engineers put in place to try to ensure that public health and safety are protected. And they do a good job at that and they shouldn't be penalized for it.

So with all the activity that you talked about, Dr. Ryan, as not being there in a few hundred years, the good thing is the systems take that risk away, or we feel like they're going to take that risk away, with a high degree of confidence. The analysis process is trying to see what remains after that risk has been taken away, and is that level of material that remains appropriate or not.

CHAIR RYAN: All I'm saying is we're taking the bright red light of the uranium that's there forever and it's now taken away. I'm not saying we change anything else we're doing for low-level waste. In fact, I would suggest you don't need to change anything else.

But you are getting a much more definable period of risk, if you will, where there is a risk to manage, down to something that's a whole lot less. And I'm agreeing with the colleagues who said don't change anything else. Same techniques, same technology, same depth of burials, all that stuff. Same site selection criteria, everything else stays the same.

But it really solves that, you know, really, really forever half-life risk assumption that's well within a reasonably predictable time frame.

MR. ESH: Yes, and understand something that we didn't make the determination that depleted uranium was low-level waste. That was done in the proceedings that then initiated our rulemaking. We were given the task of, given that this is low-level waste, what criteria do you need to use or requirements that you need to have to ensure that's it's disposed of safely.

CHAIR RYAN: Oh yes. Don't take any of the suggestions as to criticism of what you've done. Not in the least.

MR. ESH: No. Yes, so that's, you know, the task we were given, and the approach we tried to go about it is we looked at this issue of the variability and the environment sites and designs, et cetera, and said, well, everybody seems to, to date, be comfortable with this analysis-based approach. Let's make the requirements for an analysis-based approach to solve this problem.

Because the reason why we got in this situation is when the original EIS was developed they didn't anticipate this waste stream being a waste. Well, why do we believe we're so smart today that there isn't going to be a waste stream ten years from now that somebody says, now this is a waste, now dispose of it?

I can see that happening, you know, as technology changes and we change our fuel cycle and what not, there could easily be something that is radiologically/isotopically much different than we had anticipated today that needs to go in a low-level waste facility.

The analysis-based approach would solve that problem. It would take away that risk of needing to do this again in the future. It's a matter of getting people to agree to what are the criteria that you need to solve that problem for these different things that somebody could look at and one person's going to say that's a cat and that's a dog and there's a zebra in there too. You know, they're not things that you should be comparing at all.

Well, as long as it meets the legislated, verbal definition of low-level waste then it's all low-level waste that should be managed by our technical requirements.

Could you be smart enough to develop something that says, hey, if you have, you know, this amount or this concentration of long-lived waste at this point in time then you use these criteria instead of the other criteria? Yes, maybe you could do something like that.

We tried to do it the best we could, give them what we had, and there might be another way around it, but this was a pretty big activity with a lot of time put into trying to come up with a way to solve the problem.

CHAIR RYAN: Yes. Well, I appreciate that, and it's that good work that's kind of stimulated the conversation around this table, I think.

MEMBER ARMIJO: What do you want to do, Mike?

CHAIR RYAN: You're the boss.

MEMBER ARMIJO: I'm not the boss. I used to be.

MEMBER SKILLMAN: Is there anybody on the phone line?

CHAIR RYAN: Is there anybody on the bridge line?

MALE PARTICIPANT: We had 17 people signed on it seemed like.

MALE PARTICIPANT: We need to open it, I think.

MR. WIDMAYER: It has to be open.

(Off the record comments)

CHAIR RYAN: Okay, we have one comment from a member of the staff.

MR. ABU-EID: I would like to present certain things just to make you think outside of the envelope and to help you in achieving some kind of conclusion. And certain things they present my personal view. It's not necessarily to present the view of the presentations today, so I hope I'll keep this as personal.

Number one. First of all, we need to look at the international counterparts, what they are doing in regarding DU. First of all, we look at the safety requirement that I worked with, with the IAEA, actually developing the safety requirements and what are the requirements they say.

Number one, for short-lived radionuclides, the performance period should be within several hundred years. That's the safety requirement. And I believe I gave a copy of that safety requirement to Mike Reese at the ACRS and they have that requirement.

Number two, for long-lived radionuclides, the performance period should be within several thousand years. It did not define the period but they said several thousand years. That's very important to take, you know, to consider that aspect. This is the thing that we need to think outside of the envelope until the source term, what we have, short-lived or long-lived.

And then as you know, as they have mentioned that the waste classification system by IAEA is based on two things, which is the half-life and the cut for the half-life is 30 years and they use cesium, and the other factor they use, of course, is the inventory, total inventory.

CHAIR RYAN: Inventory.

MR. ABU-EID: Yes. That's number one. Number two, regarding the dose and the safety requirement, in the safety requirement, IAEA standards which is most countries they agreed with, they give a range of 1 to 20 millisieverts, 1 to 20 millisieverts with optimization.

The safety requirement says if the dose for the members of the public is one millisievert, which is 100 millirem, there is no need for optimization. If the dose above 20 milliseiverts, so the site is unacceptable for to be closed down for disposal.

So this is the range that they give. However, if it is between 1 to 20, you need to optimize in order to achieve the level of 1 millisiever which is 100 millirem. That's what we are talking about in terms of acceptability. So that's number two.

Number three. Now regarding the international community, how they regard DU, most European countries and Japan as well as U.K. because their DU as a results. And nobody asks the question why because as a result what they're going to do with it.

Well, there are lots of issues. There are lots of possibilities for use of DU in the future. As an example, it is for fast breeder reactor. Maybe their resources will be depleted and maybe it can be used for fast breeder reactor.

So that's one aspect of its use and the rationale for it, and could be other uses that we are not aware of. Therefore, they store it and they pay money for storage in France, and you could visit those facilities, in order to keep it for potential resources.

Therefore, the question is because we have large quantities of DU and we need to dispose it, and because the risk could be very high for keeping it, just in these drums we need to do something with it.

And one aspect of thinking outside of the envelope is we think of Part 61 only the way it was developed, and the intruder; we need to think of retrieval.

In Europe, they always think of retrieval. We always think with the performance period, and Europe and the international community use what's called safety case. They say this is what we think the outline of the regulation should be, and flexible, and then you go to the safety case which we call the site-specific assessment. So there is a correlation between the safety case and the site-specific analysis, and we need to think about that.

So in this regard, if we continue to have as was suggested, a simple disposal cell with possibility of adding more requirements for disposal such that we can accommodate retrieval, this way we could achieve two goals.

First of all, we are taking care of the risk from DU. And number two, in case of potential use in the future, can be used in the future. So those are the areas that I'm proposing today to think about disposal of DU and to think outside of the angle. And thank you.

CHAIR RYAN: Thank you, Boby. Appreciate your comments.

Is there anybody on the bridge line that wants to make a comment? Hearing none, do we have any other comments from our audience here?

MEMBER BLEY: Mike, there's some back here.

CHAIR RYAN: Yes. Hello, John.

MR. GREEVES: Good afternoon. Is this working?

CHAIR RYAN: It is.

MR. GREEVES: Okay. John Greeves, for the record. I'm really speaking for myself. Part 61, as I briefed this group earlier last year, Part 61 has been the gold standard. It's really done a good job. However, as I tried to explain last month when I spoke, simply put there is a gap in Part 61.

Dave called it an unanalyzed safety condition. It implements regulation my whole technical career here. It is there. And so, as currently as it's written and as interpreted by the NRC, it does not require analysis of some long-lived low-level waste radionuclides.

It's the eight that Dr. Ryan talked about. Literally you don't have to analyze those, especially if they're in Class A. DU is the poster child. It came into play since the 2000 good guidance the staff put out, but since then we're smarter. I was responsible for that guidance. I'm actually smarter than I was in 2000.

So there is a gap, and the staff on Slide 21, nails the issues. Look at Slide 21. It covers. There's a fairly simple way to fill this gap for DU and all the eight radionuclides. And if you address those issues on Slide 21 and do that, I think you could amend Part 61 fairly simply and fill that unanalyzed that Dave addressed, and leave a lot of the details and guidance that the rule write and you would fill that gap, in my opinion.

CHAIR RYAN: Thank you.

MEMBER ARMIJO: And Dr. Greeves, could I ask you a couple questions?

MR. GREEVES: Sure.

MEMBER ARMIJO: I may have misquoted you when I referred to your presentation last year. And in the two-tier analysis system which you agree with, you pointed out we should specify a time of compliance for both, and, but you also said there should be some sort of a, in the performance period there should be something specified. Did I get that right? And that there should be --

MR. GREEVES: Yes. Individually I believe there should be a metric. Without a metric it's freestyle.

MEMBER ARMIJO: That's what I'm afraid of.

MR. GREEVES: You could have three or four Agreement States doing things differently, you could have the DOE doing something differently, you could have the NRC staff doing something different. We need a metric.

MEMBER ARMIJO: Is it a dose metric?

MR. GREEVES: Well, my opinion, it's a dose metric. The Commission faced this issue with the high-level waste rule. It was mentioned here earlier. There's a metric for that second tier in the high-level waste rule. I don't necessarily think it's binding for low-level waste, but my view is you need a metric.

CHAIR RYAN: It is not even close to binding. It's in a separate part of the reg.

MR. GREEVES: Well, you know what I'm saying. I'm talking about the raw number, 100 millirem. It's certainly a lot better than 25. If you put no metric in there, somebody's going to come along and try and pin you to use 25 millirem, which is --

MEMBER ARMIJO: Or less.

MR. GREEVES: Put nothing in there, that's freestyle. Litigation, if I was an applicant, you know, I'd think long and hard about investing my money in a case where I'd have to defend something as, you know, a 25 millirem standard, if that's what my regulator came up with and used on it. If there's no metric there's a huge risk.

MEMBER ARMIJO: It would be the default metric.

MR. GREEVES: So I've listened and I see where you're maybe going, separate DU, but I would invite you to think about is there an elegant way to do this short of having -- because doing a separate rulemaking for DU, it's a heavy lift. So thank you for your question.

CHAIR RYAN: Thank you. Any other questions or comments from members?

MEMBER ARMIJO: Well, I have a question, and I guess the way I was thinking is that we're not talking about a separate rulemaking for DU. It's almost like an amendment to Part 61 that has a new DU chapter that has all the goodies that you've talked about, but those goodies apply to large quantities of DU, period, and not to traditional low-level waste. The analysis frameworks and things like that, if people wanted to have the traditional low-level waste facility and want to stay that way they could choose to use that but they don't really have to, whereas someone that really wanted to be in the DU business would do that kind of analysis.

So it's like you protect the existing working system while you address where there is a gap. So I don't see this as a separate, just DU. It's an amendment to the current reg that addresses DU, period. And limited to DU. So is that impossible?

CHAIR RYAN: I guess I don't know that it's impossible. I don't think it's a tough reach.

MR. WIDMAYER: David tried to tell you what the problems were with it.

MEMBER SKILLMAN: Yes, Sam, that was the question I had. That was exactly --

MEMBER ARMIJO: Yes.

MEMBER SKILLMAN: Excuse me, Derek.

MR. WIDMAYER: No, that's okay.

MEMBER ARMIJO: You know, the committee has to come up with a position on that, and the last thing we want to do is recommend something that's undoable. But I've yet to see what would make that undoable. Because I'm a firm believer in only fix what's not working. Other people don't think that. Okay.

MEMBER SKILLMAN: Well, if I could, and Dr. Greeves, can I ask you that same question that I asked Dr. Esh? My question was could there be a modification to the presently worded Part 61 that would be constructive in addressing DU in great quantities without undoing what is in 61?

MR. GREEVES: The simple answer is yes. It's hard to talk to you around the corner here. I'm not focused on DU. DU's the poster child. It's what galvanized the staff, the bulk of us, to recognize this gap. I've written regulations for a long time, and to me they need to be relatively simple, set a standard and they need to fill this gap we've talked about, DU being the poster child.

And to answer your question, there is a fairly simple way to do, is to fill the gap and take care of DU and at the same time, if in the future one of the other eight radionuclides becomes large inventory it would capture that also.

So the simple answer is yes, there's a way to do it. I've got some ideas on that. I've expressed them in this meeting and other meetings. And it doesn't need to be anywhere near as complicated as the proposed rule that the staff has out there. And I and many others are waiting to see what the SRM says so that we can get on with what is the direction that the Commission is providing on a few of the key -- they're the policy entity. They need to make a call on time of compliance, and a few others, and once they make that I think it can move forward fairly expeditiously.

And I'll be commenting on it in --

CHAIR RYAN: It's that exact point that has led us to this conversation among the members today. That the time of compliance doesn't necessarily need to be one number. Then if you take DU and take it out of low-level waste you can come up with a very straightforward low-level waste time of compliance.

It makes a lot of sense for the overpowering quantity of low-level waste that's left, and then you can structure a time of compliance or a compliance scheme for its, you know, treatment and disposal that makes sense for what DU is. Trying to put them together just doesn't work. It creates all sorts of conundrums that just don't work.

MR. GREEVES: And we're all sort of all speaking individually, and my view is you need a net that covers the short term. People talk about a 1,000 year time of compliance. I subscribe to that. That covers the risk, call that the short term.

You're not addressing the gap by only doing that. You have to allow for the second tier is the genius of the "and." You've got to do both. If you have the eight radionuclides that Dr. Ryan mentioned in, oh by the way Class A waste probably already has all those in it, then you're going to have to do the site-specific analysis and look out to the second tier.

Part 61 does not, as interpreted by the staff, does not require you to do a site-specific analysis. It needs to be fixed. It's not that hard. So to me it's the genius of the "and." You do both of them. You take care of the poster child, DU, and you're going to grab all those other eight that Mike talked about too in the process. A simple rule would require you to cover that envelope, with two tiers, and I am anxiously awaiting to see what the SRM says.

MEMBER SKILLMAN: Thank you.

CHAIR RYAN: Aren't we all?

MR. GREEVES: Thank you for your time.

MEMBER ARMIJO: Yes, thank you.

CHAIR RYAN: Anything else? Questions, comments, thoughts?

MEMBER BLEY: Just one last thing for me. And I really like what John had to say there. I agree with him very much. In many other areas we have consistently pushed the idea of looking at risk and looking at facility-specific analysis. And I think that does allow you to pick these things up.

I kind of think it would be bit of a shame to -- and up until today I was really focused on DU as something separate. I think it would be kind of a shame to push through a separate thing on DU when this could cover it.

Now John's comment, well, this Slide 21, which is really saying site-specific analysis and a two-tier system, but it's got the time of compliance and the other things in there as well. Dose limits.

You know, the other thing we've talked about a lot, and not here but in other areas, is how keeping the regulations simple, and as much as you can put details off in guidance would help. And I think that's just a bit of what we just heard. Anyway that's all.

MEMBER SCHULTZ: With the last shot of comments I guess the question that comes to my mind is, I think we need to provide metrics for whatever periods we're discussing, whether it be compliance or performance periods, and I don't understand why we would want to, or what we would use as a validation to select something that is different than what IAEA has done or what we would do for high-level waste. Why would we be more constraining for low-level waste?

CHAIR RYAN: Well, one country's low-level waste is another country's intermediate-level waste, or high-level waste based on what's in it. So again we're apples and oranges.

MEMBER SCHULTZ: I've heard numbers suggested that are lower.

CHAIR RYAN: Oh yes. The IAEA are lower, yes.

MEMBER SCHULTZ: So that's what we have to think about.

CHAIR RYAN: It's a multi-, you know, spidered hydra-head we've got to deal with. There's lots of moving parts.

MALE PARTICIPANT: It's come back.

MEMBER SCHULTZ: Well, I hear 100 millirem and then I hear 25 millirem.

CHAIR RYAN: All right. Give me a 10, 5, 2 and 1 if you listen carefully.

MEMBER SCHULTZ: Right.

CHAIR RYAN: We've had all those numbers in one form or fashion today, so, or this week, but I think it's worth us thinking some more about this and thinking about, you know, what is it we really want to recommend? What are we trying to fix and trying to improve or suggest improvements on?

I struggle a lot with it. I'm glad we've had this conversation and I hope it's been useful to you all. I'm trying to figure out what are we trying to accomplish. What we're trying to accomplish is continued safe management of waste, but I guess what I'm really asking is, if we did recommend some separation of the longer lived radionuclides from the shorter lived radionuclides would that ultimately be an improvement or not?

My thought is it would be an improvement because it would at least bin strategies for managing things that are much longer lived than other radioactive materials, and we could tailor the two taking into account all of technical support work that David Esh and his colleagues have done to address it, you know, and if you have long-lived stuff in a separate place than there is some long-lived questions you could begin to focus better on in that environment for those wastes.

MEMBER ARMIJO: I'm still trying to understand the gap in the existing regulations that Dr. Greeves talked about regarding long-lived radionuclides in the traditional waste streams. And I may have had a misimpression that they had been analyzed and they were a small contributor to the risk even though they had a long, long half-life.

And what I've been -- my goal is not, personal goal is to make sure that whatever we do for DU doesn't create work, burden with no particular safety benefit on the traditional low-level waste disposal. And if we have an unanalyzed safety problem with the existing regulation then, you know, otherwise --

CHAIR RYAN: This conversation started with the idea that if we took a long-lived ten to the ninth year half-life DU out of low-level waste, what risk profile would it leave behind for the rest of low-level waste? That's the question.

The question has drifted over the course of the last couple of hours, you know, as we've been talking about it, but that's the question I started with. What happens if DU is managed by a separate regulation in a way appropriate for bulk DU?

MR. ESH: And Dr. Ryan, this is David Esh, if I may.

CHAIR RYAN: Yes.

MR. ESH: And like I said, there's a figure that we developed that kind of conveys this what you're talking about to give the impression of how does the DU waste stream compare to the traditional waste stream?

It's in the Regulatory Basis Document, I'm pretty sure, or the white paper that we did on time of compliance, one or the other. It's definitely in presentation materials that we gave to you in the past. Look at that figure and it shows you the problem that you're talking about.

DU is definitely higher up on the chart but that doesn't mean the other stuff is benign. There's a lot of other data points on there that you need two, three, four or five orders of magnitude reduction by your system in order to get down to the dose level.

CHAIR RYAN: No, no. I appreciate that.

MR. ESH: Yes.

CHAIR RYAN: But, you know, it's a much higher bar when the materials tell you the ninth years as opposed to 150 or some other number.

MR. ESH: It's longer in half-life and longer in quantity and concentration, but the other stuff is not trivial, is the point.

CHAIR RYAN: I agree.

MR. ESH: Yes. And so the way we looked at is, well, yes, it's worse, but it's still from a technical standpoint within the scope of the problem we're trying to solve anyway for the other materials.

MEMBER ARMIJO: David, were those treated, those long half-life things? Were they treated in the waste classification tables, and so it was, you know.

MR. ESH: Some of them, but --

MEMBER ARMIJO: Quantities and concentrations were low.

MR. ESH: You can look at the waste classification table and compare it to a list of long-lived isotopes and you'll see that they are different lists and waste classification tables are a more limited list.

As John Greeves said, the primary one that stands out is the uranium, but it's not the sole one. There are other long-lived isotopes that could have the same problem, and that's when we said, well, we don't want to be doing this again in three or five years when somebody comes up with something new and triggers this off again.

MR. WIDMAYER: The notion, Dr. Armijo, was that for those long-lived radionuclides, the technical analysis that's required by 61.13 would possibly result in an inventory limit for those long-lived radionuclides, okay. So that's kind of the construct as it stands right now.

MEMBER ARMIJO: Sure. That's perfectly fine. If somebody wanted to go beyond that they'd have to come back to the staff or their Agreement State and put it in a case why it was okay to go forward.

MR. WIDMAYER: I guess, presumably, yes. And I don't know if that's happened or not.

MEMBER ARMIJO: Or they just live within those limitations. And that's up to them. And if they want to go further they could do, you know, take Slide 21 and just do it on a voluntary basis.

MR. ESH: The waste classification tables were primarily derived for 61.42 to protect the inadvertent intruder. The 61.41 determination was always to be based on technical analyses as Derek stated. That if you had too much of whatever long-lived isotope in your technical analysis for 61.41 that you would develop an inventory limit to manage that risk.

That was the easy way to manage the risk from the long-lived isotopes, and you would do that technical analysis. The rule didn't specify, the original rule did not specify a time of compliance. It also did not talk about uncertainty or FEPs, but there are things to get the scope right in there.

And we just saw a lot of variants in that when we looked at the Agreement State programs, and in this rulemaking we said, well, maybe we should try and clean that up if we're already doing a rulemaking. And the stakeholders thought that that was important so that's the way we went.

MR. WIDMAYER: But the unanalyzed safety issue that you brought up before is specific to depleted uranium, right?

MR. ESH: Yes. Well, the trigger was depleted uranium, and I agree with John Greeves. The trigger was depleted uranium, but it could be any isotope that is concentrated or is outside of the table isotopes. Uranium is the one that we have a practical waste stream. It's massive, sitting out there to cause that problem.

But it could be something else too. Selenium-79, it's on the tables. It's long-lived. If you had some sort of new process that spit off a whole bunch of selenium-79 it would cause the same thing.

MR. WIDMAYER: Okay, but that's not a current unanalyzed safety issue.

MEMBER ARMIJO: Yes, I was just saying the tables keep you out of an unanalyzed safety condition as long as you comply with the inventory.

MR. WIDMAYER: You have to do the technical analysis and come up with an inventory limit if needed.

MR. ESH: The tables only keep you out of if the waste stream is sufficiently similar to what was analyzed in the DEIS. If your waste stream is different than what was analyzed in the DEIS then the tables do not keep you out. That's what the issue is that we needed to solve.

MR. WIDMAYER: So Dr. Armijo, in the case of the Department of Energy, we gave you a couple of examples where their initial analyses they did, did not cover a specific radionuclide or a specific waste form, waste stream, whatever. They do a special analysis.

MEMBER ARMIJO: Yes.

MR. WIDMAYER: Okay, I guess it could work the same in commercial. I don't have an example.

MEMBER ARMIJO: I would expect if people had a new waste stream and they really wanted to handle it, they'd have to come back to their regulator and present a case.

MR. WIDMAYER: Yes, and like I said, I don't have an example of one, but the staff is trying to deal with this big unresolved safety issue that is laying in front of them.

MEMBER ARMIJO: Okay.

CHAIR RYAN: Any other questions or comments?

MEMBER ARMIJO: None for me.

CHAIR RYAN: Okay. I'd like to thank all of our participants in today's meeting. And David, I want to thank you especially for your time and engagement with the committee. It's been a real help to have you here and had a great dialogue. So thanks very much, I appreciate it.

MR. ESH: Sure. You're welcome.

CHAIR RYAN: With that, Mr. Chairman, I'll turn it back to the chairman.

MEMBER ARMIJO: It's you. You're it. This is your meeting. You're the big chairman.

CHAIR RYAN: We're adjourned.

(Whereupon, the foregoing matter went off the record at 2:43 p.m.)

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

U.S.NRC
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

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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[1] studies; NAPA[2] 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

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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 ccnstraint
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

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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

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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

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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^3 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”

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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

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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

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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

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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

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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

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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^3 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

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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.

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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^3 DU submitted in August 2013 With updated PA - Doses calculated to 100,000 and 1,000,000 years

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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

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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^3 per year from now on With added space used at the end for decommissionied 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

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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

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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[1] 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

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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

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Department of Energy

Speakers: Christine Gelles, DOE
Roger Seitz, Savannah River National Laboratory

Pictures and data indicating magnitude of UF_6 cylinder storage situation. Storage at Portsmouth and Paducah facilities
Also will receive newly-generated 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 U_3O_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

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BACKUP SLIDES

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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 1st Tier - TOC = 1000 years 2nd 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

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Discussions

“Mimimizing releases” is not implementable. Long-term analysis must have metric

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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

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Discussions

“Fine line” between regulatory certainty by putting clearer requirements in rule versus flexibility by putting implementation “guidelines” in guidance instead`

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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

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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

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Outline

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- 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

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- 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?

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- 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

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- 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

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- 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

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- 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

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- 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

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- 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

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- 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

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- 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

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- 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

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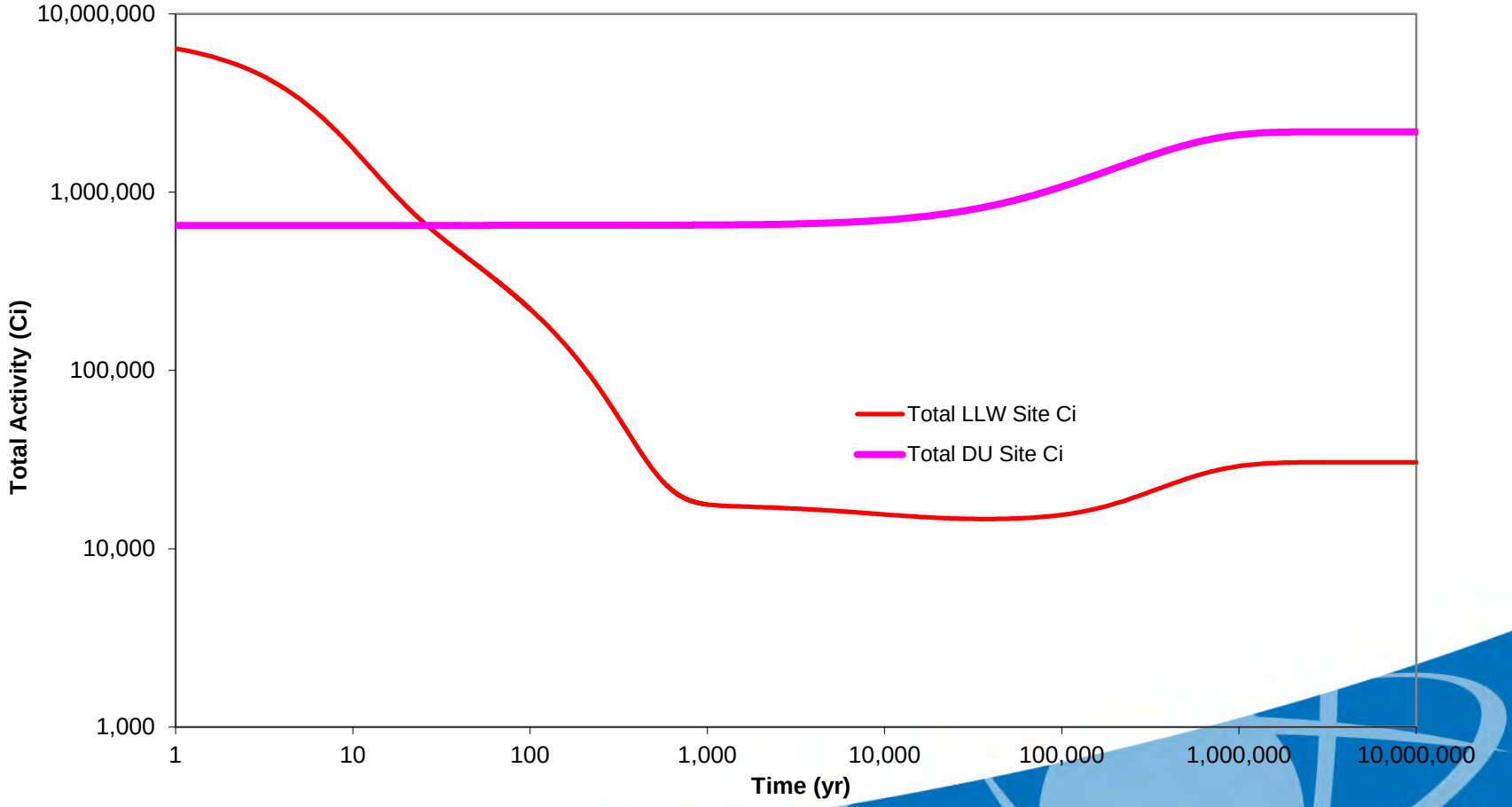

Problem Definition
Arrival Times

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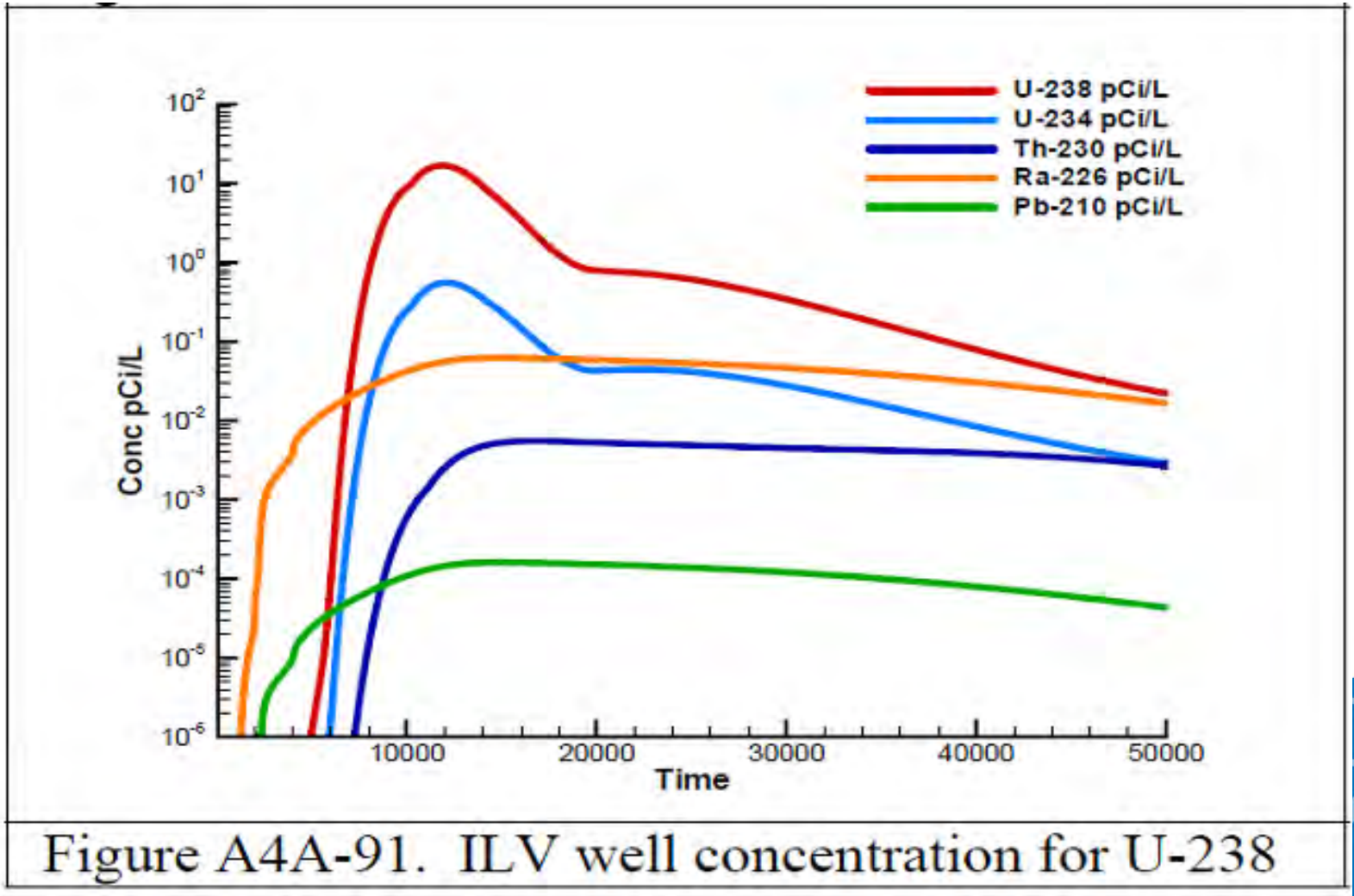

Figure A4A-91. ILV well concentration for U-238

Problem Definition
Previous Part 61 Analyses

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- DEIS (1981): 17 Ci U-238 & 3 Ci U-235 per million m^3 (~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

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- Current licensed sites
  - In Agreement States
  - Different environmental conditions
  - Different operational characteristics
  - Currently disposed uranium

Existing Considerations Previously Disposed U

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- Richland, WA

  4,400 MT U/ ~0.4 million m^3 waste

- Barnwell, SC

  14,000 MT U/ ~2.4 million m^3 waste

- Clive, UT

  52,000 MT U/ ~5 million m^3 waste

Existing Considerations Part 61

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- 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

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- 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

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- Risk-Informed/Performance-Based

AND/OR

- Prescriptive requirements

- Agreement States implementation

Rulemaking Framework Basic Structure

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- 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

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- 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

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- 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

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- 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

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NIRS/PC Contention

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The DEIS states that depleted uranium may be disposed of as Class A low-level waste. (DEIS at 2-27, 2-3 1). 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

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- 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

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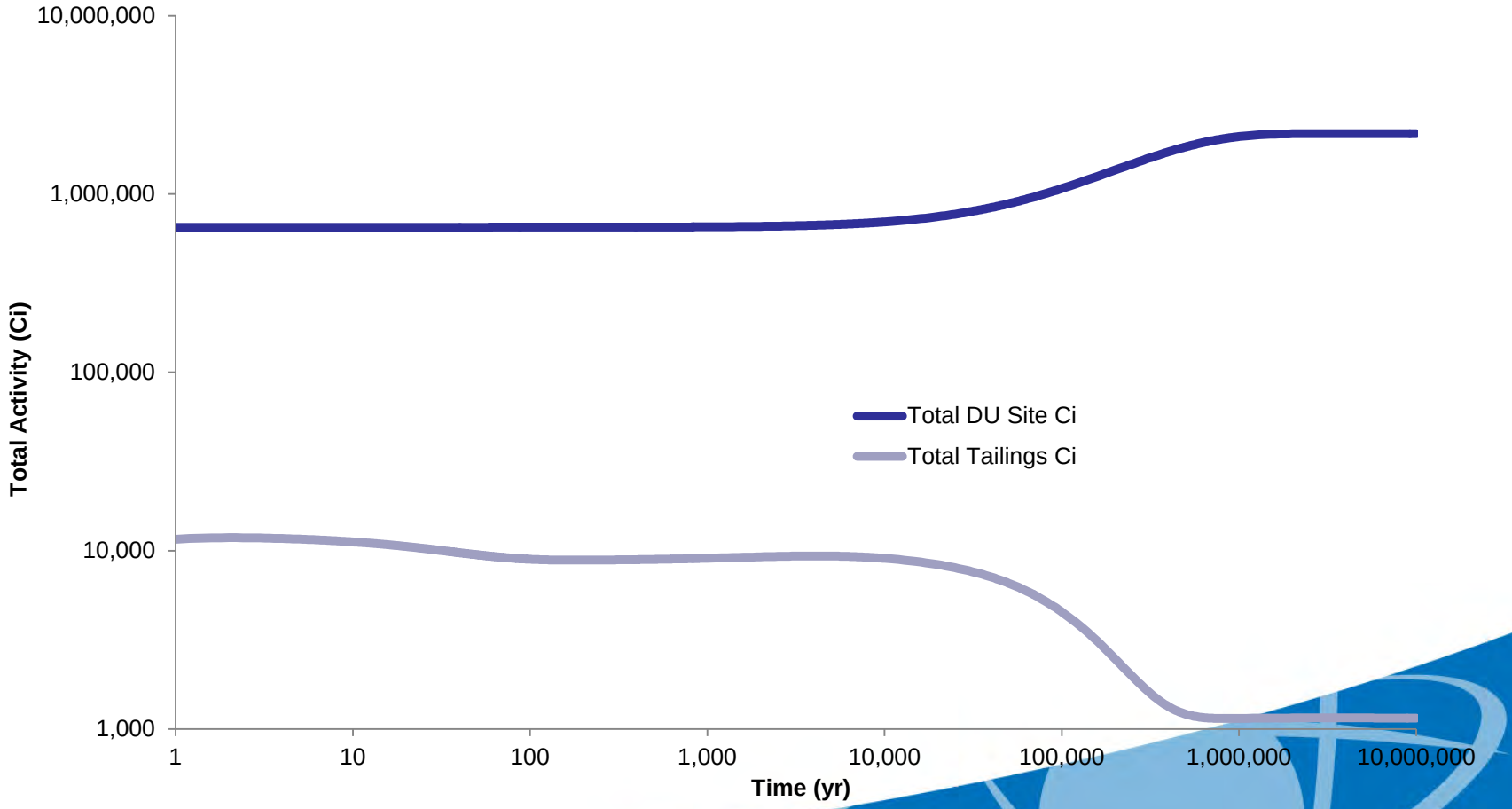

Progeny In-growth for Depleted Uranium

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