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NUCLEAR REGULATORY COMMISSION

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WORKSHOP 2 ON UNIQUE WASTE STREAMS --

DEPLETED URANIUM

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WEDNESDAY, SEPTEMBER 23, 2009

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SALT LAKE CITY, UTAH

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The workshop was held at Salt Lake City Marriott University Park, 480 Wakara Way, Salt Lake City, Utah, at 8:30 a.m., Chip Cameron, facilitator, presiding.

WORKSHOP PARTICIPANTS PRESENT:

CHIP CAMERON, Facilitator

MARTY LETOURNEAU

GREG KOMP

SUSAN JABLONSKI

DANE FINERFROCK

DREW THATCHER

CHRISTOPHER THOMAS

VANESSA PIERCE

BEATRICE BRAILSFORD

WORKSHOP PARTICIPANTS PRESENT (Continued):

STEVE COWNE
THOMAS E. MAGETTE
DAN SHRUM
SCOTT KIRK
DAVID C. KOCHER
PETER C. BURNS
STEVE NELSON
STEPHEN WEBB
CHRISTEPHER McKENNEY
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CHRISTOPHER GROSSMAN
PATRICE M. BUBAR
TISON AMEDEN CAMPBELL
LARRY W. CAMPER
DIRK DUNNING
KELLI A. MARKHAM
DUNCAN WHITE
ANDREW CARRERA

TABLE OF CONTENTS

P R O C E E D I N G S

(8:38 a.m.)

MR. CAMERON: My name is Chip Cameron, and I work for the Executive Director for Operations at the Nuclear Regulatory Commission, the NRC, and it's my pleasure to serve as your facilitator over the next two days.

This workshop is focused on the NRC rulemaking to establish site specific criteria for the disposal of deleted uranium and other unique waste streams, and before we get into the substance of the meeting, I'd just like to go over a few points of meeting process so that you know what to expect over the next two days.

First of all, I'd just like to talk about the format for the meeting. We're on a so-called round table format today as opposed to the town hall meeting, and the objective of a round table format is to promote a discussion, a dialogue, if you would, on the issues of concern, and at the table you'll see that we have representatives of affected and concerned interests. We also have several experts at the table with us, and the NRC not only wants to hear each of your individual perspectives on these issues, but also what your reaction is to the views of others around the table.

In other words, we want to try to have a discussion, and it's a modest attempt to try to develop a richer, a little bit different form of data for the NRC as they kick off this rulemaking on the site specific criteria.

And of course, the Federal Register notice on this particular effort in these meetings, you'll note that there is a public comment period also, written comments on these issues, and I believe that the deadline for comments is October 30th of this year.

In terms of the audience, the focus is going to be at the table, but we thank all of you for being here, and periodically I'm going to go out to the audience to see if you have any comments or questions on the topics that have been discussed, and tomorrow afternoon, at the end of tomorrow's round table, we're going to have an open mic session for anybody who wants to make a comment. We know that there's a lot of interest and concern about these particular issues here. So we thought we'd build that into the agenda.

The ground rules for the discussion are

very simple, and they're just aimed at helping us all to have a constructive and efficient discussion. First of all, you'll see these name tents, what we call name tents, in front of you. If you want to talk, comment, whatever, if you could just turn this name tent up on end and I'll know. I know Dane doesn't want to have his up. He doesn't want to do any talking, but if you do that, it will help us keep the discussion organized, and you won't have to worry about trying to jump into the conversation. I'll keep track of who has their name tents up.

And we will be trying to follow discussion threads. I may not take the tents in the order that they came up, but I won't lose track of you.

And I would ask that only one person speak at a time, most importantly, so that we can give our full attention to whomever has the floor, so to speak, at the moment, but also so that we can get a clean transcript. We have our stenographer, Mike Williamson, here, and he's taking a transcript, and that transcript will be available to all of you. It's the public's and NRC's record of what transpired here at the meeting.

And as usual, try to not use a lot of air time. Try to be brief, as practicable. I don't think we're going to have any problem in terms of time, but I would just add that, and try to be constructive. If you have a particular criticism of something, perhaps try to offer something to remedy that.

I'm going to be using the famous parking lot to capture issues that may come up in a discussion of a particular topic that aren't really relevant to that topic, may not even be on the agenda at all, but we'll keep track of those, and we'll either come back to discuss those at the appropriate part of the agenda, or else we'll just build time in to do that.

My role in all of this is just to help you keep focused and organized, to insure that the information that you share around the table, including information from the NRC staff, to make sure that that's clear; that assumptions are checked, and to make sure that everybody around the table gets a chance to speak if they want to.

I'm going to try not to get in your way, but I may ask clarifying questions. I may try to connect the dots so to speak on points that people have made.

And I want to do introductions around the table now and then do an agenda check with you. And I guess what I would ask you to do is not only tell us who you are, but a couple sentences, if you want, on what your expectations for either this meeting or this NRC rulemaking process are.

And the NRC is very grateful for all of you coming to this because this is going to be a great help to the NRC in fashioning this particular rulemaking.

I have to apologize for the mics in the sense that they don't stretch a whole lot. They do have a pretty good pickup, but we're going to get longer cables at lunchtime. In the meantime, I will just supplement you with this cordless mic. When I come out to the audience, I'll bring this mic out to whoever wants to talk.

And I think what we're going to do is let's start with Greg and with introductions. Greg.

MR. KOMP: Good morning. Greg Komp. I'm the Director of Radiation Safety for the Army. I'm here representing DoD, and we're here just to make sure there's a clear understanding of the type of waste streams that DoD generates in terms of DU.

MR. CAMERON: And I guess can everybody in the back hear us? Okay. I just want to make sure, but let's speak up as much as we can.

MR. KIRK: Hi. I'm Scott Kirk, and I'm

here today. I'm replacing Bill Dornsife. Bill couldn't be here today. So he asked for me to fill in, and I work out of our corporate office. I'm the Director of Licensing and Corporate Compliance, and I'm the Corporate Radiation Safety Officer.

We did receive a Part 61 like license from the TCEQ a few weeks ago, and what I'm here to do is to listen to what other people's concerns are because I think we have a real unique need.

MR. CAMERON: Great. Thanks, Scott, and Scott is a Waste Control Specialists. He didn't add that.

Marty, do you want to give us a try on the microphone? You have to press the button. A red light will come on.

MR. LETOURNEAU: Ah, there we go.

MR. CAMERON: You have to leave go of the button. I'm sorry I didn't add that. You have to not only press it --

MR. LETOURNEAU: I followed the directions.

MR. CAMERON: -- but you have to leave go. Okay.

MR. LETOURNEAU: Hi. I'm Marty Letourneau. I'm with the U.S. Department of Energy.

I work in the Environmental Management Program, and specifically within the Office of Compliance. I'm one of our radioactive waste management subject matter experts, and I am here to represent the Department of Energy and participate and answer questions as much as I can.

MR. MAGETTE: I'm Tom Magette. I'm Senior Vice President for Nuclear Regulatory Strategy with Energy Solutions. My expectations today are much like they were in Maryland, but I think we had a very productive discussion there and discussed some of the key issues in terms of what should be in the rule versus what should be in guidance, which I think is one of the most important matters that we have to address, and that's something I'd like to see us revisit again today.

MR. CAMERON: Thank you, Tom, and that is an over arching issue here, and I thank Tom for mentioning it.

Besides views on the issues, do you think on that particular issue that it should be in the rule, captured in the text of the rule, or should it be in the guidance that accompanies the rule?

Go ahead.

MR. SHRUM: Dan Shrum also with Energy

Solutions. I am in charge of the licensing specifically at our Clive facility, and I'm here to listen and to participate and to better understand what the criteria will be to do updated performance assessment for our facility and also to hear some of the concerns that will be expressed today.

MR. THATCHER: Drew Thatcher with the Washington Department of Health. I'm a health physicist. I, in conjunct with Art Rood, the two of us performed the pathway analysis for the waste facility in the State of Washington.

I'm here actually -- Tom's comment was very appropriate. I agree with that, and I also want to make sure that I have specific concerns that I'd like to see addressed in the next two days. So if no one brings them up, I will.

MR. CAMERON: Great. Thanks, Drew.

MR. COWNE: My name is Steve Cowne. I am the Director of Quality and Regulatory Affairs for Louisiana Energy Services. For those who don't know, LES, or Louisiana Energy Services, is building a gas centrifuge enrichment plant in New Mexico. We will take uranium hexafluoride and natural assays and enrich it up for nuclear fuel for nuclear power plants. One of our byproducts obviously from that is depleted uranium hexafluoride.

I'm here today to represent LES to try to understand the need for rulemaking and to be a voice of the enrichment industry.

MR. CAMERON: Okay. Thank you. Thank you, Steve.

And let's go to Steve Nelson.

MR. STEVE NELSON: I'm with Steve Nelson -- I am Steve Nelson. I'm with myself. I'm on the faculty at Brigham Young University. I want to make clear, however, that I do not speak for the institution nor its sponsor.

I am a refugee from the Yucca Mountain project. I have spent ten years as a member, chair, and vice chair of the Utah Radiation Control Board. I am a geologist and specifically isotope geochemist. I have conducted research in the Bonnevil Basin, and my expectation is to convince everyone here that the notion of disposing of depleted uranium in a shallow engineered landfill is absurd on its face.

MR. CAMERON: Okay. Thank you, Steve, and I know there's huge refugee camps for Yucca Mountain.

Vanessa.

MS. PIERCE: My name is Vanessa Pierce. I'm the Executive Director of the Healthy Environment

Alliance of Utah, or HEAL Utah. We work to engage the citizens in the process of protecting public health from nuclear and toxic waste.

And I guess my expectation for today is that we provide some input about the performance assessment and expectations for that so that we can insure that the longevity of the waste stream will be matched by the performance of the repository that's going to be designed to hold the waste, and that it will be protective of public health.

MR. CAMERON: Great, and Beatrice, let's see how that picks you up.

MS. BRAILSFORD: My name is Beatrice Brailsford. I'm with the Snake River Alliance, which is Idaho's grassroots nuclear watchdog and advocate for clean energy.

I'm here because, as probably most of you know, AREVA is proposing to build a uranium enrichment plant in Idaho. We're obviously very concerned about the effects of that plant. One of the key effects will be its waste stream, and just as we're concerned about what happens to people in Idaho from the enrichment process itself, we're concerned about what happens to people who live near potential disposal sites.

What we are very concerned about is I know many of you here know that the waste disposal at Idaho National Laboratory was conducted in a fairly ad hoc fashion, and frankly, particularly after seeing the waste, the Radiation Control Board meeting yesterday, we are concerned that waste disposal will continue to be conducted in a fairly ad hoc fashion.

MR. CAMERON: Thank you, Beatrice.

Chris.

MR. THOMAS: Yes. My name is Christopher Thomas. I'm the Policy Director for HEAL Utah. I've been working on depleted uranium issues for a couple of years, and Mr. Larry Camper attributed us to something in 2000. We've not been working on it that long, but have been working on it for quite a while.

And also I just wanted to say, you know, after attending the Radiation Control Board hearing last night, and many of you were not there, but some of you were, I have to just say that I do have concerns that NRC is potentially not conducting this rulemaking in a really open fashion, in as open fashion as I would like to see. I think some of the comments last night made to the Radiation Control Board were fairly provocative and led them to certain conclusions that I don't think were necessarily the case.

So what I would like to see out of this workshop is really sort of restoring that idea that NRC has not come to sort of predetermined conclusions about this, is very open to legitimate scientific and technical arguments, and that's what I'd like to see.

Thank you.

MR. CAMERON: Great. Thank you. Thank you very much for that, Chris, and that's very important, a very important topic, a very important issue for the NRC to demonstrate throughout this process, including today.

Peter.

MR. BURNS: Good morning. My name is Peter Burns. I'm a Professor of Civil Engineering in geological sciences and also of chemistry and biochemistry at the University of Notre Dame. I'm an expert in actinides and actinide geochemistry, specifically and mostly uranium and its transport in the environment.

I also direct a Center on Energy Frontiers, Research Center on Materials Sciences of Actinides at Notre Dame and several other institutions, and that center focuses on, in part, waste forms for actinides.

So my purpose here is to bring some expertise in these areas and, of course, being a professor, I'm anxious to learn from this proceeding and for other people's views and carry some of that back to my students.

MR. KOCHER: Hi. My name is David Kocher. I'm a health physicist by profession. I work for a small consulting firm in Oak Ridge, Tennessee called SENES Oak Ridge.

I don't have a dog in this particular hunt, but for 15 years or so while working at Oak Ridge National Lab, I was involved in performance assessments at Department of Energy low level waste sites, particularly in Oak Ridge and Savannah River. I was sort of the environmental pathways intruder scenario representative on these performance assessment teams. I guess I had some influence in developing DOE policies for how intrusion analyses would be done and the kind of criteria that would be used and the role of site specificity versus generic prescriptions. Those kinds of over arching policy issues I guess I had some say in.

I don't come here with a predisposed position about how depleted uranium and other things like that should be disposed of. What I'm interested in trying to contribute to as best I can is that whatever approach that the NRC comes up with has a fairly firm technical basis and that everybody understands kind of what the rules of the game are that we're playing by.

MR. CAMERON: Thank you very much.

Steve.

MR. WEBB: Yes. My name is Stephen Webb from Sandia National Labs. What I am expert in, gas transport and porous media. What I've worked on a number of waste repositories, with also Yucca Mountain.

MR. CAMERON: Thank you, Steve.

Dane.

MR. FINERFROCK: I'm Dane Finerfrock. I'm the Director of the Utah Division of Radiation Control. We're part of the Department of Environmental Quality.

The Division of Radiation Control has the responsibility for regulating Energy Solutions. We are also going to be the recipients of any performance assessment they may do associated with the disposal of depleted uranium.

My expectations, and I'm speaking for many of many staff who are here as well today, we want to learn as much as we can because the decisions we make are very important to the welfare of Utah and its citizens.

MR. CAMERON: Thank you, Dane.

And Chris.

MR. McKENNEY: Hi. I'm Chris McKenney. I'm the Branch Chief in charge of the Performance Assessment Branch at the Division of Waste Management, Environmental Protection, at NRC.

I have been doing performance assessment in low level waste since 1991, mostly in the area of my training, which is environmental transport and health physics, and scenario development has been my area of most use.

My intentions are I want to get as many issues out on the table and discussed so that we can have the best ability to try to address all of those issues as part of the technical basis development and so that the draft rule is closer to what is a good rule than something that is throw another rock out there and have to do it again. I'd rather deal with issues now than have to revisit them and revisit them.

MR. CAMERON: Thank you.

David.

MR. ESH: Hi. I'm David Esh. I'm a

senior systems performance analyst in the Division of Waste Management and Environmental Protection, and you'll be hearing a lot from me today especially.

I've worked in performance assessment for about 15 years on a variety of different projects, complex decommissioning sites, low level waste, incidental waste sites, and Yucca Mountain, the high level waste repository.

The objectives for me for this workshop are to get input on a diversity of views that we can reflect in the rulemaking and guidance development process. We particularly want to hear what people want to think should be in rulemaking, what should be in guidance. We're going to cover what we thought we had identified in our screening analysis as some of the main issues for this process, but would also like to hear about things that people feel should be on the list that weren't on the list. We'd also like to hear things that are on the list that people don't think should be on the list.

But the bottom line is, as Chris has mentioned, we want to develop a rulemaking and associated technical basis document and guidance document that is clear, people understand, maybe not necessarily that everyone agrees with all of the content because we definitely have some diverging views on some of these topics, but at least you deserve to understand what's there and why it's there.

MR. CAMERON: Thank you, and Chris.

MR. GROSSMAN: My name is Chris Grossman. I'm a performance analyst in the Division of Waste Management and Environmental Protection. I work with Chris and Dave.

My expectation or I guess I'll give a little bit more on my background. I'm a performance analyst, and I've been working on risk assessments for approximately eight years. Largely my work was concentrated in high level waste on the Yucca Mountain project before moving over to low level waste issues the last couple of years.

My expectation for this meeting is the Commission directed the staff to do a limited rulemaking on the disposal of unique waste streams, including depleted uranium, and the limited rulemaking sounds like it might be a fairly easy task, but when you look at the issues, it's a lot more complex than it may seem, and so I know the staff has worked very hard to assemble a diverse group of participants in this panel so that we make sure we can collect nice, divergent views, and make sure that we can grasp a lot of the issues that are out there.

Because, as my wife likes to remind me, you don't know everything and you can't know everything, and so I want to make sure that we capture those views here today.

And I'd also like to echo what Dave said. For us it's important to know what would be appropriate for the regulation, as well as what would be more appropriate to put into guidance that would be associated with the rule.

MR. CAMERON: Great. Thank you all.

You're going to be meeting several other NRC staff along the way during the next two days as they speak on various topics. We have not only members of the NRC technical staff here. We also have representatives of our legal staff and our public affairs staff with us.

And in that regard, if there are any media here who need some orientation, Dave McIntyre is our public affairs representative back there. If you could just talk to Dave about that.

And I would encourage a lot of the useful sharing of information as not just around the table, but at breaks and lunch. So I would encourage you to talk with each other, of course, and with the NRC staff.

I just want to spend a couple of minutes and just give you a quick agenda overview, see if there's any questions on that, and then we can get started.

Before I get into the agenda, I just wanted to make an observation about this second round table that we're having. All of you know that we've already had one round table in Bethesda, Maryland on these issues, and I just wanted to emphasize that do not feel limited in any way by the previous discussion. Each group has its own chemistry. Each individual has their unique perspectives, and also their unique way of expressing them so that we can all learn anew from that.

But with that said, I would note that there were two issues. What is a significant quantity of depleted uranium and unique waste streams that were discussed, and we will be discussing those here. They were discussed at the Bethesda meeting, and those were two topics on which there was general agreement. I always hesitate to say that, to characterize that, but I think I can.

On those two issues there was general agreement on the approach that should be taken, and I would just ask when we get there if perhaps one of the participants who was at the Bethesda meeting could just sort of perhaps summarize that, what was the discussion on those particular issues, the conclusion, and we'll see whether all of you feel the same way, and perhaps we can move those through those topics very quickly and have more time for other topics.

Dane used the word "learning," and that's how we're going to start the day today, by providing you some information and context on what the NRC is doing, and this is not only to aid you in the development of the discussion over the next two days, but also to inform your written comments if you choose to submit those.

We're going to start with Larry Camper, who is the Director of the Division of Waste Management and Environmental Protection, and Larry is going to give you an overview.

We're then going to go to Andrew Carrera, who is with our rulemaking staff. He's going to talk about the rulemaking process.

And then we have Dave Esh, who is going to talk about the technical basis that was developed to aid the staff and the Commission in decision making on this particular subject.

After each of those presentations, we're going to go to you for any clarifying questions you might have. We won't be jumping into discussion or problem solving on them because we're going to have specific discussion issues on those, but if a question raises an issue, I'll keep track of that in the parking lot.

Dave's presentation is lengthy. So we're going to break that into basically three parts and go to you for questions on those, and I would just ask if each speaker could get through his presentation or her presentation before we go to questions.

And the rest of the agenda discussion topics, you can see them laid out, time period, significant quantities, time period of performance; they're all there. The famous compatibility discussion tomorrow, and at the end of the day tomorrow we will be having the open mic that I mentioned for people who want to make comments.

Lunchtime, the hotel is setting up a buffet. Okay? I think it's $10.95 if you want to do that. I think that there are some restaurants within walking distance, and the NRC staff can tell us more about that.

And tomorrow they are doing a grill out in the back alley out there on the lawn, whatever that is called. So that will be the buffet lunch tomorrow.

And with that, any questions on agenda before we get to Larry?

(No response.)

MR. CAMERON: Okay. Larry Camper.

MR. CAMPER: Good morning, everyone.

Thank you, Chip.

Let me start off by thanking all of you for being here. We appreciate your interest. I especially want to thank the panelists in advance. Some of you were in our meeting in Maryland a few weeks ago, and I appreciate you showing up again and participating. There was a lot of very valuable discussion that took place in Maryland. I think there will be a lot of very valuable discussion here today, of course, and tomorrow.

The panel has been constructed in such a fashion that there is a diversity of views. We want that. That's very important. This is a very complex subject. It's a very complicated subject, and in some cases for some people it's even an emotional subject. That's okay. We're here to talk about it. We've been given an assignment by our Commission to proceed with the particular rulemaking. We'll talk about that at great length, and so all of your views are greatly welcomed and greatly appreciated.

I'm going to read some remarks that have been prepared for me by my staff. I don't normally like to read a presentation. I generally find that something I don't like to do. I like to say I never give the same presentation twice even if I do it back to back, but the important thing is there's a lot of background information, and it's important that everyone hear the same thing. It's important that our panelists have the benefit of the same information that is conveyed to the panelists in Washington.

So I beg your indulgence for doing that and for the panelists who suffer through it one time already I especially beg your indulgence.

This is the second of two public workshops NRC will be hosting to solicit early input on the proposed rulemaking for unique waste streams. We are here today because we want to gather information on key technical issues associated with the disposal of significant quantities of unique waste streams and in particular depleted uranium or DU. We want to focus on DU for a good portion of the workshop, but we also want to think about other potential waste streams that could be considered unique and that could be included in this proposed rulemaking. So our scope is, indeed, broader than only depleted uranium.

We're really looking forward to the collaborative discussion from all of you. We are here to listen seriously to your thoughts and concerns both on technical issues as well as policy issues. We want to make sure everyone understands the steps involved in the rulemaking process and see areas where the public has opportunities for providing input.

This is a complicated issue. Now, we understand there will be a lot of different viewpoints to share, and we are open to hearing all of them.

In terms of background, we had developed the term "unique waste stream" for significant quantities of DU because it is different than typical low level waste, LLW. Foremost, it is a new waste stream in the sense that there were no commercial entities generating significant quantities of it when our current regulations in Part 61 were put in place. DOE was the only entity operating in enrichment facilities in the United States at that time. As a result, only small quantities of DU were considered in the environmental documents associated with the regulation.

DU is also unique because it behaves

differently than typical low level waste. The hazard from most commercial LLW decreases over time in contrast to DU where not only does the hazard increase; it persists for much longer time frame due to the ingrowth of long-lived daughter products.

However, the impacts from the disposal of significant quantities of DU can be mitigated, for example, by increasing burial depth through the use or the use of robust radon barriers whose performance can be demonstrated over a long time frame.

In terms of continuing background, currently Section 61.55(a)(6) determines any radionuclide not on the classification tables to be Class A by default. The statement was an attempt at the time the regulation was promulgated to capture any waste streams that had not been included in Part 61 in the final form.

It was envisioned that these other waste streams would not be of significant quantity or concentration to warrant a limit in the tables.

Approximately six metric tons of DU were soon to be Class A waste in that draft environmental impact statement with a concentration of .05 microcuries per cubic centimeter as the basis for their determination.

This draft concentration limit was not adopted in the final environmental impact statement based on the Part 61 FEIS conclusion that "types of uranium bearing waste being typically disposed of by NRC licensees do not present a sufficient hazard to warrant limitation on the concentration of this naturally occurring material."

However, the specific activity of depleted uranium is 0.5 microcuries per cubic centimeter, and now the landscape for waste stream generation is changing. So clearly, the NRC is entering new territory, remarkably different than that which was envisioned when Part 61 was put in place.

In terms of the current situation, commercial facilities generating large quantities of DU and the DO/DOE is planning to dispose of large quantities of DU at sites regulated by NRC agreement states, including the State of Utah. Commercial facilities have the option of transferring their DU to the DOE under Section 3113 of the 1996 USEC Privatization Act or they can pursue commercial de-conversion disposal options.

There are no licensed commercial de-conversion facilities built at this time. The NRC would license such plants should that be the case.

LES, or Louisiana Energy Service, is expected to start limited operations in the spring of 2010. GE Hitachi has filed an environmental report in a license application that are currently under review by the NRC, and the Global Laser Enrichment Facility in Wilmington, North Carolina also is in the midst of preparing an application, and we are reviewing.

AREVA has filed a license application, including its environmental report for the Eagle Rock Enrichment Facility in Booneville County, Idaho, which has also been accepted for NRC review.

DOE has 700,000 metric tons of DUF-6 it has been storing safely on site for decades at its Paducah and Portsmouth gaseous diffusion plants. It is currently building deconversion facilities at these sites to convert the DUF-6 to DU-308 for disposal at a commercial disposal site.

So the cylinder that you see in the picture will be deconverted into an oxide powder. DOE has said that it will need to begin disposal of shipments from the DUF-6 facilities in mid-2010.

More than one million metric tons of depleted uranium will need to be disposed of over the next several years.

Next slide.

Commission direction. The Commission realized the uranium enrichment landscape was drastically changing. So when doing the hearings for the LES facility, intervenors filed contentions regarding the impact from DU disposal. The Commission directed the staff to evaluate these impacts separate from the hearing process.

The Commission stressed in their order to the NRC staff to consider the quantities of DU at issue and noted that these large quantities were outside of the bounds of the evaluation which was conducted as part of the environmental impact statement for the 1980 Part 61 rulemaking.

In the final analysis, the staff's response to the Commission direction was yes. The staff did recommend that Section A-6 of Part 61.55 be modified through a rulemaking to specify a requirement for site specific analysis for significant quantities of DU and the technical requirements for such an analysis also be part of that rulemaking.

The Commission accepted this recommendation in their staff requirements memorandum and further directed the staff in a future budget request to propose the necessary resources for a comprehensive revision to risk inform the 10 CFR Part

61 waste classification framework.

In terms of the Commission paper that the staff prepared in response to the Commission direction in the SRM, I just cite it.

In answering the Commission direction, the staff completed a Commission paper that presented a range of regulatory options that were informed by technical analysis. You're going to hear a lot of detail about that technical analysis during Dr. Esh's talk, since he was the lead for that staff analysis. I'll just describe it briefly as a screening model we use to evaluate the radiological risk and uncertainties associated with the near surface disposal of large quantities of DU at a generic low level waste disposal site that had a broad range of site specific conditions.

So we looked at a range of characteristics of disposal sites rather than looking at one particular disposal site.

In terms of the options that the staff evaluated, the first option we evaluated was the staff would issue a generic communication, for example, a regulatory information summary, which is like a guidance document that would clarify that for disposal of large quantities of DU, compliance with existing performance objectives needs to be demonstrated and the classification under 61.55(a)(6) should not be relied upon solely for this purpose.

The second option was to conduct a rulemaking to require the disposal facility licensee to perform a site specific analysis demonstrating that the unique waste stream, including large quantities of DU, can be disposed of at a site in conformance with the performance objectives of Part 61.

The third option was to develop a generic waste classification, for example, A, B or C, for DU and associated concentration limit to be added to the waste classification tables. Staff would begin with the existing technical analysis, which was consistent with the part 61 methodology, but updated to include recent advances in modeling and performance of substantive techniques.

The last option was to evaluate the entire basis for the waste classification framework and update it for all radionuclides, not just DU. The staff recommended, and the Commission agreed, to pursue a rulemaking to specify site specific analysis to be performed prior to disposal of significant quantities of DU and to specify the technical requirements to be included in the analysis for that performance assessment.

In terms of the path forward, the Commission chose to combine two options into a thorough approach to address both immediate changes needed to NRC regulations and to address issues with the existing waste classification framework overall. The Commission agreed with the staff's recommendation to conduct a rulemaking to require a site specific performance assessment prior to the disposal of significant quantities of DU, to identify the technical parameters that need to be evaluated and to develop guidance that would be provided to the agreement state regulators and their licensees or applicants.

The Commission further directed the staff in a future budget request to propose the necessary resources for a comprehensive revision to risk inform 10 CFR Part 61 waste classification framework. The staff assumes this direction means to go beyond the budgeting process and has proceeded with plans to use FY '11 budget resources to begin the rulemaking process in Fiscal Year '11.

The initial rulemaking, which is the subject of this two-day public meeting. The rulemaking will require the disposal facility licensees to perform a site specific analysis demonstrating that the unique waste stream, including significant quantities of DU can be disposed of at the site in conformance with the performance objectives set forth in Part 61.

The analysis will be reviewed and approved by the agreement state since the likely disposal facilities are located in agreement states. The rulemaking is designed to be comprehensive in that it addresses unique waste streams, including significant quantities of DU.

We would define unique waste streams and significant quantities in the rule language. These are topics which we want to discuss with you here today, and as Chip pointed out in his remarks, during the last meeting a couple of weeks ago in Maryland, the panel gave the staff some very significant and rather clear impressions about those two particular topics, and we hope that the panel today will also weigh in as effectively.

This option creates a legally binding requirement to do a site specific analysis. Specifying the technical parameters for the site specific analysis in the rule language will provide uniformity in the technical approach used by the agreement states and their disposal facility licensees and allow more alignment amongst the disposal sites.

The NRC will also publish regulatory guidance implementation to help insure more uniformity and to assist with implementation of the rule.

Now, the role of the performance assessment. You're going to hear an awful lot today about the performance assessment. The backbone of a site specific analysis of this initial rulemaking will be the requirement of a performance assessment. The performance assessment is meant to be a living tool for both the site regulator and the operator to be able to assess future compliance of the disposal facility with the performance objective set forth in 61.41 through 61.44 or the agreement state equivalent, the performance objectives.

During the licensing of a disposal site, assumptions must be made based on expected waste volumes and streams of a possible final inventory of a site or of a specific disposal unit within that site. As operations occur, these assumptions should be updated on a periodic basis with actual waste volumes and any revised information of future waste that is to be received.

The results of the performance assessment can then be used to evaluate whether reasonable assurance still remains at the disposal unit or the site as a whole will remain in compliance with the performance objectives set forth in Part 61. If the result of the performance assessment is that compliance is uncertain or unlikely, additional data collection and modeling may be performed. The facility could be modified or future waste volumes or specific radionuclide quantities or concentrations could be reduced. The decisions on what actions to take should involve both the site operator as well as the affected regulator.

This slide has a lot of information on it. It's kind of noisy. I apologize for that, but what we'd like to do is show you just briefly who will be conducting the review of these site specific performance assessments. The slide shows the location of the three operating disposal sites and the one that's been proposed in west Texas. These are in South Carolina, Utah, and Washington State and to be Texas.

On the right is a table that identifies the facilities, the waste it is authorized to accept, and the compact restrictions that apply to that particular facility. Texas is developing a new site, but it is restricted to waste that comes from Texas and the State of Vermont.

Of particular note is that the Clive, Utah site accepts Class A waste for most of the United States, but the Barnwell site accepts the majority of the Class BC waste in the United States, is closed to out of compact generators, which affects 36 states.

These are the most likely disposal paths for commercial DU waste. For the moment, I would note that three of the sites are in arid environments, and that only one of them is in a humid environment, and this is an issue of considerable consideration as the staff was developing its technical analysis, and Dr. Esh will talk more about that during his presentation.

In terms of Phase 2 or the long-term rulemaking, recalling that the Commission gave the staff a two-part direction, the second part of this rulemaking effort is what we are calling the longer term rulemaking. Specifically the Commission directed the staff to prepare the necessary resources for a comprehensive revision to risk inform the 10 CFR waste classification framework using updated assumptions and referencing the latest International Committee on Radiation Protection, ICRP, methodology.

This revision would likely involve different updated methodologies and assumptions than the original Part 61 methodology for key variables, such as disposal configurations, performance periods, institutional control periods, waste forms, site conditions, exposure pathways, and receptor scenarios. This effort would address all radionuclides, not just DU, and would explicitly address the waste classification for DU.

Other considerations. Thus far I have covered the history of how we got to where we are and the purpose for why we are here, but we recognize that there are other concerns on your minds, and we have reserved some time on the agenda tomorrow to discuss those. We've set aside a specific time frame to do that.

The few issues shown on this slide are just some of the notable issues that we've been thinking about, but there may be others. We know these are important issues, and we want to hear your concerns and invest the time down into the agenda.

For example, previously disposed volumes of DU should be addressed through the site's specific performance assessment as we have been discussing; the PA as a living tool designed to insure compliance with the performance objective.

The second topic is something we have also been discussing with the agreement state regulators, and they are in agreement with us on the following point. If a site wishes to dispose of a significant amount of depleted uranium before the initial rulemaking is completed, it would be prudent for the site operator and the state regulator to review the existing performance assessment supporting the site and determine whether the issues that were raised in the technical analysis performed by the staff and presented to the Commission and were considered as part of the Commission's decision have been adequately addressed within the existing performance assessment.

If not, it would be prudent for the performance assessment to be revised, to adequately address these issues on a site specific basis before disposal of significant quantities of concentrated depleted uranium take place.

I'm aware from discussion with Dane Finerfrock of the State of Utah that the performance assessment for the Clive site is, in fact, going to be updated. The operator, Energy Solutions, has initiated that process. Dane discussed a time frame yesterday during the Board meeting for when that performance assessment updating would be completed and reviewed.

Finally, when we reexamine the waste classification framework, we will need to think about any consequences for DU that has been previously disposed of under the initial rulemaking.

In terms of the agenda, first we will start off with the technical aspects of the site specific analysis for DU, and then we will broaden the topic to think about other unique waste streams that this rulemaking might apply to.

Then we will discuss how the agreement states would implement the NRC change in regulations and what NRC recommends states do in the interim before both NRC's rulemakings are final and before the agreement states have adopted changes in their respective regulations.

Next we will discuss the long-term rulemaking and what potential changes could be made to the classification of depleted uranium or other radionuclides, and finally we will conclude with some time to discuss any questions people may have that are not directly related to the Commission direction thus far but are still important to discuss at this workshop.

So at that point, that concludes my formal remarks. Again, I thank you for bearing with me as I read through all of that, but again, it is important that everyone hear the same thing in both public meetings. There's a lot of background. It is a complicated topic. So thanks for your indulgence.

With that, Chip, any clarifying questions?

MR. CAMERON: Thanks, Larry.

Before we go to you for questions, Susan Jablonski of the State of Texas has joined us, and I'll just ask her to just briefly introduce herself to us, and then we'll go on for questions.

Welcome, Susan.

MS. JABLONSKI: As Chip said, my name is Susan Jablonski, and I'm representing the Texas Commission on Environmental Quality, and we have regulatory authority in Texas over the disposal activity.

MR. CAMERON: Great. Thank you.

Are there questions for Larry about his presentation? Let's go to David, and then we'll go to Christopher.

David.

MR. KOCHER: I have a fairly basic question about something that I must confess confusion about. You talk about an initial rulemaking that would require a site specific analysis, and I ask: site specific analysis with respect to what? Because surely any site is already required to do a site specific analysis with regard to the requirement for protecting the public from releases to the environment.

So is what we're really talking about here a site specific analysis with respect to the intruder protection requirement or am I completely misled about this?

MR. CAMPER: No, you're not. It's a great question. When the staff was looking at the assignment given to us by the Commission, we realized that in 61.12 and 61.13 there is language that talks about technical parameters to be evaluated and the need for a technical analysis. The term "performance assessment" is not used, but "technical analysis" was used.

You are completely correct that any of the existing commercial low level waste facilities today have, in fact, completed a technical analysis that considers all of the radionuclides that are to be disposed of at that site of the operation of that site, the volumes, the Curie content, et cetera.

And in our discussions, we asked ourselves, frankly, maybe isn't that enough. Would it be sufficient just to clarify that?

And the first option that I talked about where we would put out an informational type of thing, we actually pondered that. However, as I pointed out in my remarks, clearly, the quantities of depleted uranium that are now going to need to be disposed of were not envisioned in any way, shape or form at the time that 61.12 and 61.13 were created.

If you couple that with language that the Commission espoused in one of its orders during the adjudicatory process for LES in which the Commission stated in essence it would expect the agreement states or the Department of Energy to conduct a site specific performance assessment, in the final analysis the staff thought it was important to require a site specific performance assessment for significant quantities of depleted uranium and be explicitly clear that that was the expectation and not rely upon the language that already exists from 61.12 and 61.13, because the conditions are markedly different today than in 1980.

MR. KOCHER: So with respect to this 61.41 performance objective for the public, you're basically wanting to have stronger language about reopening your performance assessment to account for this new waste?

But what might be really new is a site specific performance assessment with respect to protecting intruders.

MR. KOCHER: That's an interesting point. The performance objectives of 61.41 through 44, including protection of the public, cannot change, but the Commission was very clear during the adjudicatory process, and it said the bottom line is the performance objectives have to be met.

That would be the driving goal, of course, of the performance assessment, to insure that those performance objectives are met.

Now, this question of intruder analysis is an interesting question because when the evaluation took place years ago and the waste classification scheme was created, the intruder analysis was the driver. Five hundred millirem was the dose, but that's not specified in the regulation. Perhaps as we proceed through this rulemaking we may get feedback that leads the staff to believe that in addition to requiring the site specific performance assessment, perhaps more should be done to clarify those performance objectives, particularly on the question of the intruder analysis.

Because it was the driving force behind the classification scheme, but those are great questions. Thank you.

MR. CAMERON: Okay, and, Dave Esh, will you be talking a little bit more about this in your presentation?

MR. ESH: Yes, I will.

MR. CAMERON: Okay. Then we'll get more into that. Thank you, David.

Christopher.

MR. THOMAS: Yes, thank you.

And, David, I really appreciated you comment because my thoughts were along the same lines. Because the performance assessment or the technical analysis that I've seen so far for the Energy Solutions Facility, for example, looks at a time frame of 500 years, and as you know, that can radically change the outcomes of the analysis.

For instance, you don't yet have a significant hazard from radon at that time period. The other thing is it does not actually consider an on-site intruder scenario. That was ruled out of the analysis. So I do think that's an area for fruitful discussion.

Along those lines, Larry, I just wanted to go back to something you said, which was, you know, you know -- I just wanted to clarify. There was a suggestion that the agreement states go back and revisit the existing performance analyses now, before acceptance of significant quantities of depleted uranium, and I guess my concern is that we know there are significant quantities of depleted uranium coming to Utah, and yet we know that this new performance analysis that Energy Solutions is going to conduct won't be done, I think, until 2010, and then it will take some time for the state to review. And I think our Executive Secretary said about a year.

So I just wanted to clarify. Was that a recommendation on the part of NRC that the existing performance analysis be updated? Why is it not a requirement that those be updated prior to acceptance of significant quantities of depleted uranium?

MR. KOCHER: It's a recommendation. We recognize -- first, the Commission has directed the staff to proceed with a rulemaking that would require a site specific performance assessment. A rulemaking takes time. This rulemaking will take about three years.

So in three years, assuming this

rulemaking proceeds as we envision at the moment, the Commission would have clearly articulated in its regulations, and it would be an item of compatibility for the agreement states, that such a site specific performance assessment would be done; that the technical parameters identified would be evaluated at all sites; and we would develop guidance.

But it takes time. So what we have done is make a recommendation that we talk to the agreement states about this before these public meetings. They were in total agreement that it would be prudent to revisit the existing PAs, especially if you are receiving or expect to receive more depleted uranium, but it's a recommendation.

MR. CAMERON: And, Chris, we not only want to hear from Larry on this, but also want to hear from the States of Texas, Washington, and of course Utah on this, and when we get to the so-called "other considerations" part of the agenda tomorrow, we'll have an extensive discussion of this issue.

If it keeps coming up during our discussion of other issues, we may just want to jump into it then, but we will have a specific thorough discussion on this particular issue.

MR. CAMPER: And, Chip, I would add and,

Chris, I would add one more comment, too. We are considering after we complete these two workshops should we put out more guidance on this question. I mean, we have taken the position that it would be prudent for the obvious reasons. We've communicated with the agreement states. They agree, but we're also asking ourselves should we do more in guidance space soon on that topic. So that's under consideration by the staff as well.

MR. CAMERON: So, Larry, can we put that in the parking lot, that particular issue, for discussion tomorrow?

MR. CAMPER: Sure, of course.

MR. CAMERON: Okay. The need for more NRC guidance sooner than the rule.

MR. CAMPER: Sure, of course.

MR. CAMERON: MR. KOCHER: Okay. Great.

And, Stephen, let me give you this. Stephen Webb.

MR. WEBB: I have a couple of issues. One, I think more for the parking lot, but they aren't covered here. At the Maryland meeting they weren't covered there either. A model is only a model. But I guess are there any plans or rules for local model validation and/or long-term monitoring?

MR. CAMPER: Well, with regards to the -- well, I think part one of your question I'll sort of defer to Dr. Esh when he goes through his presentation because he'll talk about the methodology that was used.

The modeling that we use when we did the staff's analysis, as you know, was talked about at great length. There were some concerns that the model that the staff had used had not been validated. We did talk about the fact that this was done for a particular reason, to assist the Commission reaching a decision. Whatever we do as part of this rulemaking will go through a much more rigorous, classically acceptable type of validation, if you will. It will all be publicly available, and so forth.

With regards to monitoring, I mean, if I understand your question, two kinds of monitoring will happen. I mean, the states will monitor the performance of their operators over time, consistent with the performance assessment that's done for that site, and then we have a role in monitoring the agreement states' performance through our agreement state program and our IMPEP process where we go and review the state's activities.

So there is monitoring that goes on, if I understand your question really in two ways. It's the regulator monitoring the operator. The operator is insuring that they're fulfilling the actions they said they would do as part of their performance assessment in terms of placement of waste, configuration of waste, and so forth, and then we monitor the performance of the agreement states through our IMPEP program, if I understand correctly.

MR. CAMERON: Chris, did you want to add on that before we go to Steve?

MR. McKENNEY: Yeah. Dave is going to go into the monitoring a little bit in his talk, too, but I just wanted to clarify right now and also add that there is requirements for long-term monitoring of the site after closure. Unfortunately compared to the lifetime DU, it's not long-term compared to that, but relative to civilization and most assumptions you can make about how long you can make somebody do something in a civilization, it's about 100 years.

But there is those requirements already in Part 61. So obviously we could revisit that in this discussion to say are there other things that are needed.

MR. CAMERON: Okay. Thank you.

We'll go to Steve, and, Drew, did you have something? Well, let's go to Steve and then Drew and then we'll come back to Beatrice.

Steve.

MR. STEVE NELSON: With respect to site specific analysis performance assessment, site suitability and monitoring, all of these issues are completely different at time scales of a few hundred years compared to ten to the fourth, ten to the fifth or ten to the sixth years, and so I'm wondering what kind of monitoring we can expect at ten to the fifth or ten to the sixth years when activities in depleted uranium are increasing by a factor of ten or 12 or 13 or mote.

I don't really expect an answer.

MR. CAMPER: Good. That's good. I wouldn't begin to proffer one.

MR. CAMERON: And I think that point was noted when we got into Dave's presentation and more discussion.

MR. CAMPER: Yeah. No, it's a great question, and obviously you're referring to the half-life of this particular radionuclide and how long it will be around and so forth, and that is a very challenging question. No question about it.

MR. CAMERON: Okay. Drew.

MR. THATCHER: I think you brought up a good point, Steve. As far as the long term when we're talking about model and model validation, certainly when we go out beyond 10,000 years or whatever number, there's great uncertainty, but I think there could be as far as validation goes some work done in the near term to help insure regardless of geologic scales that we're looking at that let's say your radon emanation or something like that in the model that you actually use is validated on. We perhaps have closed uranium mill tail sites in the U.S. now that we could actually use to help validate whether the actual model works as predicted as far as emanation rates and that kind of stuff.

So there are some near term validation, I think, that can be done to help minimize some of the uncertainties over the long term.

MR. CAMPER: Well, good point. Thank you.

And Dave will talk again a lot about the model we use and this question of validation and so forth because we heard a lot in Maryland.

The period of performance discussion that took place during the workshop in Maryland was, indeed, an interesting discussion, and I'm sure it will be here as well. You know, how long do you evaluate for?

I'm not going to steal the thunder of what the panel told us in Maryland, but I will probably ask this panel the very same question as you wind down your discussions on the period of performance because what we learned from the panel of Maryland gave the staff something really meaningful to work with.

I mean, we have to go away from here and evaluate all of the comments that are made, develop the technical basis for the rulemaking, and so coming out with something workable that we can articulate and explain to the Commission why we think this particular period of performance or that particular period of performance is a viable approach, is something that's terribly important. So we'll be looking for a lot of feedback from this panel on that point.

MR. CAMERON: And, Drew, bring that point up again obviously when we get to the model validation section.

And, Beatrice, is that comfortable for you?

MS. BRAILSFORD: It's fine.

Has the NRC or any of the agreement states that have low level waste sites been approached about reviewing the performance assessment of your particular disposal facility under this process?

I know Energy Solutions has approached Utah about going through this interim process. Has either Waste Control Specialists or American Ecology approached Washington or Texas?

MR. CAMERON: And we're going to go into -- let's get a quick answer now, but when we have more discussion of this tomorrow, let's go into it in more detail, but Susan.

MS. JABLONSKI: We do not have a new performance assessment to review for the interim in Texas.

MR. CAMERON: And Drew?

MR. THATCHER: We've talked about it in good detail. I think the prudent thing we've decided is we really need to wait until this kind of works through because we could do a performance assessment that may not meet the criteria that the NRC ends up getting, and you'd end up having to do it twice. So I think from our standpoint we wait.

MR. CAMERON: Okay.

MR. CAMPER: Beatrice, during the course of developing the Commission paper we did have several conference calls with the states. In fact, we talked about the role of the performance assessment. There was general agreement about the nature and the importance of performance assessment. There was general agreement that articulating requirements for performance assessment -- you know, articulating the requirements for a performance assessment does two things.

One, it identifies the technical parameters that all states would evaluate so that you have a consistent approach.

But equally importantly, having an appropriate performance assessment with the technical parameters identified is designed to provide the same level of protection for public health and safety as would a classification for waste. It has the same end objective, and the NRC and agreement states were certainly in agreement upon that as we discussed this topic of performance assessment.

MR. CAMERON: Okay. I think we're going to move. Thank you, Larry.

MR. CAMPER: Okay.

MR. CAMERON: And we're going to move to Andrew Carrera, who is the project manager in our it's no the Rulemaking Division, but the division that takes care of rulemaking and other issues. He's going to talk to you about the rulemaking process, and then we'll go for questions on that.

Andrew Carrera.

MR. CARRERA: Thank you, Chip.

Good morning. My name is Andrew Carrera, and I'm also a health physicist in the Officer of the Federal and State Materials and Environmental Management Programs, Divisions of Intergovernment Liaison Rulemaking.

In looking around the room, I've seen quite a few old, familiar faces that I've seen from the previous workshop, and I will be giving the same presentation as I did at the previous workshop, and some of you have come to me and requested that I give my presentation in either Vietnamese or Dutch. So just to be consistent with the last workshop, I will have to give it in English.

MR. CAMERON: Thank you. Thank you, Andrew.

MR. CARRERA: Before beginning, I would like to thank you for taking time out of your busy schedule to attend this workshop, and I would also like to thank the Division of Waste Management and Environmental Protection for inviting me to give a brief presentation on the NRC rulemaking process.

Rulemaking is a process used by government agencies, such as the NRC, to develop regulation, and NRC regulations primarily applies to applicants and licensees who are involved in the transportation of nuclear materials or use of nuclear materials in medical, industrial, or academic settings, or operating facilities such as power plants, uranium mills, fuel fabrication, and for today's purpose, waste depository sites.

NRC's rulemaking authority stems from the Atomic Energy Act of 1954, as amended, which established the Atomic Energy Commission, which is now the NRC. It also delegated the rulemaking authority to the Commission.

However, the Commission is bounded by the Administrative Procedure Act of 1946, which is also known as the APA, and the APA established procedures that regulatory agencies must follow to implement their regulatory programs. Among other things, it sets requirements for publication of proposed rule and final rule in the Federal Register for public review and comments.

There are a significant number of people and organizations that are directly and indirectly involved in the rulemaking process. On the screen you will see a variety of stakeholders ranging from federal to non-federal government organizations, highlighted in blue; the general public and industry highlighted in pink; as well as different offices within the NRC highlighted in green.

Roles of the stakeholders may include requesting a rule to be developed, for example, through the petition for rulemaking process, or gathering and assembling information to support the rulemaking or drafting the rule text and supporting documents or providing comments after the rule is drafted.

So let's now talk about the rulemaking process. Before the rulemaking process begins, a regulatory basis and sometimes referred to as a technical basis should be developed, and the development of the regulatory basis is not part of the rulemaking process itself. However, it's a very, very important preliminary step prior to the rulemaking process.

The regulatory basis contained a justification for the rule and serves as an effective foundation, foundation of effective regulation. And the purpose of today's and tomorrow's session to a major extent is to gather information in support of the development of the regulatory basis.

And once the regulatory basis is completed, a proposed rule is developed and published for public review and comments. After public comments are collected from the proposed rule publication, the comments are analyzed and considered for the final rule, and after the final rule is published, the rule is implement.

And I will now discuss the regulatory basis, the proposed rule and the final rule in greater detail.

The regulatory basis. For our purpose, the first step is to develop a regulatory basis for the unique waste stream rulemaking. The development of a sound regulatory basis has become very important in supporting and making the NRC rulemaking process more efficient. The regulatory basis provides the foundation of effective regulation, and it is the rationale for the rulemaking action.

If you answer the questions of who, when, what, where, and why, you should have at minimum explain why the current rules, regulation or policy is insufficient or needs to be changed. It should provide scientific policy or legal information that supports the decision to undertake the rulemaking.

And more importantly, it should also

discuss the stakeholder's point of view to the extent known. And as I stated earlier, a major purpose for today's and tomorrow's workshop is to gather information to support the development of the regulatory basis for the unique waste stream rulemaking.

Proposed rule. Once we have a strong regulatory basis and it has been accepted by the Rulemaking Branch, a working group is assembled. The working group consists of NRC staff with technical, legal, and administrative expertise from various organizations throughout the NRC.

In addition, if the rule is to be implemented by the agreement states, like the unique waste stream rule is expected to be, the NRC will add agreement state representatives to the working group.

The working group uses the regulatory basis to draft the proposed rule text and supporting documents. Supporting documents may include an analysis of environmental impacts from the proposed action, as well as regulatory analysis to evaluate the benefits and cost of the proposed action.

The proposed rule package is sent to the Commission for review. In this particular case, the draft rule text will be sent to the agreement states for their review before it goes to the Commission, and if the Commission approves the proposed rule, it is sent for publication in the Federal Register for comments, and normally the public comment period is 75 days.

Final rule. After the comment period on the proposed rule ends, the NRC begins the preparation of the final rule package. The final rule is a logical outgrowth of the proposed rule and with considerations to the comments received on the proposed rule. There should not be huge disconnects, revisions, or changes from the proposed rule.

Documents supporting the proposed rule are also updated to be consistent with the final rule text. Once the final rule package is drafted, it is sent to mission for review. Agreement state participation is similar to the proposed rule stage, and after the Commission approves the final rule, it is published in the Federal Register.

The Federal Register notice includes the final rule text and responses to all substantive comments.

The final rule will be implemented on a schedule as posted in the Federal Register notice.

How long does it take to finalize a rule?

The complete rulemaking process may take several years. Rulemaking starts with acceptance of a regulatory basis.

Excuse me. The regulatory basis itself can take anywhere from months to years to complete depending upon the complexity of the issues and the availability of the information. We are currently scheduled to complete the development of the regulatory basis for the unique waste stream rulemaking by September of 2010.

Once the regulatory basis is completed, the proposed rule is to be drafted. It usually takes about one year to complete the proposed rule and submit it to the Commission for the review. However, this time frame varies from rule to rule.

For the unique waste stream rulemaking we would hope to submit the proposed rule to the Commission by September of 2011, and once the rule goes to the Commission, it may take anywhere from weeks to months or more for the Commission to take action and approve it to be published in the Federal Register for public comment.

And after the public comment period ends, the final rule is to be drafted with consideration to comments received from the proposed rule. It usually takes about one year to prepare and publish the final rule, but again, it may vary based on the complexity of the comments received.

For the unique waste stream rule we would expect to provide the final rule to the Commission for the review by September of 2012, and with the beginning of the implementation phase of the NRC rulemaking process ends, the agreement states typically takes up to three years to finalize the equivalent rules. Therefore, under the current schedule we may see the implementation of the unique waste stream rulemaking rule by the agreement state in late of 2015.

As I summarize my presentation about the NRC rulemaking process, with that in mind I thank you for your patience and time, and I would like to answer any question that you may have on the rulemaking process.

MR. CAMERON: Thank you, Andrew.

Beatrice?

MS. BRAILSFORD: It's my understanding that there is a required environmental assessment or, if warranted, an environmental impact statement. Does that come -- is that correct? And if it is correct, does that come in the proposed rule step of this sequence?

MR. CARRERA: Yes. We are following the NRC process. I believe we will be performing an environmental assessment for this rulemaking, simultaneously with the proposed rule, and depending on the outcome of that environmental assessment, we would know whether it's going to go forward, move forward into an environmental impact statement. So it would be simultaneously with the proposed rule development.

MR. CAMERON: Is that something Beatrice and others, the environmental assessment, would find in the Federal Register notice for the proposed rule or would there be a separate announcement on the environmental assessment? Would comments be solicited?

I think that's the type of information you're looking for.

MS. BRAILSFORD: That kind of information and also I understand the sequence of doing an environmental assessment to see if you need an environmental impact statement. I guess I also understand that there are many situations where it is presumed that the federal action is major enough to warrant an EIS.

MR. CARRERA: Yes. For the first item, the Federal Register notice will have a reference to a separately published environmental assessment.

On the second item, we understand that there is some federal action, for example, a licensed renewal, for example, that would automatically kick into the environmental impact statement area.

However, for this particular rulemaking, we're going to follow process and start with environmental assessment first, and it depends on the outcome to see whether we would want to go into the EIS part.

Thank you.

MR. CAMERON: Christopher.

MR. THOMAS: Just to follow along with that, will that environmental assessment have its own sort of scoping meeting or any, I guess, specific public comment opportunity before that gets underway that's different from this process that we're doing right now?

MR. CARRERA: In my passage for environmental assessment will have public comments through the publication of Federal Register. The public will have the chance to comment on it, but I would have to rely on the Division of Environmental

Protection and Waste Management to answer that question.

MR. CAMERON: There may be several different ways that the staff can proceed on that, and I don't know if the staff is prepared to give some examples. Pat, let me bring you this. It will be easier.

MS. BUBAR: Yeah, good morning. I'm Patty Bubar, and I'm the Deputy in the Division of Waste Management, Environmental Protection, and the staff that are up here today are in that directorate.

But our directorate is also responsible for doing any environmental analyses for license applications. We generally don't do the environmental analyses that are associated with rulemaking, as those come out of Andrew and Gary Comfort's organization.

But we would not anticipate that we would have scoping associated with the environmental assessment for the rulemaking. As Andrew had said, we would put the environmental assessment out with the draft rulemaking package, and that would be our opportunity to hear comments from the public, but we do not anticipate having scoping associated with the environmental assessment for this rulemaking.

MR. CARRERA: Thank you, Patty.

MR. CAMERON: And you have maybe a little bit of confusion on this, and I just want to make sure it's clear. If you mentioned draft rule, you might have meant proposed. I don't know, but I guess will the request for comments on the environmental assessment be all part of that same Federal Register notice asking for comments on the proposed rule or will it be separate, just so people know what to look for?

MR. CARRERA: It will be on -- Gary, do you want to? I see you're nodding your head.

MR. COMFORT: Hi. I'm Gary Comfort. I'm a Senior Project Manager in the rulemaking group in DILR.

Basically, if it's an environmental assessment, it will be published or it will be made available and be noticed as part of the Federal Register that asks for comment on the Federal Register in the rule language and statements of consideration. At that point the directions of how you can get a copy and, you know, provide comments through that same process, it will have the same time scope, et cetera, to be issued.

To further clarify, if through this process we can determine earlier than developing an environmental assessment that it needs to go to an EIS, we would do that. We try to do that as early as possible to not hold up the process, and at that point we'd be holding scoping meetings for that EIS also and stuff, just to make that clear.

MR. CAMERON: Okay. So that comments on the environmental assessment will be fair game with the proposed rulemaking, and those comments would be considered and may be influential with the staff in terms of deciding, well, we really need to do an environmental impact statement. Okay.

Any other questions on the rulemaking process?

(No response.)

MR. CAMERON: Okay. Let me just check in with the audience and then we'll take a break. Any questions on the two presentations that you've heard so far? All right, Dirk.

MR. DUNNING: With some of the questions -- I'm sorry. I'm Dirk Dunning with the State of Oregon, Department of Energy.

We do a lot of work on the Hanford site, all kinds of performance assessments, environmental assessments, environmental impact statements and related, and in particular I'm very involved in the technical analysis on the Hanford site.

One question that wasn't asked, but I think that they implied/intend to ask is if you're going to do an environmental assessment, which either goes to a finding of no significant impact or triggers an environmental impact statement or terminates the action, one of the three, or potentially reaches a categorical exclusion, would you then, given the interest of the folks asking the questions, insure that they are on distribution and notice when that hits the Federal Register?

MR. CARRERA: Yes. Gary is shaking his head. So yes.

MR. CAMERON: Yeah, a lot of people were shaking their heads affirmatively to that, and we will keep everybody around the table in the loop on whatever is happening on this particular rulemaking in the future, whether we're having a round table or public meetings or whatever.

Christopher.

MR. THOMAS: Sorry to come back to this. I just wanted to clarify. In terms of the regulatory guidance document, I mean, that's not something I'm familiar with. So is that going to be up for public comment at the same time as the proposed rule or before the proposed rule?

MR. CARRERA: The guidance document is being prepared by the requesting office.

MR. CAMERON: There's a long history of different ways that the NRC does this, and I'm going to ask Gary what the -- and it's a policy issue. So it could be done in a lot of different ways, but what do we usually do?

MR. COMFORT: Again, I'm Gary Comfort.

In general, regulatory analysis or a regulatory basis is I guess the term we're using now, is an interoffice memo basically with discussion of what they think should be done and what needs to be done based on comments, and it's generally not made publicly available.

We have had opportunities where we have changed, you know, based on either a lot of public interest or other direction, made them publicly available.

Is your question on regulatory guidance or the regulatory basis that's used to develop the proposed rule?

MR. THOMAS: I misspoke. It is the regulatory basis because I got from your presentation, Andrew, that that is a very important -- I mean, that sort of sets the direction of the entire rulemaking, and so it would be helpful from our perspective to be able to see that document and comment on it.

MR. COMFORT: That's something that we'll have to look at because our normal policy is not to make those publicly available, but I am aware that we have done some, and I'll have to look at the procedures to see what has to be done and what triggers that to be made publicly available.

MR. THOMAS: Okay.

MR. CAMERON: And we'll put that in the parking lot, and when we get to the parking lot item of the need for perhaps sooner regulatory guidance on this issue, we can revisit the process issue of how the guidance document is made available for comment, but thank you for asking that question, Kirk.

There's coffee outside, but it's not free, but there is coffee outside and it's not too expensive. I don't know what that means, but I guess it's all relative.

But anyway, let's come back in 15 minutes. That's around 20 minutes after.

Andrew, thank you very much.

MR. CARRERA: Thank you, Chip.

(Whereupon, the foregoing matter went off the record at 10:07 a.m. and went back on the record at 10:28 a.m.)

MR. CAMERON: Okay. We're going to get rolling.

We're going to go into our next presentation on the technical analysis, and Dave Esh is going to do that for us, and it is sort of long. It's comprehensive, and so we're going to break at three different times, including the end, and we'll go for questions on that particular segment and then we'll go on with it.

David, I'll just turn it over to you.

MR. ESH: All right. Thank you, Chip.

I heard today on the TV that 60 is the new 35, and since today is my birthday, that makes me about 15, I think.

(Laughter.)

MR. ESH: Thank you.

I'm going to talk about the site specific performance assessment and NRC depleted uranium technical analysis overview. It is a little bit long. We cover a lot of ground. I've talked about this a lot lately. So if I skip over something and it doesn't make sense, feel free to say, "I don't know what you're talking about," or it didn't make sense.

I'll try to go back and clarify.

I want to emphasize that this is a workshop today just like we had in Maryland. This is your opportunity to give input on this rulemaking process and associated guidance. So I hear a lot about, well, we need to wait and hear what NRC says or we need to go by what NRC does. This is your opportunity to decide, in part, what NRC says or does.

So we really do want all of your input. We want all of the different views, and I don't feel we've prejudged any particular decisions. We want good, sound technical input to make good, sound technical decisions, and that's the bottom line for us.

So I'm going to go over performance assessment and low level waste analyses together, and then we'll do a second part on analysis of depleted uranium disposal, and then what we felt were some of the key issues that came out of that.

The objectives of our analyses were in two main parts. One, we wanted to see do we need to change our existing regulation, and the answer we came up with was, yes, we need to change it.

And David Kocher hit the nail on the head when he talked about it earlier this morning, which was in our Part 61 that was done in the early '80s, they basically did an intruder analyses to develop waste concentration tables, which are in the regulation. They had to make some assumptions and do some analysis to determine what they thought the waste streams were going to be for the commercial low level waste facilities.

They did as good a job as they could at that time, and I'd say they did a very good job. There's a lot of detail in the EIS and the draft EIS about the waste streams they considered, the isotopic profiles, all those sorts of things. It was a very good effort, but obviously, we didn't do so good with anticipating this depleted uranium waste stream, and I would argue part of this workshop is also trying to think about what other waste streams may be out there because I don't want to be here on my near 60th birthday having another workshop deciding, well, what didn't we do so good of a job on 20 years ago when we did this unique waste stream rulemaking.

So I would really like people to think about that. I know depleted uranium is the problem of the day, but also I want people to consider what sort of regulatory requirements could you put in place to catch other things that may come up in the future.

That was the first objective of our analyses. The second objective of our analyses was to, in a first order type of way, determine what are the key issues for these unique waste streams in terms of performance that we need to address either in rulemaking or in guidance. So those were the two main objectives for the analysis that we did.

So just an overview of performance assessment. For some of you who may not be familiar, performance assessment is a learning process. It involves the collection of data, development of models or development of conceptual models, conversion of those into numerical or computer models, an estimation of the combined effects of different models. It includes consideration of site characteristics, the waste material you're considering, the disposal environment that you're putting it in, the geologic system that that disposal facility is located in. It's a systematic analysis of what could happen at a particular site.

And what we try to assess if what can happen, how likely is it, and what can result.

How is it conducted? I just covered that, the various steps.

Why do we use it? We use it for complex

systems. It's a systematic way to evaluate data that's used internationally. It can provide a lot of insights to decision makers, but performance assessments do not make your decision for you. Decision makers make your decision. They need to factor more than just technical input sometimes.

And when you do one of these analyses, you need to understand it does have advantages. It's a way to convert a lot of complex information into an output that sometimes we can't do ourselves thinking them through, but it does have limitations. You need to understand those limitations and the decision makers need to understand those limitations.

Why do we require a performance assessment? It provides sign and design data, describes the barriers that isolate waste, evaluate features, events and processes that affect safety, provide technical basis for models and input that account for variability and uncertainty, and evaluate the results from alternative models as needed.

We have an expectation and we've highlighted it in more recent guidance that we've developed, such as our NUREG 1854 that applies for incidental waste disposal, but you need to consider alternative models. There's not just one model. I think Stephen Webb commented on that this morning about validation of models.

In a performance assessment, you cannot validate the model in a traditional sense because you're doing a projection over maybe very long time frames, but you do need to develop model support. Model support is very important. It can have a lot of different aspects to it ranging from consideration of analogs, use of a variety of different computational tools, experimental data, but model support is one of the most important aspects of doing a performance assessment.

So in terms of like radon specifically, yes, that's a hard problem to model, and I think you need to collect a lot of data, such as maybe Drew Thatcher mentioned; collect data, use that to constrain the calculations or at least understand or provide some basis that you think they're reasonable.

So in picture form here, what does a performance assessment look like? They're taking some sort of real system. They're going to represent it with mathematical models of some type, in this case representing a source term and infiltration and release and transport through various pathways. That's a mathematical model, but it is an abstraction of reality.

Of course, you have to make some sort of simplifications to represent the problem. You can't usually have all the detail of a real system. It is am abstraction, but you should understand the implications of those abstractions and how they affect your calculation.

And then ultimately you're trying to estimate future performance of some sort of waste disposal facility, and you get pretty charts like that.

Low level waste frameworks, switching gears a little bit. In our low level waste analyses, one of the cornerstones of the system is stability, but also isolation of the waste and isolation is considered from a variety of respects. You need to choose a site that's stable. Generally you're looking for a site in a low population area. So you wouldn't want to put a disposal facility in a city. You design your site so that it's compatible with the site that you select, and you need to consider the interaction of the waste with your facility, and the interaction of your facility with your site.

Then you also apply site control and monitoring of that disposal facility, and lots of times we get talking in the abstract, but the reality is for a low level waste facility it's anticipated that it will be under institutional control for at least the next hundred years, and then federal and state land ownership for an indefinite period.

There's a lot of perspective about how much reliance you can place on institutional controls. This was covered in the draft EIS and EIS for the development of Part 61, and the consensus that came out of that process, much like the process we're doing now for this workshop and unique waste streams, was to not allow for more than 100 years of institutional control for these sorts of facilities because there's difficulty in insuring the political or process type requirements, the durability of those over long periods of time.

And I think that's, in general, pretty much an international perspective, too. We heard from Phil Metcalf of the IAEA out at the Radwaste summit in Las Vegas a few weeks ago, I guess it was, and he advocated that position from an international perspective.

But this analyses, the low level waste framework and analyses, it's to evaluate public exposures, both off site, so near the disposal facility but not on its; workers during operations today and while the facility is operating, and then also the potential for inadvertent intrusion. Somebody uses that facility in an unanticipated way in the future.

The disposal site, one of the requirements is that the disposal site shall be capable of being characterized, modeled, analyzed, and monitored. Now, that may be more clear whenever you have short-lived waste and you're talking about hundreds of years' time frames.

When you have long-lived waste and especially high concentrations of it, this becomes a much more challenging requirement, and I think we heard about that this morning, and I don't disagree with it. The problem becomes harder when your waste is longer lived and you have a lot of it.

So in the EIS developmental analyses, the commercial low level waste stream was what was envisioned in the early 1980s. They looked at four referenced disposal site environments ranging from arid to humid, and they looked at the impacts to the public basically doing environmental pathway analyses from all sorts of pathways, water pathways, air pathways, et cetera.

As part of that EIS developmental analyses, they developed a waste classification system, and that was developed by doing intruder and various scenario analyses and basically doing an inverse calculation.

So they did the analyses. They set a dose limit that they were trying to achieve, and then they did a backwards calculation to determine what concentrations would give me those impacts. And that's what you see in the table values that are in the regulations right now.

So where we are now, if we have a waste stream that's a lot different or could be a lot different than what was analyzed. Then you have to say, well, I don't have table values for that. So what do I need to do about it?

And our opinion is we need to change the regulations and insure you could either develop new table values or you could insure that they do the analysis, but somebody has to do the analysis. You can't have an unanalyzed situation basically.

The waste classification concentrations were based primarily on the inadvertent intruder exposure scenario, but not totally, but primarily on that. So what does it look like as we dig into that old analyses?

Well, they had a disposal area that was broken into trenches, and then they looked at a variety of potential exposure points ranging from an individual well right next to the facility, a boundary well, then a larger, maybe population well downstream, and then a surface water body. So they had to represent the release of the radioactivity from the facility and then impacts at different points to potential receptors. So those considered potential access locations for people.

But if we take that a step further and dig down, then you had to convert that representation of release and transport into the system into a mathematical model, and this just gives you an idea of the type of mathematical model they used in the 1980s. They took a planer source term and did 1D advection dispersion to a water table, and then transport from the water table to the receptor points using a streamline approach and velocities and dispersion coefficients, those sorts of things, and it's a pretty common approach that was done, especially in the 1980s.

Now we have maybe some more sophisticated tools, that people can do three dimensional modeling and all of those sorts of things. Unless you have a lot of data to constrain that analyses though, I don't know sometimes whether that dimensionality and extra complexity is warranted. You're basically limited by what you know, and if you don't know a lot, then you can do all of the fancy modeling in the world, but it isn't really proving anything.

So you really are constrained by the data you have, and if you need to justify a hard problem, then that probably says you need some more data to justify it.

So one aspect of this analyses though that was clear to us and that I want to convey to you today is the need to consider the site specific characteristics. So what I have here on this slide on the left-hand side is the retardation coefficients that were used in the DEIS/EIS analyses for different regional sites, northeast, southeast, midwest and southwest.

And I pulled out some numbers here to convey a point to you. This shows that, say, for strontium there was about a factor of four difference between the most absorptive sites and the least sorptive sites, and the reason why distribution coefficients or retardation coefficients are important, especially for something like Strontium 90, that's a rough measure of how long the geologic system or how much delay the geologic system can provide to that radionuclide before it reaches an exposure point. So in the case of strontium, distribution coefficient of, say, 73 might be enough that it all decays during transport before it gets to a receptor point, where when you get to the low end of the spectrum, maybe you can get strontium release out of you facility.

So what I did was I took a commonly used reference today, the Sheppard and Thibault references that provides a compendium of distribution coefficients by soil type. Basically they looked at a lot of data and they looked at a lot of data throughout the country. They divided it by soil type. It's a gross simplification of the geochemical processes.

I know Peter Burns is just rubbing his head thinking, "Oh, my goodness," here, but it is what is typically done in a lot of performance assessments, is they do somewhat crude approximations of some of these processes and behaviors.

The retardation factor is a function of the porosity, the bulk density, and the distribution coefficient that's measured. The distribution coefficient is the ratio of what you find attached to soil particles compared to the liquid phase in the system, but the bottom line in this compendium, this more recent data and with a lot more data points, they find that, say, strontium, if I convert the data in this reference to a common value to compare to the chart on the left, the minimum value from that reference would be about one. The maximum would be about 1400. The geometric mean would be about 90. You can see that this range is a lot more broad than, say what was considered in that EIS analyses, and then it varies differently depending on the specific radionuclide. So uranium, a minimum of two, maximum of 21,000.

Well, in many disposal facilities if you have two for uranium, you're going to see the impacts from uranium and not an inordinate amount of time in the future, whereas at 21,000, that uranium might stay in the system for a very, very long period of time.

So there's a big difference in these performance assessment calculations based on site specific information, and what was done in the draft EIS and the EIS in the early 1980s, the waste concentration values and the tables were based on the humid southeastern site. So maybe it's not fair for the data that's being used in generation of those table values, probably mostly in a conservative direction, but it wouldn't be unexpected that maybe you could have something in the nonconservative direction or the pessimistic direction, but mainly in the conservative direction that you're applying limits for a humid southeastern site and say my facility is in New Mexico. Well, maybe that type of approach is not reasonable at all.

So the site specific behavior, this is just an example from distribution coefficients, but it applies to especially many of the other things that influence the depleted uranium risk like the moisture content in the system, which affects the radon transport.

The site specific characteristics are very important. So I think that's the end of Part 1, and we can get some questions, and then we'll go on for Part 2.

MR. CAMERON: Questions?

And we are going to be going over this ground, again individual topics. So if you don't have a question now, but it comes later, we'll be able to deal with that, but, Chris, did you have anything now?

MR. THOMAS: I'm okay for now. I'll talk

to it later.

MR. CAMERON: Okay.

MR. ESH: We're going to have pretty much an hour on the lot of the individual things here, not necessarily performance assessment in general, but the specific technical things we'll have an hour round table discussion on. So you should have ample opportunity to talk about them then.

MR. CAMERON: David has.

MR. ESH: Oh, I'm sorry. David.

MR. KOCHER: Just a quick comment. As I mentioned, when I introduce myself I worked on performance assessments at a number of sites, and one of the things that comes out of a PA in general, when you look at the protection of off-site members of the public versus protection of inadvertent intruders, depending on how you choose your criteria and the properties of the site and all of that, but generally speaking, for most radionuclides it's the intruder protection that is the limiting consideration in terms of what the allowable concentrations are. It's only for a few radionuclides that the release and transport off site turns out to be the controlling factor, and that's something to bear in mind here as we go forward.

MR. ESH: Yeah, sure. Thank you.

MR. CAMERON: Thank you, David.

Dave, if you want to continue with Part 2.

MR. ESH: Sure, okay. Now I'll step into the depleted uranium and NRC analyses that we did for the SECY. As I said when I first started speaking, we had two objectives for that. One, do we need a change the rule at all or not?

Two, if we do change the rule, what are the types of things we need to cover?

And hopefully you'll see that from what I go through here.

So I'm going to go over the problem context, a little bit of background about uranium and radon, uranium geochemistry, scenarios and receptors, and period of performance.

The analysis we did was with the small team, myself, Chris Grossman, Karen Pinkston. We had direction from our Low Level Waste Branch. Basically they got to this point where they were looking at this direction from the Commission and do we need a change to the rule or not, and they said, "Well, we really need to understand the problem better. Can you do an analysis for us to help us understand the problem to make these decisions about what we might need to change and how?"

So the nuclear fuel cycle, where did depleted uranium come from? It comes from the enrichment process. We have a representative here representing the enrichment industry. It comes from the enrichment process. It's a byproduct. NRC doesn't take a position of whether it's waste or not. We're only here to say if people want to dispose of it as waste, then what do you need to do to do that safely?

So the decision about whether it's waste or not is in other areas of agencies of the government.

And some context for why we're here, and Larry already covered this in his presentation. Basically the large quantities were not evaluated in EIS. They did something like 17 Curies of Uranium-238 and three Curies of Uranium 235, and something like a million cubic meters of waste in the analyses, and if you look at the potential waste streams that may be anticipated, you could be looking at something like 470,000 Curies of Uranium-238. So you're really outside of the box from what was done, and we recognize that, and that's why we're here today.

And uranium in the environment, uranium in surface soils is about one to five parts per million, more or less. There are lots of things that can modify that number. If you used phosphate fertilizers, for instance, in farming that can increase the uranium concentrations, the 15 to 30 parts per million or so.

But these concentrations in surface soils of one to five parts per million result in about a mean atmospheric rate on concentration of a half or a quarter of a picocurie per liter or so outside. Inside they're higher because the air exchange rate is lower. You have less mixing of air not containing radon with air containing radon. So you get higher concentrations, roughly a factor of ten or so from indoor to outdoor.

And radon contributes roughly 70 percent of the average annual dose in the United States, maybe 250 millirem or so, but it can vary quite a bit, and it's driven partly by how much uranium you have in the environment and the environmental conditions where that uranium is present.

So the red areas are areas of higher uranium concentrations, with the blue areas being areas of lower uranium concentrations.

Maybe this is a neat leaching picture here though. Look at that, blue on the coasts and red in the center. I didn't notice that before.

(Laughter.)

MR. ESH: So what does depleted uranium look like compared to normal commercial low level waste? Well, I put some things up here that people may be familiar with just to give some context. U.S. uranium mill tailings contain much, much less usually than one weight percent uranium oxide, and they have daughters, radium, thorium, other daughters, too. I just listed a couple here, and concentrations for, say, Radium-226 ranging from 26 to 400 picocuries per gram and Thorium-230, 70 to 600 picocuries per gram.

So the natural uranium or the byproduct of the milling process, the daughter products are associated with those byproducts of the uranium mining and milling process.

And depleted uranium, by comparison, it has a much higher concentration of uranium. So we call it depleted uranium because it's depleted in the U-235 isotope, but chemically it's really concentrated uranium because you've made pure uranium out of the process of trying to develop fuel for reactors. And the depleted uranium is a little bit different from, say, the uranium mill tailing because initially it doesn't have the daughters in it. It's pretty much pure uranium. It does have some impurities or other things in it, but they're at pretty low levels.

By about year 1000 though the radium in-growth gets to a value similar to maybe U.S. uranium mill tailings, and then at very long times you could have a significantly higher concentration.

This is just a theoretical calculation assuming no loss from the system, of course. So just build up decay and in-growth, a health physicist type of calculation, not a geochemical evolution type of calculation that you could have loss from the system, too.

But you end up with a behavior that's something like this, where you start off with much less in the mill tailings. You end up with probably quite a bit more.

Now, I did say U.S. uranium mill tailings because there is uranium in other countries that the ore is much higher concentrations, and their mill tailings may even be much closer to this depleted uranium types of concentrations that you end up with today, not in a million years, but it has been there underground at a high concentration for millions of years. The daughter products are in very high concentrations in that material, too. I think Canada has some uranium mines that would fit that description.

On the right here I have the activity ratio of depleted uranium to a typical commercial low level waste stream, and what you see is that initially the depleted uranium -- and I hate these gross comparisons, but I did it anyway because I figured it was a way to communicate about the source.

Initially the depleted uranium has much less activity than a typical commercial low level waste stream because a commercial low level waste stream has a lot of short-lived, high activity components potentially.

Over time the activity of the low level waste decreases rapidly, although it does have a long lived component to it now. It's not unique that depleted uranium is long lived and low level waste is not. Low level waste can have long lived isotopes in it. It's just generally they aren't at very high concentrations.

So the low level waste drops off pretty rapidly. The depleted uranium is flat for a very long period of time essentially, and then it starts increasing. So you get this behavior where initially the activity ration is low, and then eventually it can be somewhat higher, a factor of ten to 20 or so.

So in our analyses what did we do? We did a screening model. We had all of the basic fundamental physical processes associated with source term release and transport through water pathways and air pathways. We developed it to examine these key variables. What did we want to talk about in these workshops and/or address in the regulation or guidance that we develop?

Some of the key variables that came out of that were the period of performance associated with the characteristics of this material; the disposal depth, and that's the driver for both radon and long term stability; receptor types and scenarios, so there were receptor types and scenarios that were done in the 1980s for low level waste analyses, but we received lots of comments from people over time about the appropriateness of those scenarios in both directions.

And then as I talked about on the one slide in the earlier Part 1, the site characteristics are very important for this type of material, maybe more so than some other radionuclides.

We performed a probabilistic assessment of the problem to look at the effects of uncertainty and variability, and the analysis methodology overall that we used for unique waste streams was consistent with the original Part 1 or Part 61 analyses, and we did that because we wanted somewhat of an apples to apples comparison.

So if we take this receptor type scenarios and analysis methodology and convert it into a picture, we have something like this, receptor scenarios where, one, we had a resident potentially living next to the disposal facility. They could use water. They could have a garden. The model was set up so that it could be a resident farmer or a resident, either one. It could also be a recreational receptor, but in general most of our results that I'll show you was for a resident type receptor.

They had a house with a basement. The primary difference between the resident and the chronic intruder, the chronic intruder could potentially build a house on the facility and have a garden and they had a well that they could use contaminated water. They could potentially get radon in their house from diffusion from the depleted uranium source into the basement of their house, whereas the resident living next to the facility gets radon from the atmosphere, either outside or in their house.

And you could have leaching of the uranium and the source term through an unsaturated zone to the water table, transport through an aquifer and then potentially uptake in a well and use to water a garden for domestic consumption and other purposes.

But we have to convert then this receptor scenarios and problem into a mathematical model. We use the software package GoldSim, which is a generic simulation package that's used for a lot of different problems. There are a lot of organizations that use it for rad waste problems, and it was a good tool for us for this type of problem and this type of analyses where we weren't interested in very refined I'd say dimensional effects. Like we weren't analyzing a particular site, and so we didn't have distributions of different geologic materials and their heterogeneity and all of those sorts of things. We used generally homogeneous properties in the analyses to assess on a first order what are the drivers of the impacts of this type of problem.

So if we take then this conceptual representation of a mathematical model into an actual calculation, this is a screen snapshot of one of the panes in the calculation that we did. We have different packages which contain basically submodels or subprocesses of the calculation.

You have a tree view here on the side and then this plan view here, which you can use to navigate throughout the model, but the software package itself, like if you've got a license for GoldSim, which is a commercial product, you open this up and it's a blank page. So it's just like if you bought Excel and you need to make a spreadsheet. You have to build the spreadsheet. In this case you have to build the model. It's a pretty good tool for this type of analyses, or it was for us.

So the major variables I talked about, we did do uncertainty analysis with genetic algorithms, which we find work well for these types of data sets where you have a lot of potential drivers of uncertainty and variability in the results, and many standard techniques can have trouble trying to elucidate what are the drivers in the output. We find this technique works well for these types of problems.

The key parameters that we identified were hydraulic conductivity and gradient of the aquifer infiltration rate, your chemical conditions, liquid saturation. These all affect water pathway type releases.

And then for radon, they were liquid saturation and properties of the house and the scenario. So like their exchange rate of the house and time spent in the basement and those sorts of things, but there were two sets of drivers for the output, things related to water pathway, things related to radon.

Now, this is a table, spent a little bit of time on. It's percent of realization so from this analyses that met the regulatory limit. So the right-most column here we have our chronic intruder, which was all pathways, and it's basically the frequency of the amount of time that you could meet the regulatory limit for this probabilistic analyses.

We were representing, say, moisture state of the system, arid or humid or even disposal depth or grout. We had to fix some of those things in the analyses to understand how they impacted the results.

The reality is we know these things may vary. Okay? But the approach used is we took real variability and represented it as epistemic uncertainty or as uncertainty. So what that means is when you run an analyses that way, you'll get a range of results which show you if you had a site that was, say, very dry, we have a liquid saturation for arid conditions that range from .2 to .6. So if you have a very dry site and it's persistently dry, that will give you one result of an output distribution here.

Most likely, you have a challenge meeting the inhalation dose criteria, but you had the other end of the distribution, say, a .6 value, or a site with like a .6 liquid saturation may be able to meet the inhalation component of an all pathways does, but it's important to understand what we did and why we did it.

We represented variability as uncertainty to understand how that variability on a site basis all over the country if you had a disposal facility in different environments would translate into a risk impact, and it wasn't correct to take those results and say convert the overall output into a mean result for a different state of this table because it doesn't make any sense. The mean result would tell you on average what happens in the country, but that's not really meaningful for trying to decide at a particular site driven by particular conditions whether it could meet the criteria or not.

So we had a chronic intruder and we had the resident receptors, and it's broken down into the all pathways, drinking water, and inhalation to show you differently which pathways are driving. We broke it down into different periods of performance potentially and then some various scenarios, and those scenarios were determined by moisture state, disposal depth, and in at least one case shown on this table here we looked at a different waste form.

And what you see is that for shallow burial, if you do an intruder analyses, you have trouble at any time meeting a 500 millirem dose criteria, and that's because you have a lot of uranium, and just inhalation of uranium can cause you dose issues. So if you do an intruder analyses, you have trouble meeting the performance objectives if you put a highly concentrated source in a very shallow disposal environment.

Now, in our low level waste regulations, near surface disposal is in the top 30 meters. So you have 30 meters to work with, and I would argue that there's a lot of difference between one meter and 30 meters. Maybe when you get to a million years, you know, our expert geologist here would say that there's no difference between one meter and 30 meters, but certainly at shorter time frames I'd say there's a big difference between one meter and 30 meters.

We looked at some different disposal depths. The inhalation component at shallow depths can be a challenge for the resident, and also the ground water is roughly about half the time depending on the geochemical conditions, infiltration rate, all of those sorts of things, that it could meet the performance objectives.

As you increase the depth at an arid site, then you increase the likelihood that you could meet your inhalation performance objectives, but you don't do a lot to affect your drinking water pathways, and the chronic intruder also because it was being driven primarily by inhalation pathways here. You increase the likelihood that you could meet the performance objectives from the inhalation risk.

At a humid site, at short times uranium takes some time even at a humid site to get from Point A to Point B. You can meet the performance objectives with a fair amount of the time, but as you go out to longer times, it becomes much more of a challenge to meet the performance objectives at a human site because you just get too much uranium leaching.

And that same effect then applies to the chronic intruder. This is the effect of the water pathway to humid site on a chronic intruder.

We did look at some things you may do to try to change this problem, whether it's somebody might consider, such as grouting the material. Grout could have a couple effects. Grout may reduce the water that impacts and that interacts with the source term. It may modify the geochemistry in favorable or unfavorable directions, and it could decrease the emanation rate, say, for radon.

We talk about this depleted uranium disposal of these large quantities, and I would say that technically there's a difference between whether depleted uranium is in a powder form or whether it's in a large ingot, such as maybe Greg Komp deals with in a lot of his activities with the U.S. military.

Those are different from a risk perspective. In this analyses, we were looking at the potential for large quantities of material that was in pretty much a powder type form that has a large specific surface area, and that changes the results a lot.

So chronic intruders, shallow depths, the radon can challenge the performance objectives for humid site. Groundwater can challenge it for both the chronic intruder or the resident, and then even at an arid site though you need to know about your geochemical conditions and your infiltration rate and your aquifer and all of those sorts of things. That will determine whether you could meet performance objectives from the water pathway.

And these are not doses. These are percents of realizations that met dose limits, which in this case were 500 millirem and 25 millirem TEDE that we applied for this analyses.

So the conclusions, if radon is included, the shallow disposal at an arid site can be challenging. Also if you dispose of it very shallowly, you'd have trouble with intruder performance objectives. For humid sites, these groundwater pathways can exceed the performance objectives, but we understand the problems are a lot more complicated than what we did in the analyses. So it's a generalization. These are generalizations, but that doesn't mean that a specific site with knowledge about that site might be able to show something different from these generalizations. So they shouldn't be taken out of context.

For this type of material, there is a very strong need for greater consideration of long-term stability. If you have long-lived waste and you're trying to isolate it from the environment, at least it should be a consideration in your disposal action, how you're going to insure the stability of that material over longer periods.

Site specific conditions can result in large variance of the impacts. So I think that's our summary of our analyses that we can take questions on, and then in this Part 3 we have a few slides on each of the issues that we're going to cover throughout the workshop for the next two days and talk about in detail for an hour or so.

MR. CAMERON: Good. Thank you. Thank you, Dave.

We'll start with Steve, and let me bring you this microphone.

MR. THOMAS: I'll just talk freestyle.

MR. CAMERON: Well, you need to use the mic because it can't get on the transcript even if you yell and scream. Please, don't do that.

MR. THOMAS: I'll try to contain myself them.

Two quick questions. Well, the second one will be rhetorical. Did you consider any disruptive events in your analysis?

MR. ESH: Yes, we did not consider, say, natural system disruptive events. The intruder analysis is essentially a human disruptive event, but we didn't consider natural system disruptive events.

MR. THOMAS: And my second rhetorical question, I'm not necessarily asking for an answer, but if you want to give me, that's great. I wonder if you or anyone in this room believes that a landfill constructed above grade is going to be anything resembling intact after a million years.

MR. ESH: It's a good rhetorical question. I do not have an answer for it.

(Laughter.)

MR. CAMERON: Okay. If anybody is brave enough to take that on over the next two days, we'll remember that question.

Chris.

MR. THOMAS: Thank you.

I guess I wanted to clarify some things. You know, last night at the presentation, and I believe it's in the DU paper as well, the statement that it can be disposed of, DU can be disposed of and meet the performance objectives at an arid site.

Now, I guess I would quibble a little bit with that statement. To me it may be; it may be depending upon the other site specific parameters. Would you agree with that assessment?

MR. ESH: Yeah, I would agree with that. It's not a guarantee that you can. You have to basically do the site specific analysis and determine whether it can at a particular site. I think if our conclusions were interpreted that because you have an arid site, therefore you can do it, that's not correct.

MR. THOMAS: And I will put down for the record I do believe that that was how that statement has been interpreted by many parties. For instance, I mean, it was interesting to me that Energy Solutions in a prior date said, look, we're going to take the results of the NRC analysis. We're going to try to do the best we can with that, and we're going to say we'll guarantee that we'll dispose of our depleted uranium at three meters' depth.

And because the NRC said that can meet the performance objectives, that's great. Well, I look at this table that you showed and I'm looking at three meters disposal depth in an arid site. I'm looking at 1,000 years for the chronic intruder, and I see the number two. Well, so just to locate it, it's in that. Does everybody see that?

MR. CAMERON: Yeah, yeah. It's right here.

MR. STEVE NELSON: Yeah. So it's at the three meter disposal depth, 1,000. So I see two, and I interpret that to mean two percent of the site variability model met the performance standard, and I'm going that seems to be a very small number upon which to make a statement that it can be safe.

MR. ESH: The three meters in particular?

MR. STEVE NELSON: Yes.

MR. ESH: I guess I'm confused with the three meter reference that you're coming back from.

MR. STEVE NELSON: So arid three meters --

MR. ESH: No, I understand this one, but I'm talking about in the context of yesterday.

MR. STEVE NELSON: Oh, no. I'm talking about Energy Solutions, and they can certainly speak if they think I'm misrepresenting, but --

(Laughter.)

MR. STEVE NELSON: -- that was very loud and emphatic.

At one point they said, well, we'll guarantee, and I think it actually went into the license recently that they would guarantee to dispose of at least three meter disposal depth.

MR. ESH: Yeah.

MR. STEVE NELSON: And so I'm saying,

okay, but based upon your analysis which didn't even look specifically at their site, only two percent of the sites modeled met the performance objective at this shortest time period looked at; is that correct?

MR. ESH: Yeah, I understand what you're saying, and for this chronic intruder three meter depth, if the house has a basement, then the basement is essentially right up against the waste. So you get radon flux rates that are very high in that situation, and that would be a challenge to meet the performance objectives.

So if you do an analysis where you, number one, assume that an intruder uses the site; number two, that they have a house with a basement; then you get results like this, yeah, and so you're not misinterpreting it.

MR. STEVE NELSON: Okay, great. I appreciate that.

And then I guess the next question is is it reasonable to assume that when you say three meter disposal depth, that that will persist up to a million years or was that pretty much a contrivance?

MR. ESH: It was a contrivance. What I think, I don't know if we said it in our SECY -- I work on a lot of projects. So I don't know if we said it in the SECY paper or maybe I'm thinking of our NUREG 1854, but whenever we have talked about this intruder scenario more recently, we've basically said if you need to have some sort of depth that protects your material and you need to protect it for a certain period of time, then you need to assess the ability to maintain that thickness over that time you need it to persist for.

So in this analyses and in our low level waste regulations, we have requirements for stability. They have to consider surface geologic processes, mass wasting, erosion, all of those sorts of things. So I guess we could say that there's a built in assumption that somebody is going to need to meet those regulatory requirements because if you can't meet those regulatory requirements, then you wouldn't be able to site and license that facility.

So that assumption is inherently built into this analyses and therefore what you termed the contrivance about the depth, yeah.

MR. THOMAS: So in terms of that stability, I mean, even with that, is it reasonable to even assume that a sight that's engineered could have sites to stability over the types of time frames that we're looking -- I mean, without active maintenance of the site.

MR. ESH: Yeah, I think that it's a definite challenge to say the least. Now, we have considered the ability of man to work on these sorts of problems and try to come up with solutions to them. We do have experience in uranium mill tailing program where they design these large erosion covers. They're designed for a goal of 1,000 years, but if you have the opportunity to see them, they look impressive. You know, in terms of whether they have this robustness for the longevity that they're trying to achieve, I think that's a more difficult question to answer.

And in our decommissioning guidance where we developed some guidance for use of engineer barriers and decommissioning, we considered examples, natural analogs like the Indian burial mounds that are found even in humid locations which have had durability and persistence for thousands of years, and those were engineered by people that maybe you could argue were much smarter than us, but they were engineered a long time ago, and they've had some persistence to them.

But it is a challenging problem. I do think you have to consider what experience we have, and we do need to consider natural analog. So not too long ago I read a report. I think it was about the Paran Plains in Israel, that they estimated an erosion rate of .3 meters per year for a million years, and that environment though has unique characteristics that help determine long-term stability, and those are hyper aridity or aridity, lack of extreme seismic events which change your land surface, little relief so that you don't want a lot of relief, and then materials which by their very nature form these desert pavements, which is nature's way of preventing soil loss.

So it's a very good comment. It's a very good input to our rulemaking process, and we're going to have to address this long-term stability.

MR. CAMERON: And, Dave, we're going to have a chance to discuss these particular types of issues when we get to some of the specific agenda items.

MR. ESH: Yeah, I think so, yeah.

MR. CAMERON: And I just would make a note that it may be useful to refer to particular sites, situations as examples to illustrate a generic point here, but I don't think that we want to have a debate about a particular site or what happened.

MR. THOMAS: I agree with that.

MR. CAMERON: Okay. Thank you, Chris.

In that respect though, I do want to give Tom or Dan, if you want to say anything about the point that Chris raised, let's do it, and then we'll move on.

MR. MAGETTE: Just very briefly, the reason I think it's a misrepresentation is because we didn't rely on that chronic intruder scenario, making that conclusion, and there is a point on the agenda to get to that, Chip. I'll be glad to talk about it more there if we think it's appropriate, but that's the notion of scenario selection and being part of the guidance. We had a lot of discussion about that in Maryland, but there is a reliance on some of the conclusions that David reached in his study, and so I think the reliance on the chronic intruder at the Clive site is not an appropriate scenario, and we didn't use that in reaching the conclusion.

So I just want to clarify that. To the extent we want to go into this and the fact that we think our site specific characteristics are even more conservative than the ones David used, we can do that, but here, again, I don't think this is the time or place.

MR. CAMERON: Okay, and if that discussion when we get to that point is a good illustration of the generic issues, then let's do that.

Let's go to Beatrice and then David, and then we'll go over to Drew and back to Marty.

Beatrice.

MS. BRAILSFORD: I want all of the mics.

(Laughter.)

MS. BRAILSFORD: I have a number of questions that I've now, because I've been taking notes -- sorry.

On the NRC analysis that you did as the basis for the SECY paper, just some sort of clarifications for me, and this is not -- I'm not opining on. I'd written down this question before. When you talk about disposal depth, do you mean below grade?

MR. ESH: In this analyses, it was below grade.

MS. BRAILSFORD: Okay. You said that you used the methodology for these unique waste streams that was consistent with the original Part 61 analysis because you wanted it to be apples to apples. Will the methodology you use in real time to develop the rule be different?

MR. ESH: At this time I think we're looking for input in the workshop about that methodology, and if needed, we may do some different things, in particular, because we have 25 years of experience in doing new analyses and things like that. For instance, the dosimetry that was used in the 1980s, we've had more recent direction from the Commission to use more modern methods. So that's one area that I could point to that we would probably do differently.

But the guts of the analyses in terms of how you do release and transport and pathway analyses, those would not change significantly. They're still pretty much the same today as they were then.

MS. BRAILSFORD: Okay. You do say analysis methodology for unique waste streams. Did you analyze other waste streams besides DU?

MR. ESH: Yeah, in this case, no. We only analyzed depleted uranium. We did analyze different forms of it, but it was all depleted uranium.

MS. BRAILSFORD: I guess those are my only questions, but I know we're going to be talking about this a good deal more. It seems to me that you have some anachronisms in the goals that you've set yourselves, and I would encourage the NRC not to overreach. You want to have these -- you know, you want to cover not only depleted uranium but other unique waste streams so that you don't have to revisit it in 20 years or we don't have to revisit it in 20 years.

Well, it will be you. I'm already at 35.

At the same time, a steady theme of all the technical discussion is that we know a good deal more than we did 20 years ago. So I'm not entirely convinced that it's particularly profitable for NRC to try to come up with, okay, here's the deal. We've got it. We got our unique waste streams. We know how to analyze them. End of story. We just have to look at the regs and keep doing it.

MR. ESH: Sure, but to more --

MS. BRAILSFORD: That's a comment.

MR. ESH: But to be open and flexible to future changes and deal with those as they may arise is that.

MR. CAMERON: Okay. Thank you, Beatrice.

David.

MR. KOCHER: Could you go back to your page 21 again, your table of results?

I wanted to -- and, Chip, if this is not the place to comment, I wanted to make a comment about the inclusion of a groundwater pathway in the intruder analysis. I may be a minority of one, but I don't think this is a good idea, and let me explain why.

Fundamentally, near surface disposal, determining acceptable near surface disposals is a balancing act between two competing things. The first is how much can you allow to be released into the environment and expose the general public, and the second is how much can you leave behind that an intruder would get in.

And with that in mind, intrusion scenarios are about intrusion into waste, period. The groundwater pathway is basically redundant with the analysis you're doing for the general public, and I guess I can say if I had one success in the DOE system is that I got this idea across, and it's in their regulations.

Intruder is about getting into the waste. How much can you leave behind in the waste that somebody might get in? And the other part for the public is how much can you let leak out.

And I would just beg you not to include a water pathway in your intrusion analysis. You're basically shooting yourself in the foot. And I know that's a controversial statement.

MR. CAMERON: Okay.

MR. ESH: Good comment. Thank you.

MR. CAMERON: And, David, when we get to an appropriate point in our discussion to reiterate that, would you please do it if I don't recognize it? Okay?

And the same for you, David. Thank you.

Drew, let's go to Drew for a question or comment.

MR. THATCHER: Two. One, I want to follow up to what Dave said just briefly. In my view, for an intruder analysis, some of the waste, certainly Class C and for long-term periods is going to be very pretty deep, in our case greater than 23 feet below ground. Without a well drilled by an intruder, I don't know how you get the waste up. So in my mind, that's a pretty standard assumption for that.

And if you're looking at limits, you know, 25 millirem to a full 500 for an intruder is not that big a deal. So I'd like to talk about that a little more later maybe.

The second one, and I do just want to make this parking lot, is I really want to make sure we follow up on what Dave was talking about as far as the powdered form of the uranium, and I think it's clear that you really can't use a grout, but maybe we look at something else, you know, whether it's an epoxy or whether perhaps it's sealed more in an aluminum or something like that where you get that oxide layer that's pretty stable.

Just -- I don't know -- think outside of the box and try to think of some ways that you don't have all of that surface area for that uranium such that even a small solubility issue becomes a big value when you have a million tons.

MR. ESH: Yeah, we discussed that at the last workshop, and I hope we'll discuss it again today during that session. Dr. Burns had at least some suggestions about things you could consider along those lines.

MR. CAMERON: Okay, and we have it in the parking lot.

Oh, Marty.

MR. LETOURNEAU: Go ahead and put your 21 back up there again.

MR. ESH: Everybody likes 21, don't they? Or dislikes it.

MR. LETOURNEAU: I just wanted to make a point that gets a little bit to some of the questions that Christopher was asking. You know, this technical analysis that was done by the NRC staff to support the SECY paper has been depicted as a screening analysis, and it's important to understand what that means as a screening analysis. This is not a performance assessment. This is not a risk assessment. This doesn't tell you anything about the ability of any specific facility or site to meet or not meet performance objectives under any conditions.

All this does is provide an insight into what aspects of this the rulemaking may need to look into further and what aspects of it the NRC staff needs to look into it further.

But to use this at all as a means of saying that proves that this facility or that facility can't do, that is absolutely inappropriate in interpretation of this analysis.

MR. CAMERON: Thanks, Marty.

And, David, Marty's characterization is correct on that.

MR. ESH: Yeah, it's spot on. I think we say that in our SECY paper, and I tried to say that in various times throughout our workshops.

MR. CAMERON: Okay, and Larry Camper would like to add something on that.

MR. CAMPER: Well, what I'd like to do, I think, Dave, if you would, is we're talking a lot about intruder analyses. Describe the depth to which intruder analyses have been constructed.

MR. ESH: Okay. Well, in this analyses where we're looking at the effect of depth and how it can affect an intruder, we had logic in the model where if the depth was less than three meters, then they could put a house in with a basement, dig up the material, spread it around, do all of their typical residential activities.

If the depth of the material was less than three meters, down to, I think, maybe eight meters or so -- or, sorry, greater than three meters down to eight meters, the logic was either do a drill going through, install a well through the material; you drill through it and the cuttings come up and are spread around, or check and see whether the indirect effects from radon were greater than that. So it did the greater of those two calculations.

When the depth was very deep in the calculation, then it was just the well going through the material and the cuttings spread around. So that was the way that we analyzed depth in intruder scenarios in the analyses.

MR. CAMERON: Okay. Thank you.

I wanted to give this gentleman a chance to ask a question. Yes, sir. Could you introduce yourself, too?

MR. HARLAN NELSON: Harlan Nelson, a contractor in Salt Lake City for 63 years.

I've lived here a long time, and I'm an engineer and a contractor and a businessman representing over 50 employees. So I'm well established, and I have an opinion that I'd like to get across over this issue without all the details I don't have time for.

I see a unique opportunity for the people of Utah, for Utah to provide a service for the nuclear industry everywhere, all over the world. We have a most unique geological situation. We have the largest body of salt on earth with no outlets at all, and a desert west of Tooele out here where as far as I'm concerned it will never be used for anything, and it's good for disposal of uranium waste.

Now, Utahans can make some money and we can save on income tax. Next to us is Nevada whose income tax is paid by the gambling, the gamblers that come there.. Wyoming has no income tax. It's paid for by a plethora of gas and oil.

Utah has an equal opportunity if we can

see it. The very thing we're talking about, uranium disposal. I'm for it. I'm for making an industry of it that's profitable for people of Utah. I pay normally $30,000 state income tax to the State of Utah. I'd like not to have to pay that like my friends in Nevada and Wyoming. And I am for what we're doing.

MR. CAMERON: Okay.

MR. HARLAN NELSON: Is that sufficient?

MR. CAMERON: That's sufficient. I think you got the point across.

(Laughter.)

MR. CAMERON: And if you don't mind me using you as an example of a process issue, and that comment -- thank you -- is on the record for us, is that that's a type of comment that we were looking for tomorrow afternoon from the public on the issues generally and what people's feelings are.

So thanks for doing it in advance, and we'll just save anything else like that until tomorrow afternoon. Thank you, sir.

Are we ready for Part 3?

MR. ESH: All right. Let's do --

MR. CAMERON: Christopher.

MR. THOMAS: Thank you.

I've got a question about this chronic intruder scenario, and one thing that's helpful for me, so one of my primary concerns is if the waste becomes uncovered -- and I don't really necessarily think that somebody building a house is necessarily the most reasonable scenario for that to happen. I'm more concerned about long-term effects that will happen, erosion or other long-term effects.

So my question is can the things that you -- can your results, can you extrapolate from those how long it would take if the waste were to be uncovered? How long would it take for somebody who comes into contact with that waste to exceed, to have their dose limits exceeded?

MR. ESH: Yeah, I understand.

MR. THOMAS: Like the number of hours.

MR. ESH: Yeah, I understand the question, and I could extrapolate, but it wouldn't be worth anything. So I can give you what my views about how you would consider that, and I think in most of our problems it would be reasonable if you have concerns about long-term stability to look at a scenario where the material may be uncovered and see what the impacts are associated with that.

And when you do that assessment though,

you have to be careful. You can't have it both ways. So if you have natural processes, for instance, that you need to defeat an engineered system and disturb your material. That's also potentially going to create some dilution and dispersion of the material as the result of that process, and I think an analysis of a scenario like that or if you felt like, well, material may be exposed and my scenario is somebody may hunt there, for instance, or ride ATVs or whatever usage you might foresee with technology 100,000 years in the future.

But I think it would be reasonable to look at alternative scenarios for a particular disposal facility and the concentrations that may result from the processes that you expect to happen.

MR. CAMERON: Okay. Thank you.

Just a process check for all of you now. We note that we're running behind, but I don't think it's anything to worry about. We'll make it up at various points. The only pacing factor for us is the fact that they will have this buffet lunch set up. So we can be a little bit late for going to that, but I don't think we can be real late for it.

So we want to get on with Part 3 and see if we might be able to deal with significant quantities. I don't know, but maybe we'll give that a try before we break.

Peter did you want to say anything quickly for us? Then we'll go on then.

MR. BURNS: I'll be quick. I just wanted to simply make a comment that the discussion in the preceding half hour or so is primarily focused on the dose for an individual who happens to drill into the deposit or builds a cellar, basement right beside it or hunts on that site and so on.

But I would point out that perhaps a much bigger issue that impacts a much broader portion of humanity is groundwater contamination, and a site such as this, especially if it's uranium dioxide -- pardon me -- U-308 powder that ultimately gets exposed to groundwater. It gets exposed to rain and so on by whatever processes. You can expect that uranium to be highly mobile and you can expect it to contaminate a large scale aquifer, and there the impact is much more dramatic than the guy in his basement.

MR. CAMERON: Thank you.

Just let me ask one clarification. Is that diametrically the opposite of -- I don't want to get into a discussion now -- but is that diametrically opposite of what David said? I'm just trying to understand the context.

MR. BURNS: Well, I'd argue that it probably is close to that, diametrically opposite. The exposure pathway that you can rely 100 percent on over the long term is through water and through release of dissolved uranium.

I was looking for the slides from the last meeting that dealt with this a little bit, but they're not in your talk anymore. So I guess I can't talk specifically about those, but --

MR. ESH: The talks are the same. So it might be in a future presentation during this workshop.

MR. CAMERON: And that's what we'll get to. I just wanted to flag this. This will be a discussion issue for us, and I just wanted to make sure that I understood that there was a difference of opinion.

MR. BURNS: Yeah, and I don't want to be hard on the guy who, you know, builds his cellar, his basement in the waste deposit, but that's only one guy. I'm thinking of the, oh, say, tens of millions downstream that could ultimately be impacted by a substantial leak into groundwater.

MR. CAMERON: Okay, and we'll have a

discussion of that, David and Peter.

Dave, do you want to go ahead?

MR. ESH: Sure. Part 3, Key Issues for Depleted Uranium Disposal. The first one that we have a session on -- is it this afternoon or tomorrow? I don't remember -- radon. Radon is a decay product from uranium, and it's ubiquitous in the environment. I talked about that in some of the introductory materials.

It's transported via diffusion and advection in gas or liquid phases. One of the challenges with it is the rate of radon transport is strongly affected by the moisture content in the system or liquid saturation. So diffusivity and tortuosity, the things that determine how quickly it moves through geologic materials are very nonlinear functions of the moisture that you have in the system.

The complexities associated with it can include -- and that's because radon itself and its daughters have a fairly short half-life. So this transport rate through the materials in the environment can allow it to decay during transport, and then it doesn't pose a risk.

The complexities include discrete features, barometric pumping and emanation, among other things. The low level waste EIS did not include radon.

The next issue that we'll cover is uranium geochemistry. The observed uranium concentrations and transport rates vary widely. They're dependent on site specific conditions. The good thing about it is we have a lot of data all throughout the U.S. of uranium, and I think that data can be taken into consideration when people try to do their individual assessments, modeling, et cetera.

We heard information at the low level waste forum in the previous two days about all that EPA is doing to look at the impacts of uranium in the environment, in particular, on the Navajo Nation, and it looks like that they've been collecting a lot of data about uranium and their impacts to people.

The uranium is relatively mobile under humid and oxidizing conditions. It's fairly immobile under reducing conditions. So that's a key consideration for uranium geochemistry. It is available for transport under arid conditions, but the availability of water can result in long transport times.

So there's a natural analog site for uranium in the environment at Pena Blanca in Mexico, which is a pretty arid site, and that deposit has been dated at, I think, between two to eight million years, something like that, and it's a fairly near surface deposit of uranium and hasn't moved very much in that period of time.

So we need to consider natural analogs when we're talking about uranium and disposal along large quantities of uranium.

One of the other sessions we'll have is going to be on scenarios and receptors. Institutional controls are required for these low level waste sites for up to 100 years.

Now, that doesn't maybe buy you a lot for very long-lived material, but it certainly buys you an awful lot with protecting the current generation and the immediate generations that follow. The implication is that the risk to them should be very, very small.

Multiple scenarios for land use are normally considered. We talked some about that with respect to intruders. We get a lot of comments on scenarios and receptors and scenarios, and scenarios and receptors can be key inputs to assessment of the impacts of these types of decisions.

Normal public exposures we evaluate near but not on the disposal facility. We're open for comment on whether that's appropriate or not. Unanticipated public exposures are termed "intruders." They're evaluated on the disposal facility, and they can take a variety of different forms.

The limiting scenarios usually involve residential, agricultural practices. Those are because you're using a lot of pathways and spending a lot of time there. So if you use less pathways and spend less time, you get less impact.

Period of performance is probably everyone's favorite. I know it's mine. Our low level waste regulations do not provide a value for period of performance. It's open to interpretation, and outside of Yucca Mountain a period of performance longer than 10,000 years has not been applied in the U.S. to any waste disposal problem, and I would say we work in the nuclear field. We work on nuclear waste problems and disposal. We don't have a lot of opportunity to think outside the box, but we do have disposal of industrial metals that occurs in the United States and all over the world.

In some countries they do consider very long impacts, but I don't believe that is the case in the United States when they make those disposal decisions.

There is not an international consensus on this though. I have a good report from the NEA that just came out. I can give anybody the reference if they want, where they talk about period of performance and how you go about selecting one and the considerations that you make, and it's really a decision about the obligations of society today to protect future obligations and how much effort you should put into that and how much expense. It's the bottom line of period of performance.

Our analyses, it provides a basic description. The SECY paper provides a basic description of assessment and assumptions. I know we get a lot of comments about, well, can we have the calculation; we want the calculation, and I don't have any problem with that whatsoever. The calculation fully supports the objectives that we used it for for this analyses.

But what I would not want or I do not like is that I know it will probably be misused to support one case or another, and the cases you want to make about the suitability of disposal should be made by your own merits, and that's my only apprehension about the analysis that was done in the SECY whether we distribute that model or not.

I feel it should be our objective to provide all of the information possible for our decision making processes, and so for our rulemaking that will absolutely be true. The analysis that we did was not intended to replace a site specific evaluation. All future calculations supporting the proposed regulations will be fully documented and will be provided for stakeholder review and comment.

The basic inclusion overall from our analyses was that we needed to change our rule to address unique waste streams.

MR. CAMERON: Thank you. Thank you, Dave. Great overview, and this last part was like a preview of what's to come.

So I would just ask you to limit this to any questions you might have, and those things fall in the well.

MR. THATCHER: Does that still count?

MR. CAMERON: Yeah.

MR. THATCHER: I wanted two for the parking lot if we could.

MR. CAMERON: Okay.

MR. THATCHER: And I think for the group I think it's important to cover a little more detail about what really are oxidizing and reducing conditions so everyone really understands what we're talking about. I think that would be helpful.

And then make sure we do talk about -- I know we will. It's probably tomorrow on time lines, et cetera -- there are some standards. In fact, I've got the IAEA guidance right here. We should talk about some of that. So --

MR. ESH: Good. Thanks.

MR. CAMERON: Okay. Thanks, Drew.

Any other questions around the table? Marty.

MR. LETOURNEAU: I think this is also a parking lot issue. Back on your second slide you had indicated that the low level waste EIS did not include radon, but clearly in your screening analysis we did include radon, and I think we ought to address on the parking lot to what extent does the whole pathway dose or total effective dose equivalent include or exclude radon.

MR. ESH: Yeah, agreed. We included it. We talk about like the modeling and the science about radon, but an issue is whether you include it in the total dose limit or not and, if not, what other standard you may apply for it.

MR. CAMERON: Okay, great. Thank you.

And Beatrice.

MS. BRAILSFORD: This is a question that I'll need to have answered before we have specific discussions. So maybe it's now or maybe it's after lunch or whatever.

MR. CAMERON: Good, good.

MS. BRAILSFORD: Could you explain the differing ramifications of whether or not a specific piece is in the rule or in the guidance?

MR. ESH: Yeah, sure. If something is in the regulation, then you don't have much flexibility in interpreting it. It's a requirement that you have to meet. Whereas if we put something in guidance, it's just that. It's guidance. Somebody can follow it or not. They can do a different approach. They can justify a different approach.

So maybe I've said the wrong thing.

(Laughter.)

MR. ESH: Go ahead. Be more specific.

MS. BRAILSFORD: Well, a follow-on to what Dave said is what are the opportunities for public input on rules and guidance.

MR. CAMERON: Okay. That's --

MR. ESH: Do you want to do that, Chris?

MR. CAMERON: Yeah, that was an issue that sort of came up indirectly about how do you comment on guidance, and, Chris, do you want to talk to that?

MR. McKENNEY: I wanted to talk about this in the whole thing. First of all, we're going to get into this in a slide bar of the most confusing topic to most people, which is compatibility.

MR. CAMERON: Speak up.

MR. McKENNEY: Sorry. I'll move forward.

I want to talk about there's one of the big defining ones is between rules and guidance, is the issue between the requirements on compatibility with the agreement states. If something is in a rule, then we'll have to figure out do the agreement states need to have that exactly worded in their rules or have something similar put in their rules that meets the same intent?

And then we have our own review process of the rules, and of course, everybody's rulemaking process has public input into various levels of it, of how you have to go about doing the rulemaking process.

If things get put in guidance, guidance does not have to be followed directly by the agreement states, and so there is that whole part of whether it goes into rules or guidance. As Dave said also, depending on how you write the rules and guidance, the level of flexibility in how you want to do something on a site specific basis may influence how you want to put it in because if you wanted to put in all of the specific parameters, say, for an intruder analysis, thou shalt do an intruder analysis that looks at A, B, C, D, E and F; well, are A, B, C, D, E and F appropriate to do for every site around the country?

Now, if some of those are, those might be in the rule, but if some of them are more related to that can be justified as appropriate or inappropriate for a site, you may want to put that in guidance, and you might have a criteria still in the rule that says you must do intruder analyses, and then have some of those specifics about how to do an intruder analysis in the guidance that develops it.

MR. CAMERON: And the public comment on regulatory guidance?

MR. McKENNEY: Regulatory guidance goes out for public review also. We put that out for public review in draft form and then have a process that goes through that to deal with comments and to go back into a final form, and then those also can be revised over time as we get more and more comments about their use.

MS. BRAILSFORD: Are there any enforceability issues?

MR. McKENNEY: Again, guidance issues are usually viewed -- they're not rules. So they're viewed as not having enforceability from the point of view unless the licensee makes, in the case of the licensee versus the state or the NRC, is if the licensee makes a commitment to follow it.

If they say, "We shall do our actions as set in this guidance document by the methods set in this guidance document," then they've got to do it by the guidance document. But when they're coming in to say, "We're trying to meet the standard. You have this guidance document that meets that standard, that shows a method to meet that standard. Well, we have an alternate method and we can show how it's just a as protective as the method you put in your regulatory guidance," then they don't have to meet the regulatory guidance if we agree that that alternate method is just as protective.

MR. CAMERON: But it usually adds time to the review.

MR. McKENNEY: That adds to the review and everything else, but it is.

MR. CAMERON: And the very, very important question, Beatrice, that we'll get into more discussion of, but let me ask Larry to just say one thing on it.

Larry.

MR. CAMPER: Thank you, Chip. Thank you, Beatrice, for the question.

I want to draw a couple distinctions here. Earlier we were talking about the technical basis for the rules, rates for impact analysis, and we were kind of mixing that in one point of our discussion with guidance, two separate things. Okay?

When we publish a rule for comment, there is a discussion that takes place as to how the contents of the rule are arrived at. I mean, the public has the opportunity to see that when they choose to comment on the proposed rule.

Now, this issue of guidance is a different things. The guidance as Chris is pointing out, our rules say do, in this case conduct a performance assessment. It has a period of performance, some number, perhaps do the following things. The guidance is about how to implement the rule. The rules are skeletal in nature by design because if they weren't they would be voluminous because the devil is in the details, as the saying goes. How do you do this?

Oftentimes we'll publish guidance with a proposed rule. We try to do that. We don't always do that. We will put out guidance for comment or we might not put it out for comment; don't have to, but there has been a general trend to try to put it out for comment for the obvious reasons that you have on your mind.

The other thing is I would point out when we deal with guidance, we have a lot of flexibility as to how we go about that. I mean, for example, we could put a guidance document out on how to implement this rule and just invite comment. We might choose to have a workshop on it and talk about it in the public forum.

We're working currently to revise the branch technical position on concentration averaging. We intend to hold a public workshop next year to discuss that, and generally what drives us to do that is the degree and nature of interest in a given subject.

So there's a lot of flexibility as to how we go about getting the guidance out, but certainly a driver is to have maximal opportunity for input.

MR. CAMERON: Okay. Good. Thank you. Thank you, Larry.

And just as a process point, we're going to try to do the tee-off on significant quantities and sort of a summary of what the discussion was in Bethesda, see how much discussion there is on that before lunch. I know that some people in the audience may have a question about some of the things that they heard. We'll do that quickly before lunch.

We were going to wait for -- the gentleman who gave a comment that would have ordinarily been reserved for the public comment period, we were going to hold those until the end of tomorrow, but what I think we'll do is we'll have a session at the end of today where people who are here today can offer that type of public comment.

Okay. Beatrice, did you have one more question?

MS. BRAILSFORD: Well, I just wanted to ask Larry is it NRC's intention in this case to publish the rules and guidance together.

MR. CAMERON: And I'm not sure the NRC has made that decision yet, but let's see if we can get a quick answer.

MR. CAMPER: That's the correct answer. No, we have not made that decision yet. I think to a large degree that decision could come out of the kinds of things we are hearing during these public workshops.

As I say, there's been a tendency in the agency over the last few years to try to put the guidance out at the same time, and on certain things when you're looking at things like Part 20, for example, which is the standards for radiation protection, there's this need to get the guidance out at the same time.

But it's variable, but what we're hearing factors into that.

MR. CAMERON: Tom, do you have something before we go to -- okay.

We're going to tee up the definition of "significant quantities" discussion, and we'll see how long that is going to go and then we'll decide when to break for lunch.

David.

MR. ESH: Okay. For each of these sessions the NRC staff gives a brief introduction to the topic, and then we have an open discussion about the topic. We did this at the last workshop, and in this area I think there was at least a loose consensus that we did not necessarily need to define the significant quantities of depleted uranium, but yet that would be determined by the site specific analysis which is done.

We did have some other views expressed that you should consider identifying a lower level, which would not kick you into needing to do the requirements of the unique waste stream disposal requirements that may be generated.

So I'll go over background, significance level, and methods to determine significance, and then we can have an open discussion on it, and how long you talk will determine whether you get hot or cold food, I suppose.

Insignificant quantities, development of 10 CFR Part 61 considered uranium. The quantities were limited. I talked about these in the previous presentation. If you take these numbers and you assume that the uranium is homogeneously distributed in this volume, you end up with something like 30 parts per million uranium, depending on the density.

If you said, okay, instead I'm going to look at a concentrated source, you get something on the order like 90 55-gallon drums.

So in terms of defining significance, we at least have one point of data where somebody thought something was insignificant. At least NRC thought something was insignificant. They decided there was no need for waste classification limits for uranium based on the limited quantities expected. That's these sorts of numbers, and what I would note is that risk is a strong function of quantity and concentration, or can be.

So we have certainly a much larger number now. We think it's not insignificant, but where you draw this line between significance and insignificance could have implications for a lot of people. I would say there's a big difference between disposing of large quantities of concentrated depleted uranium generated, say, from enrichment facilities and disposing of contaminated piping from maybe decommissioning of one of those enrichment facilities. They can have quite a bit different levels of concentration of material in them, and they have different risk implications.

So methods to determine significance, what could we do? We can look at historical values like that point that I gave there. We could do something like compare the local background. So would you want to limit your disposal facility to a uranium value that is less than in the natural environment? That might be a tough thing for the disposal facility to meet.

And then regardless of how we define significance, if we did, we could do it a couple of different ways. We could define it in regulation based on, say, okay, you could use a calculational procedure to determine whether it's significant or not, or we could do what has been done in a variety of waste areas, which is more by where it comes from or how it's defined.

There are pros and cons to each of these approaches, and that's what we want to get input on from the people at the table here. So you can define it in regulation. You could allow somebody to do an analysis and to justify whether they're in the significance category or not. There are lots of things you can do.

So we're seeking your feedback on the considerations that we should have for defining whether it's significant or not. What factors should we consider and what approaches should we consider?

I think to be fair to the discussion last time, there was a general consensus that if you're going to have to do a site specific performance assessment, then that's going to determine whether you have a significant quantity or not, but I did hear the opposing view, which was you may be applying these requirements for a large quantity situation which don't make a lot of sense if you have very low concentrations.

MR. CAMERON: Well, that was the so-called de minimis or whatever.

MR. ESH: Yes.

MR. CAMERON: That was what you referred to earlier.

MR. ESH: If all we were dealing with were low concentrations, such as like the numbers I had on that second slide, that was already covered in the NRC's EIS and the Part 61 analyses.

MR. CAMERON: Okay. Thank you for that tee-up, Dave.

And let me go to Tom. Tom Magette.

MR. MAGETTE: Thanks, Chip.

I would suggest that you don't need a threshold. The reason for that is, as we talked about in Maryland, that if you look at the numbers that have come up so far, if you take the 90 55-gallon drums, for example, that David just referenced, that would be on the order of five or six times. If you look at SECY 080147 had a number of one to nine times, might be a level of below significance.

So there are a lot of numbers floating around, but they're all really small in the context of disposing of depleted uranium from an enrichment process. So if you're going to be disposing of that waste, you're going to easily exceed any of the thresholds that I've seen mentioned or that I would think should be mentioned.

So it seems to me that you're going to be in the position, presuming that the NRC goes forward as I think we are expecting them to with a new 61.55(a)(9) that requires a performance assessment, of having to do a performance assessment if you're taking any quantities of depleted uranium of any significance, and I think if you try to set a threshold, you're going to spend a lot of time doing it. The NRC is going to spend a lot of time. The public is going to spend a lot of time. You're going to have to justify it. It's going to be a lot of technical work, which frankly I think is simply not merited.

So I say you don't need a lower limit. Now, the view that David mentioned that was expressed at the other workshop, Bill Dornsife, WCS, offered a slightly different view. Amazingly, Bill and I were not in complete agreement, but I also have a lot of sympathy for his view, and I wouldn't argue strenuously against his view.

He made the point, which is completely accurate, that we get lots of waste that is manifested depleted uranium, and David used a good example of a decommissioning waste from an old enrichment plant for example. We get a lot of waste not just from DOE, but from other NRC licensees that is manifested to include depleted uranium, not in, you know, large quantities, not drums of U-308 or, for that matter, uranium hexofluoride or some other form, but some content of depleted uranium.

So if you suggest that that merits the same level of analysis, I think that probably is incorrect and not necessary. The bottom line is though I still don't think anybody is going to be excused, so to speak, from performing a site specific performance assessment because we're all taking levels of depleted uranium that would exceed whatever threshold you put in place.

So, therefore, I see no reason for a minimum threshold in either the rule or the guidance.

MR. CAMERON: And on the other end, on the larger issue, so to speak of whether the NRC needed to define significant quantities at all, as Dave indicated, people -- he called it a loose consensus -- people thought that the requirement to do a site specific performance assessment would obviate the need to try to define a significant quantity. I don't know if you want to comment on that.

MR. MAGETTE: I think that's true. I think there was complete agreement on the point, actually even with Bill, and Bill was expressing his concern relative to a slightly different problem, which is that if there's going to be some sort of prohibition in the interim, as long as it's there at all, and maybe, Susan, you can speak to this in Texas, that that would have a far-reaching implications beyond enrichment streams.

But I don't think anybody disagreed with the notion that a threshold was essentially going to be exceeded by any disposal site and that, you know, we'd spend a lot of time trying to define something that wouldn't be useful.

MR. CAMERON: Okay.

MR. ESH: My thought along these lines was this, that, say, hypothetically you came out with a period of performance of a million years, okay, and then you had a waste stream that wasn't a concentrated uranium waste stream, but was a diluted uranium waste stream of three or five parts per million or something like that. Would you want a disposal facility that's taking that sort of waste stream to do a million-year analysis when that's the same amount of uranium that's in the environment surrounding that waste facility?

So I think like that's my concern. I think we have to try to think of the law of unintended consequences and how it may apply whenever we set these requirements or make the decisions.

MR. CAMERON: Okay. Let me get a viewpoint from Beatrice on this, and then let's go to Scott, Marty.

Beatrice.

MS. BRAILSFORD: I guess if you could just explain to me. David, sometimes you're saying "quantity" and this says "quantity" and sometimes you're saying "concentration." You know, there is no amount of spent nuclear fuel that is not significant, right? Quantity, not just concentration, but quantity.

So if you could explain why you're approaching this differently or why did you ask yourselves this question?

MR. ESH: I think the answer is especially in this circumstance, there can be a difference. I speak both quantity and concentration. I mix them interchangeably, but the product of them is what can drive risk. Okay?

So if you have a very large quantity of very low concentration material, that may not cause you a problem, but if you have a large quantity of moderate concentration, that could cause you just as much problem for one of your performance objectives as a much smaller quantity of very concentrated material could.

So I mix them interchangeably, but it's related to what material you would have and how it would be disposed of.

PARTICIPANT: (Speaking from an unmiked location.)

MR. ESH: Yes. What was done in the Part 61 analyses is they basically hard wired a volume. Okay? So they said, "We're going to have a volume of material that goes into a disposal facility, and it's going to have these radiological characteristics.

That's one approach to handle this problem of trying to define what sort of concentrations you may be able to accept at a disposal facility, but the alternative approach is you don't impose a volume, hard wiring, or even a regulatory analysis on what the value may be, but you allow it to be determined on the merits of its own individual cases.

I mean, I think Marty Letourneau could talk to that what's DOE does, for their disposal facilities. They look at what can my disposal facility accept, and then develop inventory limits and waste acceptance criteria for that particular facility.

The problem is we have a system in place that has concentrations and it has the hard wired volume associated with those concentrations, but that doesn't mean we necessarily have to keep using that approach. And so when I mix them, it's because of those issues.

MR. CAMERON: Okay. Thank you.

Let's go to Scott and then to Marty. Scott.

MR. KIRK: Thank you.

David, I agree with you. I think the way that it was handled by WCS in our license application the end result was I think we looked at ten different waste streams, nine of which were now in our application, and there was a threshold that was applied. I believe it was ten nanocuries per gram, and I think the total volume limits that we had in our license application was about 10,000 cubic meters.

Now, we have to containerize our waste. I believe it's disposed of at a depth of about ten meters. So since it is containerized, it does have an intruder barrier, but it also has an additional intruder barrier to it. So that was a way that we addressed it.

But it was also recognized that because this issue is controversial, because it is undergoing a rulemaking, that maybe nobody should get too far ahead of the NRC. So those limitations were placed on the license.

MR. CAMERON: Thank you.

And Marty.

MR. LETOURNEAU: Yeah, I guess what I was planning to say was a little bit redundant of what Scott just said, but it was to go back to what David was saying about the situation where you have a waste, whether by volume or concentration; you have something that approaches what has been identified as insignificant. It's not unreasonable to expect that there could be a very conservative lower level limit and possibly a very concerted screening type analysis that could be applied to a situation like that to say, yeah, this clearly falls to the lower end and doesn't require the additional analysis.

MR. CAMERON: Go ahead, Scott.

MR. KIRK: The other thing I didn't add though is that at least our license application in Texas has a unique role in the fact that there is a 1,000-year performance period, but they also require considerations of peak dose.

So I think the time period of consideration that was evaluated for our site was -- I believe I'm correct -- it's about 36,000 years into the future, the point being that you can demonstrate that these waste streams at least at certain concentrations are safe well into the future, and that has been demonstrated at least in our license application that was approved finally a few weeks ago.

MR. CAMERON: Okay. Thanks.

Let's go to Susan. Susan.

MS. JABLONSKI: I just felt the need to maybe make a little bit of clarification, and what Scott had said about the license is generally correct, but we were faced with this issue both on the front end, for what the period of performance, being that our rulemaking happened -- I'm sorry?

PARTICIPANT: We can't hear you.

MS. JABLONSKI: I will.

We were faced with the issue of period of performance before this issue arose, and I think it had to do with our timing of when the rule change happened in Texas in 2003. We went through a rulemaking with extensive comments from the public, the licensee, policy makers about what was appropriate in the framework.

And so I'm interested to hear, you know, what is happening in D.C. based on our experience was that this was an issue that really drove some differences in our rules from the guidance document at NRC, the period of performance. I mean, if you look at our rules right now, they look different, looking at peak dose, and Scott mentioned time frames, and it has raised some other conditions in the license to actually look at performance assessment in more robust ways to address some of the requirements of our rules that go into a longer period of performance.

And so that's another feature of this, is we're asking Waste Control to revisit all of that before they would take waste again to try to get at this period of performance issue in a way that the application has not to date.

So we're also watching very closely how this might impact rules we already have in place across the board for period of performance, and not only in looking at these incidental waste streams, but other waste steams that have long-lived radionuclides because we have a requirement to look at peak dose.

So rather than just a guidance or a policy, and I believe DOE is using that for their internal discussions, they're looking at peak dose; it's actually a regulatory requirement for us. So that's definitely a part of it. What we're dealing with in the interim, as Scott mentioned, you know, we've made a prohibition for specific waste streams that are tied to these larger quantities that would be in deconversion, conversion, actually enrichment processes.

But we recognize that there are these other waste streams that fall in this loose definition of what insignificant might be.

We have added a container requirement to that as an additional requirement, that it wouldn't be loose material coming in, and again, this revisit to performance assessment to really look at peak dose which would include those insignificant quantities across the board that are already in the proposal.

So you know, we're in the middle somewhere, I think, of where this is headed and kind of what our friends in other states have already had to deal with.

MR. CAMERON: Okay. Thank you, Susan.

Just to check in with everybody on this, you've heard what transpired at the last workshop. You've heard some different approaches to these issues. You may not feel that you have enough information to have an opinion on this yet, and that's why there is a written public comment period, but based on what you've heard so far, does anybody have a strong disagreement with the general agreement or the agreement that -- not agreement, but consensus, whatever we want to call it -- that occurred at the Bethesda workshop that significant quantities do not have to be define. It should be taken care of and it will be taken care of in a performance assessment or this other question about threshold quantities.

And I want to explore that issue with all of you. Why don't we go to David, and then we'll go to Christopher?

David.

MR. KOCHER: To go back to the first comment I made this morning about the problem here is really the intruder business because every site has to do a performance assessment for whatever waste comes in the door for an off-site member of the public, and I'm not a regulator and I've never been in that seat, but I think what NRC is thinking about here and what they probably need is that they need some kind of statement in their regulation that triggers a look-see at unusual waste.

It may not have to be a number. The significance here is clearly with respect to meeting performance objectives, and so you might say if a new and unusual waste could change my projected dose to an off-site member of the public or an inadvertent intruder by ten percent or 50 percent or some number, I think as a regulator you really probably are going to want something that triggers a look-see at something that's not routinely take into account in the waste classification tables.

I don't know how to do it, but I don't suspect that you can really ignore this totally in writing a rule.

MR. CAMERON: Christopher, let's go to you. I saw you nodding affirmatively listening to David.

MR. THOMAS: Well, there's something kind of circular here. I mean, it's like before, because of this little reading of the regulations, any amount of depleted uranium has been considered class A waste, right? And then we had this realization, oh, my gosh, large, significant amounts were not considered. In other words, only small amounts were considered previously. Therefore, we want to take a look at that and do something a little bit different.

In order to do something, David, like I was thinking you were proposing, you'd already have to have done the analysis. In other words, to say that this doses would be affected by X percent, that would require already having done a performance assessment, and yet you need a trigger to trigger the performance assessment.

So to me that's why that's kind of circular, and so I kind of agree with the idea that, yeah, there should be a trigger. It should be specified that once you exceed a certain amount, however you want to define that, of depleted uranium, yes, at that point the licensee or whomever, there should be an analysis that will take into consideration -- and I think it should be cumulative, too. I mean that's another thing that has been addressed in some other areas, but I haven't heard it yet here, but you know, there's cumulative amounts of depleted uranium. In other words, it's not a shipment-by-shipment calculation. It's a total overall amount.

So, you know, that's an interesting thing to me, too. You know, at some point is it reasonable to assume that any site, even if they're accepting large amounts of low concentration, that they will eventually reasonably go into the significant range?

MR. CAMERON: And let me ask a clarifying question for the group in terms of this trigger question, and I may have gotten this wrong from what I heard at the Bethesda workshop, but what I heard there was there would be a site specific performance analysis or assessment required for the disposal of depleted uranium.

In other words, the trigger was going to be the disposal of depleted uranium. That's what would trigger doing the performance assessment, and we're going to go to everybody around the table who has a card up, but let me just check in with Tom Magette in terms of this trigger issue.

How would you respond to Christopher's and others' comments on the trigger?

MR. MAGETTE: I think Christopher raises a very good point, and it's one that I raised before, too, and it's why I say essentially that the trigger as you just defined it, Chip, is the disposal of depleted uranium because the cumulative aspect is import, and if you're going to make some sort of judgment -- David, this goes a little bit to your point -- that when you're below that threshold, then do you have to go write a regulation that somehow requires you to account for that on a cumulative basis? Because that's not there either.

So I don't think it's okay just to accept certain concentrations over a large volume without some other threshold being imposed, and then this gets to another issue. This gets to the notion of the rule.

As I have said before -- and we haven't gotten to this yet -- I think the rule should be very simple. I think this is a very short rule, and that a lot of what we're going to talk about, have talked about before belongs in guidance, but that what I envision is the idea wording in the 61.55(a)(9) is nota voluminous rule at all, and so then you start getting into Larry's comment about once you start down this path of starting to apply all these different triggers and what this then means. Then you do start to get to a rule that is unnecessarily complicated.

So I keep getting backed into this every time I try to think through what is this threshold, and you bump into the difference between a concentration and a volume or a mass when you do that as well, to go to your earlier comments, David.

So I think the appropriate trigger is the disposal of the depleted uranium, and, David, you raised the issue that we're going to have another entirely focused session on "and other stuff." I don't think we need to talk about that yet.

So I think the trigger here is disposal of depleted uranium.

MR. CAMERON: Okay, and thank you, Tom.

I'm going to go to Larry and then we'll hear from Marty and Scott. And then I want to go back and ask Christopher what he thinks about the trigger being -- if you're going to dispose of it, you do the analysis, and then that analysis has to take into account any potential cumulative impacts, is the way I'm hearing it.

Larry.

MR. CAMPER: This is good, and I think you've kind of come to where the -- why did the staff even have this on its mind, and I think we were driven by this question of is there a graded approach that could be brought to bear requiring a site specific performance assessment. Is there a trigger, whether that trigger be in Curies per cubic meter or total number of cubic meters disposed or metric tons?

That's what was on our mind, but what we heard very clearly during the panel in Maryland, and it's being discussed now is, look, in the final analysis since it's so dependent upon the characteristics of the site, it's irrelevant to pick a number because the site performance assessment itself will be the driver, and therefore you don't need to ponder a trigger other than the disposal of depleted uranium, if you will, as Tom just said.

But that's why we asked the question.

MR. CAMERON: Great, and let me go to Marty and then Scott and then check back in with Christopher.

MR. LETOURNEAU: I was resisting Dave's invitation for me to talk about what DOE does, but since Christopher brought it back up and it's becoming pertinent, I want to take Dave up on the invitation and just address one way that it can be done, and I'm not suggesting this is the way, but this is the way that the Department of Energy implements it.

Yes, we have to have a site specific, radionuclide specific, facility specific performance assessment first, and based on that performance assessment, we look at every radionuclide, and we develop limits for each one of those radionuclides.

And that limit then tells us, based on that performance assessment what the theoretical limit is of each of these specific radionuclides that you could take in that facility, what concentration.

So then we set a waste acceptance criteria that is some fraction below that. We don't use the full theoretical limit that's in the PA. We use some fraction of that as what we're actually going to accept.

And then we take some fraction of that waste acceptance criteria that we use as a trigger, which will tell us do I need to do more analysis when this thing comes in the door.

What we then do is we keep track of everything that's coming in. It's like a budget. So on an annual basis we look at what we actually received, and we can compare it against what was actually in the PA, and we keep track of that over time as a measure of whether we're staying within the bounds of what the PA identified.

So what happens is a waste form, a waste stream will come along with a different radionuclide in it or a concentration that was higher than what you set your waste acceptance criteria at, and that triggers doing a special analysis. So we go back to the performance assessment, and now we include this new information plus the real information that we've been collecting over time, and we can look and see whether we're still within the performance objectives.

So, again, this is just one way of doing it. I'm not suggesting that that is the way of doing it.

MR. CAMERON: And Scott. Thank you, Marty.

MR. KIRK: This is probably easier.

I would agree with what Larry said. We do need to handle it in a gradient manner, and I would go further to say should we risk inform, and what I was getting at, it sort of goes to what you were saying about the cumulative effects. You know, once you run up again a threshold, you know, before we've only been looking at the period of performance being a 500, 1,000-year time period, but once you exceed that threshold and you risk inform it and, say, maybe it's ten nanocuries per gram or whatever it is, that you've recognized a need that maybe you need additional intruder barriers or additional containerization or that the performance period needs to be longer. You're not looking at 1,000 years, but maybe 10,000 years or whatever it could be.

But my own thought is that the rule should be risk informed, and that it should be graded, and it should be able to have different periods of performance.

MR. CAMERON: And bring that different periods of performance back up again when we get to that particular area.

What I'm going to suggest is we hear any perspectives that Christopher has based on what he's heard and then we're going to go quickly up to anybody in the audience who has a question about either Dave Esh's presentation or this particular issues; break for lunch; we'll come back, and if we need to discuss significant quantities anymore, we'll do that.

Christopher.

MR. THOMAS: Thank you.

I feel comfortable with the notion that disposal of any amount of depleted uranium would require a site specific performance analysis. I guess I differ probably with Tom in that I don't see this necessarily being a simple rule. I mean, one of the things I'm really concerned about is insuring that the analysis is done in such a way that it is most protective of the public, and to me when there are those exposure limits and there are laws that say an inadvertent intruder shall be protected when they come into direct contact with the waste, I believe that should be followed. I don't think that an on-site intruder scenario should be allowed to be discarded because it seems unlikely. I mean, that's the whole point.

So I guess where I think we differ is that if the trigger is disposal of any amount of depleted uranium, I think that's super, and I think the performance analysis done should have very, very hard and fast requirements that are most protective of the public, including an on-site intruder scenario in direct contact with the waste sine that is in our state law, and I believe it's also in federal law.

MR. CAMERON: Okay. Thank you, Christopher for that, and I think we all heard Christopher's view on the trigger, this idea of guidance versus rule.

When we come back after lunch, I'm going to ask our OGC representatives to just give us another reprise, so to speak, on guidance versus rule, and as Chris McKenney pointed out, there's all sorts of considerations that go into what you want to have in the text of a rule versus guidance, including the flexibility to have to change things that you need to change because going through a rulemaking can be -- where did I hear this? -- the rocky road of rulemaking. Where did I hear that phrase recently?

But it can be a rocky road, and so let's have a discussion, not only the specific issues, but of this rule versus guidance idea. And while I'm going out to the audience, Drew.

MR. THATCHER: I think you just hit it. I thought what Christopher had said bears further discussion probably tomorrow or something like that because to me it doesn't work at all to say you will consider that the intruder impact accesses the waste because there are many instances, depending on the waste classification and time frame where they simply couldn't under credible circumstances access the waste. So you have to look at it. There's more details than just saying you've got to do this.

MR. CAMERON: Yeah, and maybe what we should do is discuss some of these individual topics, and then we would have a better sense tomorrow perhaps to have the rule versus guidance discussion, specifically after we see what all of these types of details are.

But I still would like perhaps Tison or Lisa to talk to us about rule versus guidance.

Larry.

MR. CAMPER: (Speaking from an unmiked location.

MR. CAMERON: Well, not when lunch is out there.

MR. CAMPER: I'm sorry. You know, we're discussing a rulemaking that would require site specific performance assessment, but some things are coming up along the way, and you might need to make certain corollary or corresponding changes to other parts of Part 61 as you did that.

For example, what I'm hearing here is if one goes and looks today and 61.42, which is the protection of individuals from inadvertent intrusion, what you don't find is a dose limit.

Now, in the intruder analysis that was done when the rule was put in place, the dose limit driving was 500 millirem, nor is there a period of performance in Part 61. So as the panel ponders this, I mean, if you are struck by the fact that, okay, if you modify 61.55(a)(6) to add a nine that requires a site specific performance assessment, if you identify other things that warrant a corollary change, it would be valuable to point that out so that the staff can go back and ponder that.

Thank you.

MR. CAMERON: Thank you very much, Larry.

Real quick, Chris.

MR. McKENNEY: I just wanted to point out two things. One is we've been discussing a lot about exposure scenarios. We'll do that later this afternoon in a full session of that, and of course, on the corollary we are talking about unique -- right now we're focusing today a lot on DU specifically, and then tomorrow we're going to roll back into, well, does the same rules apply that we wanted to do for DU apply for other unique waste streams, which goes to Dave Kocher's point.

And also I wanted to point out that actually in the draft rule for Part 61, the intruder limit was there, and it was taken out in the final.

MR. CAMERON: Okay. Thank you. Thank you all very much.

Marty, did you have your card up from before or did you --

MR. LETOURNEAU: No, this is actually relative to this topic, and it was the point that I often like to make, and it's somewhat provocative, and we can talk about it later during the exposure scenarios, but it's related to Larry's point, which is the intruder scenario does not protect intruders. The intruder scenario was simply a piece of analysis that was used in the EIS as a basis for developing the classification system, and in fact, it is a cartoon analysis. It assumes that somebody is going to intrude.

And this has been, I think, as Drew just stated, there are situations where that may not be appropriate. So what we do to protect the intruder to meet the 10 CFR 61 requirements does not necessarily mean an intruder scenario.

And when we start doing intruder scenarios, we really ought to be clear about why we're doing them and what purpose we intend to gain from doing that analysis.

MR. CAMERON: Okay. Thank you. Thank you.

And we will get to a specific discussion of that. Audience, comments? And please introduce yourself.

MR. GREEVES: John GrEeves with Talisman International.

Just an observation, Chip and all of you. I think you have an opportunity here in your parking lot to try and capture what this group thinks belongs in a rule versus guidance, and you're going to have to do it eventually. So at the end of tomorrow I'd like to understand what people think needs to go in a rule versus guidance.

I've learned a lot in these meetings, and I would assert that the current rule requires a performance assessment. It requires it at the application. It requires it at an update stage. It requires it at a closure stage, and what we're struggling with is we're finding what I call an unreviewed safety question that occurs here, and the only way you really answer that is with a performance assessment.

Unfortunately, Part 61 is not specific about that. You look in 61.13. It calls for a technical analysis. Unfortunately, it only calls for a technical analysis for the public. You go to another section in 61.13, and it talks about intruder, but it talks about meeting the classification system.

So there are a few spots in this rule, I would assert, that should be addressed, and I think it would be useful at the end of tomorrow to see if there's any consensus. Which of these things you're talking about today, is there a consensus that ought to go into the rule versus in the guidance, and so on?

Anyhow, I would just offer that, I would look forward to maybe seeing some of that tomorrow.

MR. CAMERON: Okay. Thank you, John, and we will do that, and I think that discussion it seems logically fits perhaps tomorrow after we've had discussion of some of the substantive issues. We will put that on the agenda.

Yes.

MS. DIAZ: Hi. I'm Angelique Diaz, an engineer with the U.S. EPA Region 8 Denver office, and I'm not sure if this is something that would be covered tomorrow during the uranium geochemistry modeling discussion, but it seems like a lot of what we're talking about, a really important piece of it is how the performance assessment is conducted, and I wanted to ask about the use of KDs in modeling the behavior of depleted uranium or whatever radionuclide is being modeled.

And the reason is one of the things you said was that's a gross simplification, which I think most people that know about KDs would agree with, and in your Slide No. 10, the KDs that are shown are from the 1990 article, and there's been a lot of research between then and now on the effects of some other geochemical or biogeochemical parameters. You mentioned oxidation state, but also there's colloid facilitated transport, natural organic matter, and things like that.

So I just wanted to know what the NRC is doing about that, if there's a range of KDs that need to be modeled for the performance assessment or how that's going to be handled.

MR. CAMERON: And KDs are?

MS. DIAZ: Distribution coefficients for concentration in the soil versus in the water.

MR. CAMERON: Thank you. Thank you, Angela.

Dave or Christopher?

MR. GROSSMAN: I'll just take a second to respond to that. We will be talking about uranium geochemistry in a session tomorrow. The session will focus on some of the factors.

I'm sorry. Can you hear me? I'll scoot as close as I can. Thanks, Dave.

We do have a session tomorrow on uranium geochemistry, and we'll be talking about some of the factors that our analysis pointed to that should be considered in a site specific analysis, and I think that in conducting a site specific analysis the NRC typically has taken a position that a licensee would need to demonstrate whatever values are appropriate for their site, and so they would need to have support for those values and a basis for those.

MR. CAMERON: Okay. Thank you.

Yes, ma'am.

MS. FRANKLIN: My name is Naomi Franklin.

I would like to have a better grasp of the quantity of DU which is in question. How much is in the present waste pile, how much you anticipate in the future stream.

MR. CAMERON: Can we just give her a summary of what you had in the slide?

MR. ESH: Yeah, I believe that I'd say the Clive facility in Utah has roughly 47,000 metric tons of depleted uranium in it now. In the near future the shipments from Savannah River that could potentially be coming this month or in the near term, the 14,800 drums I believe it was, it converts into 14,000 metric tons? Ten, point eight, 10.8 metric tons would be the --

PARTICIPANT: Ten thousand eight hundred.

MR. ESH: Oh, sorry. Ten thousand eight

hundred, yeah. That would be the next immediate batch of material. Then in the long term operation of the enrichment facilities, et cetera, it would be much larger than that, potentially up to 700,000 metric tons from DOE and another four or 500,000 metric tons from other sources.

So potentially over a million metric tons in the long term, but right now it's on the order of 50,000 metric tons.

MR. CAMERON: Okay.

MR. ESH: And the disposal facilities in Washington and in South Carolina also have some depleted uranium in them, on the order of ten metric tons each.

MR. CAMERON: Thank you. Thank you, Dave.

Let's go. If you need further follow-up, let's talk to Naomi off-line so that we can get done.

Yes.

MR. DUNNING: Dirk Dunning, State of Oregon again.

A couple of questions. One, I'm not so concerned that these be addressed now as much as putting them on the list to be addressed at some point. I think, number one, I would echo the comments -- I think it's Angela?

MS. DIAZ: Angelique.

MR. DUNNING: Angelique from EPA.

Particularly at Hanford on the KDs, if you look at the chart that you see behind with the 1990s data, with the exception of strontium, the actual observed KDs in the soil at Hanford are lower than the minimum in every case.

In the case of uranium, the actual observed KDs are 0.3 to 0.6 observed, and so it creates a real problem. One of the issues is that the chemistry, there has been a lot of development of the understanding of the chemistry in the last 20 years, particularly about colloid facilitated transport and all the others that she mentioned, but particularly about the carbonate complexation of uranium which may apply in all sorts of application.

The second question would be whether or not you've looked carefully at how to include in the rule conceptual model development as you apply this to insure that that's done so that you include all of the concepts so that we don't have homogeneous isotropic, iso-everything modeling.

The third is in the past 15 years we've seen a lot of development and understanding of intruder -- what actually happens with intruder kind of scenarios, however those are used. Marty, I agree with you. The purpose for them is different than is commonly envisioned, but as an example, at Hanford we currently see 20 to 30 meter intrusions in a blink under industrial scenarios. Likewise, you see other deep intrusions under residential scenarios or light industrial in cities and that sort of thing, and so there's some other considerations to take into account.

MR. CAMERON: Okay. Thank you very much, Dirk.

Okay. We're going to have a last comment or question here, and then we're going to go to lunch.

MR. LIEBERMAN: I'm Jim Lieberman with Talisman International.

In a former life I was the Director of the Office of Enforcement at the NRC. I can't speak for the NRC today, but I can speak about my experience with guidance versus regulations, and this is really a multi-edged sword issue.

A regulation obviously is enforceable, as Chris pointed out. It has compatibility issues. Guidance is not enforceable. Guidance doesn't go to compatibility, and states have the option of adopting the guidance or not.

In the licensing process, when the licensee wants to adopt the NRC guidance it's more likely than not the NRC will accept that guidance as a way to meet the regulation.

On the other hand, in the licensing process and the hearing process, the licensing board is not required to agree with the guidance because the guidance is not a legally binding requirement, and in the hearing process the burden is on the licensee or the applicant to defend the basis for the guidance and why they feel they're meeting the regulation.

On the other hand, take the license termination rule, which is about three pages in 10 CFR, but there's two volumes of guidance in staff guidance in the NUREGs, and as Larry pointed out, to put all of the guidance that will be needed to implement this rule in the regulation will take an awful lot of space and you lose a lot of flexibility.

So these are the various actions you want to consider in deciding a regulation versus a guidance.

MR. CAMERON: Thank you. Thank you very much, Jim, and thank all of you. That was a good discussion, good session this morning.

Let's come back at two o'clock. That

takes about 15 minutes away from your lunch, but it will help us with the time.

So thank you. Two o'clock we'll start.

(Whereupon, at 12:46 p.m., the workshop was recessed for lunch, to reconvene at 2:00 p.m., the same day.)

MR. CAMERON: We're going to get started with an agenda check actually. The subject, the issue of rule versus guidance has come up several times, and it is an over arching issue over all of these substantive issues. I was going to suggest that we have a specific topic on rule versus guidance after we get through with a number of the specific issues, but someone suggested that wouldn't it be better to ask that rule versus guidance question at each specific issue. Okay?

So that's what I'm putting forward to you, but whatever we do, I'm putting that as a question to you. Whatever we do our NRC OGC representatives have put together a little slide show that tries to capture a bunch of the comments that we've heard from around the table and from the audience on rule versus guidance. So we will do that.

Christopher, Beatrice, I'm going to look for comments on this. Would any preference on how we do this? And I'm looking for comments from everybody, but I didn't know. Let's hear from Tom.

MR. MAGETTE: I think this is an extremely important topic, but I think it only has significance on an issue by issue basis. I mean, the whole notion of rule versus guidance is relative to the topic we're discussing. So I think a boiler plate discussion of rule versus guidance would just have us going through the agenda list to figure out which one we think goes where.

So I think if you do what you've suggested and deal with it as you go along, that's the way that makes more sense. If you want to wrap it up or roll it up at the end in a summary way, that certainly would be fine, but you're going to have to talk about it in the context of period of performance or scenario development or whatever the issue is for it to have any meaning.

MR. CAMERON: Anybody have any strong feelings the other way, or let me just say does anybody have any other perspectives?

Christopher.

MR. THOMAS: I would prefer to go through each issue area first and then go back to rule versus guidance because I think there's can be a significant interplay between the issues. So if you look at them in isolation, you can come up with a different result than if you look at them all together at the end, and rather than talking about this issue and then rather than looking at period of performance and then kind of having the conversation drive into exposure scenarios, I'd rather deal with period of performance, then exposure scenarios, et cetera, and then go back cumulatively to talk about rule versus guidance.

MR. CAMERON: Okay. Other views around the table?

And I know this is other views around the table. Drew.

MR. THATCHER: I think it would be we'd be able to do it maybe in a combination. I think if we did it on a piece by piece basis I think we'd be able to do it quicker. I'm just trying to think of efficiency here, and you'd be able to wrap it, and then you'd probably have an overall comprehensive at the end, but I think if we're right on a given topic, I think we'd all be able to quickly get our opinion on there and move onward, whereas I see if we do it in aggregate, to me it just gets all qualitative, and it just gets -- I don't think we can get resolution as fast. That's all.

MR. CAMERON: Well, maybe what we should do, and this is a suggestion -- well, let me hear from Beatrice first.

Beatrice.

And the cables have grown longer.

MS. BRAILSFORD: Oh, here. I can move that.

MR. CAMERON: You can actually move it further up towards you.

MS. BRAILSFORD: I guess I would appreciate seeing what the NRC staff has developed as this kind of overview presentation. Then let's start on the individual topics. I, too, think it -- I mean, I understand what you're saying about efficiency, but I think it would also be very valuable to have a lot of the issues out on the table before or as or whatever. I mean, you know, we're only talking a day and a half more.

MR. CAMERON: Okay.

MS. BRAILSFORD: I don't want to piecemeal the rules versus guidance discussion either.

MR. CAMERON: And there also may be, even though we would offer suggestions on rule versus guidance with each topic, it may be that once you've heard all of the topics, that you may have a different take on rule versus guidance.

Why don't we do this? We're going to go through the topics, and if people want to suggest, for example, period of performance should be in the rule, if people want to suggest that, let's have people suggest it. In other words, we'll do what Tom suggest, but when we get to right before the modeling session, I think, let's just have a session just on rule versus guidance. In other words, we'll do that. We'll combine both of them.

With that in mind and so that you can have some ideas on this, I think it would be good to hear the OGC presentation at this point. Tison, are you going to do the whole thing?

Okay, and just introduce yourself, too.

MR. CAMPBELL: Hi. I'm Tison Campbell, an attorney with the NRC's Office of the General Counsel, and we've just got a couple of slides we're going to walk through.

Do you want me to go up to the podium?

MR. CAMERON: Whatever you feel most comfortable with. But go up and try them somewhat.

And Tison is with the Assistant General Counsel for rulemaking and fuel cycle as are these two OGC representatives, and that's where the agreement state, that's where counsel on the agreement state program, as well as rulemaking comes from. So they know all of the answers.

MR. CAMPBELL: I don't know if I'd go that far, Chip.

MR. CAMERON: Okay.

MR. CAMPBELL: As I mentioned, I'm Tison Campbell, an attorney with the NRC's Office of the General Counsel, and I just wanted to give you a quick overview of regulations versus guidance. Most of this you've heard already. Jim Lieberman's comments were great and touched on pretty much all of the points I'm going to bring up here.

So just very quickly, regulations impose binding requirements upon NRC licensees and applicants. They're codified in ten Code of Federal Regulations, and in many cases they are adopted by agreement states. There's a whole compatibility process that determines to what extent our regulations are adopted by the agreement states, and there is going to be a presentation on that tomorrow. So if you have any specific questions on compatibility, I'd ask you to hold off on those until after the presentation tomorrow because that's going to get into a lot more detail as to the compatibility levels and what exactly goes on in that process.

As you heard this morning, regulations are promulgated through the notice and comment process under the APA. So there's an opportunity for public comment on the proposed rule, and then when we publish the final rule in the Federal Register that takes into account the public comments.

Moving on to guidance, guidance is not binding on licensees or applicants. It's merely one way that you can comply with the regulations. So there's no -- we cannot require applicants or licensees to follow our guidance. It's just sort of advisory. It's out there for people to look at and get an idea as to how they could comply with the regulations. Guidance does not have to be adopted by the agreement states. Again, in many cases the agreement states do choose to adopt guidance that's similar or identical to the NRC's, but it's not necessary, and it may or may not be issued for public comment.

I believe in this case, and Larry will correct me if I'm wrong, the NRC staff intends to publish the guidance for this rulemaking with the proposed rule for public comment.

And our guidance can come in many

different forms. If you've looked on our public Website, you've seen our NUREG publications, regulatory guides which Jim Lieberman mentioned or regulatory information summaries which go out to licensees in agreement states and provide guidance or, you know, information on regulations or policy matters that the NRC is working on.

So that's just a very quick overview of regulations and guidance, and I'd be happy to take any questions that any of you may have.

MR. CAMERON: And before we do that, just let me confirm as Tison noted what the plan was. In this case, Larry, do you want to just say anything on that?

Larry Camper.

MR. CAMPER: Thank you, Chip. Thank you, Tison.

Yeah, we did go back and look during the lunch break as to what we had planned to do on this particular rule, and the plan is to develop the draft guidance, public comment, as well as the proposed rule, the same time, and our current schedule for doing that is the September 2011. So guidance and proposed rule out at the same time for public comment.

MR. CAMERON: Okay. Great, and let me

introduce Tison's colleagues, Lisa London and Kevin Roach.

So that's sort of an overview. You've heard some of this before. Any questions for Tison or his colleagues on this guidance versus rule process?

And Christopher.

MR. THOMAS: Yeah, thanks.

I'm just trying to wrap my head around. So let's say there was guidance that the performance period should be at least 10,000 years. Now, but that wouldn't be binding on the licensee. They could demonstrate performance objectives being met in other ways.

Now, would they have to say what they did was at least as good as 10,000 years or could they choose another period of performance? Do you see what I'm saying?

MR. CAMPBELL: It would depend on the specifics. They would come to the staff with a specific approach, and the staff would evaluate it to see if the licensee's proposal complied with the regulations.

MR. THOMAS: But the regulations then would be the backstop, not the guidance at all.

MR. CAMPBELL: That's correct.

MR. THOMAS: Okay.

MR. CAMERON: And under that example, it would be --

MR. CAMPBELL: Or with the agreement states. It wouldn't necessarily be the NRC staff.

MR. CAMERON: And the way that this might be a useful example to use, the rule would say that the period of performance -- there has to be a site specific performance assessment that has to take into account A, B, C, and C is period of performance, but there's nothing said in the rule about what that period of performance is. It's all in the guidance, and I guess it would be worthwhile exploring this question further than Tison's answer, and I would just ask Chris.

Christopher. Okay. You have to consider period of performance. Okay? The guidance says 10,000 years. Under what circumstances, how would the NRC look at a different period of performance that would be proposed by a licensee?

And I'm just using the NRC as just, you know, a placeholder for agreement states because they would be the ones doing it, and we'll get their comments and other comments around the table, but how do you think that would work?

MR. McKENNEY: In general, of course, we're going to go back to what is the purpose of doing period of performance, which is providing reasonable assurance that the performance objectives are going to be met. So that would be the regulatory basis for any comparison or judgments on something.

So for other waste types, it maybe possible to discuss or depending on site situations and concentrations, other things like that, that they could show and demonstrate that their analysis already covers peak, but it's less than 10,000 years, and that there's nothing that would drive because it's short-lived materials. It's other things that it wouldn't actually -- you know, most of the source term would have already been analyzed by the time that that time period was.

So that would be one method that they could have an alternate time period that would be able to say can we get to --the regulatory decision we have to make is does the regulator have reasonable assurance that the performance objectives will be met.

MR. CAMERON: And this is also a good example of what you might want to put in a rule versus guidance. In other words, this example was talking about another unique waste stream. If the NRC knew that the risk of depleted uranium, that you're not going to be able to show that it's all going to be beyond 10,000, you're not going to be able to show below 10,000, that might be a reason to put the number in the rule.

MR. THOMAS: Well, exactly, and you know, it's interesting, Christepher, that you talked about peak, out to peak. My understanding is that there's nothing in the current rules that require an analysis to peak. I mean, that's my understanding.

MR. McKENNEY: Correct, but I'm saying if I'm looking at what is reasonable assurance and we have said that we think because of various travel times and we'll look into the performance of the national system, that we believe that for most radionuclides and low level waste you're going to see the peak exposure some time because when we did the performance assessment working group and we developed 1573, we looked at a large number of waste disposals that happened in the '80s for volumes at various sites and especially at a humid site, and we were looking at what -- we looked well past 10,000 years for some stylized calculations to see how that would affect where the peaks tended to fall, and we thought that a 10,000-year analysis captured for most radionuclides you normally see in low level waste absence of DU, and because we didn't have DU at large volumes and without volume, was that for most radionuclides that drove the total dose, you were seeing those before 10,000 years at most sites.

Now, that's why I'm saying so if someone else said, well, we usually run it for 5,000 because we got our peak at 1,000 --

MR. THOMAS: Or 500.

MR. McKENNEY: Yeah, or something like that. If you theoretically could demonstrate by various other means that you had captured the peak, you had made either conservative assumptions or some other method that you could show and justify that you had captured the peak and there isn't another peak out there from something else that's bigger, so that would be part of the justification. They would have to come in and say, "Our analysis that we provide you in this manner will provide you reasonable assurance." We would have to then make an evaluation to say is that true. Is there anything else out there that could occur beyond this time period that would want us to say, you know, at least 10,000 years or something around there.

In addition, 1573 does talk about for arid sites 10,000 years itself might not be the right one, and you may have to consider some longer time periods.

MR. CAMERON: Okay. Larry wants to say something here, but I want to get -- let me get Dan on the record and let's hear from Larry and also I don't want to forget that Tison is up there. He led this off.

(Laughter.)

MR. CAMERON: If he has anything to say on this, and, Tison, if you want, you can come down to sit at the table. In fact, you can sit right here.

But, Dan, why don't you talk and then we'll hear from Larry, and then Tison will be here to answer any.

MR. SHRUM: Thanks, Chip. I'll be quick.

In the spirit of moving forward, I would like to go back to something that we have discussed, and that is the definition of a significant quantity. That has been something that we've talked about at this table. We would propose or I would propose that the definition of a significant quantity be included in the rule, and we would also propose that there be no definition of a significant quantity in such that depleted uranium will require a performance assessment.

So that's kind of what we had anticipated or wanted with this. Let's talk about them when they come up after we've had good discussion.

MR. CAMERON: Thank you. Thank you, Dan.

Larry.

MR. CAMPER: Okay. At some point, you're going to have a discussion about period of performance. Is it now?

MR. CAMERON: No.

MR. CAMPER: Next. Okay. So you're going to have a discussion about POP per se, and when you do that and as you wind down your discussion, I'm going to ask you the same question that I asked the group in Maryland. So hold that question, but on this issue of guidance versus rule, Christopher, you're right. There's no period of performance specified in Part 61. There are other regulations where we have a POP specified, part 40, Part 60, Part 20, Subpart E for decommissioning, and Part 63 for Yucca Mountain.

So there are places where POPs have been specified. Okay? It is also fair to say that the -- and I conferred with Tom Magette a moment ago and he verified my recollection -- is that the panel when you talk about POP in Maryland reached a conclusion about whether it should be in guidance or it should be in a rule, and that was it should be in a rule. Okay?

So that at least gives you the benefit of knowing that POPs have been specified. Some parts don't have it, and where the group was in Maryland.

MR. CAMERON: All right. Well, let's hear from Drew and Marty.

Drew.

MR. THATCHER: Thanks.

I guess I want to make just a question as to where we are. I was expected us to get started on the time period of performance, and some of these are related to that and others seen to be just more in global where we're still talking about what if.

So if we're going to start talking about a time period of performance and whether that goes in rule and guidance, then I'd rather have the presentation and then we discuss some of this because I think it gives a better context to it.

MR. CAMERON: Oh, yeah. No, we don't want to get off on -- you're right -- on the substantive issue itself. I think this has just been used as an example of how rule versus guidance works, and we're going to go the period of performance. We'll tee that up right after we hear from Marty, and I don't know, Christopher, if you have anything else on this or not.

MR. THOMAS: Well, yeah, I just wanted to make a brief, very brief, comment.

MR. CAMERON: Okay. We'll go to you. Let's hear from Marty and then we'll go to you and then we'll tee up.

MR. LETOURNEAU: I don't want to be too pedantic about this, but the goal of any regulator and in this case I include ourselves at the Department of Energy because we write our own requirements that we implement under the Atomic Energy Act; they're not regulations, but we have requirements versus guidance. We use the philosophy that NRC uses, same philosophy that IAEA uses, is you're trying to identify in the requirement the what, and maybe a little bit of the why, but then in the guidance is your opportunity to provide examples of the how to satisfy the what.

And typically we try to, as people writing requirements, to make the requirements as high level as we can because of the need for flexibility and to provide opportunities for interpretation.

Now, that being said, one example that's pertinent to what we're talking about right now, and it gets to what Dan was just talking about, when we published DOE Order 435.1 in 1999, we included in there a requirement that allows us to manage small quantities of 11(e)(2) material under our AEA authority as low level waste and to meet the low level waste performance objectives, very akin to what we're talking about right now.

And in the guidance we spoke to the fact that we felt that what that meant was we needed to do a performance assessment on that, and we needed to look to whether we met the performance objectives or not.

Well, some years ago we got into a situation with the State of Nevada where we wanted to send some 11(e)(2) material from Fernald there, and the state said, "You haven't defined small quantity."

We said, "Well, yeah, we talked about it in the guidance."

And the state said, "No, no, no, no, no, no, no. Right here you just say small quantity and there's no definition of it."

So we're in the process of updating 435.1 right now. I suspect that we are going to take that as a lessons learned and now include in the requirement more discussion about what small quantity means so that we don't have that problem.

MR. CAMERON: Thank you. That's very, very instructive, Marty. Did you have a quick thing before we move on?

MR. LETOURNEAU: Well, yeah, and I think it's great to move on to period of performance. I guess it was just hard for me, Christepher, to hear what you were saying because I don't think there is any requirement currently to look out to the time of peak dose. I mean, you know, I'm looking at a performance assessment that goes to 500 years for a certain company, and yet there's a hazard that's well understood to persist well beyond that.

So to the extent that there's room for interpretation, that makes me uncomfortable because I've seen in my mind that used to create a scenario that doesn't capture the risk. So that's my point on that.

MR. CAMERON: Okay. That's a great segue in the period of performance because even if you have it in the rule, you still have to figure out what is the proper time period, compliance time period, compliance time period. That's where we're going now.

David, are you going to tee this? Are you teeing up for a period of performance?

Okay. Great. Thank you. And thank Tison, Lisa, Kevin, for that.

MR. ESH: All right. Period of

performance, this is one of my favorites. I'm sure it's a lot of your favorites out there, too. Everybody has strong opinions on it, and it's an important aspect to this problem.

I'll go over a little bit of background, what's in 10 CFR Part 61 now; what's in NUREG 1573, which is our Performance Assessment Working Group guidance document for low level waste disposal; look at some other waste programs in the U.S. or NRC regulations, and then we can talk about some key considerations and maybe approach as to period of performance.

So a little bit of background. In the development of 10 CFR Part 61, that initially considered a 10,000-year period of performance, but I believe as Chris McKenney indicated earlier this morning, 10 CFR Part 61 does not provide a value for the period of performance.

The site and waste characteristics influence timing of projected doses. On the figure on the right here as a plot of the initial activity and later activity of two different source terms, one commercial low level waste and one depleted uranium, this is what I was talking about earlier this morning when we had the table and the ratio of commercial low level waste to depleted uranium.

The commercial low level waste starts out at its highest values because it has a lot of short-lived, high activity material, and it decays very rapidly at, say, very rapidly on a performance assessment framework, of course.

By 1,000 years, it's much, much less than one percent of its initial value typically. It does have characteristics that some fraction of a commercial low level waste stream does have a long-lived aspect to it. That's why this curve does not continue to go down, and it does have some in-growth associated with typical commercial low level waste. So some of the materials that are disposed of have some daughter products that come in over time.

Depleted uranium, by comparison, it's flat, essentially flat on this sort of chart for a very long period of time, and then maybe in the 100,000-year time frame -- and this is a log scale, of course -- you start seeing some change in the activity.

This activity ratio, of course, depends on how many daughters you include in the decay chain to represent the activity ratio, but it's just to give you an indication of the type of behavior you get for the two different types of materials.

Oh, I forgot I had animation there.

All right. So NUREG 1573 considered a 10,000-year period of performance sufficient to capture the risk from the short-lived radionuclides, to assess the risk for more mobile, long-lived radionuclides, and to bound the potential peak doses at longer times. This is something that Chris was just talking about, Chris McKenney was just talking about in the previous discussion.

But it did note some exceptions, and the exceptions it noted with respect to having a 10,000-year period of performance is that if you had the in-growth of daughters from large inventories of uranium, maybe 10,000 years would not be sufficient to capture the peak.

It also noted a different case, that peak doses at humid sites from large inventories of long-lived transuranics may not be captured in a 10,000-year period, and this is mainly due -- and it notes humid sites because arid sites, even at very extremely long times, the travel times can be very long in some cases, but at a humid site some of these long-lived transuranics that can be very absorptive, they can arrive some time after 10,000 years, and it may not be reflected in a 10,000-year period of performance.

So within the U.S. we have some other disposal programs or activities where a period of performance has been specified. We have geologic disposal. The Yucca Mountain specific regulations, 10 CFR Part 60.3, provide a period of performance out to a million years.

It does provide for different dose criteria, whether you're in up to a 10,000-year period of time and then between 10,000 to a million years. So there's a lower limit up to 10,000 years and a higher limit after 10,000 years.

The WIPP specific standards in 40 CFR 191 provided 10,000-year period of performance. The general regulations for high level waste, 10 CFR Part 60, which would apply to any geologic disposal in the -- for high level waste in the U.S. outside of Yucca Mountain still has a 10,000-year period of performance associated with it.

And then we do have some other near surface disposal activities that aren't low level waste. Decommissioning, 40 CFR Part 20 has a 1,000-year period of performance, and the mill tailings regulations, 40 CFR Part 40, Appendix A, have a 1,000 years goal.

And I would also note that internationally there's not really a consensus on this. The different societies and groups do it differently, and they have different considerations that they make.

For all of these disposal activities that I've listed here on this page, they all do have some long-lived radioactivity associated with them or they can. So the fact that depleted uranium is long lived is not unique to the low level waste problem but may be what distinguishes it, could be in the concentration quantity compared to some of these other activities.

So key considerations that we think we should talk about today and be considered in developing the regulation and the guidance are hazard and longevity of the waste, what's the analysis framework, socioeconomic uncertainties, how you factor those in, how you consider them, and uncertainty in extending models. Those are just some major factors that we thought of when we have discussed this internally.

Uncertainty in timing and magnitude of doses. What you have here is what we call horse tail plot. That's what you get when you do a probabilistic analysis for one of these sites, and what you have is some sort of dose result versus time on both a log, log scale, and what I want to highlight on this figure is that there's uncertainty in the variability. There's uncertainty in variability in the timing and magnitude of the dose, and sometimes when people see these charts they say, "Well, I know uncertainty is increasing with time," but if you look at your calculational results, I'd say the uncertainty is larger earlier, and it gets smaller later. That doesn't make sense. Uncertainty is increasing. What's going on here?

Well, part of what's going on here is that in this region of this graph in particular you have uncertainty in both the -- uncertainty and variability in both the timing and magnitude of the impact. So you're uncertain about when it's going to occur, and then when it starts occurring, it increases very rapidly usually as the material arrives at, say, your receptor location.

At longer times, you're more certain that the impact will occur, but you're uncertain about the level of the impact that you will get. So that's why you get this sort of shape of the chart. It doesn't mean that the analysis doesn't make sense. It's an artifact of the uncertainty and variability in the transport of radioactive materials in the environment and how they show up on these sorts of curves.

But then to go a little further, I wanted to give some perspective on time scales because it's easy to put them on a chart, and it's much harder to think about them critically, and so what I've done here is I've put a couple of things that are about 40 years old. That's my agency, and this is my brother and myself, and since it is my birthday, maybe this is very accurate. I don't know where I put the arrow here.

(Laughter.)

MR. ESH: And then a couple of things that are more or less 100 years old.

(Laughter.)

MR. ESH: The State of Utah and this other individual we have sitting over here. Something that's 250 years old, that's our country. Okay? Two hundred and fifty years.

Transposing these things from the past and the future on dose analysis like this, you see that for this particular calculation you wouldn't even expect to see impacts until longer than the age of our country.

So I know we're concerned about future

generations. We have to be concerned about future generations, but we have to think critically about the problems, too, and think about the context of it.

This is something that's a few thousand years old, Great Wall of China, and then something that might be on the order of ten or 20,000 years old, a mastodon, and I had a lot of trouble finding anything that was really accurately dated out here in the later part of the figure.

But it's just that we're going to talk about period of performance. It's a kind of esoteric discussion, but we do need to think of the practical implications of period of performance and what it means.

So what are some approaches to period of performance? What could we do? Well, NRC could specify a period of performance. We discussed that in the first workshop and a lot of people felt, yes, you should specify a period of performance.

Another alternative besides that though is we could specify what factors you consider and the licensee or other people develop the period of performance that they think is appropriate considering those factors. That gives a bit more flexibility, but as we've discussed and for any of you that may be regulators, you understand that flexibility is a double edged sword.

So the factors to consider for either approach, we want to cover those though. What do you think should be the main factors? What should be the considerations and how should this be selected and anything else you can think of.

So we're seeking your input on this topic and would like to have a good discussion, and we'll go from there.

MR. CAMERON: Thank you, Dave.

Okay. That's pretty straightforward with some difficult issues to answer, and let's go to Drew.

MR. THATCHER: I guess I'll throw the first bomb out. At least from my standpoint, analyzing out to a million years quantitatively is just dumb. You open up a Pandora's box of so many issues that you're going to have to address potentially that it makes the whole issue meaningless.

So I almost think that you need to solve the problem without having to get the time frame making yourself tripped up all over it, and I'm jumping ahead a little bit, but take radon, for instance. We do have UMIL requirements and release limits that's specified in that, and I think in a rule you could very easily say you need to make sure you've analyzed for a peak dose for radon, and here is your performance limit that you have to meet of 20 picocuries per meter squared per second. It's already in the law somewhere else. It's already applied and used.

And as you do that, you don't get yourself wrapped around an axle of what happens in a million years. Well, geez, we're going to have 30 floods between now and then or we're going to have a glacier or whatever, and it just tears the whole model apart, and we've only been around for what, 5,000 years or something like that as humans, conscious, I guess, or 10,000 maybe?

I think beyond 10,000 years you're nuts. So at least that's my view of it.

MR. CAMERON: Well, just so we make sure everybody understands what you were suggesting, would you put a specific time frame, like 10,000 years, in or is there another way to handle period of performance?

MR. THATCHER: Well, State of Washington already did a performance assessment. We did include 10,000 years. We quantitatively analyzed to 100,000 because it was just pointless to go beyond 10,000 and be sure that anything you're doing at that point is meaningful.

So in the best world, I'd like to see 10,000 years with a way to specify. You know, in this case the million years we're worried about is radon. So there's a way to tackle that without having to say you've got to analyze to a million years. Because I think when you start to do a process for a performance assessment, you're going to get a situation where anybody's opinion about what happens in a climactic event that far down the road is valid, and you're going to get -- I think it will be an all stop. So that's what I'm worried about.

MR. CAMERON: Well, that's the piece I want to understand before we go over to Steve, is that there was a 10,000-year performance period with a way to specify, and you gave a number before, to specify what for radon? I'm just trying to understand.

MR. THATCHER: Oh, the radon flux emanation limit, in 40 CFR 192. Am I right? It's --

PARTICIPANT: One, ninety-one.

MR. THATCHER: One, ninety-one. I'm so sorry.

It's 20 picocuries per meter squared per second, and that basically is an emanation rate at the surface, at the top of the cover, whatever that be.

MR. CAMERON: Okay. Does everybody -- well, we'll find out if everybody is clear.

PARTICIPANT: Twenty what?

MR. THATCHER: It's just a flux. So you've got 20 picocuries, and then it's per meter squared. So a square meter of area per second. So so much radon can be emitted per second, and that's how we've closed UMILs in the country, several of them. So it gets you on an intruder's standpoint. The dose from that is roughly equivalent to the 500 millirem. It might be a little higher than that, but it's in the ballpark.

MR. CAMERON: So that flux limit is a present day -- that's a present day measurement then.

MR. THATCHER: Right.

MR. CAMERON: Okay, all right. Great. Let's go to Steve and then we'll go to Beatrice.

DR. NELSON: I'm going to actually agree with Drew in a minute although you may be surprised with what I'm going to start out with. I ask myself how can the period of performance be less than the time it takes for the activity of depleted uranium to reach its maximum, which is a million years. And I also would say, given that consideration, how can it not be in the rule. But I agree with you. I don't believe models and I don't want to offend any performance assessment modelers but I'll say it anyway, I don't believe models to 10,000 years.

I think models to a million years are absurd, which leads me back to the conclusion we should not even be having this discussion. Depleted uranium, because you can't model it, you can't understand its behavior when it's at its most hazardous, does not belong in an engineered landfill.

MR. CAMERON: And, Steve, let me ask you a question about that and Drew also. In order to achieve this flux, this emanation limit, to achieve that would you need to do certain engineering features? I mean I'm wondering how far that gets towards Steve's concern?

MR. THATCHER: Well Steve's point of you know you've got to get the peak dose and then what I've suggested kind of accomplishes that peak dose in that you can do your analysis without assuming, okay, you've got assume that the waste essentially stays in place, you're not going to assume a term, you can simply do a quick calculation and figure out what the ingrowth is for your radon at whatever time frame. That's not hard to perform.

Then you take that source term of radon that you have in a million years or whatever it is, that's your source term from time zero, you design and/or place the material at a deep enough depth, have enough cover there, that then allows you with the waste to cover that's in place and you analyze that there, what is your estimated flux that you're going to have?

And so you can do that analysis without then saying well what about the 74s or what about everything else that comes into place? And I can't cut you on Steve's point, his point is great, you could still do that but you know this is pointless. You could be so wrong on everything that you're doing that it may not mean anything and I can't answer that question. That's a good point.

MR. CAMERON: Is that a proper characterization Steve?

DR. NELSON: My answer is one word: salt. Geologic disposal in salt. I mean we're asking all the wrong questions. I know I'm not going to change that, I hope I am, but I'm not deluding myself. Depleted uranium, because of its long-lived nature, it shares a lot of characteristics with high level waste, long-lived nuclides that are mobile under oxidizing conditions, poorly sorptive, I'm thinking of things like uranium neptunium technicum, it belongs in geologic disposal and there are plenty of places in this country where there are thousands of feet of salt, and if anybody wants to talk about merits of salt I'd be happy to do that but I won't for right now. And that doesn't even play into the site-specific analysis for landfills.

MR. CAMERON: Okay. Thank you, Steve. Let's go to Tom and then we'll come over to Beatrice and check in with Chris and Scott.

MR. MAGETTE: Thanks Chip. Generally I agree with Drew's proposal, I think it's consistent with some of the points that David made. There is a lot in existing regulations and guidance that talks about this, whether it's 10 CFR Part 60 or 63 or 40 CFR 191 or NUREG-1573, this notion of a compliance period of performance of 10,000 years with some sort of acknowledgment that you may have to look farther than that on a qualitative or probablistic basis to get out to peak dose I think is what makes the most sense because I agree that you can't effectively model out farther than that or potentially there are large uncertainties even modeling out to that.

But the notion of some sort of deterministic quantitative projection of a dose in a million years is simply not something that we can reliably calculate by any stretch of the imagination.

But to look out, and the flux is a good way to do it too, I think we could that and we do have disposal sites, as Drew mentioned. We have sites where we do have radon elimination today where there is an equilibrium. It may be a lower concentration but in terms of the behavior of the radon it's not something that we have no analog for or understanding of so there is some meaning to using that flux as a measure.

But I think that's the best way and I think it should be in rule, it should be a part of a regulation. It's in guidance today that could be referenced or replied but I think it's appropriate to put it in the rule, and I think the place you put it is not 10 CFR 55, I think you put it in sub-part C.

I made a comment earlier today that the rule should be simple, and by that I don't mean that it's a simple problem, I just mean that the language should be simple, but I do think that to effectively regulate this there are some things that have been in guidance for a long that time should be put into the regulations. And I believe sub-part C, the performance objectives, is where they should be noted. And I believe period of performance is one of them.

MR. CAMERON: Okay. Thank you. And we're going to go to Beatrice. One question I'll just lay out there for you is if you have the radon emanation flux limit, what does the 10,000 year compliance period buy you? Drew?

MR. THATCHER: Well that would cover everything else hopefully. In most instances I think you're going to see groundwater impacts prior to that, or at least peak near that time frame, so the 10,000 years would still cover everything else for the site. I mean even for uranium and DU we've got radon but you also have groundwater transport and you certainly want to cover that. So kind of make sure you catch both things.

MR. CAMERON: Okay. Thank you, Drew. Beatrice?

MS. BRAILSFORD: And I appreciate Steve's point and I alluded to it this morning when I referred to the ad hoc nature of this process, that there is this elephant in the room that we're going to keep dancing around, is this the appropriate method of disposing of depleted uranium, no matter if it's in rule or guidance.

I understand the 10,000 and then the peak dose and I guess I think the 10,000 does get you a lot. It is a way of testing how robust or not the system is faced with the peril it is to protect us from.

Did you say though you do the 10,000 years and then you carry it out to the peak, did I hear you say that even at that peak you were still giving the facility credit for the initial cover?

MR. THATCHER: Yeah. Yes. And as far as analysis beyond that I simply made it a construct to go out to a million years, meaning you just simply calculated the ingrowth and that you just assumed through your analysis, okay, I've got it, time zero it's all here. Or wherever you wanted to do that. So that you could at least do the design work to figure out how much cover you need to in order to effectively get the radon emanation rate down to what you need.

MS. BRAILSFORD: So the cover was extant at 10,000 and out at a million? Both?

MR. THATCHER: In effect, yes. Now whether that's true or not we really have no way of knowing and that's the problem here that you get wrapped around the axle on is that okay we need to make sure that something lasts to a million years.

There's no way for us to ever do that.

MS. BRAILSFORD: Well but in this case a million years isn't a number just pulled out of the sky. It matches--

MR. THATCHER: Well a million is not even peak though. I mean it's close but it's still a number.

MS. BRAILSFORD: Okay.

MR. THATCHER: You could use 100,000 and that actually gets you a large part of the way there and I don't know maybe that's more realistic, then you're only talking about six or seven ice ages. I don't know.

MS. BRAILSFORD: Well, no, I like the idea of doing that, looking further down the road based on something besides a round number which I think your system does provide.

MR. CAMERON: Okay. Let's go to Scott and then Chris McKenney. Scott?

MR. KIRK: Yes, I too would agree that a 10,000 year time period is plenty long enough time to do the analysis and I think the performance assessment working group recognize that and I think they called it if you started looking at parameters outside of that as being exhaustive speculation, because you get into looking at things like climate changes that we just can't predict that long into the future. And so we do have limitations on the model itself.

But the other thing I would also suggest about a 10,000 year time period as far as putting it into a rule, as I mentioned before and as Susan did, the State of Texas right now has a regulation that requires you look at peak dose. So whatever the NRC chooses to do with putting a time period on it, they need to recognize the existing laws that currently are at play.

And we did analyze 10 different waste streams and we did analyze it for peak dose to 36,000 years, but we were relying on things like containerization, intruder barriers. You can also have radon barriers, and I think that's the other part that really needs to be considered heavily as part of a rule-making.

MR. CAMERON: Okay. Thank you. And at some point maybe we'll ask Susan about the peak dose. In fact let's go to Susan right to follow on that and then we'll go to Chris.

MS. JABLONSKI: Well, I think we appreciate all the comments. We went through this very discussion, as Scott will be familiar with, when we were trying to do our rule making in 2003. And the idea of peak dose is in our rule and so you know one of the things with Drew's comments, the only kind of caution I would take there is you're doing a site-specific analysis and if you have information about things at play you should consider those, understanding the uncertainties and understanding what the analysis is. And it's still a tool though.

And for us that's how we looked at it and we were clear with the applicant that's how we looked at it, we were clear with the public that's how we were going to look at it.

And so it's not that it's going to be your only definitive tool in making some of these decisions but it was one of the tools that we used that we thought was important to get at. So that it was an open discussion, understanding the uncertainty in some of this modeling going out into the future.

And definitely wanting to get as much of those site-specific information that we could get you're not just looking at generic analysis and saying that fits all. We don't want to do that. I mean we are trying in that analysis to bring in as much that's unique about the characteristics and what we do understand about our specific site as possible.

And that's the recognition we would want to be looking at. As Scott said, what we already have in place and really focusing I think what the NRC is trying to do is say, okay, we've done this analysis but the site-specific is what are the important keys here that are going to drive how you make these decisions into the future about a site taking waste.

MR. CAMERON: Okay. And Chris is going to give us a process point and I also wanted to ask a question in terms that both of you may want to chime in on is it possible to reconcile a possible NRC approach of 10,000 years and specified in the rule with the Texas approach?

MR. MCKENNEY: First to address Scott's approach about this is just remember when we had this discussion a little earlier was that as part of the proposed rule-making development is that the agreements were part of that process. So therefore that would be part of the working through would be (1) how can we make this most beneficial from all sides so that it's a consistent approach across the federal and agreement states, between the NRC and the agreement states who are on the same level of importance here on the regulation, that we can reconcile those changes with those regulators that might have already requirements similar to what we might want to put into Part 61.

So that would be one of those discussions.

Now in development of NUREG 1573 we did discuss this compliance period for a 10,000 year compliance period or approximately and then the potential to look beyond that to peak doses to make sure that there aren't processes you aren't understanding. That in the end didn't become that as part of the guidance 1573 but it's not necessarily that that would not necessarily be a way we could go in the future also.

So it doesn't mean that any one limit, a compliance limit and a peak dose limit together or evaluation of the peak are not necessarily forces we can consider.

MR. CAMERON: Great. Thank you.

MR. MCKENNEY: I also have another point.

MR. CAMERON: Did you want to make your other?

MR. MCKENNEY: If you want to continue this thread, mine's on a different thread so if you want to continue this part. So go on to that thread and come back to me after we're done with this part and then I'll go the other way.

MR. CAMERON: Okay. Drew?

MR. THATCHER: I was trying to summarize in my own head what you just said in the last few seconds and I failed. So could you say that again?

MR. MCKENNEY: Well, if we had a limit, I mean just because we have in like 1573 we have a single number limit doesn't mean, I mean that's why we're asking you guys, what would be a good approach. Would we want to go to something like either the state of Texas has done with sort of a limit and a peak dose evaluation time period or what the state of Washington has done which has been a limit for compliance of 10,000 years and then an evaluation in the environmental impact statement of a longer time period, which I believe is 100,000 years in the environment impact statement.

I mean those are on the table and so we don't want to presuppose how we actually you know word that so saying they're different than what our guidance is is not necessarily a stop.

MR. CAMERON: Okay. So you're getting an idea of the range of the way to do things here and let's go to Marty and to Peter and Christopher and Larry wants to say something and I want him to hear comments around the table before he talks. But Marty go ahead.

MR. LETOURNEAU: Yeah, this was another one of those areas where I was kind of resisting saying something but Drew so hit on it that I figured I had to throw our hat in the ring and say well what's DOE doing? When we published 435.1, we went in with a thousand year time of compliance and before we published it we went to the inter-agency steering committee on radiation standards, ISCORS, and the NRC representative there at ISCORS said well you know we've got 1573 and it says 10,000 years. Is there something that we can do? What's a middle ground here?

So what we ended up finally with in 435.1 was, yes, we use a thousand years for compliance but there's an "and" and the and is and peak dose out to 10,000 years. So in effect is the peak is between a thousand and 10,000 we're looking out to that peak. And then we're stopping at 10,000 years.

But then beyond 10,000 years we look qualitatively at what else is happening. So when you get to the 10,000 year mark does the curve go like this, does it go like that? Does it go down, because we want to see where the peak is beyond 10,000 years and understand it so that we can then ask questions about well could you change some of your assumptions? If it's right beyond 10,000 years, are there some critical assumptions that if you changed would pull that back in? And are the assumptions that you're using that are driving that out beyond 10,000 years actually reasonable or not.

Now the other part of what we do which Drew hit on is that we don't include the radon in the all pathways dose, and we do in fact do exactly what Drew suggested with one difference. The 20 picocuries per liter per meter squared per second, comes from 192 and we use that the same way Drew described it, emanation rate. But we also included the NESHAPs limit from 40 CFR 61 which is 0.5 picocuries per liter of air at the boundary. So for our radon we say you can use either one of those two measures to show compliance.

MR. CAMERON: And what did you call that last--

MR. LETOURNEAU: NESHAPs.

MR. CAMERON: Oh NESHAPs. Okay. Great. All right. Okay. Thanks Marty. Let's go to Peter Burns and then we'll go to Christopher.

DR. BURNS: What I want to say I almost forgot because I've been waiting so long so I have to recollect my thoughts here, reread my notes. The long and the short of it is that, and I said this in Maryland too, I think you do definitely need in the rule a specific time frame and although a million years would probably capture peak dose it's not realistic. So I would favor a 10,000 year time frame for the dose to the public, not just from radon emissions but from uranium release as well, from everything.

But I was outside at lunch and I was looking up at that hill over there and being a geologist I could easily figure out what the erosion rate is on that hill and I could figure out okay so we're going to have some climate change and blah blah blah and I could draw some-- and I could bury the depleted uranium in a location where it's fine for 10,000 years but at 15,000 years it's exposed and gone. So you absolutely have to have a consideration of peak dose. You can't put it somewhere where you know that in 20,000 years or whatever it will not be there.

So I think having the 10,000 year criterion is fine, but the rule has to have some consideration of a prediction of when peak release, peak dose is likely to be and this will prevent, hopefully, a scenario where somebody puts a landfill on the side of a hill or whatever.

I think restricting it to radon release rates is too simple. If I were going to bury depleted uranium I'd want this regulation to be radon emanation at the top of that landfill. That's what I'd want because that's the easy thing for me to control. But that's not where the public, the bulk of the public is most likely to get their dose in my view.

As you go out far enough in time it's more likely to come through uranium in groundwater and so it's not the radon percolating out the top that impacts a few people, it's the uranium going downstream that can potentially impact far more people.

Oh and one more thing I was going to say. It's kind of funny in a way to listen to people say it's dumb to model a million years. I agree. It's probably almost as dumb to model 10,000 years in reality because the climate change cycles etc. that we talk about in a million years they all happen in 10,000 years as well. In 10,000 years we could well be under 1,500 feet of water or some ludicrous thing here as we're in another glacial period and we have a pluvial lake on top of Salt Lake City and who knows?

MR. CAMERON: Peter, let me ask you a question. Given that approach, do you think that there's other ways to deal with this problem other than geologic disposal as suggested by Steve Reynolds?

DR. BURNS: Other ways other than geologic disposal, well yes. But first let me expand a little bit on geologic disposal.

The key feature about a uranium ore body was that it was stable. There were a lot of uranium ore bodies by the way that were not in stable environments and we're not going to find them because they're gone. And we don't want to put our uranium waste in such an environment because it too will be gone.

But we can learn a lot from deposits that are still there and we can put, it'll cost more but we can put the depleted uranium in such deposits. Those don't happen to be in salt although salt is also a good plan, but I'm thinking of any variety of ore deposits up in Northern Saskatchewan or something that have been there for 3 billion years.

Anyway, aside from that, is there a solution other than geologic disposal, other than disposal above the surface of the land?

MR. CAMERON: And following your-- and

I'm sorry I misspoke, Steve Nelson not Steve Reynolds, you laid out some factors here to consider and I just was wondering does that have to drive you towards geologic disposal or is there some other solution?

I mean can you do all the things that you said that you should do, don't put it some place where you know it's going to be danger.

DR. BURNS: Okay. So don't put it below layers of rock. When you say geologic disposal you mean below layers of rock versus in a landfill type?

MR. CAMERON: Steve what did you mean? When you said geologic disposal in salt?

DR. NELSON: Salt is one form and of course welded devitrified tuff at Yucca Mountain that was supposedly dry was another.

DR. BURNS: If you're asking me do I think that there's a scenario where a landfill-type deposit, waste disposal site, where uranium is placed in some location and buried by a certain amount of appropriate fill, if that could meet these requirements, I believe it could, but you have to pay a lot of attention to the waste form you're putting in there and the waste forms match to the environment that you're putting it in, as well as the overburden and what you place in that overburden and what other engineered barriers you need to have.

But I think it could be met although I haven't tried to model it. No doubt that disposal in hard rock under reducing conditions would be a better although more costly, a better long term solution.

MR. CAMERON: Okay. And waste form gets to Drew's point from this morning, at some point we have to have a discussion about epoxy, etc. etc. Let's go to Christopher and Steve you have your card up again, you want to say something? Okay. Let's go to Christopher and then Steve.

MR. THOMAS: First, I want to make a comment which is that I don't believe that uncertainty should be a justification for more permissive activities. In fact, I would tend to go the other way that uncertainty should lead to more restrictive requirements.

So when I hear well gee, it's absurd to model even a 10,000 years and beyond that is even more absurd, then I think well the fact that we've got a hazard that persists longer than that means you should do it.

I mean I don't tend to do things that I'm very uncertain about you know that have potentially bad consequences typically so that's just my first comment. I like some of what I've heard. I liked something that Susan said about you know you do need to look at certain, if this is a site-specific analysis it should take into consideration things that will happen at that site.

So, for instance, out at the Energy Solutions site, I know you don't like that but it's the one that I'm most familiar with, and there are aspects to it that would lead me to say, look, this could be washed out at certain times over the time that depleted uranium will create hazardous emanations. And so you know because of that I think that does need to be factored in. If that site can be washed away, I just don't think that it's reasonable to say look it's a good way to sequester it away from the environment.

And I don't know the best way to write that into the rule. But I think there is a way to capture it and my comment is to make sure that the final rule would require an analysis of those kind of events that could happen that could just destroy the site entirely or totally change the conditions under which it's modeled today.

And the other thing I wanted to say is it has to do with something Larry brought up earlier which was look are there other parts of the regulations that may need to be rewritten and so I guess I want to put this out there and then ask for a response.

I want to say this is in federal rules and it talks about institutional control of access to the site is required for up to 100 years. This permits the disposal of Class A and Class B waste without special provisions for intrusion protection since these classes of waste contain types and quantities of radio isotopes that will decay during the 100 year period and will present an acceptable hazard to an intruder.

I think this is part of the issues that came up last night at the Radiation Control Board hearing but basically there are times and ways in which it's like oh Class A, well what that means is it's decayed to reasonably hazardous levels within 100 years such that an intruder could go onto the site and not really face a hazard.

I think what we're talking about here with depleted uranium being class A is part of a catch-all. Totally different considerations. Totally different considerations. I don't think anybody here is claiming that after 100 years depleted uranium would pose an acceptable hazard such that an inadvertent intruder could go on there.

And furthermore you know my understanding is these regulations were set up such that you could have a site, have institutional control for 100 years and then kind of say look, it should perform now. It should not require additional active maintenance.

And it's hard for me to imagine a scenario in which you're going to have a site with, let's say you bury it deep enough, okay, but I think somebody's going to have to go out there and keep putting more stuff on it if there's a problem. To me that's active maintenance and the whole reason these rules were set in place was to avoid that situation.

And so I want to put that out there and see if anybody will comment, maybe from the NRC or others, because I do think this is a problem.

MR. CAMERON: Okay. But I gather from what you're saying that you've heard perhaps some different approaches that could be melded together that may give you more comfort with this?

MR. THOMAS: Yes. Yes, I've heard some good things. I don't know where I fall yet on the whole issue of 10,000 years versus 100,000 years. I mean I tend to want to go longer you know but I also like this idea, and I don't know like I said how to capture it, look if there's going to be natural events and you can predict with some certainty that every 10,000 years or every 50,000 years there's going to be some sort of event that will wipe your site off the map, that needs to be taken into consideration even if the performance period is at 10,000.

MR. CAMERON: Okay. Thank you. Let's hear from Steve and then let's go to Dave and Christopher and Larry. And then we're going to take the cards on this side of the table.

Steve?

DR. NELSON: The million-year figure for Yucca Mountain came ultimately from the National Academy of Sciences, a pretty smart group of people. The EPA which writes the dose standard for Yucca Mountain tried to get away with 10,000 years and it was thrown out in court. And EPA was told to go back and try again.

So there is certainly legal and intellectual precedent for long-term control of long-lived radio nuclides.

Now the problem of modeling to that length, just one more comment on that, I'm pretty confident I know where the canisters in WIPP will be in a million years. I do not know, well I have no confidence that Barnwell, Clive, Hanford or any other engineered landfill will be in existence in a million years.

MR. CAMERON: Okay. Thank you. Let's hear from the NRC and then we have David Kocher and we have Dan, Marty, Scott and I think we'll probably wrap up what's been a pretty good discussion and we need to get on to the other areas. Let me go to Dave and Chris. We'll go to Dave and then we'll go to the division director.

MR. ESH: Okay. Regarding the issues about site stability and long term stability, I would point people to sub-part D 61.50 disposal site suitability requirements for land disposal, especially Nos. 9 and 10.

Nine, I'll read it for you so everybody knows. "Areas must be avoided where tectonic processes, such as faulting, folding, seismic activity or vulcanization may occur with such frequency and extent to significantly affect the ability of the disposal site to meet the performance objectives of sub-part C of this part or may preclude defensible modeling and prediction of long-term impacts."

Item No. 10 says, "Areas must be avoided where surface geologic processes, such as mass wasting, erosion, slumping, landsliding or weathering occur with such frequency and extent to significantly affect the ability of the disposal site to meet the performance objectives of sub-part C of this part or may preclude defensible modeling and prediction of long-term impacts."

In our regulations already we require people to consider the processes that may affect the stability of the disposal site and the dispersion of the materials in the environment. So this discussion about period of performance is very important because then that leads you to say, well, for what period of time do I need to apply these considerations? Do I need to apply them for a thousand years, ten thousand years or a million years because, as we've heard from our experts, it becomes a lot harder if you're doing for this for a thousand years or you're doing it for ten thousand or even longer.

But it's in the regulation. So NRC certainly already factors in the need to consider these types of phenomena in a disposal action. And if you have long-lived waste it becomes a bigger challenge.

MR. CAMERON: Okay. Thank you. Let's go to Larry.

MR. CAMPER: Two things. One, Christopher I think going back to your point you wanted to hear from the NRC. At the moment the Commission has directed the staff to proceed with a particular rule-making, that being to require site-specific performance assessment near surface disposal.

Your comments really get at the question of whether depleted uranium is suitable for near surface disposal. So what we're going to do is any of these kind of comments that we've heard in this workshop we'll summarize those and provide the Commission with awareness because it's not about the technical analysis to support the rule-making that we're here today to discuss, but it is a contrary view that we want to make sure the Commission hears from the panel participants. So it will be summarized and reported to the Commission.

The question that I want to ask you is, I've listened to the discussion like I listened to it a couple of weeks ago and many of the same issues that were raised by that panel have been raised again and some new issues have been raised, you know, uncertainty, climatic change, modeling problems, etc., etc., etc., peak dose considerations. Some period of performance for compliance purposes, ten thousand years gets talked about a lot.

And the question that I asked the panel then and I would ask the panel the same thing here having heard what I've heard, given that the staff has to go away, take all that we've heard and work with it and try to do something that makes some reasonable amount of intelligence in a written word and a proposed rule.

And in the SECY, in the technical analysis that accompanied that SECY, the staff said the following. They said considering the technical aspects of the problem, the performance assessment staff recommends a performance period of 10,000 years for the analysis of DU disposal. However, analyses should be performed to peak impact and if those impacts are significantly larger than the impacts realized within 10,000 years, then the longer tem impacts should be included in the site environmental evaluation.

That is consistent with the language in NUREG 1573 which is our guidance to performance assessment in low level waste facilities.

And my question to the panel is, given all you've heard, is that a reasonable approach?

MR. CAMERON: Okay. Thanks Larry. What

we're going to do is we're going to take the cards that are up, which is almost everybody, so how's that for great facilitation. We'll take the cards that are up and we do need to try to get to Exposure Scenarios before we take a break because at some point I know you want to take a little break at any rate.

So let's go to Dave and then we'll go down the row and then we'll come back over to Christopher and maybe Larry's question will be if anybody has an answer to Larry's question throw it out. Dave?

MR. KOCHER: The problem with Larry's question is a simple one: what do you do with this additional information in making a decision? That's the hard part. I mean it's one thing to calculate this but what are going to do with it?

The only thing I'm absolutely certain about on this issue is that you must bring to bear to your decision process the full weight of information that you can generate.

EPA got in serious trouble in the 40 CFR 191 rule-making for high level waste disposal when they ran their calculations out to 10,000 years and stopped. This was not good. I have no idea what you do with a calculation at a million years except to realize that it's highly stylized and the only function of that calculation is to hopefully help you make some kind of decision.

A comment that has kind of opened my eyes here is that there seems to be an implicit understanding here that we're developing a rule for near surface disposal and I'm pretty convinced from what I've heard that the NRC should open the possibility that near surface disposal may simply not be appropriate for this stuff, for whatever reason. I mean it's conceivable that you might reach such a decision.

The one thing that I haven't heard much about here is economics. People in the insurance business have a good horse laugh over what we're doing here because the idea of discounting the future risk is nowhere in evidence. And that's okay, we've decided that this is the way we're going to play the game.

But if you're going to weigh the benefits of near surface disposal and the detriments of near surface disposal versus something like a geologic depository, you do have to weigh the economic costs of these different ways of attacking the problem.

I was generally in favor of 10,000 years for low level waste and I recognize that that was a problem for uranium to be solved at some later time.

Regulators like definitive rules, that as Dave Esh pointed out these are double edged swords, they lead to problems. You have a problem if you're not definitive, you have a problem if you are definitive. This is a really tough decision and I have nowhere close to the answer but you need to bring the full weight of information to bear on your decision process on things like this.

MR. CAMERON: Okay. Thank you David. Let's go to Scott, Marty, Tom and Dan and Drew. And then back over to Christopher. And then we'll move to the next topic.

MR. KIRK: I would say once this workshop is over and the NRC staff goes back that they really look hard at how they're going to ensure consistency amongst implementing this rule between all the different states, especially the states that do have a low level waste disposal facility such as Texas, South Carolina, Utah and Washington, because I think it's important to explain to those citizens how this rule does ensure that they are protected against depleted uranium. Depleted uranium gets more radioactive with time as opposed to less for most other low level radio nuclides.

And also I would say that the states are ultimately the custodians of these materials so their viewpoints matter very much. So what I would suggest is when you guys go back to your offices that you think long and hard about how you're going to ensure consistent implementation amongst this rule.

MR. CAMERON: Okay. Thank you. And that just sort of underlines the approach that Chris McKenney was talking about, about the state working groups trying to with this type of background of information at their disposal what they need to deal with. Marty?

MR. LETOURNEAU: Dave Esh actually captured a large part of what I wanted to say in terms of the siting stability requirements that are already there.

But the second part of it that I wanted to add is that we really do need to look closely at site-specific conditions because I've heard a lot of assumptions about you know the caps eroding and going away and yes we need to think about that and account for that. But I know of at least one facility that is in an area of deposition and a thousand or ten thousand years from now it's going to have far more native material on top of it than material taken away from it. And that's something to consider.

MR. CAMERON: Okay. Good point. Tom?

MR. MAGETTE: I would like to take a shot at answering Larry's question. The short answer is yes. I would add to that by saying taking off of what David said it falls into the category of using all the information that you have at your disposal. When you start looking out at a million years, whether or not it's a compliance period of any sort of reasonableness or not, it does tell you something. You can make assumptions, to go to Beatrice's question earlier are assuming the cap is there, are you assuming all the overburden is there, are you assuming that you have a functioning clay barrier after that period of time?

Well you can ask each of those questions. You don't have to assume them all there were all gone. It goes to David's earlier comment today about the behavior in the natural environment, you don't get necessarily to assume away part of the problem, or assume away part of the site.

That's why we talk about a qualitative or probablistic application in that time frame is that you probe a certain set of questions and it can be illuminating even if it's not something that has a lot of deterministic value.

The other thing that I would say, and I

made this comment in Maryland in the next section but I just can't wait any longer, regarding the scenarios. And the performance assessment isn't the only thing we have here, it's not all we do. This also goes to the application of sub-part D that David mentioned a while ago. We site these facilities in places that in fact do provide inherent protection. There is a siting process. There's an engineered process.

There's a lot that goes into it besides a probablistic assessment. That's merely a tool that measures the effectiveness of some of these things. But it's not the only measure of protection for the public health and safety of the environment so we have to be careful talking about this one tool in extreme isolation from this overall process, much of which is codified in part 61.

So, yes, I do think it's reasonable to have a compliance period and an informed period at the peak dose that tells you something about what might happen under certain scenario and what those results might be.

MR. CAMERON: Thanks Tom.

MR. LETOURNEAU: Chip, I was going to answer Larry's question too and my answer is yes and I consider what I described as what the Department of

Energy does to be completely compliant with what Larry read.

MR. CAMERON: With that? Okay. Thank you, Marty. Dan?

MR. SHRUM: I would just like to go on the record as simply stating that for the purposes of this roundtable discussion I would like to propose a quantitative evaluation out to 10,000 years and a qualitative evaluation to peak dose.

We've all kind of talked about that and I would just like to formally propose that and suggest it. I think we have justification for that in the NUREG documents 1573 and 1854 that have also been discussed, but I think that's a fair and reasonable way for us as an operator of a facility to proceed.

I would like to just throw in an aside. It's very simple. Don't know if that's the best thing to do but it's a reasonable thing to do, and as far as deep geologic deposits or repositories, I'd like people to consider we had a great presentation down in Vegas a couple of weeks ago on a facility in Germany that's a deep geologic repository and the question was asked of the operator, so how are you going to get the waste back out? And he said I have no idea, because they're having problems too.

So there's risk in everything we do and this is a reasonable approach.

MR. CAMERON: And under the approach that you just gave us a shorthand for, would that quantitative and qualitative analysis take into account some of the concerns that Christopher had, some of the issues that Peter thought you should look at?

MR. SHRUM: Well, they would have to answer that. I believe that it would but you know that's just my opinion.

MR. CAMERON: All right. And Drew and then we'll go to Christopher and then I think we'll have to move on. Oh and Steve, yes. Got to hear from Steve.

MR. THATCHER: I'm going to be as quick as I can. One was and I'll say Mr. Thomas only because there's too many Christophers in the room right now.

I'm sorry if you took from what I said that I was being flippant about exposures or scenarios beyond ten thousand years. I simply was using what I suggested as a construct to try and solve a problem out to a million years without getting yourself wrapped around an axle yet still solving it.

Other issues that we haven't brought up we'll probably talk about tomorrow that I think I have to be more at that, you know, we're talking about a powder form of uranium dioxide and I think we really need to look at how we can get that into a more stable waste form such that you don't have so much surface area versus mass.

And the final point, the other point I wanted to make and Dave Kocher kind of hit on this as well, was that I mean the reality is folks that this stuff has to be disposed. We don't have the option to leave it in the UF6 form forever, we do have to dispose of it. So we could make this process so hard and so onerous that we'll never ever get it disposed, and that's not really going to solve us any problems is it?

So I think we need to keep in mind that there are economics involved and there are processes. We've got to make this process worked so that this can be disposed, not so that we can set this up so that it's impossible to be disposed and then we won't solve our problem.

MR. CAMERON: Okay. Thank you Drew. And Steve Cowne?

MR. COWNE: Yes, really quickly, David brought up the concept of economics and Drew's touched on it here a little bit too and I think everyone knows that the cost of disposal of DU is borne ultimately by the people who use the electricity and others that reap the benefits of it.

But one of the things that the enrichment industry has to do, as you're well aware, is they must factor in costs into their decommissioning plans for the DU and the types of decisions that are made here ultimately for the disposal of that will affect those decommissioning costs.

And there are regulations under Part 70, specifically 70.76, that deal with cost benefit analyses that must be done and the back-fitting issues and I just would ask the Commission staff to take that into consideration, whatever decisions we make here, that we look at 70.76.

MR. CAMERON: Okay. Thanks. Steve, more on economics and cost. Christopher?

MR. THOMAS: I feel like I want to know more about what Texas has done. I mean I don't feel like I fully understand it and I think I need to go back and really consider and then provide final written comments on what I think would be actually the best proactive way to go forward.

I do want to address something that Drew said. I don't agree with the statement that we have to dispose of this material now. I do acknowledge that there is a current problem with the cylinders but that material can be de-converted and then stored on site. And I think at that point you've eliminated the immediate concerns and I think then you have the time to really find the best way to dispose of it.

And I like that you talked about the cost considerations because I keep hearing about you know cheap nuclear power and well there's ways to keep it cheap and one of the ways to do it is in my opinion to not pay for the correct best protective disposal available.

Anyway, I guess those are my thoughts about that and I would welcome any other comments about the idea that you know we have an immediate problem that we have to solve right now with disposing of this material, because I just don't think we do.

MR. CAMERON: Okay. And we're going to do the tee up here. Steve?

DR. NELSON: One sentence. The need for disposal is not an excuse for improper disposal.

MR. CAMERON: Okay. All right. Thank you Steve and we're going to tee up the exposure scenarios, see how far we get on that. We're going to then see if there's any public comments on these two specific issues and we'll take a break and come back and see what time it is. Dave are you doing the exposure scenarios or is that someone else?

MR. ESH: Okay. Exposure Scenarios for a Site-Specific Analysis. This is one of those items that is somewhat intertwined that it's difficult to separate but we're going to talk about it and I'm glad a number of you who are probably experts in this area are here to give your insights in this year.

I'll do a little background of 10 CFR Part 61, what's done with exposure scenarios there. What are maybe some key considerations and what do we mean by site-specific exposure scenarios.

So a little bit of background in the development of 10 CFR Part 61 as documented in NUREG 0782 and 0945. They basically looked at potential residential, agricultural or other activities near the disposal area and they considered inadvertent intrusion on the disposal area.

On the right hand side of this figure is basically a snapshot out of one of those documents that provides a scenario, accident, acute effects, intruder construction, acute effects, intruder construction, acute effects, intruder agriculture, chronic effects. Various scenarios, various locations where that scenario may take place and then the uptake pathways associated with those scenarios. And these were broken down into pathway dose conversion factors, PDCFs, that were used in the analysis.

But overall for scenarios and the original analyses, these were the types of scenarios that were applied.

And I would note that this is an area that we get a lot of comment on because the facilities as located today for the most part do not have that activities occurring near them or on them certainly but even near them. But for a lot of what we do as a regulatory construct to try to assess a problem and make a decision, so in this case we're applying scenarios that may not be relevant today in year zero but, based on what people do today, could be reasonably foreseeable some time in the not too distant future.

But it is a regulatory construct to try to assess a problem. We don't make any expectations that anybody can accurately assess exactly what humans are going to do but in the regulatory analysis we pick something that we think is reasonably conservative, use that to calculate impacts.

A little bit more background here. Just a picture version of what I talked about in the other slide and have talked about previously. This is a resident or resident farmer, in this case it says resident farmer, of course I don't see any animals here so maybe the farmer should be dropped, but this is somebody who lives near the disposal facility. They get a potential dose from using water, in this case we have an old-fashioned well here. I don't see too many of those any more although my grandfather had one growing up in Pennsylvania. Most of us don't have them any more. I know they still exist.

The potential dose from ingestion of vegetables from using contaminated water, people do all sorts of normal domestic activities. They spend time on site and off site, exposure outdoor and exposure indoor.

The chronic intruder is somebody that could potentially build a house on the disposal facility. There may be an engineered barrier present, depending on the depth of that barrier the house could disrupt or defeat it. But in the case of depleted uranium, as we've talked about and we'll talk about I think tomorrow, you can get diffusion of radon into the house just like you do in the natural environment from uranium in the natural environment.

You also, as Dr. Burns has talked about in detail, you potentially have leaching of the depleted uranium into the water pathways, which is part of the assessment to evaluate the safety.

So that's a little bit of background about what was done in the original part 61 analyses, what we did in our screening analyses and it's open to the workshop to discuss whether that sort of construct is appropriate for future analyses.

I've already talked about this on the previous slide; historical approach, off site resident, on site intruder, both acute and chronic, so the people that build the house, you calculate the dose to them and then you calculate the dose to the people that live in the house after somebody has built it.

But there is a relationship of the receptor scenarios to the characteristics of the waste. We use in say decommissioning right now where we have decommissioning sites that may have very short-lived waste, the area where the facility is being decommissioned is being used in an industrial manner. We allow people to consider future use of that area in an industrial manner which then defines different types of receptors and scenarios than you would otherwise do for the residential type scenario.

There is an issue in scenarios whether you include radon and at what limit you include it because in the previous analysis that we did, NRC did for Part 61, there wasn't a need to have radon because we didn't have any material that was generating a lot of it in the source term. So that's an area open to discussion for this group.

And then something we talked about the previous workshop and the general message we got was don't define the scenario in the regulation. We can talk about scenarios in guidance if anything. But an option is whether we should define the scenario or whether we allow people to make some sort of site-specific considerations about the scenarios they choose in the assessment that they do.

So we're seeking your input on those things.

MR. CAMERON: Great. Thanks Dave. Anybody want to open up on exposure scenarios for us? And again regulation versus guidance and we will have a reprise of all of that at some point. Steve?

DR. NELSON: I'm going to have to pick on

Clive as a case study for the types of site-specific scenarios you might encounter for Clive as well as other facilities.

I have a colleague who has modeled, we put it together in a letter that I'm going to distribute at the end of this meeting to NRC and if there are enough copies anybody else that's interested.

She's done a mass energy balance model for the Great Salt Lake and her calculation implied, or the result of her calculation was that you need three to six millimeters of increased precipitation, that's not very much even in a dry place like the west desert, for one thousand years to raise the level of the Great Salt Lake to the elevation of Clive. Okay? That's not very much.

I could talk about the history of Lake Bonneville, I could talk about the history of pre-lake Bonneville Lakes. I could talk about Owens Lake as another analog in the Great Basin. My point that I would like to make for any of the non-geologists in the audience who may be a little bit surprised, or maybe not, I think if you polled geologists, atmospheric scientists, geomorphologists, folks that work in the Bonneville basin and work on its quaternary history, the probability that that site will be inundated over time frame of interest by rising lake levels is probably something, the probability is something like one in the next 100,000 years.

So I think you have to consider site-specific scenarios that are effectively disruptive. We know from prior Lake Bonneville shorelines that you can cut several meters into bedrock in a few hundred years. So I think you've got to worry about those sorts of things.

I think some sort of human intrusion, inadvertent intrusion, under this kind of process pales in comparison with respect to importance. I don't see that site surviving a flooding event. I think the pile's eroded, I think it's gone. I think you need to look at that, or the state if it comes to that, and I think you need to consider other geologic processes and that might include climate, it might include tectonics, that will be operative at other sites.

I notice that Indian mounds were mentioned for instance. Well, okay, and maybe they've survived intact. So you take a 1,000 year old Native American burial mound in the mid-West somewhere, that is one-tenth of one percent of the time to peak activity of depleted uranium. It's nothing.

The site specific considerations are critically important. I think they need to be in the regulations. I don't think you can write a regulation that'll cover every disruptive scenario at every site but they need to be comprehensive enough that they can be implicitly recognized and a licensee's feet held to the fire.

MR. CAMERON: Okay. Thanks Steve. Let's go to Tom, Tom Magette.

MR. MAGETTE: Thanks Chip. I would make one comment in general on this topic which is that I think that anything having to do with scenario development appropriately belongs in guidance, doesn't belong in regulation. I guess there's just been a suggestion made that somehow there's some notion that that's a better way to keep a licensee's feet to the fire.

I don't agree with that. This is something that's been traditionally dealt with in guidance. You certainly aren't going to have a Lake Bonneville at Barnwell, for example, so the notion that somehow you're going to prescribe scenarios and a regulation way suitable to sites that exist and have not yet even been sited, to me just doesn't make sense. I don't think that's the appropriate nature of a regulation.

We've heard a lot of comments already today about keeping regulations at a top level or a first order. You've heard comments like that from Larry about how voluminous they can become.

If you look at some of these guidance documents you heard Jim Lieberman mention that as well, they can be pretty voluminous and I think that's appropriate. But I think that this is a matter for guidance because it will vary greatly from site to site and I don't think that you have to put it in regulation to get the proper level of control. Nor, frankly, do I think that you can put it in any rational way in a regulation.

MR. CAMERON: And Steve, let me just make sure that we read what you said right because you sort of broadened it out at the end. Were you saying that the specific scenarios should be in the regulation or were you saying that there should be a requirement that all scenarios, and I'm just saying it really sloppy now, that all scenarios should be considered in a regulation?

DR. NELSON: Well, I don't think you'll have to have-- it's maybe impractical or impossible to that extent I might agree that you can't list every possible event for every site because some might not even have been thought of yet. Right?

But we can certainly anticipate and write general language about disruptive events.

MR. CAMERON: So general language about--

DR. NELSON: I would have some general language. I think, well maybe I'd better not say this, well let me back off for a minute. There is some, so maybe somebody who knows the regulations better than I do can speak to it but I don't think that the one times 10 the minus 8 disruptive cut off for consideration in a performance assessment is in guidance, that is in a regulation.

There have to be things that are in the regulations.

MR. CAMERON: Okay. Chris, did you want to respond to that and then we'll go to--

MR. MCKENNEY: Just as a point of clarification. The ten to the negative eight which is in regulation is actually in the EPA and the NRC's Yucca Mountain's specific regulations. That's where that one exists. We don't have a cut off right now at all in Part 61. I just wanted to clarify that, make sure that that wasn't implied.

DR. NELSON: But I'm confident you will have the appropriate controls.

MR. CAMERON: Okay. Drew and then let's go to Steve Cowne and then over to Beatrice.

MR. THATCHER: All right. Just from the state of Washington standpoint, we like the fact that the rules don't specify the exposure scenarios. That's where the guidance document is and honestly from a state standpoint we obviously follow the guidance documents pretty darn religiously. But it's just too complex to try and put all that in a rule so that's just my point.

MR. CAMERON: Thanks Drew and Steve?

DR. NELSON: Yes, and I'm sort of a broken record too but I don't believe that it's appropriate to put the scenarios into the regulation itself. I don't know of any other precedents where we get into the scenarios and specify those actually in 10 CFR. I recommend that they be put into the regulatory guidance.

And actually, as a licensee, I can see a concern that I would have would be if you start putting the scenarios into the regulations, because you cannot possibly identify all of them, over a period of time as institutional knowledge of the regulation maybe is lost or the intent is lost, you could end up with a situation where it actually has the opposite effect and the licensees or others believe that whatever is in the regulation is all they have to look at and not other things. And I don't think we want to create a situation where it's an inclusive type of list of scenarios.

MR. CAMERON: So that would be sort of an unintended consequence.

MR. THATCHER: I've got a classic example follow up on that. In the state of Washington we included sweat lodges as a possible exposure scenario. I could never see the day where you would see the NRC regs or something like that specifying in rules that this is something you had to do. We recognized that at the state level and we included that and if you had been specific we probably would have said oh don't include that, so we're good. And we would have missed a big component of exposure at least for a given scenario.

MR. CAMERON: Okay. Thank you both. Before we go to Beatrice let's hear from David.

MR. KOCHER: Yeah, one more vote for don't get too specific in the regs. I mean an issue with that that's not been mentioned is that you don't want to provide disincentives for seeking good sites, and that's what can happen if you get too prescriptive.

And I presume that even if you relegate the scenario business to guidance, that a licensing procedure is the place where basically any scenario can be raised and has to be dealt with in some fashion or other. And to me that's where you handle the things that you forgot to write down. The unusual flood or 50 feet of ice and all of that.

It's up to the NRC to define the goal line but don't tell the licensee how to call the plays.

MR. CAMERON: Okay. And Beatrice?

MS. BRAILSFORD: I think though that the intent of the scenarios, which is to acknowledge the certainty that human beings will continue to be on or near the site. I think that that has to be somewhere acknowledged in a very enforceable, I know an acknowledgment isn't an enforceable thing, but I think that's the intent. And I heard you, I heard a little bit of skepticism about the current scenarios, you know, the subsistence farmer and da-da-da-da and by the way I heard connected with that an assumption that the current low level waste sites will be the disposal sites for depleted uranium which goes back to the concern that we've started this process backwards and we will be writing rules to meet currently operating sites, rather than writing very good rules and seeing if new or old sites meet those rules.

So again the intent of the exposure scenarios I think has to be captured in some very robust fashion.

The issues that Steve brought up, and I recognize that some of these would be perhaps dealt with in the licensing stage, but I think we've also acknowledged that we're dealing with facilities that already have licenses. But some of those big, big, the waste will be exposed through erosion. Does that go back to the period of performance discussion? I mean would that be dealt with there rather than specifically in an exposure scenarios?

MR. CAMERON: Let's go to both of you, Chris?

MR. MCKENNEY: On your last point was where I was coming from earlier from a couple of comments which is that in general our guidance currently is as part of your licensing documentation for an applicant or for what we think is good practices, is that you need to evaluate all the features, events and processes that can occur at your site over the time period of compliance or interest, whether it's you know other things.

From that do you model it on a day to day basis, you know, does the model include how the thing actually erodes? Or do you just do stylized calculations of different scenarios? That's different options you can do. But you need to, at least as a base, be able to describe that you have looked at all feature events and processes that can happen during that time period that you need to look at to make sure that the licensee or applicant can provide justification that they do meet and will meet compliance, and that the regulatory authority then can make a determination that there is reasonable assurance they will meet compliance.

And so to do that you have to evaluate everything and say we looked at this, it's either going to do this or that or we've analyzed this which covers that also. And from there generate scenarios in various ways.

MR. CAMERON: Okay. Thank you Chris. Dave?

MR. ESH: Yes and to your point about if I gave the impression that the rule would be made to fit the sites that are currently existing and may possibly accept depleted uranium, that's absolutely not the case.

The rule will be made based on what we think is needed for this type of problem and if those sites can meet those requirements then they will able to dispose of the material.

MR. CAMERON: Okay. Good clarification. Let's go to this side and then we'll go to Vanessa and Christopher, Scott, and then Tom. Scott?

MR. KIRK: Just to comment on the guidance. I know NRC has a ton of experience in developing the consolidated guidance for decommissioning on exposure pathways and I'm sure there's a lot of lessons learned that could be applied to the new guidance that you guys are developing, and I would encourage you folks to look at an acceptance criteria because that tells the license reviewer and the licensee what's generally acceptable and what's generally not acceptable.

And if you use that approach, as you've done in the past, it's really transparent also to the members of the public that are also looking at license applications and the development of exposure pathways and those sorts of things to making sure that the guidance that has been developed based on experience is well suited for the application for the site.

MR. CAMERON: Okay. Thanks Scott. Tom?

MR. MAGETTE: I would echo what Scott just said. The other thing I'd like to point is the over-arching requirement is to satisfy the performance objectives. That's that's protective of public health and safety. And how you demonstrate that you satisfy the performance objectives is something that's going to be accomplished by selecting the appropriate scenarios and then you're going to be subject to the regulatory oversight of that process. So whether it's the NRC or an agreement state, it's not as if there's some book of scenarios that we pick a few from, or some other licensee picks a few from, and once we've done that we're good to go.

As Scott was just saying, we're going to be looking at exposure pathways and we're going to have to demonstrate that we comply with the performance objectives. There's certainly nothing about the notion that scenario development being in guidance prohibits or in any way limits the regulatory agency from coming back and saying no, we're not satisfied that you have demonstrated that you meet the performance objectives.

So the notion that this is somehow not

protective or that we get to check a bunch of boxes that we have more control over, I think kind of misses the point of the first order of nature of the regulation. I think it's really important to remember that you stay tied to that demonstration of satisfying the performance objectives and the notion that scenarios are in guidance somehow limits the regulator's authority to ensure that that's been appropriately done I don't think is correct.

MR. CAMERON: So that that may go to Beatrice's concern about enforceability.

MR. MAGETTE: Exactly.

MR. CAMERON: Okay. Great. Vanessa and then we'll go to Christopher.

MS. PIERCE: I guess two quick points. One just in response to what Tom just said. I think going back to this notion of performance objectives kind of gets at the heart of both what Bea had just said in our discussion earlier about how sensible it is to model out beyond 10,000 years of the performance objective is to protect human health and the environment from this material to the limited peak dose. And we agree that it's silly to be talking about modeling that goes out beyond 10,000 years. That's kind of the crux of the problem and I think that speaks to Bea's earlier point, which is not to say that David was being flippant about how seriously the NRC is considering this process but rather the starting assumption that near surface disposal of depleted uranium is the right place to start.

And I think our concern is that you know we probably should have taken a step back and questioned whether that is truly the best way to dispose of this waste stream.

The other point that I wanted to make was just about the question about inclusion of radon and regulatory limits. I want to state the obvious to me which is that we do think that radon limits should be set forth probably in rule rather than in guidance because it is one of the primary health and safety concerns. So I just wanted to get that on the record.

MR. CAMERON: Okay. Thank you Vanessa. Christopher?

MR. THOMAS: Yes, thank you. I also wanted to go back to the comment that Tom made. I mean I think that's all well and good that the ultimate objective is to satisfy the performance objectives. But the system that you just outlined, in my view, has failed Utah. I mean it has failed the citizens of Utah because what we're talking about here is a waste stream, significant quantities of depleted uranium the NRC admits was not looked at in the original classification and also was not looked at in any of the performance analyses that has been done to this point.

So to me that current system has failed and that's why I'm interested in having more of this put in regulation so that it has to be complied with. And along those lines I think the bar for disallowing an onsite intruder scenario should be very, very high and I'll tell you why -- because the way I read current regulations, both federal and state of Utah, that is a protection that is guaranteed. It is guaranteed that an inadvertent intruder will be protected.

So to me the bar for removing that scenario should be almost impossible to meet. And I don't understand how, I mean yes you can make arguments about well maybe somebody won't go out there and build a house, as you've identified, but there are other onsite scenarios that I think are very realistic, that should be. So to just wholesale say we're not going to look at onsite exposures, I mean that shouldn't fly and unfortunately I think that's what we have currently in Utah.

MR. CAMERON: And Tom? And then we'll go to Steve and take it from there.

MR. MAGETTE: I don't think we've ever suggested that they be eliminated entirely. There are certainly scenarios that we suggest should be eliminated, for example groundwater consumption. So if you want to have an inadvertent intruder who's residential and consuming groundwater at Clive where the groundwater is simply not potable, it's more saline than the ocean, that no we don't think that's reasonable and we think if you look at the guidance in NUREG 1573 it talks about even as you look many years into the future, that you have to use as a basis for that a perpetuation of current conditions and societal practices that you can't get to a place that makes that reasonable.

And we discussed that in Maryland, Dr. Makhijani agreed that that was unreasonable and nobody suggested that it wasn't unreasonable.

So yes we see that there are certain scenarios that simply don't apply to suggest somehow we get a by on inadvertent intruder or that you can't think of a scenario that involves an inadvertent intruder, you know, people have used the sportsmen applications, whether they're hunters or bikers or whatever, I don't think we'll ever succeed in clearing a bar that says there are no inadvertent intruder scenarios.

Some of them we would suggest, I think with strong technical rationale, do in fact not apply.

MR. CAMERON: Okay. Let's go to Steve and see if anybody in the audience has questions on or comments on these last two topics. Steve?

DR. NELSON: Yes, my first question is for Christopher McKenney. I want to make sure that I understand how the requirement to adequately characterize and evaluate the relevant FEPs, I like to speak acronymese, I've done FEPs screening, it's Features, Events and Processes, is that a requirement that is or will be in a rule?

MR. MCKENNEY: I don't want to predicate whether we'd put that in the rule as such the way it's written, for example, in Part 63. I mean that is pretty much, I don't know if they even call them FEPs there but they actually might call them FEPs Part 63. Consensus is by nods of heads I think we do.

But between what we talked about on the stability and stuff that we talked about in sub-part D and then you couple in performance, that's about the most transparent method there is to be able to tell anybody else that, yes, you looked at everything is to be going through and documenting that, yes, I looked at this. And we will take into consideration whether we need to include that in the rule or whether we think there's enough in the rule already that doesn't require us to say you must do a FEP analysis.

MR. ESH: And I would add please take a look at sub-part D, see what's in there and see whether you think that there are major processes related to this sort of decision that aren't reflected in there. That would be a good input for us to get.

DR. NELSON: Sure and my point was not that there should be a laundry list of FEPs in a regulation but that the requirement that these types of features, events and processes that could be disruptive are adequately considered. That needs to be in a rule.

Okay, the other last thing I wanted to say is I just wanted to briefly echo something that Christopher Thomas said and that's about the state of Utah being let down. I'm thinking about 49,000 tons that may be in a site and now we've even had some acknowledgment from multiple individuals that maybe, gee, engineered disposal isn't the way to go.

I'm wondering, you know, if that turns out to be the case, how do we fix that? And why didn't we prevent reaching this state in the first place? And that's maybe just a rhetorical question.

MR. CAMERON: I knew it was going to be. Thank you Steve. Vanessa?

MS. PIERCE: I am not going to answer that question.

I guess I just wanted to get back to the sub-part D that was mentioned and I guess I just have a clarification question. My understanding is that criteria for sub-part D have already been addressed for the three existing low level waste sites as they were originally licensed and when that process happened they were envisioned to be sites that had to, you know, the performance analysis was done for a 500-year time span, but now we're talking about a waste stream where we have to look out ten thousand years, a hundred thousand years, and so I guess my question is I don't see how the questions that Steve Nelson has brought up are going to be addressed in sub-part D with the existing licensees that have already been licensed.

MR. ESH: I'm not sure if I can answer that now at this time but I understand your question and I tried to at least comment on that earlier. The items that in sub-part D would be influenced by the period of performance that you needed to choose for your analyses.

So right now the regulation is silent on the period of performance but it gives you basically a laundry list of the types of major technical things you need to consider when you do one of these siting actions.

Now if you go from 1,000 to 10,000 or 10,00 to 100,000 you can say that maybe that laundry list is incomplete, that's a potential outcome. Or that what you need to do to address some of those things on that list is much more difficult. I can't say at this time. I understand your comment, I think we're on the same page but I don't have an answer for you at this time.

MR. CAMERON: And Vanessa maybe bring that up when we get to the other considerations agenda item tomorrow because I think that may fit there.

Any public questions, comments on period of performance or the exposure scenarios at this point? Yes? And please introduce yourself.

MR. ESSER: Dave Esser civil engineer. I was just wondering, I'd just like to throw out there best available technology and is a million years even on the table? You look at Texas, they've shown what they can do. I'll just throw that out there.

MR. CAMERON: Okay. Best available technology. All right. Be right back there, we're going to go to Dirk first and then we're going over to that gentleman.

MR. DUNNING: Dirk Dunning, state of Oregon. Period of performance I think you guys pretty much talked through most of those issues. I think one other that came up that Drew did mention a couple of times today I would ask in the form of a question is there's a lot of folks who are not in the room. Obviously we have a self-selected group of people as well as those you've chosen yourselves. How do you assure in this process that their voices are also heard and their concerns are addressed and, in particular, I'm thinking about Tribal Nations issues which comes up a lot in the Northwest.

MR. CAMERON: And I would just note that the Yakima Nation was invited to both workshops and for some reason did not attend but may submit written comments.

Does anybody want to lay out the whole public participation process? I think that Andrew did a pretty good job, Andrew Carrera, of talking about all the opportunities for public comment on the rule and of course that means getting to people and not just through publishing a Federal Register notice. Okay?

And I know that Larry and company are considering doing other types of workshops like this and possibly town hall meetings that at least get you usually a broader spectrum. But it's a point well taken and I think that Larry and his people are going to consider the way to get the broadest impact out there because it's the most helpful think to do. Yes?

DR. STALEY: I listened intently to the contractor to my right this morning that you gave an opportunity to talk. I wanted to have equal time. My name is Kent Staley. I'm a physician, I have three degrees, one from BYU, one from Utah and one from Harvard, the latter being in the public health.

I can't help but be seriously concerned about the public health issue of this situation.

It's very complex. I sat here and listened. It's over my head but I can express my feelings about the impact of having all of this material a few miles from a major metropolitan area.

This problem extends for probably hundreds of years, even thousands, and the public health of our grandchildren and our great-grandchildren can be seriously jeopardized.

I work as a volunteer for the Emergency Preparedness Program and we talk about terrorist attacks, we talk about earthquakes, we know that this area is overdue for an earthquake and it's not a far stretch of the imagination to have that earthquake and have the fissure extend to the north south area. Contaminated groundwater from an earthquake fissure or a terrorist bomb that disperses radioactive material to a nearby metropolitan area downwind is a distinct possibility.

I adore this state, I'm going to live here. I live here, I don't come from Oregon or Washington as many of you people who have testified have, I intend to have my grandchildren and great-grandchildren here for many years. But I can't help but think about the public health aspects of this problem, and I think that any individual who votes for this in our state in close proximity to this great city of Salt Lake is going to be held responsible for their decision and their vote. Thanks.

MR. CAMERON: And doctor, could we just make sure that we have your name?

DR. STALEY: My name is Kent Staley.

MR. CAMERON: Okay. Thank you. Comments on period of performance or scenarios? Is this on one of those or is this a general comment sir?

MR. FRUIN: On the scenarios.

MR. CAMERON: Yes, sir?

MR. FRUIN: Good afternoon. My name is John Fruin. I was a safety manager for a trucking company for 21 years as a safety supervisor. One of our drivers rolled over a Class X explosive trailer in the middle of Idaho and I would love to share my pictures with you all. I'll stay afterwards if you'd like to come and see them.

I don't know how many of you have been to a spill but it's intense. And I'd like to share that with you.

MR. CAMERON: Great. Thank you. And it's John?

MR. FRUIN: John Fruin.

MR. CAMERON: And could you spell it?

MR. FRUIN: John F-r-u-i-n.

MR. CAMERON: Okay. And John has a box of very interesting pictures here that people may want to look at afterwards. And I think this is a good time to take a break. I have about 26 after four. Could we back at 20 to five and then we'll regroup and see what we can do profitably for the rest of the day. Thank you.

(A SHORT RECESS WAS TAKEN)

MR. CAMERON: Okay. Just an agenda check with you. We were going to try to get through the last item on the agenda which is Source Term Issues and a lot of the nature of that discussion, at least at the last workshop, dealt with things like the powder grout epoxy waste form issue and Christopher Grossman is going to tee it up for us and then we'll go out for discussion. And if we're going on too late we'll all go home and Beatrice keeps reminding me of the time. How perfect is that? Okay Chris.

MR. GROSSMAN: Okay. Thank you, Chip. I'm teeing up here or we're getting into the source term issues for a site-specific analysis and I'll talk a little bit about what was discussed at the Maryland meeting, try to interject that here as I'm going through some of the background on the issue and then some of the key considerations that we would ask for your input on today.

Let's see if I can figure out how to do this. Here we go. The source term in performance assessment estimates the amount of radio nuclides that are released from the waste into the environment over time. I know one of the points of confusion from the last meeting was some of the terminology that may have been used. We may not have been entirely consistent so I'll try and clear some of that up here in case I overstep some of those bounds.

The waste we were talking about this morning and this afternoon so far is depleted uranium waste form which kind of gets to the second point is the physical chemical form that you may dispose of that waste in a disposal facility.

And so the release of radio nuclides from a facility is a function of both the inventory of the radio nuclides that are present as well as the chemical and physical form of that material. And the last point here is that we consider performance assessments living documents that should be updated as new inventory is added to a disposal system to keep current.

We'll talk a little bit about the form of uranium to be disposed and some background here. From enrichment facilities the depleted uranium is commonly stored as uranium hexafluoride. This reacts with water to form a corrosive hydrofluoric acid and is probably not appropriate for disposal because of this.

The NRC screening analysis that we performed to present options to the Commission we assumed that the uranium hexafluoride was de-converted to a more stable oxide form.

And we also looked at the potential of adding some stabilizing materials such as grout which could affect the release from the waste from itself.

So in modeling the source terms some important characteristics are the physical configuration of the disposal facility as well as the inventory, influence of the chemical form of uranium on release, for example the issue of the hexafluoride versus an oxide form and there are other forms that exist that we may want to discuss today and bring some of those up.

Also the effects of any stabilizing materials, whether these be engineered barriers or parts of the configuration of the waste form itself and the long term performance of those stabilizing materials.

So what we're asking the panel today is to provide us some feedback on specifying criteria in the regulation or developing guidance related to the source term issues including the inventory, any physical or chemical forms as well as stabilizing materials.

So with that I'll turn it over to Chip.

MR. CAMERON: Thank you, Chris. Drew you've brought up the issue of the powder, grout, epoxy, that seems to fit into this section, do you want to expand on that?

MR. THATCHER: It's probably close enough. At least from the big picture standpoint as I look at the source term where you have by all measures a huge quantity of material right? And you've got it essentially in a powder form. And essentially in its current form it's insoluble but, of course, things can change. And the only way I know that makes things worse is that of course if you've got a powder there's just way too much surface area so there's got to be a mechanism or least you want to look at a mechanism by which you limit that in some way.

I mean if you say you're putting this in a 55-gallon drum which is generally stainless steel or something like that, well we know that rusts so even something as a simple as aluminum drum that's sealed or something like that in smaller, I don't know, I'm just trying to think. And epoxies are known to last quite well, they're expensive, but I mean I don't know about their performance over the really long terms.

But I just was thinking big picture. We know grouting and with the PH you know situation over years, that's really not going to be of benefit so I was just trying to think of what's another mechanism by which we could put this in a form, because you're not going to meld it, right, we can't make it a uranium ingot I don't think. So I was just trying to think of another way where we could stabilize it such that we don't have as big an issue.

MR. CAMERON: Okay. Great. Thank you. And it does raise a general issue that the NRC perhaps could shed some light on for us. Can you put the concern, the issues that Drew raised, can you put that in the context, how does that fit in, how would that fit into this proposed rule making? How would using epoxy, for example, how would that come into site-specific performance assessment?

MR. GROSSMAN: I don't remember the exact section of the regulation but I know that there are some requirements for site stability and it could play into one of those requirements potentially.

But I think along those lines is any materials that you may introduce to stabilize, you would want to consider what effects as well they may have on the release-ability of the waste form, whether it be leaching or other synergistic effects, etc.

MR. THATCHER: And this could very well be a site-specific thing. I mean if you've got a site where you do your initial first pass analysis and you're like not good, what can we do to make this a more viable product. At least that's how I usually approach an analysis. You do your first cut. Is the first cut good? And it more than passes? Then you don't need to keep doing further analyses or further work to try and see if it will work.

So I guess that's my second pass is that okay now I'll take a second pass, you didn't pass initially. Can you for the long term stabilize this in a manner such, and several of you have alluded to this, you know, making sure this gets into an environment such that reducing conditions prevail. Perhaps that's the other means of achieving the same thing.

MR. CAMERON: Okay. And let's go to Chris and then we'll go to Peter. Chris? Okay. I'm not sure if Peter, go ahead we'll go to Peter.

DR. BURNS: I think I'm responding. And I wanted to make roughly the same point I made in Maryland that the waste form is a very important part of keeping the waste where you want it. The waste form must match, within some reasonable boundary constraints, the geology and the engineering barriers that you use to prevent the mobility of uranium.

There are certain scenarios that would be truly terrible, uranium hexafluoride as a waste form for example as an extreme case. U308 is better but are there better things, and I'm confident that there are and I mean there are definitely uranium phases that are less soluble in oxidizing groundwater than U308. Although U308 is fairly low solubility there are definitely phases that are lower solubility and if you're going to de-convert from, by the way I only learned that word in the last meeting the de-convert word, I never heard that before, I would just say convert, you have six through something for disposal why not, assuming it doesn't add a tremendous expense, why not convert to something that is highly stable in the environment you wish to put it in.

Of course you have to know the environment, there has to be that marriage between the waste form and the environment. But I think that the regulations should include some specific language on the is it stability, is it durability, or just appropriateness of the waste form for that environment. But I think that should be there.

And I don't really buy is it good enough so much as could it be significantly better without tremendous cost? Because the probability of the uranium being released into the groundwater is 100 percent over time. We can all agree, whether we have to go to 10,000 or whatever. So to the extent that we can slow that process down we should.

MR. CAMERON: Okay. Thank you Peter and let's go to Chris and then--

MR. MCKENNEY: And part of the cost that Peter was talking about is that when you're looking at waste volume, waste form changes and from this powder and everything else and adding a matrix of any type whether it be whatever type of thing, if you just do it through U308 with a matrix or you change that form, I mean it has an interplay with other things such as it will change the total volumes and the actual concentrations of the material, the effective concentrations of the material on a specific basis that could play heavily into levels of performance that would have to be taken into account.

And also as the gentleman mentioned, one of the things from an operating point of view is the larger volumes do entail corresponding risks to people today of larger numbers of shipments of different types which also have to be weighed.

MR. CAMERON: Okay. Thanks Chris and Steve?

DR. NELSON: Just very briefly, there is not just uranium to be considered but all of its progeny in the waste form.

MR. CAMERON: And could you expand a little bit more on the implications of what you just said?

DR. NELSON: Well, as the activity increases, radioactivity of depleted uranium increases by the ingrowth of all the daughter nuclides, each one of those daughter nuclides will have a different geochemical behavior from the parent uranium.

MR. CAMERON: So that one waste form might be suitable for early on but not for the daughters?

DR. NELSON: Yeah. After a million years, every nuclide in that waste will have the same activity as uranium 238. So you have to worry just as much about every one of the daughters.

MR. CAMERON: Steve?

MR. COWNE: I have a question for Christepher. I missed your point as far as operation and transportation, you were seeming to make a point about the safety aspect of transporting of what you have six uranium oxide or what?

MR. MCKENNEY: It's more of a general comment. It's not about uranium specific. It's just that when you start changing volumes and start changing concentrations and adding matrices and dropping waste in a canister and therefore resulting in more canisters to ship, do you start to get transportation risks and other things that have to be weighed against the other benefits of doing that? In evaluating the change in operations of that facility, those all have to be played into it.

In our old, well it's ancient now, standard review plan for a license application for a Part 61 facility, we have the evaluation of transportation risks, including accidents and stuff like that. Sometimes waste form is even beneficial in that way because the waste form results in if there's an accident there's less chance of a release. Obviously a powder you've got more extensive release if it rains right after the powder gets out and everything else.

But those all have to be taken into effect, there's no one solution that doesn't push another side of the balance there that, you know, for example, saying well if concentration is the problem we'll just put only 10 percent as much in each canister and fill it 90 percent with sort of matrix and drop the concentration by effectively a factor of 10. Well that just increased your volume by a huge amount and you have not only volume in your site space issues but you also have wherever this goes from one place to another, those risks are also being incurred.

And I mean we've seen that heavily in de-commissioning space where, you know, we've had accidents from transportation.

MR. COWNE: Well, I guess I brought that question up because uranium hexafluoride in that form has been transported in this country in large volumes for decades now. The fuel fabrication facilities like Areva and Richland, Washington; Columbia, South Carolina; Westinghouse; GE, North Carolina and etc., etc, they make fuel pallets for nuclear power plants from UF6 that come from the older DOE facilities or from overseas and Department of Transportation regulations allow them to ship the UF6 cylinders, 48-inch cylinders, on open bed flat bed trucks. And the reason why is that solid UF6 doesn't really pose a problem to the public if there is an accident, a highway accident, and if you put it in a more stable form like an oxide, sure if you leave it on the open ground as a powder for years and let water rain on it and dissolve, etc. it becomes a problem but it's not something that's going to create an immediate hazard to the surrounding public. That's my point.

MR. CAMERON: Okay. I don't know whether it's worth pursuing this or not but I'll throw it out there anyway. Drew when he was bringing up the use of the different waste forms was talking about well this could be a way to improve the suitability of a site that was going to not be an acceptable place for disposal, and Peter brought up the philosophy, and I'm not saying that Drew would not agree with what Peter said about you should be looking to make the site as effective and controlling release as possible.

Is there something in terms of the philosophy, is there a distinction in this regulatory philosophy that would pose a challenge, or not a challenge but is it a choice for the NRC rule makers? Marty? I'm getting blank stares from a lot of people.

MR. LETOURNEAU: I think it's late in the day and we're all tired but the question that we're dealing with respect to the waste form and the nature of the source term for DU is really, in many respects, not any different than we deal with for any other waste.

Yes, you have to have a marriage between the waste form and the site, you need to look at the geochemistry, you have to consider the tradeoffs. You use your iterative performance assessment to help inform that process and help you figure out what the right forms are to perform the way you need to.

I'm not sure that there's much more that we all have to say on it and I think Steve's point is a fantastic about how the progeny change geochemically and the need to account for that.

MR. CAMERON: Great. Thank you. And let's go to Christopher and then Steve. Christopher?

MR. THOMAS: I just wanted to know from Peter what other forms there possibly could be, because I just don't know enough about it to know what the possible forms are and what the advantages are of each in different conditions.

DR. BURNS: Well, some of the lowest solubility forms of hexavalent uranium are urinal phosphates and urinal-- and we see these in nature holding back uranium in ore deposits and so on.

If one is fortunate enough to have a waste storage systems that's in a reducing environment, then as long as it's reducing uranium to oxide is effectively insoluble. So it depends on the geology but U308 would not be the best choice. It may be the best choice from the perspective of all the different factors, cost, volume, etc., but from the point of view of performance in itself it would not be the best choice. But it would certainly be better than UF6.

MR. CAMERON: Does that answer your question Christopher? And Beatrice? Oh Steve, go ahead.

DR. BURNS: No.

MR. CAMERON: Okay. Beatrice.

MS. BRAILSFORD: And this is what form is it going to come out of DOE's de-conversion, and I did know that word before. But it is weird isn't it. What form is DOE going to put out from its de-conversion plans?

MR. LETOURNEAU: I think the reason why everybody is talking about the powdered U308 is because that's the product that the de-conversion plants are creating.

The next question is what happens from there? And that's the subject of some of the analyses that are still ongoing and decisions that have not been made yet.

MS. BRAILSFORD: And these are decisions of the DOE?

MR. LETOURNEAU: Yes.

MR. CAMERON: Okay. Go ahead Christopher.

MR. THOMAS: I just wanted to ask a procedural question in terms of the DOE's decisions of their stockpile of depleted uranium. I mean I was expecting that there was a record of decision document that was being prepared and would be released kind of imminently. I'm also aware that Utah Congressman Jim Matheson has asked Secretary Chu to put those decisions on hold, and in fact depleted uranium disposal on hold, and I just wonder if you could comment on that?

MR. LETOURNEAU: Yes, you're right on both counts. The record of decision is being prepared, it's under review. I'm not sure what the timing is, when it is coming out. There's still a lot of senior level discussion about that that is going on.

The Matheson letter was dated September 16th so it's literally just a week old. We didn't get it on the 16th, it was several days later. So people are really still just talking about that and no decision has been made on what position to take on that yet.

I'm sure in the coming weeks as we discuss it and vet it and work with our senior managers that's going to all come together but I have no idea at this point where we are.

MR. CAMERON: Thank you. And let's go to David and then we'll go back to Beatrice. David?

MR. KOCHER: On this issue of selecting a waste form, Marty you still have an ALARA requirement in your order don't you?

MR. LETOURNEAU: Yes, we do.

MR. KOCHER: Well that's where you do this I think. You evaluate the costs and benefits of alternative waste forms that you can use for this stuff and see where it leads you.

MR. LETOURNEAU: I know that is the type of analysis that was done in the supplement analysis and the question now is left up to the decision makers.

MR. KOCHER: And I don't know how NRC handles ALARA in waste space. I mean in operations you certainly do it, but I don't think there's anything about ALARA in Part 61 is there?

MR. CAMERON: Well that's a good

question. How does this ALARA concept in terms of what we're talking about come into play? Chris?

MR. MCKENNEY: ALARA is actually in the performance objective for 61.41, it's also implied in the work of protection 1. So while it's not stated for all the performance objectives, it has to be considered through most of them so it is included in our consideration that you do balance what the benefits are and, of course, this has led to what you have stated previously about you know previous discussions about discounting and stuff and currently the NRC doesn't really suggest discounting for multi-generational protection to be the same today as what we'd want to protect generations well into the future.

MR. CAMERON: Okay. Thanks for raising that, David. Beatrice and we'll go over to Dan.

MS. BRAILSFORD: I guess, Marty, I don't know what RODs you and Christopher are talking about.

MR. LETOURNEAU: It's the record of decision for the supplement analysis that the Department was preparing to identify locations for disposal and I believe that that record of decision was also supposed to address final waste form.

MR. CAMERON: And it's a NEPA document?

MR. LETOURNEAU: Yes, it's a NEPA

document, I'm sorry.

MS. BRAILSFORD: So this is for all the material that's coming out of the--

MR. LETOURNEAU: Portsmouth and Paducah de-conversion plant material.

MR. CAMERON: And there was comment on the draftee I guess. I mean I'm just thinking if Beatrice wanted to get more information on what was said, there are documents out there?

MR. LETOURNEAU: Oh yeah, and the supplement analysis was issued for comment, yes.

MR. CAMERON: Okay. Dan?

MR. SHRUM: Just we have to remember that there are some people in the audience that may not understand some of our acronyms so ALARA is As Low As Reasonably Achievable. We need to be mindful of that. I think it got brought up at the other meeting but maybe not.

MR. CAMERON: I think this is the first time we heard ALARA.

MR. SHRUM: Okay. I have an SNM story I'd like to tell you at a later time.

MR. CAMERON: An SNM you'd better spell that out as it's late in the day. All right. Thank you, Dan.

I think this is probably an appropriate time to end this subject -- if not this meeting. But we are going to go out to the audience, to the public, to see if any comments, questions on this last topic on source term or anything else? John? John Greeves?

MR. GREEVES: Yes. Just to kind of punctuate this last discussion on source term. Bring back to what's in the rule versus guidance? And lots of what was discussed here I think is quite appropriate for guidance not rule. So I think it would be useful to hear people's views, including the staff, on calling for adequate source term issues to be defined in a site-specific analysis but not putting in the rule specifics like the type of waste form, the matter, etc. I think just calling for source term issues to be defined in a site-specific analysis and all the material you've been talking about here is quite appropriate for a guidance document.

MR. CAMERON: Okay. Thank you John. Drew, do you have anything on that particular point?

MR. THATCHER: I was just trying to make a clarification probably to Dr. Burns and Marty here. Isn't the conversion or de-conversion, however you want to say that, isn't it a uranium octaoxide form that it's mostly going into with a small part being just a uranium trioxide or is that not true? And I think the stability of the two are basically the same.

MR. LETOURNEAU: I believe that's correct. But Drew right now I think you know more about it than I do.

MR. CAMERON: Okay. That says a lot. Okay. And did you want to respond to John Greeves' point or did you have something separate? Okay. Yes sir and George please introduce yourself.

MR. CHAPMAN: I'm George Chapman. I'm interested in the perpetual care fund that it supposed to be set up by the State of Utah to care for Energy Solutions dump if Energy Solutions goes bankrupt or declares bankruptcy. Right now it's around $3 million dollars. It's set up because the NRC set depleted uranium as Class A which is supposed to be safer within a couple of hundred years.

But depleted uranium obviously is going to last a lot longer and if you do continue, if the NRC continues to set depleted uranium as Class A they should also make sure that the states that have these dumps prepare for not just hundreds of years but thousands of years. And therefore let's say Energy Solutions went bankrupt tomorrow, there wouldn't be enough to take care of the dump obviously and that's because you've classified it as Class A without going one step further and saying it should be Class A but the care fund should be much more.

MR. CAMERON: Okay. Thanks George. Let's back that up to a generic issue you mentioned a much broader application than just Utah. Larry, do you have something on that?

MR. CAMPER: I mean we talked about this briefly before the breaks but just a couple of quick thoughts. I mean the situation with the Clive is unusual because you have a private set up as opposed to a federal or state assuming responsibility for a site at the end of the 100 year institutional control period. So you have an unusual situation there.

And I guess I would defer to the State of Utah or Energy Solutions to talk more about that.

But the second thing is in their license and in any of these commercial low level waste facilities, any time there's a modification to the license there's also a re-examination of financial assurance. If I recall what was said yesterday afternoon at the Board meeting and the fact that Energy Solutions has already engaged the state regulator in some discussions about commitments that they're prepared to make regarding disposal of DU, I would imagine there would be some modification of that license at some point based upon those discussions and the State of Utah would look at that but, again, I would defer to the State of Utah on that.

And then thirdly, as I understand, what you have there is you have a long running escrow fund and it continues basically stating it the most simplest. But I think beyond that I would defer to either Tom from Energy Solutions or Dane from the state.

MR. CAMERON: Okay. And Steve did you have something on that?

DR. NELSON: Yeah, but I'm going to resist the temptation.

MR. CAMERON: It must be horrible though.

DR. NELSON: It's a little snarky.

MR. CAMERON: I thought it would be so thank you. And I would just refer Dane, the Utah staff, anybody in Energy Solutions to talk to George after we're done right now about that particular issue. So thank you for that question.

Anybody else? Oh Dirk, I'm sorry. And did we ever answer the question about the KDs? Are we going to discuss that at some point?

DR. NELSON: That's tomorrow Chip.

MR. CAMERON: That's tomorrow? Thank you. All right. This is Dirk.

MR. DUNNING: Two points. One, I would hope you would learn a lot from the lessons DOE has learned over the years about balancing cost versus performance, about a lot of times trying to over emphasize the cost up front ends up degrading the performance enough that they regret it and it costs more later. That's happened a lot of times.

Performance needs to be given much more weight in the evaluations.

The second one, and I don't know the answer to this one, Marty you have may some idea out of the EIS analysis, have you considered looking at using massive uranium metal embedded in copper buried in deep reducing environments as another way of looking at the disposal?

MR. LETOURNEAU: Say that again?

MR. DUNNING: The basic idea would be normally you think of building a container and putting things in it. This is a little different. It's solid metal uranium or uranium alloy, perhaps a corrosion-resisting alloy, embedded like the Swedes are planning to do with their repository in solid copper placed in a geologic setting where the copper doesn't want to go away so that you have two layers of protection within the environment and getting it out of the sensible environment.

MR. CAMERON: Okay. Marty.

MR. LETOURNEAU: By way of explanation I also want to say, Beatrice, I wasn't trying to be flip with Drew but our office has two divisions, one that is the waste processing division and one that is the compliance division and I'm the performance assessment side of things on compliance and our waste processing person was not able to be here. And that is the person who would really need to answer both Drew's question and Dirk's question because I honestly just-- I have not dealt enough with the EIS to be able to answer that question.

So I can take those questions back though and we'll find out.

MR. CAMERON: Okay. Thank you and thank you, Dirk, for that question.

I think we're at the end of the day and it's been a really good discussion, a lot of good points brought up, a lot of potential commonalities perhaps. And tomorrow we're going to start at 8:30 again and I'll try to do a review of the parking lot issues that remain for us.

And before we go to modeling, and I just will check with NRC staff on this, we just want to do a little reprise on regulations versus guidance, that's what we said we would do, and see if there's anything there. But we'll start with modeling and we'll go through the rest of the issues. So thank you and I think we're adjourned unless anybody has anything else to say right now. Okay. Thank you.

(Whereupon, the proceedings of Day 1 in the matter went off the record at 5:22 p.m.)