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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

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PUBLIC WORKSHOP TO DISCUSS THE

BRANCH TECHNICAL POSITION ON

CONCENTRATION AVERAGING AND ENCAPSULATION

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Thursday, October 20, 2011

Crowne Plaza Albuquerque

1901 University Blvd, NE

Albuquerque, New Mexico

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8:00 a.m.

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BEFORE: RICHARD BARKLEY, Facilitator

PRESENTERS:

LARRY CAMPER

JOHN COCHRAN

MAURICE HEATH

JAMES KENNEDY

DR. CHRISTIANNE RIDGE

PARTICIPANTS:

BILLY COX

ABIGAIL CUTHBERTSON

LISA EDWARDS

SONNY GOLDSTON

DAVID JAMES

SCOTT KIRK

MICHAEL KLEBE

JOHN LAPERE

TOM MAGETTE

CLINT MILLER

GARY ROBERTSON

SANDRA RODRIGUEZ

ROGER SEITZ

DAN SHRUM

LINDA SUTTORO

JOHN TAUXE

A G E N D A

P R O C E E D I N G S

MR. BARKLEY: Welcome to this meeting. Again, it's on the branch technical position that's being discussed. We have a long agenda today; there will be four separate presentations by the NRC staff and four separate Q&A sessions as we go through, and so hopefully this will go smoothly. I'll be working to handle the questions and answers as we go through.

And we do have a number of members of the public who are actually on the phone. We want to go ahead and try to announce who is on the phone at this point in time?

(Pause.)

MR. HEATH: Who's on the phone at this point in time? Could you announce yourself?

VOICE: [inaudible], NRC.

MR. JAMES: David James.

MR. KLEBE: Michael Klebe, State of Illinois.

MR. SEITZ: Roger Seitz, Savannah River National Lab.

MR. HEATH: Okay. I count four people. Hopefully we're clear on the names. I wasn't.

As we go through today, what I'd appreciate is, when we do call you to ask questions or

make comments, could you stand at this microphone out here in the front.

This is being recorded by a court reporter, and unless you're at the microphone, the court reporter cannot record your comments.

As for speakers, I was going to start out this first session, when we get to the Q&A session, using some speaker cards, so if you wanted to speak, please sign up with that.

As the day goes on, with this small of a group, I think we'll probably move to something less formal than that. I think that will move more smoothly.

But if you have any questions regarding the conduct of this meeting, please come see me. I'll be sitting over here most of the meeting.

I'd appreciate at this time if you'd turn your cell phones off so we don't have a lot of cell phone messaging, or put them on Stun. And I will do that myself.

When I do call people to the microphone, I would appreciate if you'd keep your remarks at a reasonable length and succinct so everybody can hear you and everybody gets a chance to speak, and I would appreciate it if you'd only speak from the microphone

and not disturb the speakers either with the NRC or who are at the microphone.

Okay. Again, at this point in time what I'd like to do is move to having introductory remarks be Larry Camper, unless there are any questions regarding the conduct of this meeting.

(No response.)

MR. HEATH: Okay. Larry, thank you.

MR. CAMPER: Good morning. Glad to see you here. I want to say good morning to everyone here in attendance and welcome to the Albuquerque Crowne Plaza and to thank those that are on the telephone joining us. We appreciate you giving us your time today.

I am Larry Camper, the director of the Division of Waste Management and Environmental Protection, and I want to welcome you to this public workshop that we're holding around the branch technical position on concentration averaging.

We wanted to have the meeting here and now for two reasons, really. One is we wanted to have a meeting in the western United States and afford members of the public an opportunity, in this part of the country, to be here and take part if they wanted to.

And also we just had the low-level waste forum meeting that took place up in Santa Fe, and so this is a follow-on to that, and the nice thing about that is we have many practitioners here in the audience today who can give us some meaningful input, so we thank you for being here.

We are today because we want to hear your views on the changes we've been making to the branch technical position on concentration averaging and encapsulation and how it can be further improved to address specific challenges that face the low-level waste program.

We believe that this provision specifically addresses some of these challenges and that it can make the low-level waste management and disposal more rational, safer, more secure, and more risk informed than the existing 1995 branch technical position guidance.

So what are the changes? We have a slide that we'll put up that shows you all of the changes. It's a very noisy slide, but in this column we have the revisions to the BTP. In the center we have the same subject matter as it appears in the 1995 BTP, and then we have a column that identifies the reason for the change.

You'll see this slide again during Maurice's presentation, but I'm going to leave it up during the duration of my comments so you can begin to absorb it a little bit and understand the nature of some of the changes that have been made.

So what are these changes? Some of them: First, it incorporates new provisions on low-level waste blending as directed by our Commission. Second, it significantly increases the sealed-source activity limits based on the use of more realistic intrusion scenarios.

This has the potential to improve security of sources in the United States.

Third, it specifies reactor hardware averaging constraints that are better tied to risk and, fourth, it simplifies and encourages the use of alternate approaches to averaging; that is, approaches different from those in the existing BTP.

We have received some very positive comments on the revisions so far, that the document is indeed more risk informed and that it may help to solve the sealed-source disposal problem in the US and that it's better organized and more transparent.

We've also received some comments about where it might be further improved. Some believe, for

example, that the exposure scenarios that underlie the positions within the guidance document are in fact still too conservative. In any case, our purpose today is to get your views and suggestions on how it may be further improved.

We do look forward to having a collaborative discussion with you. As I look out across the audience, I recognize many of you, and I see a great deal of expertise out there, and so we want to draw upon that expertise, and we encourage you to give us your thoughts.

We do want to listen seriously to those thoughts, both of a technical and policy nature as relates to the guidance document. We understand there'll be different viewpoints; we don't always agree on everything. But we look forward to hearing all of them.

In terms of timing, this meeting is very important for a couple of reasons: We have put this document out, and it's available out there publicly before it's publicly available officially, if you will.

We did that purposefully, knowing that we were going to be interfacing with the ACRS and that information would be public. We thought it would be

an opportunity to enhance the input.

Now, my point is if you don't see changes necessarily in the document that will be published for comment in January, it's not that we haven't heard your comments today.

The fact of the matter, though, is we're up against a production schedule, and to get the document out for public comment in January, it's going to be difficult to make substantive changes between now and then, but we are recording this meeting.

The staff will go back and analyze your comments and input, and we will be examining any input we hear today of a change nature during the public comment period. So don't be disappointed if you say something very profound today and it doesn't change between now and January. We are listening.

There will be a presentation by the staff before the full ACRS, the Advisory Committee on Reactor Safety, in December; it's in early December. The date is still somewhat tentative; I think it's December 3, December 4. It's been discussed, but Maurice informs me this morning that it is not firm yet. So pay attention to that.

So last but not least, let me just encourage you to engage, actively participate. The

staff is going to go through some presentations that will familiarize you with the contents of the current revision to the document, and then we'll -- our facilitator will lead us in our discussion, and so we really do want to hear from you.

I know you're not shrinking violets or shy, so don't be so today. Thank you for being here. We look forward to your participation. Let's have a good discussion. Thank you.

MR. HEATH: Thank you, Larry.

Good morning, everybody. My name is Maurice Heath, and I'm the project manager on the efforts that we are for revising the BTP.

And what we're going to do with the presentations -- what we're going to do today, I'm going to outline the flow, how is it going to go. Turn to the next slide, please.

I'm going to go over the introduction, kind of bring it into context, how we got to the point of -- from 1995 BTP till now; what we're going to do.

Go back one slide, please.

Then Dr. Christianne Ridge will go over the technical basis for homogeneity guidance; John Cochran, from Sandia Labs, who's been working with us in this effort, he will go over the tech basis for the

alternative approaches, encapsulation, and classifying mixtures of waste.

Next slide. Okay. Now, the topics that we're going to address today: demonstrating homogeneity and classifying homogeneous waste, classifying a mixture of individual items: activated metals, contaminated materials, cartridge filters, encapsulation of sealed sources, and other low-level radioactive waste, and we'll go over new alternative approaches that is in this revision of the BTP.

Next slide, please. Now, we're going to start: What is the branch technical position on concentration averaging and encapsulation? And basically it's a guidance document for waste generators and processors.

It is used to classify waste for disposal under 10 CFR Part 61, and it provides a method for averaging and classifying radionuclide concentrations in waste over a volume or mass of a waste package.

And we understand that this document is used throughout the industry with agreement states. It's also used by a lot of generators and a lot of processors, so we know that this is an important document out there.

Please next slide, please. Now, in our

Code of Federal Regulations, in Part 61, as you see up here, subpart (c) contains our performance objectives, which it gives the four objectives that, when you're disposing of low-level waste, that has to be met.

These are protection of general population from release of radioactivity, protection to individuals from inadvertent intrusion, protection of individuals during operation, and stability of disposal site after closure.

Next slide, please. Now, how the BTP fits into our regulatory construct is Part 61.42, which is protection of individuals from inadvertent intrusion, is the basis for the BTP. It is for to protect the inadvertent intruder.

Now, 61.55 is the waste classification, are Tables 1 and 2, and that defines the classification of waste, which is Class A, B, and C waste. And in 61.55, (a)(8) is the part of the regulation that allows for concentration averaging in determining waste class.

Next slide, please. Now, this is one of the tables, and 61.55, Table 2. Now, one thing we want to point out, important thing -- get my pointer here -- concentrations, curies per cubic meter. And the BTP, what it does, the document allows -- gives

these provisions that can assist the processor to fit within the construct to get to determining the class of waste.

Next slide, please. Now, what we want to do -- background, kind of how we got to this point: In 2007 NRC staff did a low-level waste strategic assessment, and out of that assessment the revisions of the BTP was identified as a high priority, and in this -- with revisions of this, we would make the positions more risk-informed performance based.

Now, the blending of low-level waste came into the industry as a question, and so when we're dealing with the blending issue, it put the revision of the BTP on hold until we could deal with this.

So what the NRC staff -- we performed a blending SECY paper that we sent to the Commission. Now, when we got the answer from the Commission in our SRM, what came out of that is direction for the staff to risk-inform the blending position in the BTP.

Well, staff also felt that it was a great opportunity to continue what came out of the strategic assessment in 2007, so we decided to risk-inform performance-base all the positions in the branch technical position.

Next slide, please. Now, when we talk

about risk-informed performance base, in NUREG 1614, which is the NRC's strategic plan, this is the definition when we say risk-informed. We're talking decision making approach that uses risk insights, engineering judgment, safety limits and other factors.

And when we say performance-based, we're looking at results that are a primary basis for decision making. And some of these attributes, it talks measurable, calculable, or objectively observed parameters exist or can be developed to monitor performance. And these are examples of -- this is what we can say risk-informed performance base.

Now, next slide, please. Now, how this fits within the BTP, when we say risk-inform, we're looking at things that have guidance linked to limiting dose to inadvertent intruder. We said in the BTP it's involved with protection of the inadvertent intruder, reasonably foreseeable scenarios.

And when we also say performance based, we're looking at measurable parameters. And also one other thing is the flexibility, and that's where our section with alternative approaches gives that flexibility in this document, and we'll talk about that later with John Cochran's presentation.

Next slide, please. Now, as Larry pointed

out earlier, this is -- it's a lot going on with this slide, but what it is is we just wanted to highlight the major changes in the BTP, and we're going to get into this in the presentations, but we'll just highlight -- we'll show later in the presentations -- we'll highlight which changes are in each presentation.

Next slide, please. Now, one distinction I want to make before moving forward is NRC has a lot of efforts going on right now, and another one going on is the site-specific analysis rulemaking, so I wanted to make sure we draw the difference between the BTP revision and the site-specific analysis.

As you see, we talk -- both are protection of the inadvertent intruder, yes. The primary user is different, however. The BTP's primary users are generators and processors, and the site-specific analysis rulemaking is geared more towards the disposal facility.

And also, in the last column, the regulatory status: site-specific analysis rulemaking is an addition to the regulation, and the BTP is a guidance document.

Next slide, please. Now, back on October 4 the NRC staff presented the draft BTP to our

Advisory Committee on Reactor Safeguards, and these are a couple of comments that they had for us going forward. Excuse me -- a couple of comments that came out of that meeting, that we just wanted to share what we've heard so far.

The first one is the encapsulation of power plant materials in containers larger than a 55-gallon drum, and we'll speak to that in our alternative approaches section.

One thing that was said, as Larry mentioned earlier, that the inadvertent intruder scenarios seem to be a little overly conservative, they said. Another one was the alternative approaches, there was a question about not being viable in practice.

And the last comment that we heard was that the transportation regulations impose a practical limit on inhomogeneity, and the BTP needs to recognize that.

Next slide, please. Now I would like to turn over the presentation, to go over the first technical part today, to Dr. Christianne Ridge, who will talk about the homogeneity guidance.

DR. RIDGE: Thank you, Maurice.

Before I start, I just want to emphasize

something that Mr. Camper said this morning, and I might say it two or three more times during my talk, but we are anticipating a lot of good comments coming from this meeting, and this is a draft piece of guidance right now, and we are open to suggestions about improvements and changes, so I do want to encourage everyone to participate, and I can say that for myself I am definitely here to listen to ways that you might want for us to consider changing the guidance.

Next slide, please. So as you know, there are many topics covered in the branch technical position on concentration averaging and encapsulation. I am only going to be talking about one of them. I'm going to talking about homogeneous materials, and Mr. Cochran will be speaking about the rest of the topics on this slide.

This is another cut at the same information. The topics addressed in the branch technical position include demonstrating homogeneity and classifying homogeneous waste, and that's what I'm going to be talking about this morning.

Before we go on, though, I do want to say a few things about homogeneity. Most low-level radioactive waste is miscible, and so most of it is

potentially homogeneous, and the question is determining whether or not it is homogeneous.

The benefit to being homogeneous waste essentially is that concentration averaging is a lot simpler for homogeneous waste, and I'm going to talk in a little more detail about that.

But for materials that have to be encapsulated or are items that need to be concentration averaged in other ways, there are complexities that John will talk about that the BTP goes into in some detail, but essentially for homogeneous waste we're talking about waste for which you can take the curies in the container average them over the volume or the mass of the container in one step simply.

And so there is a certain amount of interest in whether or not the waste is a homogeneous waste, because it impacts how you implement concentration averaging.

Next slide. Now, before I talk about what's in the guidance, I want to talk about the reasons for introducing homogeneity guidance. One of them was that in the 1995 branch technical position, there was what became known as the factor of 10 rule, and it was a constraint on the inputs to a waste

mixture.

So in short, as many of you are familiar with, it said that you could average different wastes that you put in a container if they were miscible if the concentrations before you started were within a factor of 10 of what you end up with.

And that was fine and handy, but it was not particularly performance based, because it was based on the inputs to the mixture and not the final product, so that's not performance based, because it didn't matter in the end what you came up with or how well you could mix something or how well any of that performed; it was based on what you started with.

And so we eliminated that constraint in the draft guidance that you're looking at today. And so today what we're proposing, which is consistent with the Commission decision on blending, is that you can average miscible wastes in a container no matter how they started.

You can put very low-level A in with a much higher concentration waste, mix them, average over the container, and it does not matter the concentrations of the waste streams you started with.

And I'm emphasizing that even though it's simple, because that is the motivating factor for most

of the homogeneity guidance. If we still had the factor of 10 constraint, there would be no reason to then add guidance on how well you mix these wastes, because we would already know, before you started, that it couldn't be that inhomogeneous, because it didn't start out being that diverse radiologically.

So that's the first motivating factor. Now, eliminating that factor because it was not performance based is consistent with our emphasis on performance-based regulation, but it does introduce a limited safety concern for an intruder, and I'm going to talk about that on my next slide.

And I'll emphasize on my next slide, but I'll say it again, that we are talking about a limited safety concern for the intruder, and I'll talk about the reasons why it exists at all and the reasons why it's somewhat limited on the next slide.

The next reason for providing some guidance on waste homogeneity is simply stakeholder concern. During our discussions on blending, we did receive a number of stakeholder comments based on the perception that eliminating the factor of 10 constraint would allow Class C waste to be disposed of in Class A sites, and that is a comment we received many times.

Now, of course our response to that comment was that if the waste is blended and if it meets the Class A concentration limits, it is Class A waste. But the stakeholder perception is something that we wanted to address, because it was a comment we received many times.

And it's understandable that people might be concerned that if you allow this type of blending, there's something that started out as a much higher concentration waste, and if they don't understand the process, there's some -- there could be some confusion as to how we know that the waste, in the end, meets the appropriate constraints to be disposed of as Class A waste. And so that was another motivating factor for the guidance.

The third reason was that providing guidance in the way that we've tried to do is consistent with our emphasis on shifting -- shifting emphasis on to more site-specific scenarios.

The tables in Part 61 are based on a fixed set of intruder scenarios that were considered in the environmental impact statement for the development of Part 61.

And those scenarios are not necessarily consistent with the waste as it's disposed of most

commonly today, and again I'll talk about that -- again, I'm making a lot of promises about the next slide, so I hope that it lives up to the promises that I'm making, but I will talk about that on the next slide.

And finally, quite simply, the staff was directed to consider homogeneity guidance by the Commission in the requirements memorandum that the Commission sent to the staff on the waste-blending issue.

And, again, I know many of you are familiar with it, but waste blending essentially means that you would mix wastes that start out with very different concentrations. That's blending in a nutshell, is that you're mixing wastes that start out with very different concentrations.

What's been proposed recently by industry is to mix these wastes so that what you end up with is a Class A waste.

And in the Commission direction that we received on that issue, they told us to do two things -- they told us to do many things; two of them related to homogeneity. One of them was to provide some guidance on waste homogeneity and, more specifically, to consider it in the context of

intrusion scenarios.

And we'll now get to that next slide where I talk about the intrusion scenarios, so if you could change it. Thank you.

And I want to start by emphasizing that I am not today going to argue that someone who exhumes a small amount of waste is at greater risk than someone who exhumes a large amount of waste. That would be a difficult position to argue, and I don't need to do that.

What I'm asking and proposing is that someone who exhumes a small of waste is more susceptible to exhuming a hot spot, and because they're more susceptible to exhuming a hot spot and bringing up only that higher-concentration waste, they are the scenario to consider when you're considering guidance on waste homogeneity.

Now, I misspoke a moment ago. Someone who exhumes a small amount of waste could exhume only a hot spot. Someone who exhumes a large amount of waste of course could exhume a hot spot, but when they exhume it and bring it up, it's mixed in that process.

And if it's not thoroughly mixed in that process, the exposure that a person might have also is time averaged, because they're not going to sit in one

fixed spot on their property.

So we are assuming that when someone brings up waste, it is physically disturbed and mixed during that process. It may not be perfectly mixed, but a person does move around the site and therefore provides an additional measure of averaging of their exposure by moving around the site.

So of course someone who exhumes a large amount of waste -- and now I'm looking at the scenario on the left -- could exhume a hot spot, but when they do, they're mixing up a larger amount of waste. It's probably not all going to be at an elevated concentration, and the average concentration they bring up and are exposed to could therefore be lower than someone who exhumes only a small amount of waste; for example, if they put in a well and they hit a hot spot and bring up only that amount of waste. There's less averaging that's going to take place.

So I want to just draw some comparisons. What you see on the left here is what was the limiting scenario, not the only scenario that was considered in the development of Part 61, but what turned out to be the limiting scenario for the development of the waste classification tables.

And there were certain assumptions made.

One is that the waste would be shallow. Generally a conservative assumption, because a person could bring up more waste.

The waste was also assumed to be randomly placed, so that when you bring up waste, you're exposed to concentrations that aren't right at the limit. And this randomization isn't done by design; it was just an assumption that when you put a lot of waste in a site, it's not all going to be at one concentration.

And that makes sense if you're considering bringing up a lot of waste; for instance, to put in a house, and you're putting in a dwelling; you're exhuming all the waste that would be in this basement.

Assuming that this waste is randomized is an assumption. People may have different feeling about it. It's the assumption that was made.

In reality waste is typically disposed of more deeply than this, as you all know. And this dwelling isn't necessarily going to be the best and most realistic scenario.

And so for the development of homogeneity guidance, we wanted to look at someone who would exhume a smaller amount of waste, and specifically we considered someone putting in a well.

Again, this might not be applicable to all sites, but we thought this was a reasonable scenario to generate some default guidance.

Now, John will talk about alternative approaches more in his presentation, but this scenario might not be applicable to all sites. If it's not, different homogeneity requirements could be proposed by an applicant.

But for the generation of guidance where we can say, If you don't want to look at site-specific scenarios, this is something we think is reasonable for most sites; this is the scenario we chose.

So the main points here, as I've mentioned: The waste is deeper. The waste is -- less of it is exhumed. The waste also is not necessarily as randomized in our assumption, and we're making this assumption because, for the sake of this guidance, we're assuming that there are barrels of waste in which a much higher concentration waste has been mixed, to some extent, with a lower concentration waste.

And for the purposes of the guidance, we're not assuming it's been perfectly mixed, so we're assuming that there are some higher concentrations that a person could hit. On average these barrels all

meet the appropriate limits, but there are areas in which there are lower concentrations and higher concentrations, and a person could hit a higher concentration.

And so the question for us, then, at that point, is how do we constrain how much of this waste and how concentrated these higher concentrations could be so that someone exhuming this waste, spreading it in a smaller area -- because less waste is exhumed, so we assume a smaller area -- that this person is going to be protected?

And this is, in a nutshell, the scenario that drives the rest of the guidance that I'm going to be talking about this morning.

Next slide. So the subtopics within the homogeneity guidance are three. One is homogeneous waste types. These are waste types that are essentially automatically assumed to be homogeneous, and they're assumed to be homogeneous in the context of an intrusion scenario, the scenario we just talked about.

And I want to emphasize that, because these wastes are not necessarily assumed to be homogeneous at the time they're disposed of, in the case of containerized dry active waste, those wastes

might not be homogeneous at the time they're disposed of.

It is assumed that by time someone could intrude on this -- so, for instance, for Class A waste, at 100 years -- those wastes will have degraded and become more miscible and become homogeneous when someone exhumes them.

And I also want to emphasize that these wastes are assumed to be homogeneous in the context of an intrusion scenario; we're not assuming that these wastes are all perfectly mixed. We're assuming that by time someone exhumes them, that they are essentially not at a significant risk of exhuming a large -- most of the waste that they exhume won't be from a hot spot, as we tried to show on the last slide.

So we're assuming that in that context these waste types that -- I'll talk about more on the next slide which waste types these are. These are waste types that, from experience, we're assuming, can be assumed to be homogeneous, unless there's evidence to the contrary.

We're then going to talk about intentional blending during waste processing, which we've talked about previously as large-scale blending. And we have

heard the comment that we need to be more specific about what we mean by large-scale blending.

Right now we're talking about this as essentially the proposals that we've heard from industry that higher-concentration wastes be deliberately mixed with lower-concentration wastes to meet -- the proposals we've heard, to meet the Class A limit. And we'll talk more about this and why this was pulled out for separate guidance on the next few slides.

Finally I'm going to talk a little bit about guidance in the BTP on classification of homogeneous wastes and additional recommendations that were made on quantifying that classification.

Next slide, please. So the first of those subtopics was homogeneous waste types. They are listed here specifically, and they're listed in the BTP. And these are, as I said, specific waste streams that are assumed to be homogeneous in the context of intrusion.

Now, we, as I said, are welcoming comments. With respect to this part of the guidance, comments on whether you think that this list is appropriate. This list is essentially the same list that was in the 1995 BTP.

There was a slight adjustment including absorbed liquid, I believe, but other than that, this is essentially what was in the 1995 BTP. If you think that that could be updated, obviously that would be a very pertinent comment.

But these waste streams are either waste that we assume will be essentially uniform when disposed of, like a solidified or absorbed liquid, or wastes that are readily mixed so that they will be easily mixed when someone exhumes them, or something that will become easily mixed, in the case of containerized dry active waste.

And for these waste streams, we're not proposing any additional testing. I want to emphasize that. We're not proposing any additional testing for these waste streams, essentially because we don't think it would be -- it would justify the additional worker dose that would occur if you did add testing for these waste streams.

These waste streams are things that we believe are relatively uniform, are easily mixed when you bring them to the surface, and additional testing to show that they're homogeneous would not justify the worker dose that would be incurred.

We are, of course, saying that if you have

evidence to the contrary, that you cannot ignore that. So, for example, I think we mentioned that we had received a comment about transportation requirements.

One of the points in the BTP is that if you are doing surveys for some other reason -- for instance, for transportation purposes as you're packaging waste to be shipped -- and you find that there is a hot spot -- and I'll talk a little more on the next slide about what we're calling a hot spot.

But if you find a hot spot in that package, you can't say, Well, okay, but it's an ion-exchange resin, so it's automatically homogeneous, and we'll ignore that hot spot. Of course we don't want you to do that. But that's all we're proposing for these waste types.

Next slide, please. I'm going to skip to the end here and then go back to the beginning, because I said on the last slide I was going to talk about what we meant by hot spot in this context.

And what we're proposing right now is that there should not be any volume in the waste that's a cubic foot or more for which the sum of fractions is greater than 10.

So for whatever limit you're looking at, we don't want the sum of fractions to be greater than

10 in a volume that is a cubic foot or greater, and the reasons for that essentially is that when we looked at that scenario and we looked at the contribution of that cubic foot that at a sum of fractions of 10 or greater, that contributed about half of the 500-millirem intruder dose that we were using as the basis of the guidance.

The other half we allotted to the rest of the waste in the column that you're bringing up. That's the basis for this cubic foot.

So for homogeneous waste types that I just talked about, we're not, as I said, proposing any additional testing, but if you find something like this in your waste, we're asking you not to ignore it.

Now, for wastes that are intentionally blended during processing, there is an assumption that there is higher-concentration waste in those packages that's blended with lower-concentration waste, and our task is to demonstrate that it is well blended, that there isn't a pocket of very-higher-concentration waste, Class C or greater waste, a pocket of it in this container that someone could exhume in waste that, for instance, is only protected as Class A is protected.

So this guidance, again, is based on that

scenario we talked about. We're assuming that processors will do one of two things. One thing obviously is you could apply it to a package. What I think is more likely -- and we are obviously looking for feedback on this point -- is that someone who is engaging in this intentional blending to bring waste to a certain limit by blending higher-concentration waste with lower-concentration waste would simply demonstrate that they mix waste well, that their process creates waste that does not have these properties.

And that demonstration would remain intact until there was a large change in the process or a large change in the waste inputs. But if you could say that the inputs would be within these certain parameters and we've shown that when we have inputs within these certain parameters that we blend waste very well, we're assuming at that point you've demonstrated that your waste does not have these properties of the cubic foot with a sum of fractions greater than 10 and that that would be the demonstration for this part of the guidance.

Next slide. The final subpoint in the homogeneity guidance relates to the classification of these homogeneous wastes.

Now, this was not part of the 1995 BTP specifically. It is consistent with the 1983 branch technical position on waste classification, which indicated that if you have a process for which a small change in the process would change the waste classification, that you need a more robust process for demonstrating that the waste meets the classification limits.

And what we're recommending in this guidance is that essentially you quantify the main sources of uncertainty and you follow them through the calculation, and you follow these uncertainties through with error propagation into the sum of fractions, and that the sum of fractions should not be within one standard error of 1.

So if you have a great deal of uncertainty in what your mean sum of fractions is, that is a more restrictive requirement, because you can't get up to .99 sum of fractions for the waste limit that you're looking at if you have a large uncertainty. If you can tighten up those uncertainties, you can get closer to the sum of fractions of 1.

Now, we're assuming that the main -- we're expecting that the main sources of uncertainty would be spatial variability and uncertainty in the scaling

factors.

One area that would be a great area to supply comments on would be if there are additional sources of uncertainty that could be expected if we got this list wrong.

This is obviously going to be different for different waste types, so we're not saying this is an exhaustive list. We did include some examples of this type of calculation in the branch technical position in the draft.

We have already gotten some very good comments on ways those examples could be improved, which we appreciate. And I'm sure there are other ways that those could be improved, but the main idea is that we're asking for essentially an accounting of the main sources of uncertainty and propagation into the sum of fractions.

That is the last technical point in the homogeneity guidance, the last technical subpoint. If we could go to the next slide, I'll just point out for the main changes in the branch technical position, I've talked about three, and Mr. Cochran has the large task of talking about the rest of them.

The first one -- of course, I talked about removing the factor of 10 constraint for blending, the

factor of 10 constraints on waste inputs that was in the 1995 branch technical position.

And I didn't talk about this because it's really a corollary to the first part. We removed the exception for blending of homogeneous waste types, and essentially we removed it because if you don't have the constraint, you don't need this exception. This was an exception for reducing worker dose or for reasons of plant efficiency you could deviate from that factor of 10 constraint. And obviously if you don't have the constraint, you don't need this exception.

So we had received comments, please, you must keep this exception, but of course if you don't have the constraint, there's no need for it. So that was removed as well.

We also talked about an added test for homogeneity for mixing similar homogeneous waste types, and that is something that's new in this draft that was not in the 1995 branch technical position.

So that, actually ahead of schedule, completes my comments, and I'll turn it back over to Rich. Thank you.

MR. BARKLEY: Well, we are very much ahead of schedule at this point, so I think, looking at the

agenda, what's most workable is we try to go to a Q&A session on this segment of the presentation, then we take a break, then we have the presentation by Mr. Cochran right before lunch. That would seemingly divvy out the time pretty fairly.

So if we could do that, I have two people who have signed up to speak to start with, and so I'd like to call those two, and then we'll see if any other individuals want to speak at this point.

And, again, I would like to have you speak from the central microphone.

First one is Tom Magette of Energy Solutions, and the second one is Don Schram of Energy Solutions.

Okay. Tom, you go first.

MR. MAGETTE: Good morning. My name is Tom Magette. I'm with Energy Solutions and have some comments on the homogeneity section; possibly will lead to some questions, too.

First of all, I agree and applaud you for eliminating the factor of 10. I think that it does make sense to look not at the incoming waste stream but at the package to be disposed of and the method in which you're going to dispose of the waste; that makes sense.

I guess it's not clear to me that you don't require a test. The discussion on homogeneity goes for a good solid page about why -- justifying your conclusion as to these certain waste types that you consider to be homogeneous and why those assumptions are reasonable and why they are valid on their face, and therefore no test is required. And then you start talking about "however."

And in our world, howevers tend to carry the day, not because we want them to carry the day but because the agency wants them to carry the day, so I am skeptical that the howevers won't dominate.

The additional information is a fairly loose standard, if you could call it a standard, so there's a lot of ambiguity in that. So it seems to me there needs to be more of a decision of either they are or they aren't, and I'm referring to being homogeneous.

And I think that there is a justification for concluding more that they are. I'll get to that on my next slide.

But before I get to that, continuing in that same section but coming now to the blending, there are certain assumptions that you make about the homogeneity of blended waste that I think are

incorrect.

Generally speaking you point to processing, processors. There's a geographical connection as to where this thing takes place, this blending thing, for which there is no basis. There is no basis for assuming that a processor will generate a blended waste package that is closer to the classification limit than a generator could generate. There is no basis for that.

And in fact I would suggests that, a priori, from my experience, the reverse is true. So therefore there is no basis -- at least none that has been demonstrated -- for going on to assume that there is therefore an elevated risk based on the consequence side of the risk equation to an intruder.

I'll come to probability in a minute, but based on the consequence side, there is -- you have not demonstrated that there's any reason to believe that.

As to the homogeneity of blended waste, generally speaking, processors improve homogeneity, and they reduce hot spots. Processing, which grew out of, at least in part -- one might argue in large part -- the Commission's own volume-reduction policy statement, all in fact remove nonradioactive material

from the waste, from the incoming waste stream, whether you're compacting, supercompacting, incinerating, dewatering, thermally treating -- there's nothing I can do as a processor to a waste package that doesn't reduce the nonradioactive volume and/or mass and therefore increase the activity of the waste package.

And that's been forever and a day, so therefore the notion that blending somehow introduces this concept of a waste package at or near the Class A limit to me is not correct. I certainly haven't seen anything that would counter the arguments that I've presented.

I have used the slide -- y'all have seen it -- of the smashed drums from a supercompactor at Bear Creek in Oak Ridge, Tennessee, of different heights. Those heights were done by taking the generator's characterization data, calculating the volume of the package at the end of the compacting exercise and then setting the supercompactor to compact it to a point where it would not cease to be Class A waste.

So those what we call pucks, those generating little smashed drums are six inches high, four inches high, 12 inches high, so that they stay

Class A, knowing that the 12-inch one, compacted to eight, might be Class B, which generally would not be a good thing for a processor that has no ability to store that waste, no contractual ability to send it back to a generator, no ability to dispose of it.

Obviously it's a big deal to us, so we've been dealing with that for a long time. We have been generating these packages.

I say this as way of, I think, trying to put in proper perspective the notion that we're doing something new today -- we're not doing something new today and, in fact, the things that we always do generate more homogeneous waste packages from compacting, from thermally treating or dewatering.

There's some level of mixing, some level of removing nonrad volume that all generate a package that has a more even distribution of the radioactivity.

So I think the notion that there is an issue with homogeneity is a bit of a red herring. I've said that before. And I understand you have Commission guidance that you have to deal with, but I think one way to deal with it is to -- by scientifically eliminating it as this issue that it has been labeled improperly as.

So now if I move forward to the intruder analysis that you've done, I would suggest that I agree with the comments that you heard from ACRS that the current approach is overly conservative.

MR. BARKLEY: Can I interrupt you?

MR. MAGETTE: Sure.

MR. BARKLEY: If you could speak up a little bit for the benefit of the people on the floor.

MR. MAGETTE: I'm not sure I've ever been asked to do that before.

(General laughter.)

MR. MAGETTE: But I'm sure I can solve that problem.

Moving on to the intruder analysis and the disposal scenario, the reason I say that it is overly conservative is specifically pointing to your conclusion regarding driller techniques.

I think that you can actually narrow the list of reasonably foreseeable drilling methods that are used for residential wells and that the one you've selected actually is not reasonably foreseeable. It's conceivable; it exists, but it is not in practice for reasons of practicality and for reasons of regulation in most states.

And this is a generalized comment that I'd

be happy to provide you more specific detail regarding, or discuss with you, but I believe that that method is not reasonably foreseeable and that if you use methods that are reasonably foreseeable, then the results of your intruder calculation will be drastically different.

And I'm sure you've seen that too. The notion of introducing a large volume of mud, the notion that this material is not historically spread around a well, that it is in fact collected in a pit and covered, all three factors would significantly reduce the exposure from any potentially exhumed waste.

So I think that that's probably the most important point. Really a lot of the comments about homogeneity maybe almost go to background, but I think it's important to recognize that, A, the waste types that we're talking about, that you have listed as being generally homogeneous in fact are; it is a good list.

In fact, the opportunity for hot spots is lower, not higher, when processed, including process by C, intentionally blending and, D, regardless of those foregoing statements, the risk to the intruder is overstated in this approach.

MR. BARKLEY: Okay. Thank you, Tom.

Staff, you want to respond to that?

DR. RIDGE: Thank you, Tom. Those were very clear comments, and I think you've given us many points to think about, but those were very clearly laid out, and I appreciate that.

I do have two points I want to get back to you about in those. One is that with respect to the -- your point that waste processing tends to homogenize waste, I understand that, and that would in fact be the goal of any waste blending process, would be to homogenize waste.

What we are proposing is that that needs to be demonstrated, that how well the process blends waste needs to be demonstrated. It would not be surprising to me if a process that was well thought out, with the goal of blending waste did in fact create a very well blended waste. That would not be surprising.

And I don't mean to imply -- and the guidance should not imply, but I see your point that maybe it does -- that the waste would not -- that we're expecting it would not be well blended.

But we need to have some measure for understanding how well it's blended. This guidance is

our proposed measure for understanding how well it's blended; you know, the guidance that we want to look at -- certain spatial scale, uncertain concentrations -- as our measure of how well this is blended.

And I guess I don't need to beat a dead horse, but I want to be clear that the assumption is not that intentionally blending waste would somehow -- you know, would not necessarily work; it certainly could; and that if it's an industrial process with good people thinking about it and the goal is to blend waste, would not be surprising if it did blend waste very well.

But that doesn't obviate the need for the guidance, to my mind, because we need to understand that it's well blended. And we need to understand it, and stakeholders need to understand it, and there just needs to be some measure for showing that it is.

Now, if there's a better way for demonstrating that, that would certainly be a very good comment, but I don't think that it's a reason to not have any measure. I don't think that the assumption that your process, you know, would work well, or someone else's blending process would work well -- I don't think that that is necessarily an

assumption that can be made.

I think that's something that would need to be shown. Honestly, my expectation is you would need to show that internally just to have control over your process.

And my expectation is that demonstrating it to the appropriate regulator would not necessarily be very different from what needed to be done internally just as a matter of industrial process control, but I do think there needs to be some measure of the homogeneity.

And the other point is very short, so before you respond, if I could get that in, I did not quite understand what you meant about the howevers carrying the day.

So if that was an important point, if maybe you could clarify that for me, but -- your comments were very clear, but I did not understand that one point, so if you want to provide additional clarification on that, I'd appreciate it.

MR. MAGETTE: Okay. The -- I understand your points about homogeneity and process control. And some of this will become a matter of the devil is in the details, that we won't get into maybe a lot of today, although there are some -- I think some

commenters that would talk about some of the analytical approaches and some of the specificity.

But, for example, you have a statement in the BTP that for blended wastes, processors should take additional steps -- if they rely on incoming characterization, they should take additional steps to verify that.

That's an imposition on a blended waste package that's not an imposition on any other waste disposal package. Now, at a disposal site there are certain sampling requirements, sampling frequencies, some things get opened, some things don't get opened.

That gets into a lot of complexity; there are people here that can talk about that in mind-numbing detail, but I'm not one of them, you'll be glad to know, but I can make up for that by talking about other things in mind-numbing detail.

(General laughter.)

MR. MAGETTE: So it seems to me unreasonable and also unsupported. What's the basis for saying, For this purpose I have to go back to a generator, especially when you have QA requirements that you've imposed on processors and generators.

So I don't think it's reasonable to say that all of a sudden we can't rely on that data.

That's like saying every third truck that rolls into Utah, you can't believe the manifest. Why? Okay. So I just don't get that.

So that's one of the -- you know, when you start kind of digging down and drilling down into it, you've got things in there that go beyond what we would suggest would be important from our own process control requirements.

And I like the idea that you just -- the demonstration is real -- can be based on a process control, not every package. But, for example, we would typically do that level of confirmation with a survey.

We would make -- we would be in an analytical basis of a post-process waste package, based on characterization data that we received from the generator, that we would then confirm with a field measurement and a dose-to-curie ratio.

And so as long -- and so that's something that we do do all the time, so we do have our own level of confirmation, not just for blending and often for transportation or other reasons.

There are some aspects of the BTP that seem to impose far more rigorous requirements on us that go beyond what we would consider to be okay.

So having dug into at least one detail, just to give you an example -- but the other thing that -- my conclusion is really more based on, If you did what I consider to be an analysis of a reasonably foreseeable scenario in terms of a driller scenario -- and here again, I'm talking about reasonably foreseeable as defined by how a resident would install a well, not necessarily the reasonableness of that resident being in the west desert of Utah in the first place, but that's another matter altogether.

But just the well-drilling scenario calculation, you would find it that even if you did have more hot spots in there, in that scenario, the doses would be far lower, which that calculates into less need for demonstrating homogeneity. That's the key point.

As for the howevers, the exceptions tend to become our rule. Yeah, it's -- I mean, the whole page of like four or five paragraphs talking about why these are homogeneous and they're all homogeneous and they're always homogeneous, sometimes in the hand of resident inspectors -- not to pick on anybody -- they just get a different level of interpretation.

Yeah, but it says here, Available information. Well, I don't have any available --

Well, maybe you should get some. I mean, I'm not trying to be unreasonable, but it's just the way things tend to work out in a regulated world. People get down to every single line.

So having a really detailed description of why this is really homogeneous, followed by a "but," you might as well throw that page away, would be my view, which is why I say focus on solving the Appendix B problem, what I call the Appendix B problem.

If you change that problem, I care a whole lot less about pages 9, 10, and 11 in your draft -- and 12; not completely, but it takes a lot -- it could be argued that pages 9, 10, 11, and 12 of your draft go away and that you would have a strong, technical, scientific rationale for making them go away.

MR. BARKLEY: Thanks, Tom.

DR. RIDGE: Thanks. And this is just brief, because we need to probably allow other people to comment, but I do understand the point you're making about the different assumptions in the well-driller scenario, and I am familiar with well-driller scenarios that make different assumptions about what happens with the waste cuttings, and I do understand the large impact that would have.

So I think what I'm hearing so far this

morning -- and actually it's consistent with other comments we've received informally -- is that we need to take a harder look at well-drilling practices, which is not to presume what we'll find, but I do hear the point that we need to take a harder look at well-drilling practices, and I do understand the impact that has on the performance assessment results.

Thanks.

MR. BARKLEY: Okay. Thank you.

Dan, you're up next.

MR. KENNEDY: Rich, I'd like to make a comment.

MR. BARKLEY: Go ahead.

MR. KENNEDY: Tom, I'd like to respond to one of the things you said early in your remarks. You said you're not doing anything new today; you said that you've been producing packages with waste near the Class A limits; for example, when you compact. And of course that's true.

What we saw as new or potentially new was this large-scale blending originally called resin solutions and later called semper safe, whereby potentially at least a significant portion or fair fraction of what would otherwise have been Class B or C resins would have been intentionally mixed with

Class A down to Class A.

And so that's, on its face and in practice, I would argue, a potentially major change in the way things have been done in the past. It had special names and still has a special name.

You're not doing it on that scale yet, of course, but we saw that as a change in low-level waste processing and in the program, lot of stakeholders agreed with it on that. It led to the blending paper, and the whole idea of the blending paper was to adjust our guidance appropriately to deal with that potentially fairly significant change in the way waste is processing.

Now, yours and Christianne's discussion about the devil being in the details, I mean, I think that's true, and we're where we need to be. But there have been some changes, or potentially are some changes that were a driver for this change in the homogeneity guidance.

MR. BARKLEY: Let's be brief. I got to give Dan a chance.

MR. MAGETTE: If I might just briefly, I accept that. I understand that point. I said I would come back to the probability part a while ago and I didn't; you caught me on it. Thanks, Jim, for that.

The problem is we have discussed this in one of degree, and the BTP is silent on that. The BTP implies that, you know, one liner changes everything. So if it's all 60,000 cubic feet of all the A plus some fraction of the B that could be blended to create A, that's a pretty large scale.

But if it's one liner, it's not. I got those liners all ready. I get them all the time. If it's two, it's not; if it's three, it's not. So where is it?

So if it's a matter of degree and that's part of a rationale for imposing a stricter requirement, then I believe it is incumbent upon the agency to address the degree, and you're silent on that.

And I'll be happy to give you more specific comments as to where I think the degree line might lie, but I accept that if it's 60,000 cubic feet that that's different; that's an increase probability, but here again, if I go back to what I call the Appendix B problem, I think even that goes away as an increased risk to an intruder.

MR. BARKLEY: Okay. Thanks, Tom.

Dan? And following Dan will be Sonny Goldston.

MR. SHRUM: Hi. My name is Dan Shrum, S-H-R-U-M, and it's a bit interesting that I was introduced as Schram. We did a little research on my name, and it used to be Schram back in the 1700s in Germany. And if you know anything about drilling, you would know that that's a large drilling company. It's Schram Drilling.

But even Shakespeare said, What's in a name? But that's what I'm going to talk about, is drilling, because that's what I do -- that's what I know best.

First of all, thank you for the work that you've done. The BTP, in my opinion, is better than it was. It's, first of all, easier to read, because the copy is better. That old one, you know, it was all scanned and dots all over the place.

Larry said that we needed to talk about reasonable scenarios, and I understand that you will continue to evaluate reasonable scenarios, especially with respect to drilling.

It is my opinion, as someone who's put in miles of wells using every drilling method out there, that a hollow-stem auger drilling method is not a reasonable scenario in a landfill. It's not really a reasonable scenarios to install a residential drinking

well because of the typical depth requirements that are required in most states. You have to go a certain depth before you can put in a well.

But in a landfill it's a completely different scenario. Most hollow-stem auger rigs would hit refusal; I know they'd hit refusal in our facility. They would hit refusal in the WCS facility.

So to me, hollow-stem auger is not the reasonable scenario. Mud rotary, other types of drilling methods are more reasonable. To go with that, because homogeneity is the reason for -- to protect the well -- not the well driller, but this well-drilling scenario, I would propose if a waste can come up in the cuttings, it's homogenized.

Even if it's not homogenized in the package, by the time it gets to the surface, it will be homogenized. If it comes up in mud, it will be diluted by the mud, and in the actual process you have to break it down, stir it up, get it up the bore hole; that will homogenize the waste.

If it's by change a cable tool, in order to get the cuttings out, you have to pulverize the waste, you have to pulverize the material, use a dart bell or bring it up; that will homogenize the waste.

Now, Tom and I were not completely in

alignment on this. I believe that homogeneity is important. It's important in the public's eyes; it's important as, you know, I'm responsible for the compliance of the facility.

I don't know that the degree of homogeneity that's being required in the BTP is necessary, and we've talked about it, the number of calculations that could be required, the number of measurements. That's a lot of dose; that's a lot of time to give to somebody to protect for this scenario, when the actual act, the reasonable scenarios of getting cuttings to the surface, will further homogenize the waste.

So that's my comment.

DR. RIDGE: Thank you.

I have something I should have pointed out while I had the slide up, was that we are assuming that the waste is mixed over the entire well bore, so that cubic foot that we were talking about, we are assuming that it is mixed with the entire well bore, and we're assuming that you go down -- I think -- there was a range that it we used, but it was something like approximately 200 feet, to water, and that you complete the well, and that everything in that whole column is mixed.

So I do understand the point that when you drill you mix these wastes, and you're not bringing up intact cubic feet that you're then exposed to. I do appreciate that you're mixing over the well column, and I probably should have clarified that when I had the slide up.

That was only one of your comments, and I definitely appreciate your comments on the likelihood of various types of drilling, and that's very consistent with what Tom said as well, and so we will certainly take that to heart.

But I should have clarified that we are assuming a certain amount of -- we are assuming mixing over the whole well bore.

MR. BARKLEY: Sonny?

MR. GOLDSTON: I'm Sonny Goldston and chair of the FCOG Waste Management Working Group. And if you don't know what the FCOG is, I can explain that to you later.

I'm going to yield most of my time to Dan and Tom and Linda Suttoro with DOE, but I do have two things I wanted to mention. One is I applaud your idea of going to more risk-informed performance-based work, and I think that's excellent.

But if you're going to be performance

based, you're spending a lot of time and effort worrying about homogeneity when you could impose a requirement to do a performance assessment of the waste type that you're dealing with that's specific to that waste type, and then deal with the facility characteristics where you're going to dispose of the waste.

Tom mentioned the fact that, who's going to go out to Utah and drill a well and drink the water that's going to kill him? You know, that's probably not going to happen. So if you look at the specific site and the specific waste type, then you become performance based, I think.

The second comment is you may have -- not intentionally, but you may have ignored the risk to the workers of removing hot spots. It's very, very -- and I've been involved in this in my career. It's very, very difficult and very risky for workers to go into waste packages and remove hot spots.

That's all I have.

MR. BARKLEY: Okay. Thank you, Sonny.

You have any remarks?

MR. KENNEDY: Sonny, with respect to your first point, I appreciate your comment about the site-specific analysis, and we had some other folks comment

on that.

Just a couple of points to make: One is that our guidance in the branch technical position is primarily designed for generators, who are required to certify that they meet the Class A, B, or C waste classifications in Part 61.

And so even if you've got a site-specific analysis that shows something else, currently, under our current regulations, the waste generators have to certify that they meet Class A, B, or C, and this guidance is directed towards them.

At the same time we've acknowledged in the BTP that we've got the site-specific analysis rulemaking underway, which will require a site-specific performance assessment. It's possible that that performance assessment could come up with waste acceptance criteria for generators that are different from Class A, B, and C, and we acknowledge that could happen in the future and, you know, perhaps someday the NRC will actually do away with the classification tables.

But for now the classification table's there, and they need to be met, and this guidance is designed to help them. That's not to minimize or downgrade the importance of what you said, that in

fact you can do site-specific analysis and come up with site-specific WAC that may be different from what the BTP says.

MR. BARKLEY: Thank you.

The next two people I'd like to call are Billy Cox and then Lisa Edwards.

Billy?

VOICE: Lisa.

MR. BARKLEY: Okay. That's fine.

MS. EDWARDS: First of all, I would like to echo what others have said. I -- my hat's off to the NRC staff, and I express my appreciation for the level of effort that you've already put into this document. I do think it represents an impressive improvement over the existing guidance that we have.

I do think that, as you have acknowledged, there's opportunity to make further improvements, but that does not at all take away from the effort that you have already made.

In light of that, though, I'm going to focus my comments on some things that I think we could work on going forward.

The first is that in regards to homogeneity, the assumption that the current activity distribution that you find in a container at the

moment of classification -- the assumption that that distribution can reasonably be assume to persist in the container over a long disposal period of at least 100 years, I'm not sure that that is reasonable.

There will be mixing within the container due to vibration during handling and transport, which will happen subsequent to characterization. There will be continued ion exchange within the container over time between the beads that are already in the container, and there will be mixing due to thermal climbs, along with possible density differences that impact movement within the container.

And all of these factors combined together will result in a different activity distribution 100 years from now than what you see at the moment today, which is directly applicable to the concept of homogeneity within the container.

Furthermore, based upon the preliminary research that EPRI is undertaking, where the location of a hot spot or how the activity is actually distributed in the container at any given moment is really -- does not appear to be important because of the amount of mixing that takes place in any reasonable intruder scenario, including the drilling scenario.

And our initial investigation, which we continue to pursue, indicates that there are a number of drilling methods that are available, are possible in the United States, but they are used for specific activities.

And in the case of drilling for well water, many of those types of drilling techniques can be eliminated, because they simply either cannot satisfy the regulation or they are not appropriate for the environment that a water well -- a residential water well would be drilled in.

We are going to pursue that further and try to help supply the staff with additional research that can assist you in your deliberations, but maybe one important point to make relative to what you said, Christianne, about your assumption that, in the column, the spoils or the exhumed material -- excavated material is completely mixed in that 200-foot column.

And what our research indicates is the most probable and applicable drilling technique used, it would not only mixed with itself, it would be mixed with a substantial amount of what's called drilling mud, and so there would be further dilution and introduction of other materials beyond what is just

contained in the 200-foot column.

So I guess I would also just kind of in general say that in some cases I think some of the feedback that you will get is more related to how the language has been read in the written word versus the intent and that there in some cases is a mismatch perhaps between what you intended, which is indicated either by comments that you've made or examples that you've given, versus when you read the actual language, how it is interpreted by a potential user.

So I think there's some common ground to reach just with clarification of language, and I think that's all I have for now.

MR. BARKLEY: Thank you, Lisa. Do you have any remarks?

DR. RIDGE: I don't think I have any questions. And again, if there are specific mismatches between what we wrote down and what we seem to be saying today, please do point those out in specifics, and we'll obviously consider that.

MR. BARKLEY: Billy?

MR. COX: Billy Cox with the Electric Power Research Institute also. Before I started working for them recently, I worked in radwaste for over 30 years, and I've moved a lot of resin, so I

know a little bit about it.

Definitely like to thank the NRC for revision to the branch technical position, having struggled with the old one from a generator standpoint for many years. This is a welcome change, and I think there are a lot of good things in it.

Regarding the point of homogeneity, from a technical standpoint, EPRI still doesn't -- EPRI research still doesn't indicate that it necessarily risk-informs the regulation.

And specifically what I wanted to talk about was the test, because in the guidance as written and also in your presentation, you talked about that it's not necessarily required for generators, but we go on with the "however," which is kind of something that Tom alluded to, unless there is a reason to suspect nonhomogeneity, based on survey or sample data.

So the implication is that despite the stated intention not to require a test, nevertheless one must be performed. So I want to tell you a little bit about -- and it really has a lot to do with plant design, and they're not all the same.

But from my experience, which is primarily in PWRs, most PWRs have one spent resin tank, and the

way that resin gets put in the tank from all the ion exchangers in the plant is basically in a stratified basis. It lands in the tank in the a layer, it stays in the tank in a layer. If the tank holds more than one demineralizer, you may have multiple layers, and when that gets moved to the liner, it doesn't mix up a lot; it tends to stay in layers. It will mix a little bit, but you will still see layering in the liner.

Some plants only have capacity in their resin tank for one demineralizer, so after every demineralizer is removed from the plant to the spent resin tank, it then has to be put in a liner, so again it stratifies in the liner.

Now, to give you an example, in a PWR we have deborating resin which we use at the end of the cycle, which is the anion product, and it would take out iodine if present, but it really doesn't have any class drivers in it to speak of.

Generally the dose rates are very low, a few millirem per hour on the resin, whereas we have a mix bed that's been used for a cycle or for a shutdown, and when that gets put in the liner, it could be, you know, 25,000 to 100,000 times that dose rate.

So if you take the concept of a test and

you apply to, say, a liner survey, say, because I guess in that instance I would have to suspect that if I had two layers and one didn't have a lot of dose rate on it and one had a lot, it might not be homogeneous with respect to, you know, do I suspect it or not. So I can see this question coming up.

And one of the things that our preliminary research -- we took a look at was, well, what would it take to meet the test as described from just one liner survey? We just picked on liner survey that we had.

And it would require -- to get the statistics, it would have required like, on that liner survey -- now, that's not necessarily in the extreme that I described, but in that -- well, I'll call it typical liner, it would require 7000 dose-rate measurements.

So if you take the area of a typical liner -- the outside area of a typical liner, you're looking at two-square-inch grid, which isn't really, I don't think, something that you intended.

So we really need to take another look at this. It seems like we're applying a statistical test to something -- to a process or a measurement that doesn't really have the precision that a laboratory measurement would have.

So typically what we do with resin liners is -- in the industry, again, I say, because I'm speaking mostly from a generator perspective now, but I do have a lot of experience in this.

The manifest requires a contact dose rate, so we typically look for the highest contact dose rate. We do not use that for any classification purpose. Some plants will dose rates curie, which they'll use measurements at a distance, because with the inverse square law, you're going to get a better number at L over 2 or greater.

So some people use 30 centimeters. My experience is a meter is probably more typical. But we don't do a lot of contact measurements, and it doesn't make sense to do that from a classification standpoint because of the error that would be introduced.

What I have seen is isokinetic type -- I'm sorry; not isokinetic -- isolog-type sampling, where the flow rate of the resin to the liner is continuous, and we would take a timed batch out of resin out of that flow path as it went to the liner, and then a composite of that is representative of what went into the liner, and that's what gets analyzed to characterize the resin when you're not doing a dose

rate to curie.

Some plants may do dose rate to curie on resin. That hasn't typically been my experience, but you can't rule out both methods being used.

I don't know if you had any questions on that.

DR. RIDGE: I do. Thank you for the comments.

I am -- I actually have a couple of comments -- questions. One is that, as you've pointed out, a measurement every two inches is not what we envisioned, and so if the guidance that we've put out is somehow pushing industry into a measurement every two inches, that is not at all what we envisioned, and I need to understand better how that happened; you know, the logic of going through the guidance and how -- where that 7000 measurements came up -- where that came from.

MR. COX: Okay.

DR. RIDGE: That was not the intent, but -- and perhaps offline -- because I for one am probably not going to be able to fully understand it if we just do this in this context back and forth.

But perhaps offline if I could understand the logic going through the guidance that led to that

conclusion, we could clarify that.

MR. COX: We can do that.

DR. RIDGE: Well, what was the intent.

And obviously we would want that to be public, so if, you know, we go through that logic, but if that could be submitted as a public comment during the public comment period, you know, we want to do that publicly.

MR. COX: I did note that it was preliminary research, so we haven't -- nothing that we've published yet.

DR. RIDGE: Okay. I understand. Thank you.

And we've gotten the comment a couple of times this morning, maybe more, that -- in general it's something we've said a few places in the guidance, but specifically with respect to homogeneity, when we talk about these wastes are assumed to be homogeneous; however, if there's a reason to suspect that it's not -- and I'm hearing this comment because we've gotten it a few times now, that that is not going to be how it's interpreted when the rubber hits the road.

And I would love to know how to say that better if what our intent is to say we're assuming

that these wastes are homogeneous, these certain wastes, and all we want to prevent -- all that statement was trying to prevent was someone saying, Well, you know, we did this survey for transportation, and we saw this hot spot, but it's listed as a homogeneous waste, so with respect to that part of the NRC guidance, we need not do anything.

I feel that's a very modest thing to say, and in fact, you know, maybe the point is that it's such a modest thing to say that it doesn't need to be said.

But if that modest comment not to ignore information you have is causing a difficulty, I'd love to know how to say that. I don't know how to convey it any more clearly, and in fact we tried to emphasize that by including an example.

And, again, we've gotten suggestions on how those examples could be improved, but one of the examples, the first one, the point was, Do no more: Do not do additional testing.

And that was part of the conclusion of the example, that the certain waste stream comes in -- in fact, I think it's stated in the first two, that because this is one of those listed waste streams, no additional surveys were done; they need not be done to

prove homogeneity; don't do them.

The reason that's there in the examples is to try to emphasize this point, but I appreciate that that is not how things are interpreted in the inspection regime.

I don't know if this is an impossible notion to convey or if there is a way to convey it, because I felt like hitting the thing on the head three times, you know, was almost beating a dead horse, but apparently the horse has not been beaten totally into submission.

MR. COX: You would be surprised how guidance is interpreted just between regions.

Yeah, we can offer help. Lisa's better at this than me.

DR. RIDGE: Okay. Thank you. And let's make sure to talk about the more technical aspect so that I understand that better. Thank you.

MR. SHRUM: Could I say something?

MR. BARKLEY: Go ahead.

MR. SHRUM: I just -- in listening to that conversation and what Jim said in response to my comments, I completely understand you're trying to provide guidance on how to meet Class A waste concentrations when you're blending waste together or

you're concentration averaging. I understood that.

I wasn't trying to put forth a future proposal, although we could do that. What I was trying -- and maybe I wasn't very clear. I was trying to say that if you had a hot spot -- if you blended A, B, and C waste together and the result was Class A waste and it wasn't -- didn't meet your homogeneity test, if you alternatively looked at the performance of that waste form in the specific waste disposal site and the reasonable intruder scenario for that waste site, then you may have a waste form that meets all of your requirements for Class A waste disposal.

Is that more clear than what I said? -- because I was afraid you were discounting my comment as something that you're going to think about in the future. I don't -- and the corollary to that is if you're asking workers to go dig out hot spots, that's very hazardous and maybe unnecessary.

DR. RIDGE: I don't think we were discounting your comment, but I think I might still not understand it, because we -- I understand part of it, for sure, which is that we need to appreciate the worker dose involved.

And I don't know if that means we need to do a formal comparison, which would be complicated by

intergenerational fairness issues and, you know, all of the issues that are complicated between worker dose and, you know, as an accepted dose and an unaccepted dose.

But I certainly do understand that, you know, it's not for free if you are trying to limit homogeneity -- I'm sorry; I think I said limit homogeneity, and that's not what I meant, obviously. I meant limit inhomogeneity or constrain homogeneity.

But the first part of the comment about the a site-specific scenario, I'm still not sure how to implement in guidance for generators, and so I -- we don't want to discount your comment, certainly, but I don't understand how to put in guidance for generators something that they wouldn't necessarily know, which is all the specifics of a site-specific scenario at the disposal site.

So I'm sorry to say to that extent I'm not sure I do understand the first part of your comment, if you want to clarify it; we certainly don't want to discount it.

MR. SHRUM: I'll try, and maybe we could work on it further on the side, but --

DR. RIDGE: Sure.

MR. SHRUM: -- you can -- I think you're

right; it's difficult for you to tell a generator that he needs with work with the disposal site to determine if his waste form met their performance criteria, but you can do that.

MR. KENNEDY: But just one thing to add to that that makes it a little more complicated is that if a generator has a Class A package that does not in fact meet the Class A limits because of certain averaging constraints, the fact that it could be shown on a site-specific basis that it was safe to dispose of it still doesn't get around the problem that there's a requirement to meet the Class A limits and the generator has to meet those. Do you see what I mean?

MR. SHRUM: Yeah, and what I was trying to -- that's why I stood back up.

MR. KENNEDY: Yeah.

MR. SHRUM: The overall package would meet the Class A requirements, in my thinking. I mean, if you average the container contents and you happen to have one hot spot in there, the average would meet Class A.

And so how it performs in the disposal facility is much more important, in my mind, than whether or not you've got one hot spot in there.

That's what I'm trying to say.

It would meet the Class A requirements if you averaged it, in my scenario, anyway.

DR. RIDGE: Yeah, we understand that certainly there are wastes that could meet the Class A limit and then not necessarily be homogeneous, and to a large extent that's what the BTP and this whole afternoon is about, and it's a little easier -- I think a little clearer to understand in the context of the types of waste that Mr. Cochran will be discussing, where you are talking about, you know, discrete items that can be carried away.

But I do certainly understand that -- and let me paraphrase, and maybe I'm coming to a better understanding -- that you're pointing out that certainly there are wastes that, if averaged over the whole volume or the whole mass of a container, meet the Class A limits and let would fail the homogeneity guidance as we've proposed it.

MR. SHRUM: Right.

DR. RIDGE: And we appreciate that that could happen, and then the question is is there any risk significance to that? And what you're saying is that in the context of certain site-specific scenarios, there would not be any risk significant

consequence to that, in which case the homogeneity is superfluous.

Is that your -- for the record, I'm seeing a nod.

MR. SHRUM: Yes.

DR. RIDGE: I understand the comment, and we do appreciate that that could happen in certain site-specific scenarios. The guidance, of course, is meant to be more generic.

And, you know, we'll consider the other comments we heard this morning, but the proposal going in is that we did think in some situations there was some risk significance to meeting the Class A limits but not meeting the homogeneity guidance as we have proposed it, and we did think in some situations there was some risk significance to that, which is why we have homogeneity guidance.

And we've heard other comments this morning about perhaps there never is any risk significance to that, and of course if there never is any risk significance to that, then the homogeneity guidance would be superfluous.

MR. KENNEDY: Now, given all that, do you think there's something that needs to be added to the BTP to address these points?

MR. SHRUM: You want me to help you write it?

(General laughter.)

MR. SHRUM: Yeah, I think you can -- there's an opportunity to do that. I mean, I haven't given it a lot of thought right now, but I'd be glad to work with you on it. Sure.

MR. BARKLEY: Okay. Thank you.

At this point, in all fairness, what I need to do is ask if there's any comments that want to be made from those individuals on the phone, so soon as we go off mute, I'll ask whether anyone wants to speak up and ask a question.

(Pause.)

MR. BARKLEY: Okay. Anyone on the phone want to ask a question?

(No response.)

MR. BARKLEY: Okay. Hearing none, all the individuals who asked to speak have spoken, so unless there's one other person who wants to have some follow-up remark, and then after his remark we'll go to a break.

And your name is, please, sir?

MR. ROBERTSON: Gary Robertson, and I'm just representing myself.

I wanted to address the transportation and the reconcentration issue and just say that when material gets to a disposal site, there's acceptance criteria, and that should address that.

And I'm speaking from experience. I used to work in the state of Washington at our disposal site, and we would see vibrations and reconcentration, and that's how we addressed it.

And also I wanted to comment. It appears you did a generic model of a disposal site, and if you take a four-inch well bore and you were to average it over whatever area the site is to get a probabilistic chance that you would hit a hot spot, that really diminishes the chances of really hitting a hot spot.

For example, in Richland we have 100 acres. In our analysis, that's what we did.

DR. RIDGE: Thank you. I'd like to say two things about the probability issue: One of them is that we acknowledge that the intruder scenarios, the one I talked about this morning, the ones John will talk about this afternoon, are consequence analyses, and they're not formally -- dose is not formally multiplied by the risk, and we acknowledge that to begin with, and we do find that that's -- that it is appropriate to apply some bound to the

consequence that an intruder would encounter, which is not to say that the probability is ignored.

And the probability, in my mind, is incorporated in the selection of reasonably foreseeable scenarios. Now, we've had a number of other comments this morning about the reasonableness of the scenarios that have been selected.

But the scenarios certainly shouldn't be outlandish. I should have also said we've heard a number of those comments this morning, and certainly we'll consider them, and we'll look at the reasonableness; we'll look -- take another look at the reasonableness of our scenarios.

And that is how the probability is incorporated for the intruder, is to look at the consequences and to try to look at the reasonableness of the scenario.

If you formally took the probability of hitting a hot spot by looking at the area of a well bore over the area of a whole site, you could very well have a consequence that was a lethal dose for the intruder, and it's not clear that that would be acceptable.

If the probability were sufficiently small and you multiplied it by the dose, then the

consequence part of that could be lethal, and the dose, once multiplied by the probability, could still be quite small, depending on what the probability is.

And that is part of the reason that we look at both the consequence and the probability. I understand that the probability can't be discounted, but the consequences also need to be looked at, and that's -- the consequence -- I think we're about to get some comments on this.

The consequence also need to be looked at, and we have always acknowledged that the intruder scenario is a consequence analysis and not a PRA type -- the acronym being probabilistic risk assessment -- not a formal PRA-type analysis.

Again, I want to emphasize that we're not ignoring the probability, and I'm sure we're about to get some more comments, so I'll save some of my discussion for that.

But the second point I wanted to make was a little simpler, which is just that if you do want to look at the probability of hitting a hot spot over the area of the site, I certainly think that's a fruitful thing to do. It's a little complicated by looking out into the future and trying to understand the -- you know, what future activities would be, and correctly

assessing the probability of those would be quite complex.

But I do want to add that it's not necessarily the probability of one well bore hitting one hot spot at the site, because there are potential hot spots -- potential hot spots in every waste package, and the guidance is aimed at constraining those.

If there were no guidance, then there's a potential hot spot in every waste package, and so then the probability looks a little different. If it's not the probability of one well bore hitting one hot spot on this, you know, hundreds of acres of site -- I acknowledge that's an extremely small number -- the probability number does increase if you were to look at the probability of hitting any hot spot on a site.

And part of the purpose of guidance is to limit those, to keep that probability number small.

Thank you.

MR. BARKLEY: Thank you.

Do you want to make one followup remark, and then we'll go to a break?

MS. EDWARDS: I think you're in a very difficult position.

DR. RIDGE: It's kind of you not to say I

just put myself in a very difficult position.

MS. EDWARDS: No. I don't think you created this by any stretch of the imagination, but I would point out that I think most of us recognize that the definition of risk is consequence times probability, so you're in a bit of a conundrum, because you have this term to be risk informed, and so for those of us who deal with risk, we understand it's risk times -- consequence times probability. So to separate the two and still call it risk is I think a difficult sell.

That being said, if you assume in some cases that the probability of intrusion is 1 and then you follow it up with the assumption that the intrusion happens at the first possible moment, at the end of institutional controls, and then you follow it with the assumption that the intrusion encounters a hot spot on top of it, you get further and further away from what appears to be reasonable or credible to many of the generators and practitioners of waste management, because you start -- maybe a person can accept, Look, the way the model works, you got to assume an intrusion happens.

But then to follow that assumption -- which is not particularly risk informed -- with the

most conservative set of assumptions possible after that, or some of the most conservative, just really compounds, and then you get into trouble. You start stretching people's ability to support that as a credible or reasonable scenario.

So I would encourage you to consider that if you are going to introduce a probability of 1 as the intrusion, which has been the case for many years, long before you inherited this issue, that you reconsider some of the events that follow, or when the intrusion does happen, the time occurrence associated with it, and the -- are you going to hit a hot spot, or is it more reasonable, since you're assuming a probability of 1 of intrusion, to say that you've going to hit an average of what's in the container, particularly when you know that most intrusions are going to, by definition, involve mixing of the material anyway.

So I'm rambling a little now. That's -- I think you got my point.

DR. RIDGE: Yes. I think we do. Thank you.

I don't want to be the person standing between everyone in this room and a break. I think this is an important issue, and we I think are still

ahead of schedule, because we have a whole Q&A scheduled for after the break --

MR. BARKLEY: We have three Q&A sessions scheduled as we go through, so I don't mind coming back and revisiting topics if we need to in the other Q&A sessions.

DR. RIDGE: Right. And the Q&A for this topic still -- the time isn't complete.

MR. BARKLEY: We still have a few more minutes if you want to do that. Yes.

DR. RIDGE: Well, but after the break there was more Q&A on this topic?

MR. BARKLEY: If you want to, and then we'll go to Mr. Cochran's presentation.

DR. RIDGE: Yes. If we can follow up after the break, because I think there's time scheduled, if I understand correctly, and that way we could have the break which we're already late for.

MR. BARKLEY: Yeah. How about we return at five minutes of 11:00. We'll probably have ten minutes' more follow-up Q&A, and then Mr. Cochran can make his presentation before lunch.

Thank you.

(A brief recess was taken.)

MR. BARKLEY: Take a seat and we'll get

started again.

(Pause.)

MR. BARKLEY: By the schedule we were way ahead of schedule with the NRC presentations this morning. We did a 75-minute Q&A session, which is exactly what was on the schedule. There is a lot of interest in this topic of homogeneity.

I think at this point in time what's most prudent is we go through the questions to finish out this topic. If we get done at a reasonable time, we'll take a break for lunch. If we are way early, then we'll actually do Mr. Cochran's presentation. Otherwise we'll evaluate at the end of the Q&A session whether we want to do lunch then or have Mr. Cochran present. All right?

I had two people in the break that said they wanted to talk further on this subject, and then I'll be glad to call other people who have spoken before at more length.

The first one that actually asked to talk was -- is it John Tauxe? Is that how you say it, John?

And then the second one was Abigail Cuthbertson.

So, John.

MR. TAUXE: Okay. John Tauxe with Neptune and Company. I just wanted to introduce -- you know, people were talking about drilling and the probability of drilling into a hot package or something like that. I just want to sort of bring in an example that we did in a performance assessment -- well, it wasn't part of the PA, but it was a study we did on the side for low-level waste disposal at what used to be called the Nevada Test Site.

And we did an analysis of who might be out there, what they might be doing, a site-specific receptor, and where they might drill; let's say they go out into Frenchman Flats, and Frenchman Flats is a big place. What's the probability that somebody would actually hit even the waste site at all if they're out drilling randomly around the site, much less hit a hot waste package.

And we even got into, you know, considerations of reoccupation of the site, if there were a receptor who had built some sort of homestead there that might be more likely to be reoccupied later, so if the old well was decrepit, they might drill a new well, but it would close to the old well, in the same region, and not just at random.

And there was also the possibility of

communities developing out there, so you might have a community-size well instead of just a domestic well and these sorts of things.

And I just say that to sort of introduce the complexity that that can get into if you go down the road of site-specific analysis. I think it's appropriate, but it can get kind of tricky when you think of who's coming and going instead of the idea that there's always a probability of 1 that somebody's going to be there and will be drilling a well through the waste, and they evaluate then the dose they would get through time or something. Instead of doing it that way, we had people coming and going and reoccupying sites and things.

And the other comment I wanted to make was the idea of risk being the product of the probability times the consequence. And I understand that, but I don't agree with all my work colleagues on this, either, but I'm still really uncomfortable with just taking your consequences and multiplying them by the probability and leaving it at that.

It tends to flatten out everything, and you do miss the occasional black swan or whatever that could be important. Of course, sometimes the importance of that is blown out of proportion, too,

and if you've got a 1 in 100,000 chance that someone's going to drill through this hot package and get a lethal dose, well, it's a 1 in 100,000 chance. How much should that go into your decision making?

If it's a 1 in 100 chance, then that's much more significant, but I'm more comfortable leaving that judgment to the decision maker rather than to the analyst who might -- you know, if you just multiplied them out and said, Here's the risk, then the analyst has done that extra step.

But I think information is lost when you do that. I kind of like the idea of leaving it out there and presenting the decision maker with a cloud of results. It often makes them very uncomfortable, and I just love that, because then they're doing their job, and I did my job to give them that information.

And I'm not going to presume to do their job in making judgments about that information. But I always am uncomfortable when information is lost in the system.

But anyway, that's just a couple of comments I wanted to make.

MR. BARKLEY: You have any remarks?

DR. RIDGE: Thank you, John. I do have a few things to say to respond to your points and to

respond to the points that Lisa Edwards made before the break, but you've done part of what I was going to do, so I thank you again for that.

I agree with your closing comment that -- I as well am also more comfortable leaving those two pieces of information, presenting both the consequence and the probability, for the same reason.

I think that information is lost if in this type of situation those are just multiplied, and I think that there is a role for understanding the consequence, and you also point out the probability, to whatever extent you can quantify it, but -- and maybe there's more work that could be done there. But I do think that there is a very important role for understanding the consequence.

And we've said previously -- the agency has said and we're continuing -- the staff here is continuing to maintain that the intruder analysis is consequence analysis; we want to understand what could happen to the intruder.

It's also important to understand how likely it is that that would happen to the intruder, but it's important to understand both pieces.

And I would -- I'd like to just make a couple points related to that. And one is the

intrusion scenario is meant to test the site. The intrusion scenario is a stylized calculation; it's meant to understand, as I said, the consequence; it's meant to understand what could happen at this site, and is this waste going to protect an intruder from serious consequences?

Now, in that sense it's meant to test the site, and the dose limit that we're applying here is 500 millirem. Now, people could argue about that particular choice.

Originally the 500 millirem was based on the public dose limit, so I don't want to imply that originally that choice was based on some accounting for the probability.

We understand originally that 500 millirem was based on the public dose limit. The public dose limit was subsequently lowered, and NRC was asked, Well, now that the public dose limit has been lowered to 100 millirem, why don't you lower the intrusion dose, and that would change the classification tables if you did that.

NRC's response was essentially not to use the word "probability," unfortunately, which would make my job a lot easier, but to say intrusion is a hypothetical scenario. We do not need to lower this

500 millirem simply because the public dose limit was lowered, because intrusion is hypothetical, it's meant to test the site, it is not the same thing as saying that there are persons that we expect to receive this dose, in which case the public dose limit would have a much clearer tie-in to that number.

So there was a subjective consideration of probability in that response. And really John said the rest of what I wanted to say.

Now, John mentioned some work that was done to look at the probability of intrusion, and I'm sure there's a lot more he could say about that. I'm a bit familiar with that, having seen presentations and looked at papers that they've done on that topic.

But if I understand correctly, one of the bases for the work that was done to incorporate the probability of intrusion into intruder analyses, some of the original work that was done to look at the probability of intrusion, I think one of the recommendations that came out of that work was that that should be reevaluated every 25 years.

And I think that was a very good recommendation in the context of that work, that if you are going to be hypothesizing about human behaviors into the future, that needs to be revisited,

because there is not a good technical basis to make predictions about what humans are going to do hundreds of years in the future.

We really don't know. Technology changes too fast. Human behaviors change too fast. Geology changes slowly. You know, we can do PA -- I'm sorry -- performance assessments about geology, and we feel really good developing that part of a model and getting into that, because geology changes slowly, and we can be pretty comfortable about parts of that.

And then there's the part about probability of intrusion that we like to not think about because it happens too fast. And the recommendation that those probabilities be revisited -- the work I think we're talking about was based on expert elicitations, and those experts said, Well, this is our recommendation for the site, but if you're going to look that far in the future, you need to come back with new expert elicitation every 25 years.

That's not the framework that low-level waste is currently in. That is the framework that some other types of waste disposal regulated by the Environmental Protection Agency -- they revisit analyses periodically.

Right now that's not the regulatory framework that low-level radioactive waste is in, and so while I appreciate that there has been some very good work done on the probability of intrusion, if we want to keep low-level radioactive waste on the basis that we do not periodically revisit it, those are hard to marry together, because the experts who did that work said, This is our prediction for now, but we need to come back and look at it every so often.

And with respect to the BTP, changing the philosophical framework of whether or not we revisit these analyses every 25 years, that is far outside the scope of the BTP, and that may be a thing that should be discussed if Part 61 is more holistically revised, but right now that is not the basis that the regulation or this part of the guidance is on.

MR. BARKLEY: Okay.

I promised I'd have Abigail up first, then I'll have you again.

MS. CUTHBERTSON: I first wanted to thank the NRC for accommodating so many of our requests to make the BTP better for sealed sources. It's so much better now. The activity limits which are being implemented at 10 to 30 curies at the commercial disposal sites would go up significantly under the

revised BTP, which would allow for higher-security-concern sources to have a disposal pathway that they don't have right now, and we really appreciate that.

We also appreciate the changes to the alternate provisions and alternate approached, which will also help facilitate the disposal of sources, as right now we've tried to use them but haven't been able to find a way to do that, and I think that the new language will really help facilitate the utilization of those options.

I wanted to say I understand that homogeneous waste needs to -- there are certain things that you can take for granted with it, and having hot spots is not one of them.

But sealed sources will be the hot spots, and so I don't know how the modeling is done and how the intruder scenario is modeled, but I just don't want -- I think the -- probably in some cases the easiest thing to do for homogeneous waste is to just not deal with sources, because they make hot spots, and to treat them differently -- and I'm concerned, if you treat them differently, it limits disposal options for them further, because they have to be reassessed separately.

And one of the problems with finding

disposal for sealed sources always has been that they're such a small volume that they're not -- their disposal is not going to help any company make a profit.

And we appreciate both Energy Solutions and WCS trying to find solutions for sealed sources, despite the fact that they'll probably be more work than profit for them.

But I worry that -- this morning we spoke so much about homogeneity and how to prove something is homogeneous, and I don't want that to become so important that there's no space for the sealed sources anymore.

Thank you.

DR. RIDGE: Thank you, Abigail. We're going to talk about sealed sources and discrete items all afternoon.

I too think that homogeneity guidance being first in this presentation maybe put a little more weight on it, because everyone had good comments they want to make and better to get them in early.

And because it shows up first in the guidance, every time the four of us talk about this, homogeneity goes first. I think that if I went after John, no one would have any energy to talk to me at

all.

(General laughter.)

DR. RIDGE: But I do understand your point, and I think we'll be able to talk to it in more detail this afternoon.

MR. BARKLEY: Okay. Thank you.

Lisa, you had a point? And then, Tom, I'll get you next.

MS. EDWARDS: Christianne, I think if you went at the end of the meeting, your -- that's very wishful thinking to think we'd be out of energy by that time. I think we would save some.

I guess I would comment it might help me as a reader to understand how you're weighing consequence and probability a little if there was a little bit more written about the probability.

When I read the BTP, I find many examples and actions actually based upon consequence, but I don't see how probability is factored into the actions and requirements that are outlined, but the consequence, I can see that connection more clearly from your evaluations.

Then I would just comment on one other thing, about the 100 millirem versus 500 millirem for protection of the intruder.

That's a factor of five. I guess if you go back to 25, it's a little more, but, you know, if you're comparing the 100 to 500, it's a factor of five, and we're not really talking about a probability of 1 in 5.

So to -- sometimes I hear that comment, and I'm happy to acknowledge that the 500 is there rather than the 100; I'm very happy about that. But it isn't really an offsetting equivalent to probability.

Also, on the probability, I understand the comments, and I think you can find some agreement on the -- you know, you don't want to hide a potentially really severe consequence by drowning it in a really small probability.

But there must be some threshold, and if you find this terrible consequence but it's 1 in a gazillion, that's a different thing than if it's 1 in 10,000 or 1 in 100, et cetera.

And then related also to the dose limit, if you are considering that in the same sphere of compensating for probability, we are looking at reentry criteria for contaminated areas, both within the United States and certainly globally, after Fukushima, and there are numbers like 2 rem, both

within the United States and outside of the United States, that are being considered for real populations right now that are alive that may be subject to those actual doses upon reoccupation of contaminated areas that were previously evacuated.

And I think some of the decision making that's going on in that area in the evaluation is applicable to the thought processes that we're undergoing in terms of what's a reasonable risk for an intruder to encounter.

Thank you.

DR. RIDGE: Thank you. I understand the factor is only a factor of five; probability of 20 percent is not probably what we're thinking about.

And so I completely understand, and I believe you're correct about that. I just want to point out, for Class C waste, an additional factor of 10 that was largely although not entirely based on probability also was added for Class C.

Now, in this discussion of homogeneity, we are largely talking about Class A waste, so your comments are completely complete, and I do just want to add for Class C there's an additional factor, so we're talking about not 1 over 5 for Class C but 1 over 50, which still may not be the most accurate

number if you want to formally account for the probability of intrusion, but I did just want to add that in.

With respect to reentry criteria, I don't know if someone else wants to address that. I think that there's a difference between dealing with an accident that has already happened that there -- is now just a fact that the accident has happened and dealing with it after the fact and what you want to allow to put into the ground when you still have control over it.

I think that there's a difference there that needs to be appreciated, which is not to say we shouldn't, you know, consider --

MS. EDWARDS: [inaudible; not at microphone]

DR. RIDGE: You just made a comment that I don't think was recorded, so I'll just repeat it.

At least I believe what you said was that once you put it in the ground, the scenario we're looking at is based on lost of control.

And I agree; the scenario we're looking at is actually based -- is after the end of institutional controls, so we're assuming a certain period of institutional controls; for Class A, 100 years; for

Class C, 500 years.

And the scenario we're looking at now is after the end of those institutional controls. Nonetheless, the guidance pertains to waste before you've put it in the ground, when you still have control over that package, which is different from a reentry criteria, where something has happened already, and now you're just weighing the benefits of someone being able to go back to their land.

Now, I'm not the person to talk to about this. This is a much larger policy consideration. And so I hear your comment; I'm not the right person to talk to, but I did just want to mention that I think we do consider it to be a different framework, and I think the right person may be getting up, so I'll leave it at that.

MR. BARKLEY: Larry, do you want to make a remark?

MR. CAMPER: Well, yeah. In listening to a lot of this, I made some notes, and I always like to come back to my Aha moments at the end of the day, but I'll do one of them now, because it's just a good time.

I mean, so much of what I'm hearing is the discussion of guidance versus a regulation. Okay? As

you all know, today in Part 61, we have a classification scheme that was built around the assumption that there was an intruder, a probability of 1, and a dose limitation of 500 millirem, for the reason that Christianne cited.

But when I hear some things that I've heard today and some other venues recently, where things were said like, Bury it deeper, require an alignment between what goes on in the classification with the site-specific PA, the notion that you shouldn't have an intruder assumed to be 1; you should really use probability; all these kinds of things clearly are beyond the scope of the guidance document.

I mean, what this document is designed to do is to modernize this guidance that's been in place for many, many years, continuing to build around the existing regulatory framework that we have in Part 61.

Now -- and you all know that; I'm just saying the obvious. But it does strike me, from my perspective, if I look at the fact that the staff has an assignment from the Commission to look at this question of a comprehensive revision of Part 61 or, more specifically, to come back and tell the -- go back to the Commission in December of next year with some ideas about what to do about Part 61 -- many of

you are aware that we prepared a paper; we identified five options, and some of those were fairly broad in nature; for example, aligning with international waste classification scheme; moving to the same system that DOE use for site-specific performance assessment in the WAC; don't proceed to do what the Commission's already told us to do to risk inform the waste classification scheme.

What I am hearing here -- and actually we heard it when we briefed the ACRS on the site-specific performance assessment rulemaking, and we heard it when we briefed the ACRS subcommittee on the BTP -- is that next year, when we have some discussions about what to do around Part 61, there probably needs to be what I'll call, for lack of a better way to put it, a tweaking focus.

In other words, we have these broad options that we've identified already, and we made it very clear that they weren't the only options, but what I'm hearing is although we have a regulation in place that's worked well and served us well for many, many years, some of the fundamental tenets of the existing Part 61 perhaps need to be reexamined.

That's not a wholesale revision of Part 61, for example, by comparison to moving to an

international waste classification scheme or even moving to what DOE does, but it is another option that has emerged that I think warrants discussion next year.

So what I will commit to you to do is to work to get a session publicly next year where we can talk about these fundamental tenets of Part 61 as a way of continuing to refine the staff's subsequent discussion with the Commission in the SECY paper next year.

So I think that these types of things are worthwhile intellectually, and it's good that we're having this discussion. I just draw the distinction between what the staff can do now in this guidance document built around the existing Part 61 as compared to, are some of the fundamental tenets in Part 61 worthy of reexamination now that we have 30 years of operating experience.

So I think what we need to do is we'll have an opportunity for a focused discussion around some of these things you're talking about. I mean, is it reasonable to use a probability of 1? Is that really what we should do?

Is that 500-millirem dose limit still the right limit? And many of the other things you talked about.

What I think is really germane, though, today, and in the current situation, whether it be today or during the public comment period, is someone earlier said it: this notion of, Are we, through our scenario choice, compounding an already conservative assumption?

Are we compounding that, and are we compounding it in a reasonable way? That's where the bang for the buck is at the moment, and I've heard some very good comments this morning about that.

So, anyway, just an observation at this moment in time.

Lisa, I bet you want to say something.

MR. BARKLEY: Real quickly, because I need to get Tom up here.

MS. EDWARDS: So I'm not sure I follow the 100 percent of everything, but I think I got the gist of it, that there was more coming later, Larry.

But right now we actually are revising the BTP, and while we're hopeful about the revision of Part 61, it still isn't a certainty, and it seems to me that the staff has used the fact that they need to risk inform and performance base the branch technical position as a means to introduce a new scenario, which is the drilling scenario.

And I think kind of concurrent or parallel to that, the same line of reasoning can be used to introduce other lines of risk informing the BTP.

MR. BARKLEY: Thank you.

Tom?

MR. MAGETTE: I just want to make a couple of brief comments on this same topic of probability. First of all though, Christianne, I appreciate your comments earlier about the inability to predict human behavior a few years out, and I think you should probably have a discussion with your colleague Dr. Esch about that.

As to probability, if I were in your shoes and I was charged with assessing compliance with the performance objectives, in particular 61.42, and I could create a scenario that showed a lethal dose but with some vanishingly small probability, in 10^{-6}, and I multiplied them out and made it go away, I would be very uncomfortable with that.

I don't think I would think that that would be an appropriate way to apply the performance objective, so I appreciate your example.

I think what we're faced with, though, here is not examples of lethal doses but potential doses that are, even given the assumptions that have

been made, at the margins.

If I get a 510-mr dose under that scenario and say, whoop, it fails -- not so much. And so I think we're not seeing examples with extreme dose -- extreme high dose and extreme low probability, which you often see when you do population doses and reactor accidents, for example; that's not really what we're talking about.

So I would caution you to not be too driven by that extreme-dose scenario that I'm not sure we've identified, and a lot of this points to, you know, what was just discussed by Lisa and Larry about selecting the proper scenario, because then that really gets you out of a lot of this other debate that we're having, because the probability is still an issue; you're still incurring real dose on the front end, especially if you impose more rigorous measuring requirements.

The workers are getting dose; people that we know today are getting dose to save some hypothetical unknown individual hundreds of years from now from maybe getting a dose. So that's another part of the probability imbalance that I see in this, so I think it's important to recognize that there is a weighting that should go on.

And the other thing, as to the probability of 1, there is nothing that says a probability of 1 has to be one scenario. Now, I've heard the comments made to the ACRS and otherwise that we can't assign any sort of numeric weighting to any spectrum of probabilities; we don't have enough data to do that.

But you mentioned expert elicitation earlier. People make assignments like that all the time. You know, rarely do models have absolute data certainty as part of their composition. If they did, then we wouldn't be modeling; we'd just do the math.

So there's always uncertainty, and so to suggest that your job is to come up with the one best one maybe makes your job harder than it ought to be. So I still think some probability spectrum for intrusion is a reasonable consideration even if you assume that spectrum of incidence has to sum to 1, to a unit probability.

So I would offer that for something that could improve the guidance, not just something that goes out into the future rule that Larry was referring to.

The second comment I want to make -- I want to briefly go back to the "howevers," to try to clarify that, because I think that's still not clear,

from what I've heard.

But I think it may be that in your case you are applying a standard that maybe is like a judicial standard: what a reasonable person could reasonably conclude. I think what we experience is not such a standard of reasonable and that what you write down in guidance or rules or any sort of interpretation will be taken by some parties to be interpreted in the most extreme way possible.

And the pressure to be more extreme is not just outside the industry, where it's very extreme, but even at the agreement states that have the job of enforcing these regulations and imposing this guidance have a lot more political pressure. As you go down within the political system, I think the opportunity for political pressure goes up.

So I think it's important for the NRC to read these documents for ensuring that they can't be used in opposition to your intent, and I'm not convinced that you necessarily do that, at least not typically, but that's often the way we read them, which is why you get comments from us maybe that seem, Well, that's not what we meant.

I'm less worried about what you meant than what other people may mean.

And the final comment that I would make goes to one of the slides that was presented regarding the Part 61 and the BTP and the notion that the BTP is written for the generators and the processors.

I would suggest for your consideration -- and however this plays out into your deliberations, I'm not sure, but I think it's just as much for the disposal site operators.

I've talked before about if you take this notion that EPRI has proposed that you could do averaging over a larger area, a cell or a lift, I think that's caused some interpretation difficulties.

Well, if I'm a generator, if I'm packaging, if I'm -- how do I do that? How do I know that? Well, if you have a WAC, a site-specific WAC that would calculate into whatever those limits might need to be, you would have to deal with the disposal site operator to fully understand that.

That's not really, if at all, much of a complication, because today we deal with generators all the time. We have a unit -- they're health physicists and scientists and engineers; that's what they do every day, is interpret for people that the BTP mean, what our WAC mean, how they fit together, what container sizes.

That's probably -- well, you've heard the news about the greater-than-Class A disposal actions that happened to Clive over a period of time that were discovered by an audit of records. Twenty-three of those 25 were strictly how the math was done, how the averaging was done. It was done by people who were not used to necessarily applying the BTP and were coming from commercial sites.

And so that is an everyday fact of life for us, is this interpretation, so the BTP is just as much a tool that we use. I don't want to complicate the relationship between the rules that we have to comply with and the guidance that you give the generators and the processors to help ensure that they comply with rules that apply to them, because there's a difference between Part 61 and the BTP.

But the message is they are linked, inextricably linked in our practice. And the generators could not apply them without us, without us understanding them, and without us helping them understand how they juxtapose with our waste acceptance criteria.

Thanks.

MR. BARKLEY: Any comments?

DR. RIDGE: We have time?

MR. BARKLEY: Actually what I was going to try to do is get the two individuals that asked to make two short comments -- Gary and then Scott afterwards -- at which point in time then I think it's best if we break for lunch.

DR. RIDGE: Tom just made complex points.

MR. BARKLEY: Have at it.

DR. RIDGE: Try to do it very briefly now? I appreciate that we should break for lunch.

MR. BARKLEY: Let's address Tom's points, then we'll get to Gary; then we'll come to Scott.

DR. RIDGE: Okay. I will try to do this briefly.

Tom, that was a number of good and, as I said, complex points. I think that you made the point that we should consider more of a spectrum of scenarios that would have different probabilities, and we should consider those all as part of a decision about what's reasonably foreseeable, what is more of a bounding consequence, what might be more probable, and I think that's a very point, if I heard you correctly. If not, I'm sure at some point in written comments or verbal ones you'll straighten that out. But that's what I heard, and I think that makes a lot of sense.

I would be remiss if I didn't mention

briefly that every time that I have thought that I understood something better than Dr. Esch and gone to talk to him about it, I have been corrected, so I do need to address that part of your comments.

And I did just want to say that I think the most important thing I got from that was considering a spectrum of scenarios, and I think that that does make a lot of sense.

And your point about the branch technical position influencing the waste acceptance criteria I think also makes a lot of sense. When we pointed out that the branch technical position is for the generators, I think that part of our motivation there was just to explain that we can't simply say, Do a site-specific analysis, and if it meets the performance objectives, then you're done, because the generator doesn't have all that information.

So I think it's a good point that it applies to the disposal site as well. We didn't mean to say that it didn't necessarily, but the reason we pointed it out that it's for the generator is that a lot of the reason for the guidance and using generic scenarios is that it has to work for the generator as well, so that's the more limiting part of it, but I do understand that it applies to the disposal sites in

that way that you explained.

MR. ROBERTSON: Well, first off I want to say that this is a vast improvement, and thank you for doing the work. I think there has to be some acknowledgment, though, that it still is really a bounding assessment, super-conservative.

And then with that thought in mind and what Larry had just brought up, you did use the 100-year institutional control period. And for years I've been asking folks to give me some information on the scientific data that was used to establish 100 years.

And what I've always found is it was a commitment made back in the early '80s, when Part 61 was developed. As a former regulator, we did a risk assessment out to 10,000 years and peak dose out to 100,000 years, and looks like we're going to be going to 20,000 years soon.

I think it's time that somebody -- if you're going to use 100-year institutional control period, grab the bull by the horns and do a scientific analysis to show that institutions will not be around in 100 years.

You know, the further you go towards the East Coast, there are lots of homes that have been around a lot longer than 100 years. Go to Europe.

We're talking thousands of years. And it may be a cornerstone of low-level waste, but it's time to be able to defend that number.

MR. COCHRAN: Appreciate the comments. This is John Cochran. I did some time ago have the opportunity to research the basis for the 100 years, the 100, the 300, and the 500, and what the draft -- and finally I asked for Part 61 -- says, and that's where the 100 was developed, is that it's not a measure of the expectation of the durability of our society but rather they're setting limits on how long we should be obligated to have to watch these sites.

So we don't want to set an obligation for our future generations beyond 100 years. It was not a prediction that our society might end in 100 years, but rather it was the weight of the burden, if you will, on future societies.

I would also say if you try to assess the durability of our society or other societies, what you'll actually find is a spectrum.

Some only make it a few years, and they fall away; others, a Catholic church in Europe, they've been in control of that cemetery and that church for 7- or 800 years. You're just going to find a spectrum out there.

But the 100 wasn't a projection of the durability of our society but rather just setting a boundary on the obligation that we're creating here.

MR. ROBERTSON: Okay. And that's pretty much what I heard, that it was a commitment made during public meetings to set it at 100 years.

Here's why I have a problem: There are facilities out there that have a uranium mill and a low-level waste site right next to each other. And guess what? The uranium mill is managed for perpetuity, and the low-level waste site only has 100 years of institutional control.

And being in the seat that you're in when I was in Washington, it's a real hard sell to argue the case of perpetuity when you're closing a uranium mill with people that know that we're seeing only 100 years when it's a low-level waste site, and I would like to see consistency.

MR. COCHRAN: Gary, I'm with you on just about all of what you've said, particularly these differences in the allowance for institutional controls. Part 61 I think has the most conservative, being only 100 years, and in Europe they use 300 years in a number of cases, and you point out, appropriately, that mill tailings impoundments rely on

institutional controls in perpetuity, so there are some vast differences.

But one of the givens we have on this, as Larry pointed out, is that Part 61 simply has 100 years as the institutional control period that can be relied on.

I think that's ripe for a rulemaking if we undertake one in the future, but that's what we've been given to work with with the BTP, and we have to work with that.

Now, maybe we can make some allowances by having language in the BTP on likelihood; perhaps that'll help and address the issue somewhat, but 100 years is a given for this particular effort that we have here.

MR. ROBERTSON: Okay. Thank you.

MR. KENNEDY: Just to add to what Jim said, it's actually 100, 300, and 500, so the US is actually more liberal for Class C than what you might find in Europe, so for Class A it's 100, but for Class C it's 500, so it's actually more liberal than the Europeans for Class C.

MR. ROBERTSON: Well, the 100 years is for institutional controls, and then you rely on packages for the 300 and 500 years, so there is a big

difference.

Here's another point -- sorry I said a minute, but --

MR. BARKLEY: One minute, then I got to get to Scott.

MR. ROBERTSON: Okay. One minute. When we closed the Western Nuclear mill site, we were required to have the company put up $670,000 for perpetual care and maintenance for a uranium mill site.

Granted, the covers are different than at a low-level waste site, but at the US Ecology site, they have $50 million, and we're estimating there's going to be a $20 million cost to close it, and there's going to be probably a $30 million kitty for institutional controls for long term, and the money's there if it gets dedicated, and if you do a cover that's thick, homogeneous, the money will last. But I would like to see you guys be consistent.

MR. BARKLEY: Okay. Thank you.

Let's go to Scott.

Scott, go ahead. Scott, please state your last name, too.

MR. KIRK: Scott Kirk, WCS. I would encourage the NRC to further elaborate in the BTP

about what risk-informed performance-based actually means. This philosophy that the NRC has used for quite some time in order to establish regulations, but I think in large part, based upon what I heard at the ACRS meeting the other week, there are some misconceptions.

What I had heard was that the NRC is somewhat compelled to use probability estimates in shaping their decisions, but it was also my understanding when the NRC started to adopt a risk-informed performance-based approach they selected those words very carefully.

It did not read risk- and performance-based. It said risk-informed performance base, where probability estimates were just one of the number of factors to help you shape your decisions.

So I think that's really important. In large part, when it comes to waste disposals, the facilities that existed many years ago that were licensed don't look at all like the facilities that will be existing in the future, especially for ours.

You know, we have multiple intrusion barriers. Our waste is disposed at great depths. We have a great engineered cover. So the likelihood of intrusion, of bringing these wastes to the surface are

also much more minimized, and the likelihood of bringing these materials is reduced greatly.

So I think the BTP would be greatly served if you would expand on the definition and how risk-informed performance base, how it's used and what it actually means.

Those are my comments.

MR. BARKLEY: Any remarks?

DR. RIDGE: Thank you. And maybe we could bring you in to say that to the ACRS.

MR. COCHRAN: I think that's a good comment. Oh, yeah, you're welcome. I gave that to you because I wish that's what I could have said to you at the meeting.

MR. BARKLEY: All right. At that point it's three minutes of 12:00, which puts us actually about ten minutes behind schedule, so I think it's appropriate that we take a break till one o'clock and reconvene at that time, and Mr. Cochran will make his presentation then. Thank you.

(Whereupon, at 11:57 a.m., the public workshop was recessed, to reconvene at 1:00 p.m., this same day, Thursday, October 20, 2011.)

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

1:12 p.m.

MR. BARKLEY: If you're on the phone, we're just getting started again. I would like the people who are on the phone to acknowledge their names again, because we had trouble picking their names up earlier.

(No response.)

MR. BARKLEY: Is there anyone on the line at this point?

MR. JAMES: [indiscernible]

MR. BARKLEY: Could you repeat the name slowly and spell it out, please?

MR. JAMES: You want me to start with the first name or the second? Last name is J-A-M-E-S.

DR. RIDGE: David James.

MR. BARKLEY: David James. Okay. Thank you.

Anyone else on the line?

MR. KLEBE: Michael Klebe, State of Illinois.

MR. BARKLEY: Is it Clayton, C-L-A-Y-T-O-N?

MR. KLEBE: No, it's Klebe, K-L-E-B-E.

MR. BARKLEY: All right. That was real

close, wasn't it.

All right. Anyone else on the phone?

(No response.)

MR. BARKLEY: Okay. John, whenever you're ready.

MR. COCHRAN: Good afternoon. Is everybody ready? My name's John Cochran, and I'm going to review the BTP's position on encapsulation of sealed sources and other low-level radioactive waste.

I'll review both the existing position and the proposed position, and it's going to be a little bit of a shift of gears. All morning we talked about homogeneous waste, and for encapsulation we're going to talk about typically smaller items that may contain a lot of radioactivity, so a very different waste form in terms of the BTP position.

I'd like to reiterate something that both Larry and Maurice and Christianne pointed out, and that is that we're here to seek comments, so we reviewed the existing BTP from 1995, we reviewed input from the stakeholders, put our own eyes to it, and provided some revised policies, revised guidance, and we're here to seek your input on those revised guidances.

Next slide. Just a quick reminder, what

is encapsulation? That's the surrounding of radioactive material -- could be a sealed source, could be a cartridge filter, for example -- in a binding matrix like concrete in a container where the radioactivity remains in the dimensions of the original item. So that's encapsulation.

Why do we do it? We do it to meet waste form stability requirements for BMC. We do it because it provides worker protection from some of the hotter items. And finally the BTP allows the curies in the encapsulated item to be averaged over the encapsulating media prior to classification.

Now, as you can imagine, that could be abused, this ability to average the curies in a small item across the clean material, and so the BTP sets limits on encapsulation.

Next slide. So let me start by reviewing those limits that are in the existing 1995 BTP. There's a maximum volume limit that's allowed: 55 gallons or .2 cubic meters. And for the nongamma sources, the limit is the number of curies that could be in there when averaged over the volume won't exceed the appropriate classification limit.

So for nongamma strontium-90, the number of curies would be the curies that you could put in 55

gallons and go up to the Class A or the Class B or the Class C limit.

There are also curie limits for the gamma emitters, and those are based on an intruder exposure scenario that's presented in the back of the 1995 BTP.

Next slide. So as a part of the formal presentation I'm not going to go over the intruder scenario that's used as the basis for setting the curie limits, although we could go over it in the question and answer session if folks wanted to.

But I will point out a couple of things that are in that exposure scenario. The exposure scenario assumes that the intruder is exposed for 2360 hours to a sealed source, encapsulated or unencapsulated, one meter away.

And the staff didn't feel that this seemed very reasonable, the idea that someone might be one meter away from a sealed source for 2360 hours, and so we revisited that exposure scenario, and I'll talk about that in a minute.

But using this scenario, which is the scenario that's in the 1995 BTP, here are the curie limits for the gamma emitters; I'm not going to go through them in detail except to point out that for cobalt for Class B, 700 curies of cobalt could be

encapsulated, and for cesium-137, the curie limit is 30 curies even for Class C disposal. So those are curie limits derived using this exposure scenario that's in the 1995 BTP.

Next slide. Now, if you've had the opportunity to review the revised draft of the BTP, you know that some changes have been made; let me just step through them.

For the maximum encapsulating volume, that was actually not changed; that was held at .2 cubic meters, and for the nongammas, that was not changed as well; it's still just the number of curies you could have in there that would meet the classification limit with averaged across the volume.

But we developed a new exposure scenario, intruder exposure scenario to develop some new limits for the gamma emitters.

Next slide. We reviewed a number of factors in developing the new exposure scenario, and we knew from talking to staff that accidents -- sealed radioactive source accidents -- were one of the reasons that the BTP had been developed in the first place in the early '90s.

And so we took a look at those accidents to provide information to us in developing new

intruder exposure scenario. And we were looking for a scenario that would be reasonably foreseeable yet conservative.

You say, well, what's that mean? -- reasonably foreseeable and yet conservative? Reasonably foreseeable means the circumstances are circumstances that we believe could occur. Something like this has happened before, or something like this could happen in the future. That's reasonably foreseeable.

Then conservative means that of the spectrum of things that might happen, this scenario or this set of scenarios are those that would give us higher dose limits.

Next slide. So we reviewed a number of sealed radioactive source accidents. Here are the covers of three of the studies that were done of accidents; one in Goiania, Brazil; one in Thailand; Lilo is in the Republic of Georgia. There were some others that I didn't put on the slide.

There was one in Egypt where a farmer and his son found a little sealed source that had been lost in the construction of a pipeline for water; that was Meet-Halfa, Egypt. Ultimately the son and his father died from that.

There was the one in Morocco in 1984; a construction worker found a sealed radioactive source and didn't recognize the hazard, brought it home. Ultimately eight members of the family died from that.

So we reviewed a number of these. The one I would say a few words about is the one in Goiania, Brazil, certainly the most of all the accidents that have ever occurred.

I think this was in 1987. There was a semi-abandoned medical clinic. There was a cancer-treating machine in the clinic. A couple of fellows sort of broke into the clinic and removed the head from the teletherapy machine, took it back to a scrap metal dealer, opened it up, and in the very center of this was a small capsule, maybe a couple of cubic inches, small stainless steel capsule.

Didn't recognize any hazard; it was just a little capsule of metal; wasn't hot, wasn't cold, didn't smell bad, didn't vibrate. And so they cut that open to see what was in it, because they'd already gone down through this teletherapy head.

And they cut that open, and in it was a white powder, and in low light it actually glowed a little bit bluish, sort of a magic powder, they thought.

Well, by the time they discovered what they really had -- and this was 3,700 curies of cesium-137 at the time of the accident, so 3000 curies of cesium was in there -- ultimately three people died; a little girl and two others died, and it took years to clean up the town, because the cesium powder was spread around.

And this represents probably a worst-case accident, where not only did they find the source and not recognize its hazard, they actually cut it open. And so this, again, represents maybe a worst-case. And we didn't -- in postulating a scenario for encapsulation, we didn't take it quite this far. I mean, this seemed like turning the dial all the way to the right.

Next slide. In looking through the accidents that were common elements across all of the accidents, there was some loss of regulatory control; the victims were engaged in normal activities; maybe they were construction workers, maybe they were a farmer, maybe they were in the metal recycling trades.

Importantly, the hazard was not recognized. The sealed source in no way communicated its hazard to the person who found it. Your senses fail you when it comes to gamma radiation.

Many of these accidents resulted in fatalities, and if you look broadly at the accidents, very unlikely, frankly. I mean, there are thousands or millions of uses of sealed sources in a given year, and these accidents are every few years, so they're really quite unlikely.

So we looked at these factors and others to develop a new scenario. Next slide. This is an important point. The scenario is not hypothesizing what will happen but rather a stylized scenario that's used to set limits so that if the intruder does get into the landfill, he won't receive an inordinately high dose.

Lisa, you made a good point earlier, that we should say something about probability of intrusion. Something like this I would recommend would go in the back where we discuss these scenarios.

They're not a prediction of what will happen but rather they're reasonably foreseeable yet conservative scenarios that are used to set limits so that if intrusion does occur, the intruder won't get an inordinately high dose.

So in developing the scenario -- and I'm not going to present the whole scenario here; the scenario is presented in the back of the draft BTP.

It starts a lot like the scenarios that were used to develop Table 1 and Table 2 in Part 61; that in the future there's a low-level waste landfill; there's been a loss of control and recognition. The wastes have decayed away -- physically decayed away, become soil-like.

But in this case, with the sealed source, we hypothesize that a stainless steel source, like a cesium source, might survive intact, so the encapsulating media, the concrete after 500 years might have gotten kind of rotten and soil-like, but the sealed source would remain intact.

Next slide. So as I said, I'm not going to go through the entire scenario right now; we can go through it in the Q&A session. But the outcome was that the sealed source, if it's cesium, needs to be limited to 130 curies at the time of disposal to keep the dose to the intruder under 500 millirem at 500 years.

And one of the things that I think's really noteworthy with these concentrated sources is that the old adage of 10 half-lives and you're done doesn't apply if something is really concentrated like this.

So cesium's got a 30-year half-life; 500

years we've gone through 16 half-lives, and yet we've still got a limit -- or we're proposing to limit the curie limit to 130 curies at the time of disposal to keep the dose down 500 years later.

So using the same scenario, we applied it to the other two gamma-emitting nuclides -- primary gamma-emitting nuclides: cobalt-60 and niobium. Here's the new proposed curie limits for encapsulation of gamma-emitting radioactive materials.

For cesium you see we've gone from 30 curies to 130 curies for Class C. For cobalt at Class B we've gone from 700 curies to no limit. The cobalt really, really does decay away in 300 years.

And then niobium, of course, with its long half-life, high-dose conversion factor, we've got a pretty low limit, and that remains constant, whether it's for A, B, or C.

Next slide. So in summary we've proposed a draft revision to the encapsulation policy. It's got a new scenario basis. The scenario was intended to be reasonably foreseeable yet conservative. The scenario results in higher curie limits.

We've also got a more transparent basis for implementing alternative approaches, and I'll be talking about alternative approaches later, but

alternative approaches are the opportunity for the licensee and the agreement state to use positions that are different than those that are in the existing BTP.

Next slide. So that concludes my discussion on the proposed encapsulation policy in the BTP.

MR. BARKLEY: Okay. I don't know whether we have any questions that want to be raised in this area. We don't have cards on this section, so let's go by hands.

Lisa.

MS. EDWARDS: I lost my reading glasses, so if somebody finds them, please let me know.

Thank you for the presentation, John, and I think that, again, I would say the same thing that I said earlier. I think amazing strides have been made. I think you tried to introduce a much more reasonable scenario for the exposure scenario for the individual and a source, and I applaud that effort.

Since you are asking for feedback, I would make a couple of comments: I think the NRC has received feedback from one of the utility members regarding using waste loading.

Right now you have the 500 cubic meters. Is that right? -- not 500. Sorry. I'm losing it

here. So a 55-gallon drum basically, which is not a commonly used package any longer.

There are a number of processes that have developed over time that actually involve the loading of multiple filters into a single container and adding a binding agent; it could be cement, it could also be a polymer type of agent, et cetera.

And the desire is for you to consider a waste-loading criteria which is suggested at 14 percent based upon the 1 to 7 ratio, so that if the -- to prevent extreme measures being used in this kind of situation. And I think the result would satisfy what you're after in terms of not having extreme measures but being more usable and also result in a more stable waste form, which I think is a good thing for the disposal environment.

And just a little bone to pick, I appreciate the scenario changes. Maybe they could go further, but you did kind of point that out in the beginning, that maybe that was an example of the use of probability. I don't see how probability is used in that example.

If you took existing information, I think, to define a more reasonable scenario in terms of whether a person sits one meter away from a fixed

point for 2000 hours or not is a reasonable -- you said it wasn't and you backed away from that. But the probability of whether someone digs down far enough to encounter and capture that particular item, bring it back to their home isn't included in that. So I would just clarify that I don't see that as an example of where probability was taken into account.

Thank you.

MR. KENNEDY: Thank you for the comments.

Lisa, I'll just add that with respect to waste-loading, that we do have that in the alternative approaches section of the BTP. And what we're going to do with that is consider whether that should go up into the BTP itself and be a position that says, instead of just averaging over a 55-gallon drum maximum, what -- the criterion you should use is a 14 percent minimum waste-loading, or some other percentage. So that's the comment that we've taken and we'll look into that.

MR. BARKLEY: Were there any other comments in this section?

(No response.)

MR. BARKLEY: From those on the phone, is there any comments?

Sorry; we have to go off the mute here

just for a second.

(Pause.)

MR. BARKLEY: From those on the phone, were there any comments on this section?

MR. MILLER: Yes.

MR. BARKLEY: Go ahead.

MR. MILLER: Yes. Clint Miller from Pacific Gas & Electric Company.

MR. BARKLEY: Go ahead, Clint.

MR. MILLER: Yes, I wanted to reiterate the item as Lisa and Jim had talked about. For the encapsulation of multiple items, that has been previously looked at and approved by the NRC in the last topical report on waste form that was ever approved. That's the varied encap back on December 3 of 1999.

And the vendor submitted in that waste form application that the encapsulation of multiple containers in up to 200 cubic foot liners. They used empirical data from actually our power plant, and we typically had waste-loadings of 30 percent filters to the binder, and that did exceed the 14 percent waste-loading.

The 14 percent waste-loading exists in the 1995 BTP, in the scenario -- I believe it's Appendix

C, of looking at one cartridge filter in a 55-gallon drum, based on the historical standard practice of pre-mortaring a drum with cement so that one cartridge filter could be placed inside and then grouted.

So I submit that it's been approved. We would highly desire that it be written in the BTP, as Mr. Kennedy said, that is being considered. We think that would just make it crystal clear, and the agreement states that, you know, these questions have been asked and answered.

MR. BARKLEY: Any follow-up?

(No response.)

MR. BARKLEY: Okay. Thanks very much.

Any other comments from on the phone?

(No response.)

MR. BARKLEY: If not, John, you want to move to your next section?

MR. COCHRAN: I think next time we do this, Christianne's going to want to go after lunch.

(General laughter.)

DR. RIDGE: Every time we've rehearsed, I said, Maybe I should go second this time.

MR. COCHRAN: Food is a sedative.

I'm going to review the BTP's position, both existing and proposed for classifying a mixture

of individual items, be that activated metals or contaminated materials or cartridge filters.

Next slide. In the 1995 BPT it provides independent guidance, depending on whether you've got activated metal or contaminated materials or cartridge filters. So you got three different sections. But the guidance is really similar, so we've gone ahead -- well, I'll tell you in a second -- and merged them.

The existing BTP, as well as the proposed BTP, defines a term, primary gamma emitters. This refers to cobalt-60 and niobium-94, cesium-137. And the BTP also defines the non-gamma emitters. I'm not going to read the list to you, but you can see the list here.

Next slide. So in reviewing the 1995 guidance, the existing guidance, if you've got a mixture of pieces of say activated metal in a container, you've got two broad choices. One, you can classify the entire mixture based on the classification of the piece in the mixture that's got the highest classification.

So if you've got a mixture of pieces and one piece in there is Class C and you're willing to classify the entire mixture of pieces as Class C, you're welcome to do that. That's sort of the

conservative route.

The other route is that you can classify based on the average of the mixture. Right. Curies divided by the volume of the pieces in the mixture, as long as the hot spots are removed. And there's four tests here, two tests to remove the gamma hot spots and two tests to remove the non-gamma hot spots.

So for the gamma hot spots, if there's a piece in the mixture that's less one one-hundredth of a cubic foot, about like a coffee cup, bigger than you'd think, I thought a hundredth of a cubic foot was really small, but it's -- if you do the calculation, it's more like a coffee cup -- and exceed Table A, then you've got pull that piece out and manage it individually.

There's also something called a factor of 1.5 rule, and that is, for one of the -- each of the gamma-emitting nuclides, let's say cobalt-60, the cobalt concentration in each piece cannot exceed one and a half times the average cobalt concentration in the mixture. So that's the factor of 1.5 rule, and you'd apply that to the three gamma-emitting nuclides.

Then to remove non-gamma-emitting hot spots, any piece that exceeds the Table B values needs to be removed from the mixture and managed separately,

and there's also a factor of 10 rule. And the factor of 10 rule is a lot like the factor of 1.5 rule.

So you'd look at each non-gamma-emitting nuclide, and its specific activity in each piece, and no piece could have a specific activity for a non-gamma nuclide that was more than 10 times the average activity for that nuclide in the mixture.

So if you apply these four tests to a mixture of items, you've removed the hot spots, and now you can concentration average, curies of each nuclide divided by the volume of the pieces in the mixture.

Next slide. Now I'll talk about the revised draft guidance. And it looks at face value a lot like the existing guidance. You've got two broad choices, you can do the conservative classification based on the piece with the highest classification in the mixture, or you can concentration average across all the pieces if you remove the hot spots.

Now some of the individual tests have changed though. Let me just highlight them here and then we'll go one-by-one through them. So for the two gamma tests, any piece that's less than one one-hundredth of a cubic foot and exceeds Table A needs to be removed, and Table A has been updated.

In fact, you've already seen Table A. It's the encapsulation limits for the gamma emitters. So they're consistent between the encapsulation policy and the policy here. If it's too hot to encapsulate, it's too hot to average in a mixture.

And then the factor of 1.5 rule has changed to the factor of 2 rule, and the change is more significant than it might look like, and I'll go over the change in a minute. For the non-gammas, that hasn't changed, Table B hasn't changed and pieces that exceed the Table B values need to be removed.

And then for the non-gammas, the factor of 10 rule is still the factor of 10 rule, but it's changed in its reference point, and I'll talk about that in a second.

Next slide. So this is the first test, remove the sealed source like items from the mixture. Pieces that are less than a hundredth of a cubic foot and exceed Table A need to be removed. And Table A has been updated.

So for example I was pointing out the 130 curies as the maximum curie limit for a cesium source that could be encapsulated; it's the same limit here. If it's too hot to be encapsulated, it's too hot to be in a mixture of items. So we've just updated Table

A to match the encapsulation table.

Next slide. Factor of 2 rule has changed. Those of you familiar with the 1995 BTP, there was a factor of 1.5 rule, and there's a scenario basis for it in the back of the 1995 BTP. And that scenario basis is that if in the future somebody were to excavate part of the landfill and uncover pieces of activated metal, and then the activated metal were to be placed in a disk, 3.3 meters in diameter, the dose would exceed 6mr per hour to somebody in the middle of the disk. That was the basis for the factor of 1.5 rule.

We reviewed that and proposed a new exposure scenario for the pieces of activated metal, and it's a lot like the scenario that was proposed for the sealed sources, and I'm prepared to go through it in the Q&A session if you wish.

The result being that the factor of 1.5 rule is now a factor of 2 rule, and more importantly, the factor of 2 rule is linked to the classification limit and not the average of the mixture. And I've got a good slide that'll show that in a second that'll explain that.

Next slide. Well, actually this is a little bit about the scenario that we used to set the

new limit. And our first question in looking at the 1995 BTP, which is this pieces of activated metal, 3.3 meters in diameter, was does it really matter?

I mean if people 500 years in the future excavate some pieces of activated metal, is it really going to matter. Developed a different scenario, and the answer was yes, even after 500 years people can get a dose greater than 500 millirem.

So the new scenario that's the basis for the factor of 2 rule is presented in the back of draft revised BTP. Again, I'm prepared to go over it if you want.

What we did find, and we used niobium during the first cut, was that if niobium was more than two times the classification limit, the dose to the intruder would be 500 millirem at 500 years. So you've got to hold the concentration of niobium to less than two times the classification limit.

Next slide. This slide explains the old and new rule. This is the factor of 1.5 rule, and what that said was, two things, of course your average concentration of all your pieces has got to be below the limit, in this case below Class C. And then the hottest individual item can't be more than a factor of 1.5 of the average.

The new proposed rule also says of course that the average has got to be below the class limit, and that the hottest item can't be more than two times the classification limit. So fairly different. Here we've got uniformity about an average, but it was hard to determine if that was really linked to intruder protection.

Plus here we've got a new rule and we actually did a scenario calculation and determined that if the concentration of each gamma emitter is less than two times the classification limit, then the intruder dose is going to be less than 500 millirem.

Next slide. Factor of 2 rule for the non-gammas. This is the third rule that we're proposing to change. The old rule linked the factor of 10 to the average of the concentration like you just saw in the last slide. So you've got an average concentration in the factor of 10 is about that average. The proposed rule is that no individual item can be more than 10 times the classification limit.

So if we can go back one slide. So it's really like this, except it's now a factor of 10. So the old rule was factor of 10 about the average with above and below, and the new rule is the factor of 10 has to be no more than a factor of 10 above the

classification limit.

Next slide. Next slide. So in summary, the position on classifying a mixture of either activated metal, contaminated materials or cartridge filters, we're proposing to update that.

The updates include a new Table A with higher gamma limits, a new factor of 2 rule based on an exposure -- an intruder exposure scenario, and it's linked to the classification limit and not the average of the mixture, and then a new factor of 10 rule, no lower limit and it's linked to the classification limit and not the average of the mixture also.

Next slide. So with that, ready for questions.

MR. BARKLEY: Who would like to lead off?

Go ahead.

MR. COX: Billy Cox with EPRI. Would it be okay to ask a source question, to go back one, or is it beyond --

MR. BARKLEY: Go ahead.

MR. COX: Well, I guess we've been contemplating this a bit, and in the examples that you gave about the source accidents, the difference that we're having trouble grasping is in all those instances, what you have is you have a loss of

licensee control. It's not really tied to a disposal, excavation or intruder scenario.

And, you know, granted the consequences of those were, you know, were very bad, but I also think that the probability of those in a disposal scenario versus a loss of licensee control scenario are significantly less.

And I guess the other thing that seems to be evident, at least to me in looking at it, is really in all the evidence that you presented for the accidents, doesn't it really make a case that we should be encapsulating higher activity sources so that we can put them someplace safely rather than still have to store them?

MR. COCHRAN: Let me address your first comment, and that is, if you look in Part 61, you'll see the definition of an inadvertent human intruder, and that's someone who intrudes upon the site and doesn't recognize the hazard.

And so there are some parallels between that definition of an intruder and the sealed source accidents. Because in the sealed source accidents, the individuals also didn't recognized the hazard. So it's not a full one-for-one, but there are some parallels between the two.

And then secondly I understand the desire to say, Gosh, we've got these high activity sources, you know, in the land surface right now, wouldn't it be safer to put them all in the ground. And I think the answer is two-part. One part is that they are being well-maintained right now. OSRP is bringing them up, I think to Los Alamos here in New Mexico; a lot of them are being stored there.

And then secondly, we have an obligation here to protect the inadvertent human intruder. I mean that's whether you agree or disagree with the performance objective. It is a performance objective that we have to meet.

And in a different world one might do some kind of trade off, some societal analysis, you know, what are the risks to the future generation versus the risks of the current generation. But our regulatory scheme's a little simpler here, and we're required to protect the inadvertent human intruder.

I would, again, point out that if these new policies are implemented, the new guidance is implemented, quite a few more sources can be safely disposed of. And also -- and I'll talk about that as the third topic, there are alternative approaches. And under alternative approaches, the draft revised

BTP is pretty specific in defining circumstances where higher curie sources can be disposed of safely.

MR. BARKLEY: Yes, sir.

MR. TAUXE: John Tauxe. This isn't a comment so much on the content, but just as an obligate SI promoter.

What caught my attention was the .01 cubic foot, and that's mixed in with cubic meters and other things like that. You don't -- I mean I'm hoping that the BTP will use SI, at least in terms of those kind of dimensions.

I might forgive you on curies and on millirem, but the rest of the world is using becquerels, sieverts and certainly meters and, you know, kilograms. So I'd just throw that out there, and I'm hoping that, you know, you'll see the light and move to SI.

MR. KENNEDY: There's a story behind that, and the final version will have both units in it.

MR. TAUXE: Okay. With SI first and then the Fred -- with the Fred Flintstone units in parentheses?

MR. KENNEDY: I can't guarantee that.

(General laughter.)

MR. COCHRAN: You know, if you're familiar

with Part 61, it's mixed. Right? Curies per cubic meter.

But anyway, good comment and as Jim said, the revised BTP will have both, and I think the NRC's policy is SI first. I think.

MR. BARKLEY: Okay. Lisa, go ahead.

MS. EDWARDS: We agree that the change that you've introduced to compare to the concentration, the class limits, the factor 2 and factor 10 are the class limits rather than the average of mixture is a very good step. And very much appreciate you doing the work to introduce that concept.

There are two things that I would like to comment on related to this section, and the first is I don't think you really mentioned it in your presentation, but while the step to compare to the class limit has been changed, the other change was that you had to do it not just for the class driver nuclides, but for all of the nuclides, do the comparison.

So our preliminary investigation in looking at that indicates there's not a large impact we've been able to discern so far in terms of what the outcome of the classification of the package would be.

We have been able to determine that it is quite a bit of an extra burden to do that comparison for all of the nuclides instead of just the class drivers.

And our initial take on it is a belief that if you look at the class-driving nuclide, you should not have to look at the others. And the reason is, if the other nuclides were significant relative to risk, they would, in fact, be class-driving nuclides because that's how the concentration limits are set.

So we would like you to consider the basis, again, for why all of the nuclides have to have that comparison made. Not because it's particularly damaging to the outcome, just because it's fairly burdensome and we don't see the benefit from it.

Go ahead.

MR. COCHRAN: I appreciate the comment. For the gamma emitters, of course there's only three, and the non-gammas the list is longer. It is a good comment. I would say, to have the knowledge to know which ones are the class drivers and which aren't, they almost give you the knowledge you need to do the test. But it's still a reasonable comment.

MS. EDWARDS: Okay. And then in your scenario you're take away scenario, which you kind of have used for both, or a very similar type of a

scenario for both the sealed sources and irradiated hardware. You comment that in your evaluation at 500 years you find that the activity present in irradiated hardware is still significant enough to represent or constitute a significant hazard, if it is subjected to the take away scenario.

Filters are also included in this category, and I'm assuming the same type of scenario was applied. I haven't done the evaluation myself yet, but I wonder if you had, and if you found that the same hazard existed for cartridge filters at 500 years that you found for irradiated hardware, because a) there are very different activity levels present in the two materials, and b) how they are bound in the matrix is significantly different in one or the other.

So the ability to envision an scenario where a item undergoes a digging process and an extraction process and, you know, some kind of transportation process, and maybe a cleaning process if you're going to keep it in your home on your fireplace, and retain the activity within that item is challenging for me to accept as reasonable.

So I would be curious how that evaluation looks for the cartridge filter activity, both the quantity of activity and how it is bound.

MR. COCHRAN: We haven't done the analysis. I'm guessing the output of the analysis will be similar. Is it just for the three gamma emitters? Right. The non-gamma's different. I've got a factor of 10 for the non-gammas, but for the three gamma emitters -- but it's a good comment and we'll do the analysis.

MR. COX: Just one technical point on that relative to filters. It really is different from hardware, and that's that in filters we see very little cesium-137 because of the solubility of cesium-137. We also see very little niobium because it's really an inactivated metal, it's from an impurity in the metal not necessarily as much of a corrosion product in the core. So it is primarily cobalt that you see in -- of the classifying nuclides that you see in filters as gamma emitters.

MR. BARKLEY: Okay.

MR. COCHRAN: I mean if cobalt's the driver, you know the class limits for cobalt is unlimited.

MS. EDWARDS: But the question becomes if it materially represents, or constitutes a different hazard at 500 years than the irradiated hardware does, why is it subjected to the same kind classification or

characterization restrictions that sealed sources and irradiated hardware do? Because they seem to be very different, both in the quantity of activity and how the activity is affixed.

MR. COCHRAN: As I said, it's a good comment and we'll do the calculations, but for cobalt, I mean it's unlimited, a Class C for example.

MR. BARKLEY: Anyone else in the audience want to make a comment on this section?

(No response.)

MR. BARKLEY: If not, then, John, go ahead and move to the last section.

MR. COCHRAN: This is really one of the good news pieces of the revised draft BTP, the alternative approaches.

Next slide. And if you're familiar with the 1995 BTP, you know there's a section called Alternative Provisions. I'd like to point out the difference between alternative approaches and alternative provisions.

Alternative provisions are in the 1995 BTP, and loosely stated they say that if you'd like to deviate from the guidance in the BTP, you need to do it through 61.58, which is deviation from the regulation. That sets a pretty high bar for deviating

from guidance, suggesting that folks need a deviation from the regulation.

Now, in the revised draft of the BTP, we've kept the alternative provisions portion, but been clearer that there are some circumstances where you might need to deviate from Part 61, and if so, you should do that through 61.58.

But other deviations which are merely deviations from the guidance should be done through alternative approaches. Now, alternative approaches is a new section to the draft BTP.

Next slide. And really, the alternative approaches represents a new philosophy in the BTP. That is, the BTP will provide broadly applicable, easy to use look up values and set a uniform level of safety across the country. And then in turn, the alternative approaches provides licensees and the agreement states together with very specific NRC guidance on factors to consider when seeking a deviation from the guidance.

And in all cases, through the use of alternative approaches, we have to continue to be protective of the inadvertent human intruder. And this is spelled out in the alternative approaches. So let me just give you an example.

And we've talked about encapsulation, we've talked about cesium-137 sources, and the revised draft sets a new limit of 130 curies for cesium sources. But let's say you've got a 200 or 300 curie cesium source you're interested in disposing of. The alternative approaches of the revised draft of the BTP gives very specific set of circumstances which might be appropriate in invalidating that exposure scenario that was used to set the 130 curie limit.

So for example, if I'm going to bury the larger sealed source at depths greater than 10 meters, maybe in some type of shielded housing that'd be difficult for the intruder to open up, the intruder couldn't pocket it, couldn't take it at home easily, these circumstances would invalidate that exposure scenario and would allow the disposal of higher curie sources.

So the alternative approaches provides opportunity with very specific NRC guidance to the agreement states and the licensees an opportunity to seek deviations from the guidance.

Next slide. So really it's a new philosophy. The 1995 BTP didn't have this philosophy, but the new one does. That is we've got easy to use look up values, uniform level of safety across the

country, and then alternative approaches provides specific guidance for deviations from the BTP.

Next slide. I think at this point, this is just the summary of all the major proposed changes to the BTP. And I think the one that's not here, I'd like to point out staff has tried really hard to make the new BTP more readable. Our first reading of the BTP a couple of years ago was difficult, frankly, and so we hope the new one's a little bit easier to read.

So with that, I wasn't going to go through this unless folks want me to. I'll ask for questions on alternative approaches.

MS. CUTHBERTSON: I have a question. It's to the NRC regarding feedback you've received, and it may also be something that members of the audience have insight into, and that is that we are very, very appreciative of the new alternate approaches option, because we've found it to be impossible for people to understand how to use the existing alternate provisions.

And so we're very enthusiastic about it from our part and it looks good to us, but it's not us who will be implementing it. And I was wondering what feedback you have or what comments people here might have as waste site managers or as state regulators

regarding how easy it will be for them to implement. Their alternate approaches given the new guidance.

MR. COCHRAN: Abbie, I'll just one thing real quick to that, and that issue of course came up in the ACRS meeting a couple of weeks ago where one of the members of the ACRS said that they didn't think the alternative approaches section would be viable because agreement states would be unwilling to use it.

That is, if it's documented up in the BTP itself, that's fine. But that getting a variance from those positions using the alternative approaches was not, as a practical matter, something that was going to be useful. So that's something we're particularly interested in as well.

A variation on that is that it might be more practical and usable the more specificity is provided in alternative approaches. That is, the more we can say how you can deviate from the BTP positions. And so that's a variation on the same issue. But we'd like to hear a lot more about that today.

MR. MAGETTE: And you'll be glad that I'm up here, because I'm here to give you feedback on that very point.

So in response to what the ACRS said, first of all I would like to say that you were

cautioned that you should be careful in emphasizing that this is guidance, because it is, in fact, a requirement that's imposed on at least the two disposal sites that we operate by virtue of the fact that it's included in our license. That is correct. So I echo that caution.

This is not guidance to us, this is a requirement for us, this BTP. Okay. As to whether or not the alternatives provisions in the BTP are implementable, I believe upon review that they are. I find them to be useful and implementable, and I do believe that there is certainly, if not uniformly at least some reasonable expectation for portions of them that the agreement states will go along with them.

There are a couple of cautions that go along with that. Currently, as John just described, you specifically differentiate in that section between a 61.58 and a 3.9, if we can call them that. That's important, and you need to keep that in there.

So this is like a don't take it out comment, because if you do take it out, then all is lost. I mean not to over-exaggerate or anything. So I think it will apply, but that's important.

I don't think you should rely too much on it. For example, Clint's comment. I think if there's

something that has been analyzed and determined to be okay by the Commission, and it seems to be universally applicable, it should be in the body, elsewhere in the body of the BTP. Okay.

So I don't want to hear repeatedly, But you can always do a 3.9 on that. Okay. That would, to me, would be a misapplication of that flexibility. So I think, you know, Clint has raised one, I think there are others that should be elevated to the main body of the BTP in order for them to be most useful.

Another caution is that when I read the intruder protection portion of 3.9, I am unmoved. If we should, at some point in time when the BTP is final, having spent probably close to three years in workshops and commenting on Sandia drafts and official proposed promulgated versions and everything else that we're going to have done, and find ourselves looking at an intruder section in the main body of the BTP that looks like it does today, why in the world would you think I would waste my time and try again to convince you that there's something else that will work.

So I don't think anybody will ever try to invoke that if there's no softening or recognition of probability we've talked about, some notion that there

is another approach, other than what you've articulated in the BTP. Otherwise, to me, it's just a meaningless alternative, because I will have spent three years trying to convince you to recognize alternatives and failed.

So even I at some point in time will stop trying to convince you to do something different. And I just don't think any licensee or applicant would ever try to invoke that. So as written I don't think it's at all helpful, just the intruder part. Okay. Of 3.9.

Do you understand what I'm saying?

MR. COCHRAN: No.

MR. MAGETTE: I was afraid of that.

MR. COCHRAN: The site-specific analysis part?

MR. MAGETTE: But I'll keep trying.

MR. COCHRAN: The site-specific analysis part you mean?

MR. MAGETTE: No, just the fact that in 3.9 there's this, Hey, and if you haven't altered it, intruder provision you want to propose to us, bring it on in. And what I'm saying is, I would have no reason to believe I would be successful in invoking that portion of the BTP, seeking an exclusion for a

different intruder scenario if there's no movement on your part in the discussions that we've already had on the intruder scenario.

Now do you understand? Okay.

DR. RIDGE: Tom, I think that there's a difference between what you could convince us of generically, and what you could convince us of on a site-specific basis. And I appreciate your point, I think, if I understand it, that you've already spent a lot of effort in discussing what would be a reasonably foreseeable scenario and having us change that.

But there's a real difference between looking at it generically where you have to say, is it reasonable to assume that at some place in the country, with some type of site, with some type of waste someone could do this. Well, a lot of things are reasonable when you have that much uncertainty.

When you can say, is it reasonable to assume that at my site in this part of the country with these types of waste placement processes and controls, with this depth of disposal, with this type of intruder barrier, is that reasonable to assume that something would -- that this scenario is reasonable. That's a very different thing.

So I understand that it's a business

decision how much effort you want to put into these, but I do think that we need to point out that it's not necessarily the same argument, arguing something generically on a site-specific basis.

MR. MAGETTE: I appreciate that comment, and I understand the difference, and I think it's perfectly valid. The problem is, I don't see that flexibility in those three paragraphs in that intruder section to 3.9. John referenced examples, that the BTP gives examples in 3.9 of alternative things you might want to consider.

That one doesn't. Okay. The intruder scenario section does not say for example anything. It just says, If you want to try again, knock yourself out.

Okay. So if you mean it, then you need to put something like what you just said in there. And so I think -- and plus a lot of things that we've talked about I believe are generic and not necessarily site specific. But I also -- that is an example. I mean so what you have just said to me is significantly different from what I read in the draft. Okay.

For example, also looking at the large component section. Okay. I don't think I'm going to say anything different about the robustness of the

container that a steam generator or an RPV would constitute at any one of the sites. Okay.

So on the one hand I see why you put it in 3.9, you know, just come make a case, and I think that we would be more than willing to do that under the proper circumstances. Even though I think it kind of has a more generic multi-site application, because really the argument's more about the container itself than either the characteristics of the site or the depth of disposal or any of the things that might come into play in a site-specific analysis.

But I'm kind of -- it's hard to think of how you'd elevate it into some other part of the BTP and write something that's more useful. If I think of anything, I'll write it in a comment. But even though -- so even though I think that's generic, I think it's okay where it is. But the intruder part, to me, is just not compelling as written.

MR. BARKLEY: Okay. Thanks, Tom.

I overlooked somebody that apparently had a question on the conference arrangements. So as soon as Maurice gets that set up we'll take a question from one of the callers.

MR. BARKLEY: Yes, sir.

MR. LAPERE: A couple of actually

observations, if I could.

MR. BARKLEY: All right.

MR. LAPERE: And I'd like to --

MR. BARKLEY: Please state your name too.

MR. LAPERE: I'm sorry. John Lapere from WMG.

MR. BARKLEY: Go ahead, sir.

MR. LAPERE: Okay. In section 3.3.2, on this, John Cochran, if you would, the language where it says an item should be removed an treated as an individual item, the way you presented it is that it needs to be removed from considering in the averaging scenario, and I don't believe that that was ever the intent.

In fact, the title on Table A speaks specifically to the fact that you're not removing it from consideration, you have to treat it as an individual item for consideration. So I think the words "removed and treated" need to be modified. I think the "removed and" should probably come out.

I have a couple of other editorial items, but I can certainly do that, you know, in written comments. I do want to echo what Clint and Tom and Lisa have said with regard to encapsulation of filters. I think the language in the BTP should

clearly recognize what has already been approved and determined to be bounding.

So limiting an encapsulation to a single 55-gallon drum when you can clearly demonstrate that you meet the same waste-to-binder ratios in larger containers doesn't make sense. It doesn't make sense to leave it out if the addition of a few words at this point could make life a lot easier for a lot of people.

MR. COCHRAN: I think both of those are good comments. Appreciate them.

MR. LAPERE: Okay.

MR. BARKLEY: Any other comments from a speaker on the phone?

MR. MILLER: Clint Miller again.

MR. BARKLEY: Go ahead.

MR. MILLER: Yes. On Lisa's point about the one section 2.3 which talks about mixtures of activated metals or contaminated materials or cartridge filters. Based on discussion today, if you do the -- you know, crunch the numbers as was suggested on cartridge filters, you may well find that it would be better to spread out contaminated materials and cartridge filtering mixtures from activated metals. That would be a new section.

I would argue wherever the section is for mixtures of cartridge filters, and we do, in fact, at the plants mix cartridge filters and contaminated materials, i.e., we'll throw in hot valves and hot cartridge filters in the same container.

We do not do that typically with activated metal. That's stuff really handled in a different project basis.

So those things together, encapsulation is an acceptable means, so in that section, you know, I would think adding a subsection that says, you know, encapsulation of these mixtures should be right in there.

MR. COCHRAN: That's a good comment. We received a lot of comments on sealed sources, and maybe we're remiss in considering other items that would be encapsulated until now, and we've gotten several good comments on that. So I think we'll be able to make those changes.

MR. MILLER: Thank you.

MR. BARKLEY: Any other comments from someone on the phone?

(No response.)

MR. BARKLEY: Okay. Let's go back on mute.

Lisa?

MS. EDWARDS: A little bit of a follow on to what Clint just outlined, and some of the previous discussions about what examples stay in the alternative approaches versus what you bring in to the body of the BTP.

One in particular is -- alternative is called out for -- from the Trojan experience with more or less an encapsulation process. And I would encourage that as something that be moved to the BTP. It has been done and executed in the industry, it was approved.

There were some kind of funky things related to how the decision making process went to allow that, but now that it has been allowed, I think it should be clarified that that's an acceptable approach with reactor internal vessels. And it would be very beneficial to the industry and save dose for people who are handling those components today in the plants.

MR. HEATH: Lisa, this is Maurice. One quick thing on that. Are you suggesting that we take that, what happened in Washington and put it in an appendix or put that position as an addition in the position part of 3.9, or whatever section of the BTP?

MS. EDWARDS: I'd like to see it in the body of the BTP, instead of being an alternative as called out as an example application of a correct way to apply the BTP. If you look at encapsulation in particular, you kind of focus on sources and filters, but, in fact, there are many items that are -- encapsulation could be applicable to, and reactor vessel internals are one of those.

Our folks can get significant dose related to how they have to handle and package reactor vessel internals, particularly in decommissioning scenarios. And the ability to concrete them into place inside of the reactor vessel, if that works in their disposal environment and the options that they have, it should be allowed in the activity averaged over that entire package, if the waste loading exceeds 14 percent by weight.

So it's kind of a consistent kind of concept that binding is a desirable way, a conditioning process for waste, because, A, it removes water; B, it provides for stability, and, C, the takeaway scenarios become much more difficult. So there's all sorts of reasons to like binding type of conditioning treatments.

That being said, you don't want the

extreme measures. So you have the 55-gallon drum example, we would say expand that to a waste -- a weight ratio so that you -- a waste-to-binder ratio so that you're not tied to a single container, which makes it more useable. And then apply it in other instances where there are direct benefits for dose saving, such as this reactor vessel example.

Does that make sense?

MR. HEATH: Yes. Thanks for that clarification. Thanks for your comment.

MR. KENNEDY: So let me follow up with a question. Tell me more about the reactor vessel at Trojan and how we could incorporate that into the body of the BTP, because on the face of it, it seems to me that a large -- a proposal like that is pretty significant and for us to endorse it generically in the body of the BTP, I don't know how we'd do that because it's such a huge undertaking, and it's complicated and would have to have specific review and approval in any case.

MS. EDWARDS: Well, I think you -- there are a number of things maybe about that specific example. There's transportation issues, et cetera. But the concept of binding materials together and putting limits on it so that there's not extreme

measures employed, as a direct example, and it's not limited to a 55-gallon drum or to any particular container, would be beneficial, and I think accomplish a number of beneficial items.

MR. KENNEDY: And I think might be something appropriate for the body of the report. I agree.

MR. BARKLEY: Okay. Billy, go ahead.

MR. COX: Just to follow up a little more with an example of that, I was involved in the decommissioning of the Rowe Reactor, and I can tell you that we were one of the earlier ones that did it, and the approach that we felt we had to take because of the restrictions and the regulation in the BTP was such that we segmented the reactor internals out, packaged them separately, segregated the greater-than-Class C waste from that, stored that in the ISFSI.

And to do that we picked up 100 rem of real dose, the real work, and I guess I would contend that if you could average that across the reactor package -- now there may be transportation logistics and things associated with this, it just makes more sense to me from a collective ALARA standpoint that we should be considering this as a specific example where we allow this to happen.

And this comes back to my point that I tried to make when we were talking about averaging irradiated components in the summer there, at the end of June at the waste conference, is that it would be helpful if we could average over similar and adjacent components. I mean that would give you the leeway to do something like this.

And then when you grout the internals in, if you do the analysis, you know, I really don't believe that the inadvertent intruder is going to get, you know, an additional millirem compared to what we picked up from occupational. So I don't know if that helps amplify the difference between the Trojan example and the Rowe example, but Rowe cut it up in pieces and Trojan kind of left it all together, so.

MR. BARKLEY: Okay. Linda, do you want to make a presentation?

MS. SUTTORO: Oh, my god, everybody so much taller than me. Okay. Am I on here? Can you hear me?

MR. BARKLEY: Yes. Go ahead.

MS. SUTTORO: Okay. Great. So before I begin, I'd like to make a point to a previous statement that -- made by Christianne, and I think it actually got picked up by other folks also, that I was

concerned that your statement that the this BTP was written primarily for the generator, but yet the rest of it reads like a disposal document, and when we would use that, we'd be using it in disposal operations not on the generator side necessarily.

Because, well, let me -- I work for the Department of Energy and so we don't actually need to comply specifically with the BTP, except for where we ship our waste off site, and then the BTP would come -- you know, then we also incorporate the concepts in the BTP into our own regulations, and so we do try to harmonize our approaches.

But anyway, so what I was going to say is that the low level waste homogeneity issue, which we discussed before, is not just a generator issue, but we see it primarily as a disposal issue because all our generators must work very closely with the disposal facilities to make sure that we meet their waste acceptance criterion. So that's why it actually becomes a disposal issue, not a generator. Even if the generators are merely doing the packaging or the waste processors are doing the packaging.

So the Department of Energy Office of External Management -- I'm actually going to read from this. I have to get general counsel approval for

everything I say pretty much, so I have to do more of a reading rather than a regular presentation.

EM does appreciate the opportunity to provide information on the approach used by DOE concerning management disposal of low level active waste at DOE facilities, as well as our observations concerning the NRC draft BTP, the NRC effort to revise Part 61 is a very important step towards a more risk-informed approach, and provides valuable opportunity to achieve a more consistent and comprehensive national approach to low level waste disposal in this country, and DOE -- we're very pleased to be able to speak today.

This BTP has identified and discussed concentration averaging encapsulation, consolidation of waste, blending of waste, and does include good modifications to the current BTP. And we do support many of the suggested changes, particularly in Abbie's case with the sealed sources they are greatly appreciative of the changes because it makes it much more usable for sealed sources.

And, however, it may be advisable, and I think almost everything I'm going to say has probably been picked up at one point or another during the day, but this is kind of the combined view, I think, of all

the comments made today.

I will discuss a few areas today which I do believe could be enhanced, and I hope that you are able to use these ideas. As you know, DOE manages our radwaste in accordance with our own DOE order of 435.1, which includes requirements that ensure low level waste is disposed of at DOE sites in a manner that is fully protective of human health and safety in the environment.

In terms of bringing a risk-informed approach to low level waste disposal, DOE believes that a thorough -- and I understand your concern about that you can't just change Part 61 to include a site-specific approach the way we do.

However, we're hoping that through little nuances in the BTP and the other parts of Part 61, particular performance assessment update, that you're able to bring in much more of the site-specific understanding of the disposal facility operational practices and waste forms and waste containers, that they are key in assessing the suitability of disposal at a specific facility.

In our comments at NRC's recent meeting on period performance, I provided a summary description of DOE's low level waste disposal requirements and how

we use them and the technical basis for that. And I mentioned many of the following components in our disposal system approach.

And while NRC Part 61 does not currently recognize the value of revisiting this disposal analysis fully, DOE does firmly believes that NRC should be making these changes or approaching these changes in their regulations, and it would also help to harmonize the national approach.

We at DOE analyze site-specific characteristics to analyze particular characteristics which might provide geologic and hydrologic barriers to radionuclide transport. We also look at the facility design and the appropriate buffers and manmade barriers to intrusion. We use performance objectives very similar to Part 61.

We have waste acceptance requirements tailored to each specific site, which is a very important component of our disposal, and we establish limits on the radionuclides that can be disposed of based on a performance assessment of the facility.

We have very rigorous waste characterization requirements. We have a formal waste generator certification program within the Department of Energy. Also, in our performance assessments we do

the projection of the hypothetical performance of the facility and the intruder scenarios.

And all of those, the performance assessments then, we also do something called a composite analysis where we actually consider other sources, other radionuclide sources that are at or near the facility that might interact with the low level waste disposal, and that's another important point of our entire package of disposal.

We also, and something that was mentioned earlier today, is the revisiting. You're kind of saying EPA does revisit their disposal, but NRC does not, and DOE definitely revisits on a regular basis. We have a regular maintenance plan that's part of our performance assessment.

And part of that is a five -- we do an annual summary revisit of the -- we review the disposal practices conducted in the past -- the previous year, but then at the same time we look to the future and identify what additional studies and research and development needs to be conducted to determine whether that facility is protective and will remain to be protective in the future.

And if it's found actually that we are concerned about the protectiveness for the future, we will add barriers, modify the design of the closure cap that we

are anticipating for the future.

If the disposal facility is closed and no longer accepting waste, we continue to do these same analyses on an annual basis, and we've continued to do them, make modifications to the disposal facility as we go along to make sure that it is still protective. So we don't make an assumption and we definitely do not walk away from a disposal facility, even if it's still operating or if it's closed.

We also, you know, have very strong QA provisions and all related to the low level waste disposal, including a permanent maintenance of records. We don't have any expiration of maintenance of records.

And also part of our process and is very similar to the licensing process only we do it within DOE, is we have a formal review and approval of the basis of all the information in the previous documents, the performance assessment, the composite analysis, the maintenance plans, we have preliminary closure plans, we have final closure plans, we have institutional control plans, all that stuff is part of what we call the disposal authorization statement, which is equivalent to a federal permit.

So among the tools used in management of radioactive waste is radioactive waste consolidation. And this process, as we all know, is the combining of two or

more low level radioactive waste streams to render the waste more suitable storage, treatment or disposal, to reduce risk to the workers, and to -- and/or promote efficiency and life cycle management.

You know, if we find that one waste stream is particularly important, but particularly expensive to dispose of, then we will actually consider the blending or the consolidation of that with another waste stream that would be a lot less expensive and by merging those waste streams we save taxpayer dollars and without an increase in risk. We very carefully consider that.

And also, as you --

(Pause. Microphone went out.)

MS. SUTTORO: Again, I'm too short for the world. Okay. Here we go.

So among the advantages that DOE sees in using consolidation, and let me point out that when we do consolidation, we don't just do consolidation, we don't do segregation unless the segregation of separate waste streams -- for example we have a lot of legacy waste. We have waste that's already drummed. And very often we just over-pack it for shipping because it was drummed anywhere between 30 and 50 years ago, or 20 to 50 years ago.

So we will over-pack it if the drum it's in is corroding and, you know, is falling apart. But we very --

we don't necessarily go in and right now and segregate waste streams if it would impact worker safety.

Now if it's, you know, a very contaminated hot spot and by mixing -- by retaining it in its current form and over-packing, it still wouldn't meet low level waste disposal requirements, then we would go in and pull out that hot spot.

But if it's all blended and if we do the concentration averaging, and we find that it meets the low level waste disposal WAC of the facility we're shipping it to, then we would not do the segregation because we feel as though the worker concerns and ALARA are much greater than the benefit of doing the segregation.

So we very much look at the here and now. Our workers are extremely important to us and we can't needlessly contaminate folks, or increase their annual dose.

So some of the advantages that we see is consolidating several different waste streams, we do minimize the use of inert void fill and material that's used to mitigate subsidence, particularly where we have soils and PPE and hard equipment. If we consolidate them all, then you do minimize the use of void filler material.

We also -- it assists us in reducing the number of waste packages requiring unique engineering controls, I mentioned that before. It helps provide a clearer path for

disposal that's not always obvious prior to the consolidation in certain cases.

And it produces a more uniform distribution of radioactivity within the low level waste disposal facilities. And DOE disposal facilities are often many hundreds or thousands of acres, and so we do want the waste to be fairly uniformly distributed across the facility.

Particularly in the case like John Tauxe mentioned where we've done scenarios where a village might start up in the middle of a disposal facility. If there were more than one house that would be a greater concern to us. Hopefully they would not stay there long, particularly in the desert like that. Right? Especially when it's so far from ground water.

So consolidation is applied consistent with the philosophy of a less prescriptive increased risk-informed approach that provides flexibility to determine how to meet the established performance criteria in a way that will encourage and reward improved outcomes.

We require low level waste managers to justify consolidation of waste streams and absolutely require that there be specific improvements in waste management for doing so. But we also require justification for segregating waste streams already in storage in one package. As I mentioned before, such as legacy waste, because of the concerns of

worker safety.

The daily analyses have shown that consolidation does not impact compliance with performance requirements for its low level waste disposal facilities. So DOE calculates concentration of radionuclides present when consolidating, the amount of radionuclides present are typically averaged over the total mass of the volume and the waste package if appropriate, based on the site-specific intruder scenarios, and in some cases grout used to stabilize a waste package and encapsulate surface contamination is considered in the concentration averaging.

But DOE does not necessarily require that the consolidate waste be homogeneous. Safety requirements, technological limits, ALARA considerations and process limitations present constraints that often make homogenization of radioactive waste impractical. In consideration of such factors, DOE uses a graded approach when determining the extent of mixing needed.

When solid radioactive waste -- I'm sorry, I thought somebody said -- when solid radioactive wastes are consolidated, not attempt is generally made to achieve homogeneity. When blending radioactive waste during the packaging process, it's generally unnecessary to produce a homogeneous final waste form.

However, the degree of waste homogenization

required must be sufficient to satisfy the site-specific conditions of that disposal facility, and to meet applicable requirements from other agencies, like EPA and DOT and host states.

So to implement the process, DOE allows waste handlers to determine the most safe, cost effective, and practical method for managing waste. If waste streams are anticipated to be consolidated, the waste handler must characterize before consolidation takes place, and when the consolidated, the consolidated waste itself must be characterized.

All processes must be documented, and while preparing waste for disposal, it must then be classified to verify that the waste does meet the waste acceptance criteria of the intended disposal facility. And if it's determined that homogenization is preferred, then the method used to achieve homogenization is documented. So we do require a lot of documentation and a lot of careful consideration. It's not done willy-nilly, but it's done very often.

As you know, most low level waste disposal facilities are located -- for DOE disposal facilities are located in these large federally-owned reservations. And the government is committed to retaining ownership and control of the land containing the residual radioactive

material in perpetuity.

So nonetheless DOE does perform site-specific local scenario driven inadvertent intruder analyses to provide reasonable expectation that the performance objectives will be achieved. In support of these analyses, DOE develops plausible inadvertent intruder scenarios. That is reason with -- we talked about it today, hypothetical individual unknowingly intrudes onto a disposal facility and interacts with the waste, that are consistent with the best management practices and current industry standards such as those issued by NCRP and ICRP.

The inadvertent intruder is considered by DOE to be a hypothetical accident scenario which could occur after active institutional controls have lapsed. We also typically use 100 years primarily with the understanding that, you know, you have to have a World War III go on before DOE loses active institution controls. But we do use that as part of scenario.

It is a hypothetical situation, simply to provide a basis for determining the acceptability of near surface disposal of certain types of radwaste, and may be used for establishing acceptable concentrations of radioactive material in a near surface disposal facility.

In the intruder assessment, active institutional controls -- let me see, I've already said

that. In some cases we actually do use longer periods for -- than 100 years for assumed, but there has to be sufficient justification.

Inadvertent intruder assessments involve formulating scenarios and then calculating exposure resulting from these activities. But the inadvertent intruder scenarios typically consider the following at DOE sites.

The inadvertent intruder carries out the activities for no more than a year before discovery, before somebody discovers them and either kicks them off or they go, Oh, my goodness, we're getting out of here.

An inadvertent intruder may perform reasonable activities consistent with regional social customs, well drilling, excavation and construction practices, and consistent with the regional environmental conditions projected for the time that intrusion is assumed to occur.

The inadvertent intruder events may involve random contact with waste. However, the inadvertent intruder will usually take reasonable investigative actions upon discovery of unusual material.

So we don't make an assumption that they will pick up a sealed source -- they will pound through a 55-gallon drum of cement and find a sealed source and bring that home and put it on their mantel. That not typically

how DOE uses those scenarios.

Inadvertent intrusion events that contact waste may be assumed to be limited to drilling or simple excavation scenarios involving the use of relatively unsophisticated tools and commonplace machinery, and the doses calculated for an inadvertent intruder will depend on waste disposal facility design and operating practices, and may be reduced by practices such as disposal below depths normally associated with common construction activities, the use of intruder barriers or durable waste forms or containers, or distributed disposal of higher activity waste. Assumptions regarding these factors are determined on a site-specific basis.

So the inadvertent intruder assessment considers at a minimum the appropriateness of including an acute construction scenario, an acute well-drilling scenario, and a chronic agricultural scenario. However, all these scenarios may not need to be assessed for a particular disposal facility and actual scenarios were developed on a site-specific basis with the appropriate balance between conservatism and plausibility based on engineering judgment.

The inadvertent intruder assessment is required to be included in the performance assessment, as we've discussed, for the purposes of establishing waste acceptance requirements and other controls of the disposal facility.

The likelihood of intruder scenarios may be addressed in the interpretation of the results of the inadvertent intruder assessment.

The approach takes into account the long-term control of the site by the federal government, the likelihood of contacting any specific item or a hot spot within a disposal facility. It is also considered consistent with the site-specific intruder. In any case, the scenarios selected for evaluations are required to be reasonable for the specific location and provide a reasonable assessment of the impacts that could be experienced by the individuals.

In addition to the considerations summarized above, EM has the following additional observations concerning the draft BTP:

It may be appropriate for NRC to consider providing a basis for the intruder analysis NRC used in the draft BTP. In this regard, the draft BTP is not clear as to the basis or need to establish the restrictive controls premised on an intruder -- inadvertent intruder scenario exposure to uncontrolled radiation sources left unsecured or in abandoned buildings in other countries.

It's not clear how such a scenario is relevant for considerations related to hypothetical exposures associated with inadvertent intruders into a containerized

and grout encapsulated sources that are disposed with other waste in multi-acre licensed or authorized disposal facilities. It seems reasonable that NRC should remain consistent with the scenarios considered for the development of Part 61.

We also suggested NRC consider finding the alternative approaches discussion to more fully reflect a risk-informed philosophy. For example, we suggested that NRC consider clarifying the precedent or basis for NRC's selection of a 10-meter depth of disposal in the alternative approaches discussion.

Without further explanation of basis, specification of default 10 meters' depth seems inconsistent with the purpose of the alternative approaches section, and inconsistent with the risk-informed approach.

So thank you again for letting me -- giving me the opportunity to tell you about EM's approach and give those other options -- little suggestions. Thanks.

MR. BARKLEY: All right. Thank you. You're welcome to turn in those written remarks, if you'd like to as well, from what you were reading.

MS. SUTTORO: The DOE's sending a letter.

All right. Very good.

Were there any other questions or comments that this point?

Go ahead. That microphone is now working, although the -- it's flipped around a little bit. The battery went dead on us, that's what happened.

MR. MAGETTE: I have a process comment that I know you're going to love. I would strongly encourage the Commission to not publish a draft that's other than the draft they would like to see become final. If you publish a draft that addresses some comments, knowing that you're going to address other comments later, we won't know which are which. It will -- it wastes a lot of our time and yours sending you comments that you've already decided to incorporate that we don't know.

And vice versa, there may be those of us that would just assume you were of course going to take all our comments so that -- because they're so wise, that we wouldn't further comment.

So I don't see how I can review a document not knowing where it stands. I understand your schedule issues, I understand that would push your schedule out. I think it would be well worth it, no matter what your concurrence path is.

You've already noticed this, you've noticed this workshop, you've noticed the language that those of us who are here and others have read and commented on. You could, for example, publish another notice, give us 30 days

from the date of that notice to give you written comments on this.

So whatever it is anybody has to say on what's in front of us today, we could -- we would be responsible for ensuring that you are the beneficiaries of. But to do otherwise, I find unworkable.

So I know that's a complication for you. But I really encourage you to think hard about not giving us a proposed document unless you think you're done with it.

MR. CAMPER: I'm sorry, Tom, I'm sorry, I don't understand what you just said. Could you try it again?

MR. MAGETTE: I don't want to start over. I haven't been told that often either.

I heard said earlier today that the document published in January might not incorporate all of the comments that you're willing to address. If you do that, if you're accepting a comment, I'm going to revise the well-drilling scenario for the intruder, but I'm publishing a proposed draft that doesn't say that, how will the reviewers know that?

How can I comment on something that includes some, but not all changes you've already decided to make, how will I know which is which category? And so can I effectively comment on such a document. I can assume everything that's not reflected in there has been rejected

and write you another 25-page letter, and I will.

(General laughter.)

MR. MAGETTE: And I'm sure others will too.

DR. RIDGE: Your time. Right. It takes your time and effort and mine.

MR. MAGETTE: Yes, and it won't be an easy thing to do that I would look forward to writing any more than you would look forward to reading. So that's all. I don't know how else to do it, and it would be -- it would waste a lot of time and resources.

MR. KENNEDY: Now, we're one of the things we're considering is publishing the January document would be the same as what's out now, and there wouldn't be any changes there. And so people would be commenting on the same document that you're commenting on today.

MR. BARKLEY: Okay. You want to make another remark?

MR. COCHRAN: I had a question for Linda.

Linda, in doing the research to put together a new scenario in the BTP for the encapsulation position, you did try to take a look at DOE's position, and I know you have both site-specific WACs and then deviations from those. So for example a test site for security, national security site.

Let's go to general WAC, and then when somebody

brings in a specific waste stream that doesn't meet the WAC, you can do a site-specific, or a waste-form-specific assessment. And I tried to research those. In particular I was interested in the ones that were deviations from the existing WAC.

Couldn't find them. If you could --

MS. SUTTORO: That's actually what -- it's a fairly new thing that we've been using, and we call it an unreviewed disposal question evaluation. And they actually have not been -- we haven't used them in the -- had them in the public realm because they're kind of a new thing we've done in the past several years.

And, in fact, when the new DOE order 435, that's under -- you know, the 435 is under revision, that's going to be incorporated as a standard method of doing business, but they haven't -- it hadn't been -- it wasn't in the order that came out in 1997.

And very shortly thereafter it was recognized that when you have -- we have two kinds of UDQEs, we call them UDQEs, unreviewed disposal question evaluation -- we have the, oops, something was sent to a disposal facility that we later recognized did not meet the WAC, and the decision -- we do an evaluation to see whether that would impact the performance objective and the performance assessment and the validity of the current documents. And

if it would, then we remove it.

If we recognize that it doesn't have a future impact on the performance, we would still meet all our performance objectives and the performance assessment is still a valid document, then we leave it in place rather than have a potential -- have worker safety dose, you know, worker dose.

And so we do have the -- we use it for the oopses, but we also use it for the planned disposal when we recognize that an item does not meet the WAC. We do a full blown analysis just like we do the UDQE, we do an analysis that requires it -- and if you want, I can send you example.

I actually have one in my -- I just got sent one from Savannah River site last night asking approval from headquarters, they have to get approved from headquarters when they do a UDQE that has the potential to impact the performance assessment or performance objectives.

So I do have several as examples, because DOE is not typically -- it's not like NRC, we're not in the public realm and the disposal facilities are not licensed outside of the DOE system, and we don't have those -- document haven't been made public in the past because they're just our own operating facility documents.

But, in fact, one of my goals is to make everything public from now on, and so there's no reason why

we shouldn't have them public, it's just not been done because nobody considered it as something that the public cared to read, you know, sitting in the middle of NTS, so we've got -- we have a different piece of equipment than originally intended in the WAC.

So, yes, I can share lots of those with you because we have a lot -- particularly, you know, NNSS, the Nevada test site, new name, there are a lot of those. They do them on a regular basis because that site has -- they actually can handle a lot more than the WAC that we developed for the site. They take a lot of large pieces of equipment that can't go anywhere else, so, you know, as long as they meet the DOT shipping requirements, we ship them from other DOE sites there. So I can provide you with several.

MR. COCHRAN: Yes, I'd appreciate seeing some of those. And again, we did try to research the DOE practices and we're a little bit time limited, so we just worked off the web. But it would be nice to get copies of a few of those.

MS. SUTTORO: Yes. And any time you guys need anything. I work on that stuff all the time, I can always come over and help.

MR. KENNEDY: And, Linda, just a little bit of history on the sealed source scenario, you know, that wasn't

part of the original Part 61 draft environmental impact statement, and it was included in the 1995 BTP, it was the basis for the limits in the 1995 BTP. The staff at that time went through a five-year process, and in particular did a lot of coordination with the agreement states and CRCPD on coming up with that position and coordinating with them.

So it is different from the Part 61 scenarios, but it had substantial support at the time from NRC and the agreement states as well. And what we've tried to do with the current revision to the BTP is simply take the sealed source scenario as a given that there will be one, but we've tried to make it more risk informed, and as a result we've increased the activity limits.

But we haven't gone back and said that we're not going to consider it at all. That would actually make a big difference in the BTP. We continue to say that that's -- it's appropriate to address the sealed source scenario, but we've made it more realistic and risk informed in this current draft.

MR. BARKLEY: Okay. Any other questions from the audience?

Go ahead.

MS. EDWARDS: Since Tom commented on process, I'm going to add my comment to it. I would rather have a BTP that [microphone malfunction] in March.

DR. RIDGE: The mike is not working.

MS. EDWARDS: I would rather have a draft of the BTP that reflects your current state of thinking related to all the recent comments you've had in March, say, then just get what you have right now in January, for many of the same reasons that Tom cited, but also because the more insight we have to where your line of thinking is going, the better information we can provide you back to your deliberation process, and if that gets truncated and we only get to look at what we've seen so far, it limits what we might be able to help provide for your deliberations.

MR. HEATH: Any other remarks?

(No response.)

MR. HEATH: No, Lisa, we appreciate that comment. We understand that, and Tom as well. So what we'll have to do is just go back and take a look at that because we have some metrics that we have to meet that have been set forth by our EDO in certain things.

So this meeting was designed to take advantage of a lot of people in the industry who were in the area for a low level waste forum, and since the document just went public at -- you know, August 29, we just kind of wanted to see -- get the first cut from everybody.

So moving forward, like your comment, what we'll have to do is go in internally and see if there's

anything that we could maybe change that could help our process moving forward so we can make sure that we get all the comments and that everything -- you know, you'll see it when the FRM comes out and that sort of thing. So we appreciate that from both of you.

MR. BARKLEY: Okay. Are there any other questions or comments?

(No response.)

MR. BARKLEY: Based on the schedule, we were supposed to take a break at 2:45. However, we have no more material to cover at this point in time.

So what I was going to recommend is I just make one plug to actually have members of the audience fill out one of the public meeting feedback forms, which you have on the table as you leave, as well as on the two chairs at the end of the hallway here.

And I was going to turn it over to Larry Camper to make some closing remarks and see if the staff had any other comments.

MR. HEATH: One more thing. Could we try the phone line and see if anybody else has a comment before we turn it over --

MR. BARKLEY: If you'll take us off, we'll make one last chance to see if anyone on the conference call wanted to make one other comment.

Again, as I was mentioning, we were going to wrap up this meeting, but I wanted to go to the conference call members and see if they had any last minute questions?

(No response.)

MR. BARKLEY: Okay. Apparently not. Okay. With that let me turn it over to Larry Camper.

MR. CAMPER: Thank you very much.

Let me start my closing remarks by thanking my staff and John for all the hard work they've done today and all the hard work that went into getting us to where we are.

Sandra Rodriguez, who's our lead secretary in the Division, and my secretary, who tries to keep me in the right place and the right time all the time, and it certainly cannot be easy, Sandra. Thank you for coming and helping us.

I thank all of you for being here, I thank all of you for being engaged. I asked at the outset not to be shrinking violets. You certainly have not been that. I appreciate that.

And, Tom -- is Tom still here -- yes, Tom is here. Tom, I'm sorry I didn't understand you the first time, because no one is more eloquent than you are. But I did understand it the second time.

So let me start with process. I made some remarks early this morning when I was hearing what I thought

were commentary that was going back and forth between this notion of a rule and what you do in a rulemaking and what would it take to change Part 61 and what can you do in the BTP. Because obviously we're developing a guidance document and we have to develop a guidance document for the rule that we have.

We can't impose things in the guidance document that aren't consistent with the existing rule in Part 61. My comment was a process question. And what I was trying to say at that time was, a lot of things that I'm hearing lend themselves to a discussion about Part 61, and if not the existing Part 61, then what should it be.

And my point was, is that I think it certainly sends a signal to me that we should afford an opportunity for those kinds of things that we've talked about, you know, the 100-year institutional controls is just one example of many to be talked about in the forum where that would be the primary focus.

However, having said that, as Lisa pointed out, you know, the BTP is important, the BTP is on the table now and it's time for constructive changes in the BTP. And so we readily recognize the role of the BTP, and also, by the way, we do recognize what happens not only with the BTP but a lot of our guidance documents frankly in the various states as they go implementing their regulatory scheme.

It's because, in their defense, we've taken the time, effort and money to put in place guidance. They don't have the time and resources to do that, and so they use what we use, and perhaps sometimes they use it more prescriptively than we had intended. That's not a bad thing. They're trying to conduct a regulatory program with the asset that's available to them. So we understand that, and we understand how important this document is.

Continuing with process, this is very interesting, and I'll have to say what I've said at the forum meeting when we were talking about the fact that the staff put out its impression of language that could go into a proposed rule on the site-specific performance assessment.

And I said at that time, I said, No good deed goes unpunished. You try to put out information ahead of time, the Commission has made it very clear they want a lot of public interaction around Part 61, and so the staff is striving diligently to do that.

But the information that went out has often been conceived as a proposed rule. It's not. It's staff language that we put out to draw comment that would help us to facilitate the language that goes into the rule that we'll submit to the Commission in January.

Well, the same thing is happening here. We discussed this, and I think it's fair to say that my good

friend and dear colleague, Jim Kennedy, expressed to me months ago some concern about the fact that we're going to put this guidance document in August, that we're going to do that before we go to the ACRS for the last time, we're going to have this public meeting out here just before we go meet with the ACRS, and then we're going to go out with this proposed guidance document in January, and this is not going to create a lot of confusion and concern, it might not, we'd hear the very thing that we heard today so eloquently expressed by Tom and then subsequently addressed somewhat by Lisa.

And it is a dilemma. It is a dilemma because on one hand, if you stop and think about it, the staff has two choices based upon what we've heard. The staff could proceed to publish the BTP on the existing schedule, i.e. January. As part of that for example we might put out an FRN that would draw attention to the availability of this transcript.

There are lots of other people out there in the public sector who may want to comment about some of the subject matter as well, in addition to this August group that's very closely associated with it. There's lots of other views out there.

So on one hand we could take the notion or the plan and say, Okay, we've heard these views, we're going to

think about them, we're going to massage it, we're going to incorporate them into our further considerations of this document, we'll make sure that the public is aware of this transcript, they can see what was said here today, and we'll continue to proceed with publishing the document in January. And, yes, it'll be a little more difficult for some of you who have some comments and some close working relationship with this to understand just where is the staff now based on what we've heard today.

The alternative of that though would be to go back, do more work on the document, if we've had a number of ah ha moments that we thought, Wow, we ought to change that, and I will go back and confer with the staff about that. I'll confer with the Office of General Counsel about further delaying.

We do have a schedule. We do have a schedule to get this document out. And if we do the essence of what Tom was suggesting, and then Lisa -- I think Lisa -- I heard two different things there. One I had heard the idea that, yes, we'd like to have what's been said here by this group that works there considered more and just know where we are, but there's also some concerns about let's get this thing done because it's an important document.

So I mean -- and obviously we go back to talk to the staff and say, Okay, look, do we want to go back and

work on this document more, make further changes to it, seek and extension from the EDO and publish document a few months from now. And that is another option. It would delay its publication.

So what I'm going to do is go back and confer with the staff about that, and talk with the Office of General Counsel about that. And if there's a sense that it would be a better place to be that was more effective to do that, then we'll take that under serious consideration.

But, you know, when it comes to process, I mean one can argue we're sort of our of process on both that rulemaking that I cited in here, because we're making a genuine effort to try to get more public involvement. So that's what happens when you do that. So we'll take what we heard under consideration.

You know, kind of other things that I heard is this just kind of building on process. There's this question of the role of the BTP. And in that regard, one of the things we're trying to do, as Maurice pointed out in his slides, is to ensure we're making the document as risk informed and performance based as we can.

But when I was listening to the discussion taking place about alternatives in the alternative section, it did hit me. I wonder, is that section as performance based as it could be? I mean I heard some comments that

were questioning really was this performance based as it might be. So I was struck by that particular point.

Homogeneity. We've talked a great deal about homogeneity. We have hopefully provided an explanation of why it is in there. Certainly the Commission heard concerns about homogeneity when the blending topic was on the table. The Commission heard that, other parties then picked up concerns about homogeneity, the Commission wanted to ensure therefore that the staff did something about homogeneity. But I think we've heard a lot of meaningful input today around that topic that we need to go back and explore a bit further.

The disposal of sealed sources, I think by and large we've heard certainly positive feedback about the steps that have been taken thus far in the document around the disposal of sealed sources. However, there was some concerns expressed even in that arena.

I did get a kick out of the role of SI units versus the Fred Flintstone units. We will, in the final document, have both SI and Fred Flintstone. And for those -- on the record, those are actually US numbers that we use, or US documentation system, not really Fred Flintstone, but we all know what we mean. But we'll have both units in the final. That's actually what we're required to do in our documents, have both.

Scenario choice. A lot of discussion about scenarios and the notion of, Okay, we have this intruder analysis built into our regulatory process the probability of 1, we've talked a lot about that. But then this question of, Okay, do you further compound that rather aggressive assumption, if you would, or conservative assumption, by further assuming that certain things happen that are even more conservative.

A lot of talk about drilling. I think the staff needs to go back and look more carefully at what we heard about drilling scenarios and some of the implications from that.

Okay. I think that that probably -- from my vantage point I was just trying to capture some things that gave me pause from a management philosophical standpoint.

What we need to do now is go back and seriously ponder this question that's been raised, this prospect of making further adjustments to the document before publishing it that would bring it as up-to-date, if you will, as possible, given the things that we've heard in this discussion today.

I do understand that concern and that point, so we'll take a good look at that and we will come to decision about that and we'll make sure that it's communicated, what that decision is.

So with that, I think I'll stop. And, again, thank all of you for all of your comments. As I said at the outset, there's a lot of experience and wisdom in this room and that was evident today, and you gave us an awful lot of useful information, a lot of things to think about. Thank you for that.

And with that, I guess we'll conclude.

(Whereupon, at 3:00 p.m., the meeting was concluded.)