UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

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# PUBLIC WORKSHOP ON DEVELOPING AN SRP FOR DECOMMISSIONING

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USNRC, TWFN BLDG., Auditorium

11545 Rockville Pike

Rockville, MD 20851-2738

Thursday, January 21, 1999

The above-entitled workshop commenced, pursuant to notice, at 8:37 a.m.

P R O C E E D I N G S

[8:37 a.m.]

MR. GREEVES: Good morning. We're starting a little late, but we had a few electronic logistics to deal with. I think that people in the room might notice that we've got a video conference format, and I understand the regions are going to participate as much as they can. So from time to time we'll turn to the video and address some questions. That's Regions 2, 3, 4 for the most part. I had trouble hooking up with 1. So that will be an advantage to us.

Good morning. Let me welcome all of you. I'm John Reeves, Director of Division of Waste Management, and I see a bunch of familiar faces from lots of different venues, and I welcome you to this particular meeting.

This is the second of six public meetings held by the NRC to support our development of the standard review plan for the license termination rule. These are intended to be public forums where the staff and the stakeholders get together and talk about technical issues for the most part. Today's workshop is going to focus on dose modeling activities, and tomorrow's session going to focus on releasing sites under a restricted use provision. I think most of you in the audience are familiar with that process.

This morning the NRC staff and some of our technical assistance contractors will make presentations on some of the key issues that we've been working on, pretty much focusing on dose modeling activities, parameter selection, resuspension factor which has been a difficult one that many of you have helped us with, implementing the so-called screening table. We put this out some time ago. It's the update of the use of the Reg. Guide 186-type approach, and subsurface contamination.

We're finding that we get a lot of useful information from you, various stakeholders in the process. We needed some actual measurements at license facilities such as the resuspension factor data, and BWX Technologies was able to provide that. So that has helped us quite a bit. You're going to hear a lot about that.

As far as dose modeling, I've been able to sit in a little bit on the sessions, talked to my own staff, talked to some of you, and just wanted to go over a couple of things. It's clear the Nuclear Regulatory Commission is encouraging the use of probabilistic methods. We do that in reactor reviews, we do it in haulable waste program, and we've been looking at it for years in the low level waste program.

It is a useful technique to help you make risk informed decisions. But there are places where it's not needed. You've got a simple case, you don't have to go to a probabilistic approach. So I just wanted to make sure there was some balance on this. I know some people have commented on it and don't take us to be saying everybody's got to go this way because obviously for simple cases, you don't. Where you have information, you can use that technique. It really can help you make some decisions.

Going to a dose standard, which we did in 1997, does offer challenges. It's not as simple as a pipe per curie per whatever approach, but it does give some flexibility in demonstrating compliance. So it's a tool that needs to be used effectively depending on what your case is.

Management and staff appreciate the public input through this process. These interactions have been valuable. And what we intend to try and capture these approaches in the standard review plan. Let's see. This afternoon, NEI and EPRI will be providing a discussion of their evaluation of the draft guidance document that we have out there addressing the dose modeling issues to pertinent activities, specifically applied to nuclear power plants. And I'm real pleased to see that you all have formed a group to address these issues.

Dave Fauver went out and met with a group -- what was that, a month or two ago, and I find these interactions are very useful. I got good feedback from Dave, and I got good feedback from your group. So I continue to encourage that type of interaction. We can't do it all ourselves, and we're much more efficient if we get input from you, the stakeholders.

On Friday, there'll be presentations by licensees on their experience with license

termination under restricted use conditions. I can just recognize people in the audience, and you have some of those sites that look like they're candidates for restricted use. I'm pleased to see you here, and we need some real world cases to look at in terms of capturing how that approach would be addressed in our standard review plan.

The first workshop was first part of December, and we considered it quite successful. Those of you who I've talked to, I get similar feedback. And a lot of that is due to presentations by you, not just staff. So I encourage you to continue that process. As far as we expect this particular workshop to be -- fall in that same suit, and we welcome comments. I know it's a little hard to warm up early. Last time I spoke, I got no questions. But I know these groups tend to warm up as the day and days go on.

We have the website up. It's established. There will be comments provided by individuals on that website. We're going to post concerns that people have so everybody can read those and comment on those. And I think many of you have already visited the website, and you recognize it does contain the four modules we've been focusing on for the most part being dose modeling, final surveys, ALARA and restricted use. And we find this to be a very successful format, and I encourage all of you to visit the website.

We do post agendas -- draft agendas for this and other meetings to make it available to people so you can plan. I know two weeks isn't enough notice. You need about 30 days to be able to get your travel in to attend these kinds of meetings.

We also plan to post the standard review plan on the web so that we can get feedback, real time issues. In the past, we've made a mistake of looking at these review plans ourselves and showing them to everybody when they're further along, and it just doesn't work that way. So I'm encouraging the staff, and they're shaking their heads right. We're going to get them up on the web so that we can get your feedback even while they're being generated.

So at this point, I think what I did last time was I encouraged people who are presenters please come up to the table. It looks a little naked now. So who's making

presentations later? Let's see if we can invite them up to the front table.

MR. FAUVER: Theresa and her folks.

MR. GREEVES: Theresa, come on.

MR. FAUVER: The folks from NEI.

MR. GREEVES: I can take on Theresa.

MR. FAUVER: The NEI Task Force folks are making presentations. Paul could come up -- Paula Genoa from NEI.

MR. GREEVES: He's fooling around -- that's it, Paul. Bring your crew. That's good. And how about agreement states. We've got somebody from the agreement states here? Come on, don't be bashful. I know we've got one here. Please join us because this process -- the agreement states are going to inherit a lot of these issues. I know a number of you in the room not only is NRC your regulator, but the agreement states are also. So they need to play an active role because they're going to inherit a large number of these issues.

So I'm open to question at this point. Last time I didn't get any because people just don't warm up this early. But I'm going to be back at 4:30 this afternoon, and then Dave's got a little bit of an informal discussion he's planned at that point. But I'd be happy to answer questions now, and don't see any. You do -- do you have a question for me, Nick?

MR. ORLANDO: No, I just have a statement. This is Nick Orlando. Anybody who does come up and make a statement over either of the two days, please for the transcriptionist speak into a microphone and identify yourself so that we can get that on record, if you would, please. And any of the presenters, please don't stand between me and the television set because I'm controlling it from over here today. Today I'm the roadie. And if you get in the way, it blocks the beam, and that goofs up what we're trying to tie into the regions.

MR. GREEVES: You'll be rated on that, so --

MR. ORLANDO: Yeah. I can't program a VCR.

MR. GREEVES: All right, not seeing any questions, like I said, I'll be back this

afternoon. Dave, you want to finish off the introductions?

MR. FAUVER: Yeah, just a couple of brief comments. John mentioned that you've got the NEI Task Force here folks on reactors. The first workshop we had was mostly focused on material issues. This workshop will be somewhat more directed towards reactor issues. Many of those issues are different because of the different isotope mix and matrix that they're dealing with, but there are some overlaps. So this will be interesting, and I see a good mix of both. So that should work fine.

I also want to announce that on the table we have a list of a number of the issues and questions that came up in the last workshop. We're trying to address those comments and questions. When we get them addressed, we'll post them on the Q&A section of the website as a sort of a draft response to the questions. But we're trying to be responsive to that so that we can keep the momentum going on on this process and encourage people to participate.

Unfortunately, we didn't complete the e-mail link to the website that we talked about at the last workshop. We're still working on that. We ran into some glitches. Hopefully in another two or three weeks perhaps, we can get that link completed. We do have an e-mail. On the sign up sheet, you can put your e-mail down again. I encourage you to do that so that we can add you if we don't already have you on our list for the e-mail link. And if you don't recall, what we're trying to do is sort of like the RADS safe list serve where when people make an entry onto the website, it will immediately be sent to those folks on the list so you'll see what's going on more of a real time instead of having to chase down the website just to see what's been posted.

With that, I think we'll just start the presentations. The first presenter is Theresa Brown. What we've sort of within NRC concluded over the last month or so or two months as we've interacted on this is that there still seems to be some confusion about what we mean by the probabilistic approach and how that interplays in the regulatory process. So we're going to

have Theresa provide an overview of this sort of one more time. I think she's going to try a different tact, and hopefully this will help folks to get grounded on this issue.

MS. BROWN: I think I'll raise the mobile line on this.

MR. FAUVER: Okay. It's on.

MS. BROWN: How's that? To the middle? Okay. Better? I've heard that the hand outs for the presentation aren't terribly clear. So if you have problems looking at it or you would like a more clear version of the presentation, if you e-mail me, I will send you an electronic copy or I'll send you a hard copy, whichever you prefer.

And then I noticed I didn't put my e-mail address on the overhead slide. But I have cards this time. I think those of you that have talked to me in the past, I still hadn't had my cards yet. So I will hand you my card. Just come and find me. It's a good excuse to come and talk to me. The -- oh, I'm sorry.

What I'd like to do is give you a little bit of background on the parameter analysis for DandD. I'm sorry, I'm getting a lot of feedback here -- and to give you the background on the parameter analysis, I'd just like briefly to go through the decision framework and what that represents.

Some comments that have come up in the past in these workshops. We need to emphasize that DandD is a screening tool that's been developed by the NRC. And as such, it implements the very simple models that are in Volume 1 of 5512 -- NUREG CR 5512.

The intent of the software itself is to provide this user friendly interface and generate reports automatically for implementing these models. But obviously you're not required to use the software or the models per se. It's just a screening tool.

The parameter analysis was designed effectively to allow NRC to make license termination decisions given very little information. The concept there was that there are some licensees that have very simple problems where all you'd really need to know is a source term, and you'd be able to make a decision based on default set of parameter analysis and these

prescribed models.

It is designed also to be used within this optimized process that NRC has developed for making these decisions. And the concept here is not only that we're doing dose modeling so that you'll have equitable risk applied to each site as opposed to a strict concentration criteria, but also that the process that they would follow would be iterative, and they'd only have to supply as much information as is necessary to make the decision. And the idea was to help develop tools, then, that would guide the licensees through this process, and it would be a consistent process for everyone.

If we look at that in terms of the DandD decision framework and you looked at where the DandD software or DandD software fits into this decision framework, the pink box is the first set of series of steps and within the screening process -- the generic screening process, NRC has predefined the parameter values, the models, the scenarios. And so that there's nothing else to do there but define the source term, what the activity concentration is.

DandD can be applied outside of that very limited field -- the generic screening field. You can change the parameter values to represent site specific conditions, and you can make different assumptions about pathways so you can somewhat alter the scenarios -- the exposure scenarios.

And the concept of screening in an optimized decision process means that NRC had to take care in how they defined this default parameter set. And the criteria that we had was that given that you don't know anything to begin this process for generic screening, all you know is source term, then these parameter values need to represent the possible range and site conditions. And if you go out and collect additional information, that it would be very likely to decrease dissimulated dose.

Again, this assumes that you're using the same models. And so you'd also want your models, then, to do the same thing for you. That given increasing information or increasing complexity in your modeling, you'd want the dose to go down because otherwise there's no

value in going out and collecting information or changing your models.

And within the parameter analysis, then the uncertainties are quantified and evaluated. And this is where we get into the probabilistic approach. And although in DandD, the software and in the default parameter site you have a single set of parameters, it is a deterministic means of evaluating the dose. But this is based on a probabilistic analysis of the uncertainty in the parameter values.

And if we look at this graphically, how we handle uncertainty, if we have uncertainty about what the future events are going to be, how people are going to be exposed, we tend to handle that by using different scenarios -- multiple scenarios.

In this case, the NRC has prescribed the scenarios that you can use so you don't have to look at uncertainty in future events. And the other uncertainty that you might have is uncertainty about how the physical system behaves. You may have mutually exclusive possibilities in terms of behavior of the physical system. And so you'd use different models, conceptual models of that system and evaluate those to evaluate model uncertainty. In this case, again, NRC has prescribed a set of models that can be used for screening so you have a single scenario, a single conceptual model.

And then that leaves you with then parameter uncertainty -- the rates, the magnitude, the range of possible values of parameter values that would be representative of that site given the models that you're using. And that's what we've evaluated to come up with the single set -- one set of parameter values.

Again, the concept that we have here is that you're starting here. You don't really know what the dose will be. You have a source term, but you're not sure what the dose will be. And you want to optimize this process of gathering enough information to reach a decision. You don't have to quantify all the uncertainty. You don't have to completely characterize the system.

But what you want to do is get somewhere in this state of knowledge to where

you can make a decision. You can come to a decision. So that's why when we start the DandD parameter analysis, we start with our uncertainty and all of the parameter values for the models that are set down. We represent the possible range -- the reasonable range in parameter values for the model with PDFs -- probability density function of that particular parameter value for each parameter.

In the simplest case, we're talking about the building occupancy, and we've represented the behavioral parameters and the physical parameters. I believe there's nine -- the ones that are sensitive, identified as sensitive. So there are nine parameters with probability distribution functions in the building occupancy parameter analysis.

If we're starting to talk about the residential scenario, excuse me, then we're starting to get into over 90 different parameter values. And if you actually count all of the permutations for separate elements and separate plant types, we have over 200 that are treated with probability density functions.

And all of this is documented or will be documented in Volume 3 of 5512. And I believe the first draft of that is on the website, and that is just strictly talking about, then, the defense for the different parameter distributions and why they represent uncertainty.

Given this uncertainty in model input parameter values, they're fed into the model. You run in Monte Carlo fashion, and you get a distribution of output. The decision about the default parameter set is made based on a confidence interval which set of realizations are above some confidence level on the output distribution.

So that the default parameter set is based on the distribution of output and the probability of having a higher or lower dose estimate given site-specific information. It's not based on a confidence interval for each individual parameter.

I think there's been some confusion about that in the past. So that's why I emphasize that. Again, just a reminder that there are two scenarios, and the pathways associated with those scenarios that are prescribed in DandD for which the default analysis was

done. The residential scenario and the building occupancy scenario.

For each of those scenarios, then, there are physical parameters, behavioral parameters and metabolic parameters, and they're treated differently within the parameter analysis. The physical parameters are representing the uncertainty we have in what the site-specific parameter will be. Should you take it to a certain specific site. Giving no information about where this actual site will be, you have to treat this as the uncertainty in values across the United States.

And to represent that uncertainty, our PDFs really represent the variability in measured values for the United States so that there will be realistic in the sense that they're bound by that uncertainty.

The behavioral parameters actually represent the variability in the individuals within the screening group, the critical group that's defined for screening. And even though we've described the uncertainty with PDFs and the variability of those individuals, then the mean value is selected as the average member of that particular critical group or screening group. And so that single values are used for those parameters as well as metabolic parameters.

That leaves us with only one parameter and the building occupancy that's treated probabilistically in the parameter analysis which is from 94, I believe, that are treated probabilistially for the residential farmer analysis.

Now we had some goals in defining the default parameters, and there's been some confusion about what exactly -- how exactly those goals are implemented. First of all, we wanted to define an upper bound on the probability of the site-specific dose exceeding the screening dose. That is, you want to limit the regulatory risk in setting a single set of default parameters to represent all possible sites.

Then we also wanted to quantify the magnitude of potential errors. All right, if you go to a site-specific case, use the screening default values and you have an error, that is, you've under estimated the dose with the screening value, what's the magnitude of that potential

error? Is it, you know, an order of magnitude greater than the regulatory criteria. You want to limit that. You don't want to have the magnitude of the potential error to be very high. And how you do that is to have a fairly narrowly defined screening group. How you define your exposure analysis.

Also, you wanted to minimize the use of extreme values in the default parameter set as much as possible. That is, you don't want to have a set where you're going to consistently be over estimating the site-specific dose by many orders of magnitude.

And then you want to define a single set of parameter values to be used in a deterministic fashion that represents all sites, all isotopes. And then you would need to do that for each scenario, and that's two scenarios that we're analyzing.

If we look at the process of then defining a single set of default parameter values, we did Monte Carlo analysis for each isotope. And you get a dose distribution for each isotope given the uncertainty of the physical parameter values.

Taking those realizations of dose for each isotope, you identify those sets of parameters from the Monte Carlo analysis that meet your criteria that you set your critical probability of for under estimating or over estimating dose. You want to define that probability.

Then taking those individual sets of parameter values for each isotope that meets that criteria, you evaluate using in genetic algorithm which ones meet that criteria for all isotopes. That gives you a combination of set parameters that are possible candidates for the default parameters set.

Then what you do is take and take two measures -- the joint excedence probability and the average aversion probability and evaluate these. And what you want to do is maximize those probabilities. And what you're doing in that process and in the description of that process is minimizing the use of extreme values.

So you -- the very critical first step is to take only those sets of parameters that meet your standard criteria probability criteria for exceeding the probability of under estimating

dose. You want to minimize that probability. And then you want to maximize the probability of not having extreme values.

One other thing about the process is that these two steps taking all of these possible sets of parameters and narrowing it down to a single set of default parameters because you're including all isotopes add an inherent conservatism to this analysis.

So that for some isotopes, if you just had one, you may have something that comes out of the very high end of the tails. You're going to have a very low probability of under estimating dose, and maybe you're going to be, in that case, using more extreme values than you really need to for screening.

If you use a Monte Carlo approach, you can put in just your source term and the uncertainty in your parameter values, and you don't have this inherent conservatism that's built into the default parameter set because you're not having to account for all isotopes -- just the isotopes of concern.

And I wanted to talk a little bit about moving to what we're doing right now is getting ready to develop a Monte Carlo version of DandD so that you could eliminate that inherent conservatism so that you could put in your source term, and you would have a consistent, then, decision point for all source terms based on risk rather than having, again, an inconsistent criteria in that sense.

If you pass screening, it really doesn't matter. But the Monte Carlo approach, if you don't pass this initial screening with a default parameter set, it gives you a little bit more information for deciding what your possibilities for site characterization, what your sensitivities are in terms of parameter values and combinations of parameter values.

You can still get that sort of information from using a deterministic model, but it's less obvious. It takes a lot more work, actually, to do that in a deterministic fashion, and it will have a similar interface to the deterministic release 1.0 that's out there.

And a couple of things that I wanted to point out in terms of moving from this

generic screening to site-specific analyses. This important of understanding the difference between uncertainty and variability. Uncertainty is a measure of our lack of knowledge, and that's what we've tried to incorporate in the default parameter analysis and in representing the probability of distribution functions for each of these parameter values for the 5512 Volume 1 models.

As you move to site-specific analyses, you'll go out and you'll collect measurements of parameter values that you deem -- give you a high probability of reducing dissimulated dose. Presumably, you'll do this. And you'll have variability, then, in those data points. That's different than uncertainty.

That variability needs to be used in deciding what's an effective representation of this system and with a single model parameter value or a heterogeneous model parameter value.

And so it's different than this uncertainty that we've used in this parameter value in the default parameter analysis. I know it's a little subtle. But we always get bogged down in this argument of whether or not it's variability or uncertainty and how you represent it in the modeling. So I think it's a good talking point for all of us.

And as you move to the site-specific analyses, then hopefully the information that's in the draft of Volume 3 will provide you information for which parameters are likely to be the ones that your site is sensitive to, given the pathways that you're analyzing.

What we'd really like is feedback on whether or not Volume 3 does that -- provide you the information you need, and whether or not those uncertainties are represented accurately. That was it.

MR. FAUVER: Questions for Theresa? Paul?

MR. GENOA: Theresa, thank you.

MR. FAUVER: Identify yourself, please.

MR. GENOA: Yes. Paula Genoa, the Nuclear Energy Institute. If I could ask

you to go back to slide six, I believe it is, where your graphic presentation of the distributions.

MS. BROWN: Okay, they're not numbered. I'm sorry, but I will.

MR. GENOA: I know. I just counted them. It's a pretty picture.

MS. BROWN: Is it this one?

MR. GENOA: Yeah. And my question is really on your output distribution. One of the issues raised by our task force is really when you're using a distribution result, how you determine compliance. And I know we addressed this in the performance assessment for low level waste disposal sites characterization and so forth.

I see that you have a line drawn somewhere out on the tail as opposed to the mean/medium, et cetera. Could you describe a little bit your thoughts on that and how you would deal with different distributions in determining compliance.

MS. BROWN: Well, that would be a policy decision for NRC ultimately.

MR. FAUVER: Let me take a shot at that to start the conversation. We put up a paper to the Commission a month or so ago, Boby. Do you know the --

MR. EID: SECY 242.

MR. FAUVER: Ninety-eight two forty-two in which we provided the Commission sort of an advance notice of our building surface contamination screening values that we then subsequently put out in the Federal Register notice. In that paper, you'll find some discussion of our thoughts on use of the various output points on uncertainty distributions. I think that would be a good start for you. In general, if you look at the low level waste BTP, there's also a position that has been through management review, and it basically points towards the mean for a site-specific analysis where there's a thorough analysis is of all parameters, et cetera with a control on, of course, the upper bound of the distribution at some point.

But I think you'll find some good information at that point. But in general, I think that's the direction towards the mean for site-specific analysis with an upper bound on the distribution tails. What Theresa's been talking about is screening. And for screening, there is

some justification although there's also, you'll find in the papers, some debate about pros and cons of that. But there's some justification for using another value.

In the end, I think that justification will rest on the relative ease of moving away from that if it becomes very difficult resource intensive. And we might have to relook it and make some sort of decisions upfront. But if it's fairly easy to move into site specific and start using some of these other parameters, the mean or whatever the case may be, then we might be okay starting with a conservative value on screening and then moving readily away from that.

MR. GENOA: Thank you.

MS. HORNIBROOK: Carol Hornibrook, EPRI. I guess I'm not even sure if it's a question or it's a statement. But the input parameter -- it would seem to me that you would need a fair amount of data to model the initial -- I don't know if it's -- it's me, it's not you. So I was wondering is that impression, or do you have some idea how much data you would need on the input.

MS. BROWN: To alter the default values or the --

MS. HORNIBROOK: Even, yeah, just to get some kind of realistic output distribution.

MS. BROWN: I think realistic, yes. You may not need any -- I mean, realistic is, gosh, that's such a vague concept. I think that the --

MS. HORNIBROOK: Whatever you want to use.

MS. BROWN: I mean, from a modeling standpoint, we're not going to be realistic in so many ways, and I know that's a really volatile statement. But we can't model reality because we just don't have the computing capacity or the time or the resources to actually characterize everything perfectly.

And, again, I think the concept that we need to stick with is that we bound this based on what we know. We have reasonable bounds or realistic bounds on what the distribution is and how we've represented the probability of selecting a particular parameter

value.

In some cases, you can do that with very little information. The distribution itself becomes less and less complex with less information. There is also less indication of how much likelihood there is if you go out and collect site specific information that that will actually help you in terms of reducing your simulated dose from this screening value.

So it really depends.

MS. HORNIBROOK: Yeah.

MS. BROWN: On the probability. I have a feeling that, based on some of the sensitivity analyses that we've done just as kind of a preview, that there'll be very little value if you stick with these very simple models in going out and collecting single parameter values. You're going to have to go out and collect sets of parameter values -- multiple parameter values.

Or better yet, you're going to have to characterize the source a little bit better if you've made a conservative estimate of what the source actually is -- the concentration is. Really, that's where the value's going to be in. That's where we've always had it anyway.

MS. HORNIBROOK: Great. Thanks.

MR. FAUVER: Thanks, Theresa. The next speaker is Steve McGuire. He's with the Office of Research here at NRC. Steve's going to provide a follow up from our lengthy discussion at the last workshop about the resuspension factor for the DandD Building Occupancy Code assessments.

He's done an analysis of the data that was provided by Dave Spangler of B&W as well as some additional data sets that we've been looking at that are addition to what you'll find on the website that we used for the original resuspension factor determination.

MR. MCGUIRE: Thank you, Dave. Yeah, I'm going to talk on the resuspension factor today. That's a follow up of the presentation that I made last month. This is still a work in progress. It's a draft. It's not final, and it's subject to revision and being improved. So don't take it as the last word.

And just if you weren't at the last workshop or if you were but don't remember every word I said, if you remember that the resuspension factor for the building occupancy scenario is really the most important parameter, particularly for, well, of course, if not direct materials like Cobalt-60, but for Alpha emitters, inhalation is the dominant pathway and the resuspension factor is the one that's most subject to variation and uncertainty.

The dose conversion factor, another factor, we have a value for that. The breathing rates, there's not much uncertainty, and people breathe at a certain rate. But the resuspension factor is the one where we have the most -- it's most unknown and most subject to possible change.

Now what I did in an attempt to reanalyze the resuspension factor was to try to locate more references and data, then to do a separate analysis for the resuspension factor based on removable activity and for total activity. So looking at each one separately as a separate data set.

And then I tried to look at the representativeness of each of the data points relative to the building occupancy scenario to see which data set was most appropriate for that scenario. And in looking at the appropriateness of the scenario, really there are three factors. The first is how the particles are bound to the surfaces on which they reside. They can be bound fairly loosely such as the extreme case would be the deposition -- a dry deposition of a powder that was just freshly deposited on a surface.

And the opposite extreme would be things that are highly fixed to a surface where they've been ground into a surface. Perhaps there would be some adhesion, and they may have been -- the surfaces may have been washed afterwards so that anything that was loose was easily removable right on the top may have been removed.

Now the next slide is the most important slide. Basically, it is the results if I can get it up there. What we have here is two separate curves. This one on the right is based on removable activity. So what that means is that the airborne concentration was compared to the

removable activity. The removable activity in this case established by a smear sample.

And the curve on the left is based on total activity. Now there are -- the references, if you look at the hand out, these references that are listed there are identified in some details of the - or just a brief summary of the articles given. That's kind of on the back of the hand outs that you've got. Okay.

So these are the type numbers that we get. And what has been plotted is a cumulative probability distribution where this represents in each set, number one is the lowest data point up to the highest. And then the distribution we could have also primed this as a bar graph if you wanted to, but I have just drawn a line. Zero percent would be here, 100 percent here up at the far end.

And then you can select any point on that curve that you think is appropriate. For example, if you wanted the 90th percentile, you could take the 90th percentile. So is this -- do you have a general idea of what I'm doing there because if you don't understand this curve, you don't understand the rest of the talk.

MR. FAUVER: I don't.

So you don't understand the curve? Okay.

MR. FAUVER: Pick one example and work it through.

MR. MCGUIRE: Okay. The one that I can reach, Merrill Eisenbud reported -- not reported, a resuspension factor. But what he did was he compared airborne concentrations to total contamination levels that were present at a facility.

When we divide the airborne levels by the surface contamination levels, we get in this case, this is .3 times 10 to the minus 6, okay. Now of all the data points that I had that we're comparing airborne concentrations to total activity on a surface, this was the lowest. So we plot that as the first data point in coming up with a cumulative distribution.

So what I could say is that since there were six data points here, that that represents one-sixth of the whole distribution. Joe?

MR. NARDI: Joe Nardi, Westinghouse. Steve, what you're doing there, then, is basically giving equal probability to every one of those -- or equal weight to every one of those data points.

MR. MCGUIRE: That's correct.

MR. NARDI: And we would have to understand the applicability of each one of those data points to do that. Have you said you're taking out, then, those data points that represent extreme situations where they deliberately tried to get it into the air, or something like that?

MR. MCGUIRE: Yes. I -- this only includes data that I thought was close enough for the scenario to be applicable. If you look -- if I looked at a reference and I decided that a certain measurement just simply wasn't applicable, I didn't include it.

So in essence, the weighting is either one or zero. Each of these is weighted equally if it's used at all. If I decided it was just too unrepresentative, then I didn't use it. Within this, if you -- you could as a next step try to say certain measurements are more representative for a certain type of facility or certain measurements are better quality, and you could give them more weight.

I did not do that in this particular set of data. It gets -- it starts to get very difficult to try to give that type of weight.

MR. EID: I would like just to make my comment. My name is Boby Eid with NRC. Are you supposed -- what Steve is doing is over simplified, and there are certain data that are considered as one data point. For example, the choosing his data 998, it was considered a single data point although we have over 5,000 data points there that I believe is credible and could be -- should be given higher weight.

While this is a starting point, it is over simplification is to see whether there is a need to modify the resuspension factor or not.

MR. MCGUIRE: Yes. I think the next step might be you could go and say, all

right, I have -- in looking at the data, I feel that certain data is of a much higher quality, is much more representative, and I might give that data much better weight. That's a possible next step.

It's not easy to do because there's a lot of subjective feeling there. But it is a possibility, and we can look at that.

MR. EID: There's question, Morton.

MR. MORTON: Is it not also possible that what we're seeing on the graph is particularly over on the removal activity that more easily removable activity are the data points that are higher on the resuspension factor. For instance, Bernie Fisch's data from 67 was from data in which you had material that was injected in the air and then deposited in a relatively small chamber, that is, most ceiling height easily resuspended.

Al Breslin's data from earlier years, is it not at last prospectively possible that those were data taken at a time when prominently higher removable contamination levels were acceptable in operating facilities and, thus, represent more easily removable activity as contrasted with the more modern cleaner facility represented by the Chesney data in 1998.

MR. MCGUIRE: Basically what you're saying is perhaps there is some bias -- sort of a systematic bias in the data because of the way it was selected.

MR. MORTON: Yes, and --

MR. MCGUIRE: What measurements were made.

MR. MORTON: And that the basically the condition at the time of the pushed clean up or at the time of release for decommissioning would be a cleaner circumstance more nearly related to the Chesney data that might be related to Ray Fisch's data and Al Breslin's data so the --

MR. MCGUIRE: Okay, so what you're saying is perhaps the Chesney data is more close to a correct situation.

MR. MORTON: That's my suggestion, yes. So I'm questioning the applicability of some of the data that -- particularly Fisch's data and Breslin's data. I don't know the Eisenbud

data.

MR. MCGUIRE: Yes, you're absolutely right. There is -- okay, I'm just going to talk about what's on the total curve here, or actually in both of these. In no case was any of these facilities cleaned up. So all of them have more surface or loosely bound contamination than would be present at a decommissioned facility. And this does in particular for -- well, both curves. But this one is really looking at the total.

Yes, that will skew this curve to larger values because the stuff that's more deeply embedded -- okay, the stuff that I guess is loose -- that's been freshly deposited is over represented compared to a decommissioned facility. In addition to which in the case of -- in this one, we have six data points. In the case of the three Breslin and the fourth Eisenbud, there was some contribution from ongoing operations. So that would also tend to move the curve to a larger value.

So there are biases in this data, but unfortunately we don't know the size of those biases, and we don't know -- it's difficult to correct for it. But now the Chesney data, I have in parenthesis because we really at this point don't have quite enough information on it to say exactly what it represents and if it's the correct value. And so that's another problem with that one.

And so I'm putting it in its sort of -- again, this is a work in progress, and we're looking at that. So we'll what in the end whether -- how that comes out.

MR. MURRAY: Scott Murray from GE. I also observed from the Breslin data -- I'm not familiar with that data at all, but it looks like there's a factor of four so spread between, I think, the three areas that they collected information for on total in a factor of five spread for the removable graph, I think, for the same three areas.

Intuitively, at least in our facility, the pressure would have much more available activity to be resuspended. Yet, that produces the lowest number as compared to the rod polar or the rod straightener error. I don't know what facility this was, but, again, it was 30 year old

information.

So I don't know how you can explain perhaps or try to explain why the three spreads, I guess, on the Breslin information there.

MR. MCGUIRE: I don't have an answer to the reason for the spread, but I'd be happy to mail you a copy of the article, and perhaps you can shed some light on it.

MS. BROWN: Steve, Theresa Brown from SANDIA.

MR. MCGUIRE: Yes.

MS. BROWN: One thing that you might look at is actually the distribution of particle sizes more than concentrations of the amount of material. It's really how you get these things in the atmosphere -- the ones that get into atmosphere, obviously the ones that are the smallest particles. And so it's probably related to the process and the size of the particles more than the concentration.

MR. MCGUIRE: It could well be. Okay. Well, let's move on. Now I wanted to mention that there was one data point that I did not use. It was from Fisch, and it was used in DandD to establish its default probability density distribution. And I didn't include it because I thought that the data that was included was much more appropriate for the building occupancy scenario.

The Fisch data that was not used was a case where the driving force was not representative of the building occupancy scenario. What it involved was sweeping freshly deposited powder, and this is something which will give sort of an anomalously high value, but it's not a sustainable long term activity. So it didn't representative.

Also, it was a closed room with no ventilation which would be not representative of the scenario either. So that particular data point was not included in the previous graph.

So what -- when you look at these graphs, what type values do you get. And if you looked at the 90th percentile on these curves and compared them to DandD, they're somewhat lower -- not drastically lower, perhaps not quite a factor of three when you look at

removable and perhaps a factor of eight or nine when you look at basing it on total activity.

The total activity is what goes actually into the code that you plug in. So -- but now looking at this question of total versus removable, how do we define this term removable activity. And really people have used often don't tell what they're talking about.

But when you look at it most -- the most useful definition, I think, to our case and the way we've tended to use it is the removable is basically whatever comes up on a dry wipe or a smear, and that's what we're using in this presentation whereas the fixed activity is defined as an activity which is left on the surface after the smear.

So what are the reasons that one would look at -- try to calculate a resuspension factor based on removable? You're basically relying on two assumptions, and that is that the activity fraction is removed by a smear is the same fraction of the activity that would become airborne from activity such as walking, and that those same activities that would resuspend particles really will not resuspend any of the fixed activity.

So we're just saying that it is the view of using the removable activity is the basis is saying that some of the material is fixed just simply is not susceptible to resuspension from these activities, and it's the loose stuff that is.

Now there's a problem with these assumptions. And then -- and really start off with, you really can't find any measurements or I couldn't find any that really supported them. A second is that while both of these are abrasion type activities in the case of smear, we're putting a few ounces on a surface whereas when we walk on a surface or drag a piece of furniture or some equipment, something like that, we're putting much greater forces. And you know, I put down 100 pounds on a shoe, and what we may see is an abrasion or a gouging which is acting much deeper on the surface which could be removing fixed activities as much as the removable activity.

Furthermore, at a decommissioned facility, almost all the activity will be fixed after surfaces are washed, and it doesn't seem very prudent to ignore the resuspension from this

fixed activity. Another reason is this assumption of 10 percent total activity removable is sort of a bounding case, and it's sort of more consistent with the old philosophy of regulatory of having the bounding case and not as consistent with what we're trying to do now and come up with the probabilistic approach with really trying to produce our best estimate of a realistic dose distribution.

So my -- well, conclusion is that we really should base the resuspension factor on the total activity, and for the reasons that almost all activity will be fixed at a decommissioned facility, that this is the activity that is likely to be subject to abrasion forces, and that is giving us our resuspended particles.

And, therefore, the two curves I showed you, I would recommend the one that was based on the fixed activity. But further reasons, the total activity is more reliably measured in the removable. The MARSSIM in looking at the site may reach the conclusion that they would be better off basing things on total activity. And so the MARSSIM method in fact does not include measurements for smears.

And at a decommissioned facility, the removable fraction will often be so small that the smears might not provide a reliable measure of activity. So there are measurement problems as well with that.

So if you look at the numbers that you would get for building surfaces, these are the type of numbers that you would get using for U-238 and Thorium-232 Alpha emitters as an example. This compares the regulatory guide 1.86 numbers with the DandD current default resuspension factor. Those are the numbers you get. And if you use the 90th percentile on the total, these are the type numbers that you would get.

MR. FAUVER: I have a question on that.

MR. MCGUIRE: Yes.

MR FAUVER: Dave Fauver. When you look at your total curve, on the surface this doesn't seem like a necessarily bad idea to make some correlations and some assumptions

and this kind of thing. But the first thing that pops in my mind is the relative fraction of removable in the total measurements that you used in your curve. And that would likely be a conservative aspect of it, and I would assume -- my first guess would be that there's maybe a significant fraction of removable activity in those total measurements.

But the question is do we have any idea from the data what that fraction is in the total curve that you put up there what fraction of that is removable?

MR. MCGUIRE: Yes. In some cases, some of the data was -- some authors presented data as both removable and from smears and total. And what you would see in those cases, for example, Breslin provided both. So his data points show up on both curves.

Some didn't provide both sets of data, and they just provided smear or total. So in that case, the data point would only show up on one of the curves.

MR. FAUVER: The other thing that would be interesting to know is where there's a crossover on these two curves. If you're at one percent removable, then do you get a lower resuspension factor using sort of these removable numbers, for example, than the total numbers. And what is that relationship? Is there a way on a site-specific analysis to do some kind of cost benefit on remediation of removable or evaluation of removable, and to see where that gets you as compared to simply making the measurements of total, and I think that would be an important consideration.

In fact, what this is leading to, it seems, is perhaps consideration of both in a way with some kind of assumptions built in to allow optimal flexibility.

MR. MCGUIRE: You could do that

MR. FAUVER: In this factor.

MR. MCGUIRE: The spare results are also a measure of whether you really did wash your surface very well. If you have a high removable, you didn't do a very good job of washing.

MR. FAUVER: And that always begs the sort of regulatory question of if you

have 90 percent removable and you sort of have an analysis that says your total measurements in your data sets are 40 percent removable, then that question sort of pops up. But that's something that I think can be handled in its sort of a generic sense in terms of deciding what the resuspension factor is and might not have to get into specific information every time on that.

MR. MCGUIRE: It's a difficult parameter to measure. You really can't measure it on a decommissioned facility after the decommissioning has been done because the concentrations airborne are going to be so low that they just can't be measured.

You're going to end up -- these will give you very, very low potential airborne levels, and any contribution from this natural radon is just going to confound your results and make it impossible to do.

MR. FAUVER: I wasn't suggesting making air measurements.

MS. BROWN: Theresa Brown at SANDIA National Laboratories. I had a question about -- or actually I wanted to clarify how the default parameter analysis was done and the use of the 10 percent removable.

What we did is we had data for removable. So if you looked at your curves of the additional data that you collected, you can see that when you look at just the removable, you get higher resuspension factors than if you do the total.

And since, as you pointed out, you're using total concentration, the 10 percent removable was used to reduce the resuspension factor from the removable to one that would be more representative of total.

So the 10 percent you said is not realistic, should it be higher, should it be lower -- that would be another way to evaluate that data to look at that shift from removable versus total

And essentially what you're seeing is that order of magnitude shift between your two curves. So I would say it is actually realistic, and that it was just a different way to get at a resuspension factor for total. Maybe we should talk about that.

MR. MCGUIRE: All right, that's what I'd like to add on that is that's what I was saying about the benefit if you're at one percent. If you looked at that curve, it was about an order of magnitude. And if you were actually at the one percent value, then you might get two orders of magnitude. So we have to carefully look at those to see where the real benefit is. It's not quite as simple as you see up on that graph, I think. Scott?

MR. MURRAY: Yeah, I'm Scott Murray with GE again. Steve, could you put your last slide up there again, please. The one that showed the comparison. If I understand that slide correctly, help me -- the reanalyze, resuspension factor there of 800 -- I guess that's 800 dpi per 100 square centimeters, and that happens to be based on the 90th percentile or what you're calling the 90th percentile calculated indoor resuspension factor of 1.8 minus 6.

MR. MCGUIRE: Yes.

MR. MURRAY: And that also, I believe, from the graph corresponds to the highest value on the graph which was the highest of the three value of the Breslin data.

MR. MCGUIRE: Yes, that's correct.

MR. MURRAY: So we have six data points, and we're saying that because we only had six data points, the most conservative or the highest based on total which happens to be the Breslin data that I'm not sure I understand, but the Breslin point that's at the top of that total activity, the 1.79, I believe it is, is what you then recalculated the 800 dpi based on. Do I have that right?

MR. MCGUIRE: Yes, essentially, yes, you do. When you go on the probability distribution here and you have six data points, basically that's sixth or highest data point is representing your 90th percentile.

The exception might be if you have one piece that were a total outlayer and way over here, you might still decide to draw your line a little bit. There's a little bit of variation on how you draw your line.

Now in this case, it was not too hard to draw the line because the data points

are lining up fairly well. So I don't have -- if I had a data point that was way over there, I would probably ignore it when I drew the line or might exclude it completely. That would be the same thing.

But the extra consequence -- the consequence of selecting the 90th percentile is in essence you are selecting the highest piece of data that you can accept as being representative.

MR. MURRAY: Okay. I was going to suggest it might be worthwhile if we could go back to the Chesney data, for example.

MR. MCGUIRE: Yes.

MR. MURRAY: And then ascertain total activity. That I would think would produce a number closer to the Eisenbud data, but I'm not sure it would change anything the way you've represented the data there. In other words, if you had another data point down there at close to the Eisenbud, you'd just have seven data points, and you'd still have the Breslin data at -- it would make 1.8.

MR. MCGUIRE: You're correct. It would make a very small change.

MR. MURRAY: Interesting. Okay.

MR. MCGUIRE: It would change it something around -- actually, even looking -- if you go to the midpoint in this curve, you're only a factor of two and a half lower if you take the 50th percentile on the curve. It isn't changing things drastically.

The question that isn't really -- what you really have to look at is are these data really representative, or if you can find data that is really more representative of the scenario and find a reason to show that these are not, then there's a possibility of shifting the curve substantially.

And when this -- and he is coming up with some total, and perhaps that will happen. But that would sort of -- would be the next step.

MR. BURKLIN: Rich Burklin, Siemens. I just want to go over this. So what

we're saying is we're using -- in the numbers we just saw, we're using a 90th percentile. We're using it in a facility where the total represents a combination of both fixed and removable with removable most likely causing the airborne and in a working facility where there's a reasonable probability that a good fraction of the airborne is caused by actual work activity rather than what was actually -- rather than the floor itself.

So it would seem to me that we are being extremely conservative in coming up with that number. Would you agree?

MR. MCGUIRE: The question is basically what you're saying, is this number extremely conservative. I would say there's probably -- that is probably a good argument. As I said, there are some biases in this data, and the biases would seem to be biasing them -- actually, each of these data points is being biased towards a higher resuspension factor.

Selecting the 90th percentile on the distribution is something that was done really because that's what the current default is based on. One could make the argument that a lower value should be used. You could make the argument that perhaps a lower value would be more representative of an actual facility. That's really another issue that I didn't go into in this particular thing.

MR. ZAMONI: Good morning. Hi, Steve. My name's Dennis Zamoni. I work for the New Jersey Radiation Protection Program, but I'm here representing CRCPD. The basic question goes back to what you stated earlier which I think you covered at the last workshop, and that is the indoor resuspension factor has the largest potential effect on the calculated dose.

For my own benefit, since I think we reviewed that last time and we're getting some feedback on it, could you bound that or at least resummarize what is the impact -- relative impact, and has there been some sensitivity analysis done to show because it has to do with the level of confidence again. Basic questions that I'm receiving back are, you know, how much should we take a look at this based on the impact it has on calculating the final dose? How important is it?

MR. MCGUIRE: Yes. If you look at the Alpha emitters, almost all the dose is coming from the inhalation pathway -- over 99 percent. So the other pathways are unimportant.

MR. ZAMONI: Okay.

MR. MCGUIRE: If I look at the parameters that are involved in this particular calculation, it's really the occupancy time which has -- once you assume it's a full-time worker, you basically put the hours in a very tight range. Once you've assumed that it's sort of a light industrial activity -- that's the scenario with people just doing a moderate amount of walking, you've really put their breathing rate in a very narrow range.

For the dose conversion factor, we're using a point estimate from ICRP which one could argue is a conservative value. But we don't really look at that. The only parameter that is left that doesn't have a very tight possible range is the resuspension factor. And what the later graph showed is that just looking at it in a different way changed it by perhaps an order of magnitude that was -- well, I don't have the one. But this is the effect of reanalyzing the resuspension factor. It's about a factor of eight.

I can't get a factor of eight by looking at the occupancy time or the breathing rate. So it's really an order of magnitude. And the argument was made over here that this is biased in a way that for facilities that still may be too high, and we don't know how much.

MR. EID: This is Boby Eid. I believe the impact is significant, and it looks like the relationship is more dislinear. If you increase the resuspension factor by a factor of one, most likely it will increase the dose by a factor of one, as you can see. And we have very large uncertainty. It is now he's becoming conservative in Steve's analysis, and we are finding a factor of eight. I believe this is essential, and we need to take a second look at it and to look at the weighting factor for the data that we're using and the applicability of the data to the scenario that we're using.

And just for your information, just to remind you that the scenario you are using is light building industrial scenario. So that's the generic scenario we are trying to compare with.

So I hope you understand that it's not just occupancy. It is light building occupancy scenario where you assume some kind of work and mechanical disturbance in the facility.

MR. MCGUIRE: I'd like to make sort of a process point here. What Steve's doing is presenting in essence a raw analysis that he's done, and the idea is to get these raw analyses out to you as quickly as possible so that we can get feedback that comes in early enough before we congeal on some solution that would be harder to break apart.

[Laughter.]

MR. MCGUIRE: So -- but the other point is that if this is important enough to industry, I think other than simply responding verbally in these workshops and if it's important to certain sets or the entire industry, an industry analysis of the problem in written form and in presentations at the next workshop however this thing evolves would be very useful and encouraged.

I think it is seen as an important parameter, and that's what the purpose of this process is. You see where we're heading and we're thinking about it, the idea representativeness. You know, there's other ways to approach this problem, maybe from an operational perspective. You've got other ideas, and you can take the same data and put it in another form. And that's really what we're looking for in terms of this feedback, and we're looking for it in a timely way so that we can get it and work it in to our raw analysis.

The other thing I guess that strikes me is what this -- what one might conclude from some of these discussions we've had in the last workshop and this workshop is that perhaps this is becoming enough of a cost issue to the decommissioning industry that some new research might be called for. Some new data analysis might be justified by somebody, whoever that may be -- a university or sponsor or EPRI or somebody that maybe there's some new information that's a need to be generated in a structured way that actually answers some of these problems that we're talking about.

You know, you design your experiment to feed into the models and answer

some of these questions.

MR. NARDI: Steve, we have another question.

MR. MCGUIRE: Okay, let me just close, and we'll take the last question. Actually I showed -- this analysis only applies to non-volatile materials, and I think that things like Tritium and Carbon-14 and Iodines would have much higher resuspension rates, that this is simply not applicable to them.

But also I offered last time to send basically a notebook with copies of all these articles for anybody who wanted to look at it and contribute, and last time I only got one request, and I haven't sent it out yet because I'm still kind of putting things together.

But if anybody wants to really take a look at this and please give me your card afterwards because I think this effort could be aided by having other people look at it and try to find things that perhaps I have missed. Thank you. There was another question?

MR. NARDI: I'll put this up. Joe Nardi from Westinghouse. Taking a leave from Dave, I'll put up some data. In getting ready for this -- and this is a very preliminary thing. I don't put any real strong weight on this. But looking back at what we had operational data, in trying to get an idea of where would we fall based on operational data and looking at a lot of this, I went to three facilities at our Cheswick site. Let me give you a quick run down.

Pump at PRF is a pump with para facility. That's a facility where we would work with Navy pumps. The highest level of activity where we would be working on components that are contaminated.

Building 12 is the motor repair facility where the components are more cleaned when we're working on them. So there's less activity on the component. And the D&R which is where we test the motor is even less activity on the components.

So if you look at that ratio there, you're going from a more contaminated facility to a lower, and these numbers are based on floor activity and air activity. So they do not represent true resuspension factors due to what's happening on the floor.

But in this case, the only thing that would happen would be they would be driven lower if you eliminated the component from the effect -- resuspension from the components. And those are the numbers. And if you look at where they fall on your curve for the total activity, they are way down in the bottom end of it or in the middle -- not up at the 90 percentile range. And the removable activity, they're really on the other end of it. They're almost off into the -- above the 90 percent range.

Looking at where the data falls, I've got a lot of problems with this data in that we have a large amount of air samples and a large amount of smear samples, but not many fixed measurements because that's not our operational aspect.

And you can see that average air sample, the number of air samples goes from 600 to over 3,000. And that's only a three or four month -- I'm sorry, about a six-month period of data for all air samples. So air sample numbers are not going to change if I took a larger number of activity.

The smear results, we had more numbers. In two of the buildings, I used the operational smears. In the pump repair facilities, I only showed 28 smears and 28 fixed measurements, and that's because I went in and did a vastly facility under decommissioning. We went back in and did a specific set of measurements of smear and fixed at the same point.

So that's why I only used about 29 data points. An interesting aspect is that bottom line. They've ratioed the total activity to smear activity. We are no where near 10 percent, and this is not a decommissioned facility. We have done nothing to try to clean that up yet other than remove components -- not clean floors.

And under your points on point number six on your why base it on total activity, I probably have 20,000 or 30,000 data points of smear and fixed at the same point on the decommissioned facility, but I have no air sample data, and that's the hard part.

MR. FAUVER: Thanks, Joe. That was great. Are you going to be further developing these data sets?

MR. NARDI: I'm sorry?

MR. FARVER: Are you going to be further developing these data sets?

MR. NARDI: I think that we can. We can look at this. But we're still always going to be impacted by operational aspects. Pump repair facility -- and remember, these are all Beta/Gamma facilities. They're not Alpha facilities. The other data I have is for where we worked with uranium.

This could be worked on, and, for the pump repair facility which is undergoing decommissioning right now, I think that we could look at this and do more air sampling before, during and after and get a much better handling on it than we have right now.

MR. FAUVER: That sounds interesting. Earl, you have a question.

MR. SAITO: Earl Saito. I have two questions for you, Joe, here on this data before you walk away. The first one is radon decay -- were all the air samples radon decay?

MR. NARDI: All that air sample data is after 24 hour decay, and it's strictly the Beta activity because we're measuring Cobalt and Cesium. We're not looking at the Alpha. So that's really not a tremendous impact on it. But I'm not absolutely sure. We do not do, you know, those are gross Beta-Gamma measurements, not nucleide specific.

MR. SAITO: And the second question is how you did your fixed measurements. Did you use MARSSIM's method where you use the source correction factor, or did you simply use what's generally used in the industry now which is a calibrating and assuming no source sufficiency of 100 percent.

MR. NARDI: The latter would be more, you know, it's strictly 100 centimeter gas proportional probe. One of the problems in all of that is how I -- what background do I subtract from that measurement at that point. That's a problem I have continually on what's the appropriate one. But it's not the MARSSIM -- quite the MARSSIM. I know what you mean.

MR. SAITO: So that number should go down then if you used MARSSIM's method.

MR. NARDI: Right.

MR. SAITO: Does it go down substantially?

MR. NARDI: Yes.

MR. FAUVER: Thank you, Joe. Any more questions on this?

MR. POWERS: George Powers, the NRC. MARSSIM early on had determined that measurements taken to take care of removable contamination were at best going to be pretty close to meaningless when you get into a decommissioning situation.

About the only information that you could obtain from a smear survey in the field might be during the creative clean up when you are attempting to determine whether you have probably cleaned an area reasonably well.

We also recognize the possibility that since the surface is in a decommissioned facility that's probably been washed down or are reasonably clean, but the resuspension is probably going to be more related to the wearing down of the materials in the facility itself -- the surfaces. If it's fixed, you are going to ward off the concrete, and it's going to be the rate at which the concrete is removed and basically independent of whatever contamination would be there.

Particle size was mentioned earlier. If you think of a Desert Storm sand blow versus the oil fields burning themselves, there's a considerably different particle size there. And the height at which these particles move is also very important.

So I think when it all gets looked at a little bit further, probably efforts should be made toward looking at the impact of the materials that the stuff is on itself and its effect on abrasion.

Tienneman Square, for example, was closed down due to people wearing out the sidewalks. And I think that is where you're going to find the highest area of needed development. And the estimates are that you will probably find your resuspension factor changing by another two orders of magnitude or numbers like ten to the minus six probably drop

down to ten to the minus ninth, ten to the minus tenth or even eleventh.

MR. FAUVER: Thanks, George. Henry, if you can wait and hold that question. There's plenty of discussion period. We will take a break. We're running a little late, but I let the conversation go because I thought it was important.

Chris can't wait til after the break. So I'm going to let Chris do his presentation. Then we'll take a break a little behind schedule. His is very quick anyway. What he's going to do is talk about the implementation of the screen values for building surface contamination that we've published. We're going to get into more discussion about this removable -- the 10 percent removable and this type of thing in this quick talk here.

MR. MCKENNEY: Yeah, this is going to be short. Okay. This is going to be really short. This is actually an example more of what Dave asked about -- talked about this morning about us posting information on the website in the Q&A section on frequently asked questions.

We've had a number of questions received in the regions from various licensees on what sort of information do they need to take or provide to the NRC to use the table -- the default tables and screen values.

And so what we intended to do was to add the -- put the information onto the question and answer form, to disseminate the information faster than in other ways. That's the HTTP of the question and answer form.

And this is just one, and it's also, again, it's more drafted. It can change. This one is based -- since this is on survey requirements for the screening values of the table that we published in the Federal Register, issues such as the removable total and other things that we talked about in the previous talk that it may affect how this would change if we changed the approach.

And, okay, the screen values are published in the Federal Register before even the last public meeting. And, as most people know, only Beta and Gamma emitters were

included in the table. And the table lists the total residual concentrations which is important in a way.

But the question is what sort of data do you need to show to the regions or to the headquarters that you need the table values -- that you're as clean as you need to be. Okay. In general, right now two sets of data are needed. We need to know what your total residual concentrations are, and what your removable is which may, I mean, as the other data showed, the removable may nearly be zero or show that it's hardly measurable.

But to compare those data in effect to the -- for compliance using screen values, the two have to meet these two criteria -- that the total residual is less than the screening value in the table, and the removable is less than 10 percent of the screening value because for ones that were driven by the inhalation pathway, we used 10 percent removable to drive the dose.

And so if you have a removable residual concentration of less than 10 percent of the screen value, you'll get dose of less than 25 for inhalation based population. If you don't -- this is my last slide. But if you don't -- if this doesn't meet, there is, since a lot of Beta-Gammas are not affected very heavily by the inhalation pathway, you can run the DandD screen and modify the inhalation pathway to get rid of the level of removability, and it may not affect the total residual. It depends on the nucleide.

So -- and if you have any other questions, you can contact me after the regions. Yeah?

MR. ROBERTS: Are you accepting questions now?

MR. MCKENNEY: Yes, I am. But it's going into break.

MR. ROBERTS: Just one. Rick Roberts, Rocky Mountain Remediation Services. Would this requirement to do removable residual concentrations -- are you expecting that if you implement MARSSIM and you're taking total concentrations that at each of those survey points you would also take a removable concentration measurement?

MR. MCKENNEY: I don't know -- I think that how that is resolved is open at this

point. I think if you look at all these data sets that have been presented and depending on your isotope, how crucial the inhalation pathway is, how many measurements you're collecting and the cost impact of some of these things, I don't think it's unreasonable to imagine that one could make some kind of removable determination without having to make the measurement at every location.

Particularly, it would depend on how far below you are to the 10 percent number. If you're close, you might want to do something. If you're dealing with Cobalt or Gamma emitters, you've got a very low fraction of your total dose from a building occupancy scenario from inhalation anyway.

So all these arguments, I think, would enter into your DQO process to determine how many removable measurements you'd make.

MR. ROBERTS: And with that type of answers, would you say that if you did take a removable survey at every fixed point that you would meet the requirement?

MR. MCKENNEY: I imagine that would probably be the case. But, again, if you were really going to use MARSSIM verbatim, you might have a different background situation. If you're going to do the Wilcox & Rank sum, then you might not end up with the right power curve and all those kind of considerations, I guess, could come into play. But in general, I suppose that would probably work out to be a reasonable solution.

MR. ROBERTS: Thank you.

MR. NARDI: Joe Nardi from Westinghouse again. I mentioned that I do have a lot of data of fixed and smear from past decommissioning efforts. And my answer would be that smear data's absolutely useless.

MR. MCKENNEY: Yeah.

MR. NARDI: It is almost entirely less than MDA.

MR. MCKENNEY: Right. I've reviewed hundreds of thousands of those, and I've seen the same conclusion. That's why when we picked 10 percent, it was a very high

confidence that in reality it would be less than that. So I think that the point maybe to be gained from that is that you might even be able to operationally demonstrate that your removable is low maybe in something like your ALARA analysis. If you can show that whatever you're doing is getting you down to 1 percent because you're scabbling or whatever the case may be or just wiping it down, you show that you're getting down to 1 percent every time or less or whatever the case may be, perhaps operationally you can show that you got low removable and then minimize the number of samples to further demonstrate that.

There are a lot of approaches that could be used.

MR. FAUVER: Thanks, Chris. I think we'll take a break. Maybe we'll go until, say, quarter til eleven, and then we'll start up again. Thank you.

[Recess.]

MR. FAUVER: We're a little behind schedule, but I think it was worth it. The next speaker is Mark Thaggard, NRC. Mark's been working on a preliminary NRC staff guidance document on evaluating those assessments for subsurface contamination, and he's going to give an overview of this preliminary guidance.

MR. THAGGARD: All right, can everybody hear me? Okay, as Dave said in my introduction, my name is Mark Thaggard. I'm in the Division of Waste Management in the Office of Nickel Material Safety and Safeguards.

I've got my telephone number and e-mail address up here if anybody have any questions that they think of later on and they want to get a hold of me. What I want to talk about a little bit this morning is I want to provide some information on some approaches that we've been looking for analyzing subsurface contamination.

I want to kind of make the same statement that Steve McGuire made. Keep in mind that this is somewhat preliminary right now, and we are still testing some of the stuff that we are presenting. What we've been looking at so far is we've been looking at the use of two computer codes. I think most of you are familiar with these -- DandD and RESRAD.

The approaches that we've been looking at involving these codes, we are making the assumption that we have uniform contamination in our source area. We recognize that this is a big assumption that's going to need to be justified.

We recommend that people, if they can get away using simple conservative analysis that they ought to do that and add more realism to the analysis as needed. We're evaluating different approaches for analyzing subsurface contamination, and we're trying to keep in mind the data requirement. This is an important consideration because some of the former burial sites, the 20.302 and 20.304 burial sites, there really isn't a lot of data in terms of what was disposed at these facilities and how it was disposed, and we don't want to require people to unnecessarily go out and start collecting data if we can do some bounding analysis to convince ourselves that what was disposed was not a problem.

One of the major advantages to using the DandD Code for analyzing these sites is that it is a screening code that if you use it in a screening mode, the only information you have to put in there is the source term. And as I indicated, data requirement is an important consideration. So if you can do analysis well, you've got to put a source term that's an important feature, especially for some of these old former burial sites. The only information they have is some burial records on activities and stuff of that nature. So they really don't have a lot of information. If we can come up with a way to do some preliminary analysis to determine whether or not there's a problem there, then that would be kind of useful.

The other advantage to using the DandD code is that because it is a screening analysis, it is intended to be conservative. So we should get conservative dose estimates. One of the big disadvantages, however, is that DandD, one of the built-in assumptions we're using DandD is that the contamination is limited to the top 15 centimeters. And when you're dealing with subsurface contamination, right away you're violating that assumption. So you need to play some game with the geometry of the contamination zone in order to use the code. I'm going to get into that in a little bit.

We've been looking at so far three approaches for using DandD for analyzing these type of facilities. I call them the mass balance approach, the single simulation approach and the dual simulation approach. I'm going to get into these a little bit more detail in a few minutes.

We want to look at a continuum here. We could say that in general the mass balance approach should give us the most conservative dose estimates, and the dual simulation will give us the least conservative estimates.

And then if we were looking at the degree of difficulty in terms of implementing the dual simulation, obviously that's the most difficult to implement because you're having to do two different simulations which I'm going to explain in a few minutes.

Okay, what I mean by the mass balance approach, now one way to use DandD to analyze these type of facilities, if you've got some kind of waste contamination zone with a cap over it, what we're doing with the mass balance approach is we're just basically assuming that the activity is uniformly mixed in this volume of 360 cubic meters. And so all you really need to do this analysis is information on activity, and you don't even need to know what the volume of the waste is.

Now the 360 cubic meters comes from the defaults that's built into the DandD code. There's an assumed cultivation area of 2400 square meters and a thickness of 15 centimeters. So that's how I came up with the 360 cubic meters.

In most cases, this probably is going to be a very conservative -- give you very conservative dose estimates. So if you can bias with this simple screening analysis, you'll probably be home free. And the reason I believe this is going to be fairly conservative is because that volume is fairly small. And so when you mix your activity over that small volume, in most cases you're going to get fairly high concentrations. So if you can bias with that, then I don't think you need to do much else.

Now one other assumption is that we also assume that there is no cap over the

waste burial. The single simulation approach using DandD, and this is one of the cases where we're having to try to play a little bit of games with the geometry of the contamination zone. We're basically trying to represent the waste volume on the left into the same volume at a smaller depth on the right. So we're going to have to extend the surface area in order to get the same or equivalent volume. So it's basically extending out the surface area to get an equivalent volume to what's on the left because of that limitation of the 15 centimeter contamination zone thickness.

Then we assume that there's no cover over the contamination zone. So this should provide slightly less conservative analysis than the mass balance approach. Now the dual simulation approach is -- the reason I call it dual simulation approach is because it was going to require that you do two separate analysis. What we're assuming in this -- for this approach is we assume that somebody basically excavate a limited volume on materials either coming on the site and building a house with a basement. So a limited volume of the contaminated materials excavated, and it's mixed with the cap. And so you're going to get some dilution of that materials that's brought up to the surface if you have a cap.

This material that's brought up is assumed to be spread out over the surface to a depth of 15 centimeters. And so what you wind up having is you have two contamination zones at this point. You have surface contamination at a slightly reduced concentration because of the dilution from the cap material. And then you've got the remaining stuff that wasn't brought up to the surface at the original concentration value.

Now you have to analyze the impacts from both of these and the exposure from both of these zones are going to be slightly different. The stuff that's brought up to the surface, you're going to be exposed to direct Gamma radiation, inhalation, maybe plant and soil ingestion. So it's going to be your dominant pathways.

Whereas, the stuff that's left below the house there, you still got a potential problem with rain falling on that and bleaching it down to the groundwater and somebody putting

a well in and pumping that stuff back up. So you can't exclude it. So you have to analyze the potential of stuff bleaching out and getting to the groundwater.

So the drinking water and irrigation pathway would be your primary pathways for the material that's remaining. And because of that, you'd have to do two separate analyses and kind of integrate the doses between the two analysis. That's why I call it the dual simulation approach.

And we've also been looking at the use of RESRAD, and, again, I came up with two approaches -- the single simulation and the dual simulation approach. The advantage to using RESRAD is we don't have to play these games with the waste geometry because there's no limitations on that code about assuming a 15 centimeter depth of contamination zone. So we can get a much better representation of the geometry of the waste area.

Now one of the limitations to using RESRAD is that the default parameters set in RESRAD we're not sure at any given site that those defaults are going to give you a conservative dose estimate. And because of that, it may be much more difficult to justify or defend your results. And so there is a big drawback to the use of RESRAD.

Now the single simulation approach is, I think, the approach that most of the people that use RESRAD is what, you know, this is what they commonly do is they basically just assume that none of the materials brought to the surface -- they're analyzing the waste zone the way it is now. We would advocate that they would assume that there's no cover over that material because we don't know what's going to happen to that cover in the future. So it would be difficult to justify assuming that there's a cover over it.

And so this is commonly the way people use RESRAD now. It's nothing really fancy about that. Another way that RESRAD could be used is this dual simulation approach is what I described for DandD which would be to assume that a limited volume of this material is brought to the surface. And, again, if you've got to cap this material that's excavated, it would be assumed to be mixed with this cap material. So you would get some dilution of the material

that's brought to the surface.

And material that's brought to the surface would be assumed to be spread out, and somebody would basically do their gardening in this contaminated material. Again, you can't eliminate the stuff that's left behind. So you do have to look at the impact of stuff bleaching out of that stuff that's left behind and getting down into the groundwater. So, again, you wind up having to do these two simulations. So this is a lot more -- there's a lot more involved in terms of doing this analysis.

Now unlike for DandD, for RESRAD with the second analysis where you're analyzing the material that's not brought to the surface, we do assume that the cap is there because RESRAD does allow you the option of evaluating the assumption of a cap.

What I've done is last time we had one of these meetings, I went over and talked briefly about some test cases that we are looking at right now. And we've actually gone through and analyzed one of the test cases using each one of these approaches that I just described.

This is the facility that we've used. It's a former burial site that has trash buried in trenches at about twelve feet deep. The waste burial is a little less than half an acre, and the waste was disposed between 1959 and 1981.

We believe that the trenches are covered with a three-foot cover, and the site is located in the Southwest. And I don't know how well you can see the activities there, but you've got a hand out. These are the activities that we have based on some burial records.

So this is one of these cases where we've got a former burial site. We've got limited amount of data. We do have information on the source term and the activity that disposed it. So the question is, well, can we do some analysis of this facility to determine whether or not there's a potential problem here.

And so this is what these approaches would allow us to be able to do. And we basically have done the analysis. You can see the doses are quite high. And so based on these

preliminary anaylysis, we would say, well, we probably need to do either some additional analysis where we sharpen the pencil a little bit more, maybe look at digging up the material.

You can see if we wanted to make some broad conclusions, we could say that in general the DandD results were much more conservative than the RESRAD results. However, as I indicated, one of the problems with using RESRAD would be that there would be a lot more work in terms of justifying the parameters in RESRAD.

The single simulation approach did tend to be a little bit less conservative than the dual simulation approach. Sorry, I had that backwards. The single simulation approach tended to be a little bit more conservative than the dual simulation approach.

And just based on this one example here -- and this is only one example, if I had to recommend a hierarchy in terms of how you would proceed with this, it would be we do know that the use of the DandD mass balance approach is probably the most conservative approach we could use. So somebody would probably want to start with that. So there would be very little in terms of justifying the input parameters.

And then to move on to some of the other approaches as the need is required. That's basically all I had. If anybody has any questions. I know I went through that kind of quick. If somebody's still awake.

MR. FAUVER: Go ahead.

MR. SAITO: Earl Saito, Combustion Engineering. I had a question on your example when you have the table here. Were these all the nucleides that are present, or did you just kind of pick these because I notice you have uranium 238 but no uranium 235 and no uranium 234.

MR. THAGGARD: Yeah, yeah, that's a good question actually. It's actually a combination. This isn't all the radionucleides. There were some screening. For the uranium series, unfortunately all the data records only listed U-238, and that would be one of the questions that we would have is, well, what are some of the other forms of uranium be in there.

But based on the burial records, it just said 238. And this is one of the problems you run into with some of these former burials where the records are very kind of spotty, and you have very little information to go on. So we have kind of the same question about that.

MR. SAITO: Okay, did they have an enrichment, or was it natural enrichment or was it --

MR. THAGGARD: Well, we think it's natural.

MR. SAITO: Okay.

MR. FAUVER: Carol.

MS. HORNIBROOK: Mark, Carol Hornibrook, EPRI. When you looked at the two different codes, did you have some idea of what the impact is of not being able to account for the cap and RESRAD and being able to help you in some way?

MR. THAGGARD: Well, I think in general it's probably a big impact. The reason I would say that is it's difficult to say not having a cap in DandD. You can't tell the sensitivity of it.

MS. HORNIBROOK: Right.

MR. THAGGARD: But I did do some sensitivity analysis with RESRAD looking at having a cap there versus not having a cap there, and it was very sensitive to that. I would assume it would be very sensitive, you know, not having that there in DandD is I think a pretty big assumption. But I can't say for certain. Maybe Theresa may have some insights on it.

MS. BROWN: Theresa Brown from SANDIA National Laboratories. In doing the model comparison between DandD and RESRAD and Tritium looks like one of your major contaminants that's there, there are huge differences in the models between DandD and RESRAD for Tritium.

And with the cover, I believe, and it's three meters cover, then there's no Tritium transport at all in RESRAD in the surface. It just cuts it off. It just assumes that there's none. I'm not sure that's even a reasonable representation of the system. I think you ought to be asking questions about that as well.

So the differences in reality cover, no cover may be less than the differences between the models.

MR. THAGGARD: Yeah.

MS. HORNIBROOK: Yeah, but I believe the DandD model -- Carol Hornibrook -- has a pretty simplistic groundwater pathway model. So it would allow a good portion of the nuceides to get in there. It may not be realistic either.

MS. BROWN: That's right. And, again, the dose that you're making the decision about, you may still be making a very good decision. But as you go to looking at this in terms of a more realistic representation of the system, DandD does not have a conservative model of the vapor faced transport for --

MR. THAGGARD: Yeah, I need to point out one thing that the cover in this case isn't limiting infiltration to the groundwater. It's simply a moderator for Gamma radiation and maybe exposure from the plants. So it's really not affecting stuff getting down to the groundwater. I mean, it's --

MS. HORNIBROOK: Yeah, I was just thinking of the two -- when you said you did the dual simulation.

MR. MASCIALLI: Steve Mascialli, Cabrera Services. In the draft Guide 4006, it indicates that you can use mixing to calculate DCDW, assuming you have clean over burdening or maybe even in the cap as well. How would you consider that, or did you consider that in these assessments that you did?

MR. THAGGARD: Well, that's kind of what we were assuming by the assumption about for this dual simulation some of the material being brought up to the surface, and it's being mixed with the cap. We're not -- I mean, the most conservative assumption would be to assume that the cap wasn't there, and you just brought stuff up, and you didn't have any mixing. We are looking at some mixing.

MR. MASCIALLI: I guess I misread what your slide showed. But the lay that

you showed going up -- laying on the surface would then be mixed with the clean cap or any other clean over burden there was to lower the effect of concentration.

MR. THAGGARD: Yes, yes.

MR. PAYNTER: Good morning. Art Paynter from GPU Nuclear. Mark, we did some analysis with a cap and not a cap, and we notice that it's radionucleide sensitive, especially for Cobalt-6 is probably the big driver when you're looking at a cap to no cap.

The other nucleides change slightly. But the big difference is the direct radiation pathway for Cobalt-6. The question I had, though, is even that's a waste disposal site. Did you look at the Iodine-129 values to see what that would do for dose.

MR. THAGGARD: I don't believe we had any Iodine. Yeah, I don't believe there was any Iodine-129 in the disposal. I don't believe -- I mean, we didn't look at that.

MR. PAYNTER: You know, for disposal purposes, you'd look at the heart of the nucleides, and you do usually account for Iodine. And we noticed with some of our RLD numbers that using Iodine could give you a high exposure number. Did you see anything like that?

MR. THAGGARD: Well, no, I think the assumptions about which radionucleides is dependent upon the type of facility that it is. I don't want to go into too much about what type of facility this is because I don't think that's really germaine. We're just using that as an example. But yeah, we didn't see any Iodine-129 in there, and we didn't really have any reason to suspect that there would be any present. That may be an oversight on my part.

MR. PAYNTER: Okay, thanks.

MR. MORTON: Henry Morton. Isn't it the case in this particular case that the impact of the Cobalt-60 and Cesium, some of the Gamma emitters near the surface would be the dominant in the early years as contrasted with the long lived Iodine-129. It tends to have its impact when other things have diminished, I think.

MR. THAGGARD: That's --

MR. MORTON: I think that's probably the answer to that issue.

MR. THAGGARD: Well, unfortunately I got a report on this particular analysis here, and I left it back in my office. But the dominant radionucleides actually were Carbon-14 and the Tritium and Chlorine-36. Those were the three dominant radionucleides, and they varied depending upon which of these analyses we ran. So I can't get into too much of the specifics without having that report here.

But the Gamma emitters were really what played a nominal amount -- they had to have nominal effect on the dose.

MR. ROBERTS: Rick Roberts, Rocky Mountain Radiation Services. In putting together your examples, I'm looking at how to put those together. Did you look at EPA's sole screening guidance at all? EPA spent a number of years over the last four years looking at how to screen soils for different types of contaminants, and they looked at subsurface soils in depth.

I was just wondering if that was used at all to come up with these examples.

MR. THAGGARD: Well, I reviewed that -- in fact, I reviewed that quite extensively a couple of months ago. There's enough differences between the programs that I don't know if it's completely applicable to what we're doing.

One of the -- there's enough differences in the regulations and how you're trying to do the analysis, I don't think we could use what they've put together. It's useful information. But I didn't find any way that we could necessarily implement what they have developed. Do you have some specifics that you've got in mind.

MR. ROBERTS: Well, in particular, they've set up a geometry where you have, I believe, ten meters of subsurface soils, and you have a block of contamination -- uniform contamination. And you assume a distribution coefficient that's pretty uniform across that. And then you have a certain groundwater movement within a certain saturated zone as well.

And in looking at your different geometries, it looked like you had a number of different geometries that may not be applicable in some places. And the EPA methodology

looked like it has a good way to move forward in a screening type of assessment in that you do have -- most of the time, you don't have a solid block of contamination with uniform bleaching coefficients. And so it looked like a good way to set up the geometry for something like that.

MR. THAGGARD: Yeah, we're taking another look at that. I mean, the issue about the uniform contamination is a big issue. It's a big assumption that we're making, and we know that in most cases it's not going to be valid.

The only limitations on the geometry as far as I can see what I've composed here is the one with the mass balance, and that's tied to our specific model. I don't know how you could come up with another geometry and use that mass balance approach and still use that particular model. So that's tied with that particular code.

But I mean, we can go back -- I mean, I can go back and take a look at some of the EPA documents.

MR. ROBERTS: Especially mixed waste sites. It may be a good idea to do something like that because you may want to look for consistency between how the chemicals and metals are modeled versus how the radionucleides would be modeled in subsurface.

MR. THAGGARD: Thank you.

MR. ROBERTS: Thank you.

MR. ZAMONI: Dennis Zamoni, CRCPD. Just one point. First, I want to thank you, Mark, for this presentation because, as you know, there is a lot of discussion going on around the country about the models and which ones are better and some of the benefits of using others. So this information is going to be very helpful to them.

But I do want to stress the importance of examples. And the more that you can provide, the more helpful I think it will be. I don't know what you intend on doing, but as a request, I think more examples definitely will be the easiest way to help my counterparts and counterparts throughout the country understand this process.

MR. THAGGARD: Yeah, one other thing I should point out is that I went through

this kind of quickly. But I've actually written up a paper that goes into a lot more detail on this. And at some point, we hope to try to get put out on the web as a draft document so that you can give us feedback.

MR. ZAMONI: Yeah, the feedback I'm getting, that's the greatest learning tool for these folks because they can look at the example, learn a lot from the way you lay it out and do. It's very helpful. So the more, the better.

MR. FAUVER: Okay, if there are no more questions, we're running a little bit late. But I think we have plenty of time in the afternoon to make up the time. So why don't we go ahead and break for lunch and return at 1:30.

[Whereupon, at 11:12 a.m., the workshop was recessed, to reconvene at 1:30 p.m., this same day.]

AFTERNOON SESSION

[1:03 p.m.]

MR. FAUVER: Okay, the first presenter in the afternoon is kind of a carryover from this morning. Boby Eid's with NRC, and he's going to go over kind of briefly where we're at in terms of the outline and standard review plan for dose assessment. That should help. Maybe give you an idea of thought processes that we're going through right now. So Boby?

MR. EID: Good afternoon. My name is Boby Eid. I'm a senior technical staff with the Division of Waste Management - Performance Assessment and High Level Waste Integration Branch.

I will be talking today about draft outline of the standard review plan for dose modeling. It is still the disclaimer that was presented this morning holds that this is a preliminary, and it is an area of discussion and will be more evolved.

I have here on this slide my address, phone number and e-mail. So please, if you have any questions, don't hesitate or to send me messages by e-mail. My presentation outline will include touching base on possible categories of the dose modeling standard review plan.

Also, some kind of typical structure that we anticipate for the dose modeling standard review plan. Then I will be talking about the areas of dose modeling reviews, then the dose modeling review procedures, and then possible evaluation of review findings and recommendations, and I will close out by conclusions.

The categories we anticipate, those are not binding. Those are not official categories. But we anticipate that the staff will be faced with these categories of dose modeling, SRP reviews. The first one when there is a screening dose analysis and only screen dose analysis for very simple sites. And those, they are subdivided into two subcategories. They are for building surfaces and for surfacial sowing, for the top 15 centimeter of the soil, for example.

And this kind of category I gave for unrestricted site release. We strive to divide

those categories or to generate those categories based on two major factors. The major factor is compliance with the dose in the regulation CFR Part 20, 1402, 1403 and 1404, and the other area of division is the involvement of the media that we are faced with -- where the contamination is located.

The second category is the unrestricted release site-specific dose analysis, and this is subdivided into four subcategories -- building surfaces, surfacial soil, subsurface and onsite disposal. And there is a fourth category which we cannot define right now, we call it under other. The third category which is -- by the way, these two source two categories will be in compliance with 10 CFR 1402.

The third category will be to demonstrate compliance of the dose with the dose criteria in 10 CFR 1403, and we call it restricted release site-specific dose analysis and again subdivide it into four categories I explained in bullet number two.

The fourth category will be classified as alternate release criteria site-specific dose anaylsis, and this is in compliance with 10 CFR 1404. The anticipated overall structure of the SRP for dose modeling will be describing or specifying the staff responsibility and the qualification of the staff for the review. And there will be first primary reviewer which typically will be the project manager to conduct the review, and then secondary reviewers, those more to provide technical assistance and supporting reviewers to provide more additional detail, technical analysis and assistance for the primary reviewer.

Then the second portion of the SRP will be dealing with the generic areas of the dose modeling reviews, and the generic areas will be review of the source term that the licensee presented, the exposure pathways, scenarios and institutional controls, the conceptual models that were developed in order to simulate the source and the transport pathways and the computational metals that are used, models or codes so it could be hand calculations. Then review of the input parameters and ascertainment, if any, they were provided, and then the overall dose modeling and analytical results, analyzing the results that were generated.

The other areas of the review or the review procedures or what will be included in the SRP will be acceptance review. Then there will be a review of the safety or the dose impact analysis evaluation how this was conducted. Then the analytical results and uncertainties, then comparing with the acceptance criteria based on the regulations or the reg guides, and then finally evaluation of the findings.

I will describe briefly each area of the review within the time that is available. The first area will be the source term. The source term will be focusing on characterizing the radionucleides that are present at the site. I believe this is a must, and this is needed. You cannot do dose modeling analysis without this information. And to be sure that this is available, the contaminated media where the contamination is, is it in the surface and the subsurface or the building surface? Is it in groundwater or somewhere else or offsite? Then the extent of contamination, how the contaminated is spread horizontally and vertically. Then the source distribution and how original is the source.

Then the physical and chemical form characteristics. So this information, of course, depends on the purpose of the analysis. If you are doing screening analysis, we may disregard all of this about the source term. We understand that you assume only you have source term with some kind of total activity for the site, and then you do the screen analysis. That's why we try to be very conservative in the screen analysis because you eliminate all of those kind of data that you need to provide.

But I am talking here about, of course, site-specific analysis. Then we look at the exposure pathway scenarios and institutional controls that were provided. The first one would be the critical group definition and try to compare with the NRC's -- the four critical groups. As you know, there are two default critical groups. The residential farmer scenario and the building occupancy scenario.

So the first thing you would compare with the critical group assumptions. If they are consistent with NRC's critical default critical groups, so this means we do not require more

information -- try to be information provided is consistent with the default to start with, and then we move from there to see how the critical group definition was modified.

Then we look into the exposure pathways. For example, whether the licensee, they use the default values for the exposure pathways. In other ways, all the pathways, they are assumed in the scenario. Or, some pathways were eliminated, or the pathway analysis was modified from the default.

Then elimination with the pathways so the licensee could eliminate pathways because of site conditions. You do not need to completely abide by the pathways that we say for the scenario. You could eliminate some of those pathways based on the site-specific conditions.

Then, of course, the exposure scenario parameters in terms of occupancy. You have these parameters, they were changed. Do we have the same occupancy parameters or because of certain kinds of specific conditions, this exposure scenario parameters were modified. So we accept the argument presented or discussion presented by the licensee or modification of those parameters based on site-specific conditions.

Then, of course, we look into the conceptual models. We expect that the licensee to be conceptual models either the models that we generated as default or maybe models that were developed by the licensee based on site-specific conditions.

We review the assumptions in these conceptual models so the licensee may assume how the radionucleides will move from the source to the receptor of the critical group. The reason we define the critical group because we define the receptor. The location of the receptor and the behavior of that receptor. So we need to see what kind of assumptions were made to analyze the transport of contaminants from the source term to that receptor.

Then review the approaches for simplification of the physical system into mathematical model. Typically, you try to simplify nature and then to use some kind of simplified model. We question how you move from that complex nature to a simple model.

We review, of course, the source term -- in this case, the radionucleide transport assumptions and the pathways assumptions and exposure pathway assumptions. The other areas of review will be the computational methods, models and codes.

It's quite significant when we review the computational methods that the code that is used and the model or the approaches to the calculation to be compatible with the assumptions -- to have compatibility between the code and the model with the site-specific physical conditions.

For example, if we say residential farmer scenario, this means is onsite exposure for somebody who's comparing the site, and you have a model where you try to analyze something which is offsite like Galston's plume model which you measure how much exposure or contamination that is read offsite. This means maybe the model is not appropriate. You may need to use for onsite exposure -- that simple example.

Then we would evaluate the big question of appropriateness of the model and code to account for the conceptual model or the environmental transport and exposure pathways. Also, we need to ensure that there's some established numerical link between the source, the starting point and the receptor. And, of course, in between there will be the radionucleide transport and the environmental pathways. So between these two, we mush establish some kind of links between those.

Then justification of the model input parameters. Again, we talked about that. So how conservative they are if you are doing screening analysis. There would be more strict justification that they are conservative because not get much information.

If you are doing site-specific information, we'll examine the site-specific information provided to be sure that it is comparable with the site physical conditions. Also, there will be some kind of view or review to look at the QA/QC or the model and the formulation that they are used to give some examples of the output results.

Then the other area of the review, there will be the input parameters and

uncertainties. We would review the behavior and input parameters to be sure that they are consistent with our current default values or some modification was changed. And if there are some modifications, then we'll look into the rationale for such kind of modifications.

The physical parameters, we try to look into the site conditions, how they are, and then to compare the physical parameters. Then also look into the probabilistic selection of parameters if there was an approach. The probabilistic approach for selection of parameters would be good, would be very useful, will give us confidence on how conservative the analysis is. Or, if there was deterministic selection parameters, then we assess the conservatism and the deterministic parameters selected by the licensee.

So I'm not saying that strictly you should do probabilistic analysis. You could do deterministic analysis. But the question is how conservative the selection of your parameters and how compatible with the site conditions.

And the uncertainty analysis, of course, we expect some kind of uncertainty analysis to show the bounding conditions for the dose results. Then we will try to look at the dose analytical results. The analytical results could be based on highly conservative assumptions and input parameters. This means that with this kind of analysis you are almost assured that we will accept directly the results because you're starting to be very conservative.

Or, the analytical results, they are based on ranges of input of sensitive parameters. This also will be valuable to us to understand the ranges of the dose impacts, and we will look at the mean values. There was a question this morning about the mean values or the 90th percentile values. I guess Dave, he answered part of that question.

We informed the Commission so far for the site-specific analysis we are moving towards the mean values for site-specific analysis. Currently for screening analysis, we are using the 90th percentile. However, we are analyzing this situation of using the 90th percentile what is the impact of using the 90th percentile.

Steve, this morning he presented only the 90th percentile. But I believe he has

some data even on the 50th or the mean value of the resuspension factor. This area still we are looking into it. We cannot talk more about it so the staff is discussing it again, and we are evaluating it.

So regarding the screening analysis using the mean of the 90th percentile. Also the review will be the analysis of the dose conversion factors using lower and upper bounds. So we'll look at the lower and upper bounds in the dose impact analysis.

In the dose modeling review procedures, there will be acceptance review so as to review the complete list of the dose modeling information submitted. And this would be against appropriate criteria such as the regulatory requirements or reg guides or other regulatory evaluation materials that we may develop in the future.

Also, we look into the safety of dose impact evaluation. And so as I described with you, the assumptions, review of the models, and in order to assure to have appropriate compliance with the license termination regulation. Also there will be a review of analytical data and results, as I said. Maybe we'll start with the scoping review to enhance the procedure to see how the data submittal is completed, and then we'll go further for a detailed review.

MR. FAUVER: Five minutse, Boby.

MR. EID: Just to give you examples, what possibly we may find as a result of this review. We may find -- the staff may find that the dose estimates, they are conservative and defensible and will be approved, and we'll accept whatever's submitted.

The other possibility, the dose analyses and results, they are inadequate. And so the staff will prepare one set of comments, and hopefully we'll try to eliminate to one set so that we can resolve it not going back and forth as soon as possible in order to resolve the inadequacies or the inadequacies may be the result of using alternative approaches to dose analyses.

For example, we may advise using alternative scenario, alternative input parameters or alternative source term assumptions. The reviewer may find also that in those

results that uncertainty needs to be further analyzed and may result uncertainty analysis using upper and lower bounding condition analyses.

In summary, what we are trying to do, we are trying to complete the SRP dose modeling outline hopefully within the next three months or we'll have the outline agreed on by all the staff and management. And we'll try to post it on the website.

Also, we'll try to pursue the efforts to resolve the key technical issues we discussed in the previous workshop and this workshop and try to post it on the website or discuss in the next workshop about issue resolution. But continue writing of the SRP dose modeling. And as soon as we have something that is acceptable for posting on the website, try to post it so we'll let you know and we have feedback from you as early as possible in the process. If you have any questions, I'll be glad to answer you.

MR. FAUVER: No questions? Okay, great. Thanks, Boby.

MR. EID: Thank you.

MR. FAUVER: Okay, for the next two, three hours, I guess, we're going to hear from the NEI Reactor Task Force, I think it's called. I haven't seen the specific information on how they're going to do this. Paul, are you going to introduce this?

MR. GENOA: If I could.

MR. FAUVER: So why don't you just go ahead and take it from here.

MR. GENOA: Can you hear me? Am I close? Is that better? Again, I am Paul Genoa. I work for the Nuclear Energy Institute. I want to thank the NRC for hosting these workshops. I think they're very valuable.

I particularly want to thank you for providing NEI the opportunity to bring forward our comments in this manner. I think it's an effective way to do business. I want to take just a minute to explain what NEI is doing in this regard.

Many of you know my colleague, Ralph Anderson. Ralph Anderson is well known in the radiation protection community and has worked on this issue in the past. Ralph is

still with NEI and has a new opportunity within NEI to work within the Government Affairs organization on a rotational basis and will be carrying many of these issues up on the Hill and talking with our Congressmen about them.

In the meantime, I am going to take over these task force activities for NEI and will be interacting with you from now on. NEI works through our member companies, and many of the ways we do it are through issue task forces on technical and regulatory issues.

The task force with you today is the Site Clean Up Restoration and License Termination Task Force. That task force has members representing all the decommissioning utilities in the United States as well as some of the larger utilities -- operating utilities that will be looking forward to decommissioning activities.

With us today are some of the technical members at those decommissioning plants that are working with your tools, that are trying to understand how to use those tools and are here to provide you with their early input on their experiences with them.

What I'd like to do today is merely introduce the members, allowo them to go through these presentations. These are not fancy, glitzy presentations. Rather, they're early input that we want to share with you at this time. I commit that we will be with you throughout this process to continue the dialogue and to build on it. And so with that informal nature, please ask the questions that you need, and I'll let you moderate that in any way you choose.

With us today, we'll start out with Jerry Cooper. Jerry is with us from Portland Gas Electric, the Trojan Plant. Following Jerry will be Pete Littlefield. Pete works with Duke Engineering Services at the Yankee Rowe Project.

Following Pete will be Repete -- Pete Hollenbeck will follow up also from Duke Engineering with his experiences at Connecticut Yankee. We have Joe Darman representing Main Yankee followed by Art Paynter with GPU Nuclear at the Saxton Plant, and Carol will take up the end of the presentation significant time talking about EPRI's research with the codes and related issues.

I would like the opportunity to come forward and give you a very brief wrap up at the end of that, if I might. So that's how we'd like to proceed. So Jerry?

MR. COOPER: Okay. My name is Jerry Cooper, and, again, I'm from Portland General Electric. I'm working with the Trojan Plant decommissioning.

What I'd like you to do, my presentation is relatively lengthy compared to the other presentations. And so as I'm going along, if you have questions, if you wouldn't mind interrupting me with a question, and if the questions becomes unmanageable, I'm losing too much time -- if I'm taking too much time in the presentation, then I maybe will forego the question. But right now, if you have questions, go ahead and take a minute.

Let me share with you a little bit of the perspective I'm coming from. In 1996, the NRC approved the decommissioning plan for the Trojan Plant which allowed us to decommission the plant and perform final site survey using the old rules under Reg. Guide 1.86 and the NUREG 5849 methodology.

We actually performed a survey of a portion of the site. These are now guidance. And we have written a plan to survey the entire site or the balance of the site under those old rules when the new rules, the Subpart E of Part 20 came out as well as the MARSSIM and the related guidance.

So we sat back and looked at the two approaches because we were right there at a crossroads. And as we weighed them, we determined that we would set aside the old approach and go towards the new approach. And so I believe that's a strong statement that where we're going, we believe, at our utility is a strong step in the right direction.

We'll be submitting our license termination plans as early as next month to the NRC, and then this year we'll be getting our -- we'll be starting our final site survey process. As we're into this process, our goals are straightforward. We want to accomplish the release of the site in a timely, cost effective manner.

We really want to avoid being what I call a research project. And so with that in

mind, we're trying to use as many of the NRC's tools that they're providing us from the guidance and the default parameters and what not as we look at our site.

As illustrated by this morning in earlier presentations, getting into the parameters and manipulating those parameters could potentially become quite a project in itself. And we want to minimize that at our site.

We're trying to establish a simple yet adequate process to implement the site release criteria. The guidance that we now work under gives us a great deal of latitude. And what we've found is it's actually too much latitude for what we're trying to accomplish.

And so we've gone through the guidance, particularly through MARSSIM. We've tried to pick and choose those things which we want to keep and use and apply and rule out those areas where we feel it would be not beneficial to us.

Along this line, we recognize is there's a broad range of licensees. And so this latitude, every segment of the industry would probably use a different segment of the latitude that's been provided by the guidance. So along this line, we want to preserve the latitude that we choose within the guidance. We're trying to take the umbrella approach since we're looking at things from a dose based perspective, we want every aspect of our final survey project to fall within that umbrella.

We've got some special cases that I'll be talking about a little bit later, and we're trying to make sure we fit those under the models and the assumptions and the parameters that have been provided us.

This last part of this slide, the decision making process allows the licensee to coordinate his planning efforts with the NRC's input to conduct dose assessment and site characterization activities that are directly related to regulatory decisions.

To develop cost decisions, integrate analysis for ALARA requirements, elicit other stakeholders' input at crucial points. Again, this is a very strong step forward, we believe.

And we believe this is the intent, that -- and how the guidance's working forward.

However, it's a largely unknown path. And so I think that's one of the purposes of this workshop to better define the path not only for ourselves, but for the NRC as they work us through this.

MR. FAUVER: Jerry, can I ask a question real quick?

MR. COOPER: Sure.

MR. FAUVER: Did you look at DZ4006?

MR. COOPER: Yes. 4006 without the few paragraphs and the real nuts and bolts to making the process work is 1549 for dose modeling, right.

One thing we found for our site, too, and I'll discuss this more for a simple, straightforward case such as a site dealing with a single nucleide and perhaps a single medium of contamination, the screen process, the scenarios and what not work probably very well. But for ourselves, we are a complex site.

And so I believe -- I speak, again, just from the single reactor that I'm dealing with. But the conversations with other decommissioning reactors, the simple default screen scenarios and DCGLs may be too conservative or not comprehensive enough to address many of the sites. And most, if not all, of the sites have circumstances or conditions. They'll need some site-specific work to be done.

There may be a few parameters identified, and we've been discussing this as a task force that may be specific to our segment of the industry where we could actually develop parameters that we could use as a reactor community.

Also at our site, we have multiple radionucleides and distributions. And so there'll seldom be a thing called DCGL as we apply it to a reactor. In fact, we're looking at actually have ten, if not hundreds, of DCGLs by the time we finish. We've done some preliminary divisions of the site, and we'll have about 400 survey units, we believe. So it's a relatively large project.

Also, this third bullet, multiple scenarios that would involve both surface contamination, also volumetric DCGLs may apply. Since we're looking at releasing the site for

unrestricted use, there's many possible future scenarios that could be applied at the site.

The particular situation I was thinking about this is we have our containment building where the reactor is located, and we're applying the surface contamination DCGLs everywhere except to the portion of concrete that's actually around the reactor which has been activated. And so the contamination there is volumetric in nature.

And we thought about, gee whiz, if we're applying this volumetric DCGL to this area of the containment building, it would only apply if the entire building was demolished. And so shouldn't we then be applying this volumetric DCGL to not only the activated concrete, but also the contaminated surface areas. And so that created some thought and some looking at how the surface contamination and the volumetric DCGLs correlate. Also, dose modeling issues ripple through the entire site release process. The dose modeling is, of course, the backbone of the final site survey process and is a single component most different from the way we used to do business under the old rules is this dose modeling piece, and it requires much more upfront work. And I think we're all discovering it requires a much greater understanding of our site and site conditions as well as modeling and how those conditions are modeled.

Implementation of the process is described as a sequence of steps, however in practice it is iterative, and this is particularly true for a complex site. We describe site characterization as a one-time evolution that occurs, and then we're done with it.

But while we found and other reactor sites have found is the site characterization is initially completed, but from then on it's ongoing, and the characterization continues as you begin to more fully understand the site and the unique conditions or problems you face at your site.

So with the additional knowledge and understanding, you go back and you rethink where you are and where you're going. Also, over time you have a better understanding of your decommissioning costs. Those are factored into the process, and so indeed the process does evolve over time.

Results from step may lead to repeating prior steps. The iterative approach is designed to ensure efforts expended to remove residual radioactivity are commensurate with the risk it poses. And, of course, this process applies not only to dose modeling, but many other aspects of the site.

After I've modeled the site and I'm into the data collection process, then data collection, the investigation process as well as the data assessment and the evaluation of the conclusions may draw me into this cycle of iteration. This last little segment at the bottom of the overhead for the phased approach.

For the phased approach process to work efficiently, again that would be the approach we would need to use as a reactor site. The licensee is encouraged to involve the NRC from the very first step through the end of the decision making process. And we like that. We think it's a very worthwhile objective.

However, our experience has shown us that it's not always possible. And there's several reasons. We've been involved in this process for a little over a year now. And so we've made multiple decisions about how we're going to address this. The NRC has yet to be involved or be informed of anything that we're doing.

So we're hoping next month as we submit the plan to them what they receive is what they were expecting. The iterative approach that is how we implement this new methodology more closely follows the engineering approach that we're all familiar with in solving our problems, incorporate and weighing multiple factors into a final conclusion. Jerry?

MR. GENOA: Paul Genoa with NEI. Could I ask you a question or make a point?

MR. COOPER: Sure.

MR. GENOA: I think in your last bullet, I think what you were saying is the guidance encourages you to contact the NRC early and often in this process. And I think what you explained to me was that the fact is that because of docketing issues and whatever, until

you actually submit your license termination plan, you are precluded from having those early and often discussions.

MR. COOPER: Thank you, yeah.

MR. GENOA: Based on OGC decisions?

MR. COOPER: Right. So though we would like to have been involved with NRC more actively, because of various reasons, we've been unable to enter into a dialogue, get feedback for the path we're marching down and what we hope to propose.

MR. GENOA: Thank you.

MR. DARMAN: And maybe even to -- this is Joe Darman from Main Yankee. Maybe even hope to have that dialogue with NRR or --

MR. THAGGARD: Yeah, this is Mark Thaggard from NRC. I guess it's not clear to me is the concern about whatever -- all your documentation will be promptly available and you feel that because of these preliminary numbers and stuff like that, you don't want them out there available for the public. Is that the concern?

MR. COOPER: No, we don't mind them being available. I think the staff or various members of the staff that we've contacted have expressed hesitation in looking at our material and commenting on them except it will go through a public review process or public availability process.

MR. FAUVER: And the staff you think contacting are the project managers for the site?

MR. COOPER: Right.

MR. FAUVER: The project manager, the NRR project manager.

MR. COOPER: Right. And also the regional inspector and some of the technical staff such as yourselves.

MR. FAUVER: To answer Joe's question, I think everybody realizes that NMSS has the review responsibility for license termination plan. They put out the standard format and

content guide and basically I think yesterday came out final standard review plan, draft standard review plan. So NMSS would be the people that need to somehow get to. And I wasn't in this loop, so I haven't heard this issue. I heard a little bit about it yesterday, and, again, I'm hearing it now. I heard it from Ralph yesterday.

Frankly, I'm a little surprised, but I'm not going to make any judgments. I always thought that the licensee had the option at any time to come in and request a meeting with NRC. But I'm not going to prejudge what the conclusions were in this particular case. But that does sort of surprise me. I'm going to look into that.

MR. COOPER: I'm following along this line a little bit is this initial -- I call fluid versus framework. In the guidance, it says, "It is important to know that these chapters in the process of considering by any particular licensee should be fluid." And we believe that's necessary for this iterative approach to efficiently apply our resources to work.

But we also recognize the framework that the NRC needs to regulate us as licensees. A well thought out consideration of site-specific options for comliance with Subpart E and for submittal to NRC will enhance the process of decision making on both the licensee's and NRC's part by allowing the licensee to make decisions in a timely manner that are both cost effective and have a sound technical basis.

And so in our minds, as we've gone through this process, we're trying to ask how can both objectives be accomplished to keep the process fluid so we can work within it, but yet provide the framework where we can be regulated and ultimately cross the finish line successfully.

So this is a process that we've been working on, and that we will be proposing before we present to you. The initial iterations are performed prior to NRC formal involvement. Of course, this involves characterization of the site, developing a fitting of the scenarios and the parameters to the site and establishing some form of what I would call screening DCGLs.

And this process, we've been involved in for over a year. And hopefully next

month, we're going to take the next step and involve the NRC in this process formally. But we go through this series of initial iterations, and then we also propose a decision making framework that we present to the NRC and have them approve. And this framework entails how to apply our screening DCGLs, how to handle cases that don't fit the screening DCGLs, and how we plan to interpret and evaluate the data.

And then subsequent iterations of this process that we believe will occur will then be performed in accordance with the NRC approved framework or as NRC approved deviation from the framework. So, again, these are the two challenges to provide the framework that has sufficient substance but yet maintain the options and the flexibility that we are allowed and would like to use.

MR. EID: Excuse me. I have a question. This is Boby Eid. Could you elaborate more on what kind of deviations from the current framework you want to face, or can you enlighten us?

MR. COOPER: Yes. In fact, let me just run the next slide quickly. In 4006, that paragraph in the middle of the slide, in general it is the advantage of the licensee to obtain NRC approval of its DCGL and area factors prior to remediating the site and conducting a final status survey.

And we agree wholeheartedly with that. We also recognize there may be issues that as we go through this process may arise where it may fall outside the scenarios upon which the DCGLs are based or require other special considerations and circumstances.

And so that's why we want to then not only propose this screening DCGLs that are modeled such that we believe all circumstances are most all conditions within the site will fall within, but also provide that framework such that something that doesn't fall inside those screening DCGLs can be addressed.

And so the first part of establishing that framework is that, again, I call it site-specific screening DCGLs. We're trying to maintain the use of DandD as a screening tool

because we think that's a marvelous concept. And we need to tweak it for our site. So we're going to tweak as little bit -- as minimally as possible such that it should address most, if not all, conditions we anticipate on our site.

And this will become then the baseline, and those screening DCGLs are actually submitted as threshold values to the NRC that they would review. And the second part is what is provisions for site-specific DCGLs or site-specific modeling that would go beyond the screening DCGLs where the scenarios don't fit or the parameters don't fit, or we require a little bit more leeway that we granted ourselves in the screening DCGL process.

The cases that we're dealing with are the embedded pipe and the activated concrete. We believe they have a good chance of falling within the screening DCGL set we established, but we're not sure. And we get further on into this process, then we'll more readily understand where we are. One of my slides later on, I'll present it to you and show you a little bit of the nuts and bolts of what we're looking at.

So the screening DCGL set is a base set of DCGLs. It's a radionucleide specific set, and it involves not only surface contamination set of DCGLs, but also a volumetric set. It's developed using NRC's DandD code. It's based largely on generic input parameters and on the generic exposure pathways and critical groups. And as I mentioned earlier, it's developed to cover most, if not all, site conditions.

And then when circumstances arise, the fall off cycle spring that screening DCGL set, then we make provisions to establish site-specific DCGLs, and we've laid out that process which will be approved wherein we can work to develop the site-specific DCGL we need to apply to the special case we're dealing with.

MR. EID: I have a question about the generic input parameters on the previous slide. Those are the site conditions -- specific conditions, generic input parameters or default input parameters for the DandD code?

MR. COOPER: Those would be the default ones.

MR. EID: For the code.

MR. COOPER: The default parameters for the code, right.

MR. EID: Okay.

MR. COOPER: The development of the DCGL set. Of course, first we need to identify our contaminants. In other words, the representative distributions. And we would expect to encounter as we go through the decommissioning process to release the site unrestricted use.

MR. GENOA: Excuse me, Jerry. Paul Genoa, NEI. If I could just make a quick comment. Trojan Site is essentially on a rock, and there are not groundwater pathways. And so they're hoping they are going to be able to use the generic default input values to build the screening codes. It's unlikely that in most power plants you're going to be able to take advantage of those. Is that correct?

MR. COOPER: What Paul refers to, yes, we're trying to take the default scenarios, the default parameters. In our case, we've actually taken two versions of the residential farmer scenario, and in one case we've turned off the water pathway.

Another case, we modify the source term and leave all the pathways on. And so I'll hit that in just a few minutes. But the idea is and I think what we anticipate is every reactor site will have to do something like that to develop a screening DCGL set for that site.

So it's not a true default screening set, for it's a modified site-specific screening set that, again, is relatively conservative, yet it's made less conservative or, rather, it's made more site specific.

MR. EID: So you did eliminate, you know, some of the pathways in, in this case.

MR. COOPER: Yes.

MR. EID: The groundwater pathways.

MR. COOPER: Yes.

MR. EID: You are going from the screening mode to the site-specific mode,

then, in this case.

MR. COOPER: Yes. Right.

MR. EID: Okay.

MR. COOPER: And so in fact, as you laid out, the SRP, we have the four different categories -- the two unrestricted release categories, and we would not fall in the first but rather the second one where we've taken it and made it site specific. The second thing that we did before we looked at the 5512 scenario -- default scenarios, we had a brain storming session and tried to anticipate all reasonable future uses of the site regardless of what the 5512 scenarios had laid out.

Again, the guidance directs us to develop scenarios which represent reasonable and plausible human activities and future uses of the site. The next step we did is look at what we thought would be reasonable future uses of the site and how they compared with the default scenarios, the screening scenarios and the modeling assumptions.

Then we go the next step, define the screening, the scenarios, critical groups, exposure pathways, model parameters. We run the dose model, and we established our screening DCGL set.

Now let me get into some specifics of what we've done just to give you a little bit of a background. We have in one sense, we don't have some problems that other plants have. This is a quick summary of our site characterization, the type of isotopes we have and the type of contamination media we're dealing with.

Mostly, it's with plant, our structures and surfaces, and also we've got the activated concrete. As far as soil or the environmental component, we don't anticipate any environmental remediation. Everything we found is at very, very low levels or background levels from an environmental perspective.

We do have some transuranics. We'd had some fuel failures in the past, and so we do have those that we need to deal with. Whereas we're looking at these site specific

screening scenarios, again, they represent that set of reasonable future uses. And as the guidance also directs and as we've mentioned earlier today, we need to conclude that there's no conditions that exist at the site that would cause the estimated potential dose to the public to increase. And our experience was, as we believe it was intended, that most all of these activities that we look at into the future that are reasonable would fall within the generic scenarios, the default scenarios, or some basic version of those scenarios.

Our approach, again, is to maximize the use of the tools we've been given. We want to minimize the amount of justification, the additional QA/QC and the research, so to speak, that we'll need to do to get our site released.

The four scenarios we came up with and then fitted to the 5512 scenarios, course of building occupancy. That scenario was unchanged by us. We came up with a repower option where we actually took the site apportions of the site and repowered it. That fell under the building renovation or demolition scenario. And then these two versions of the residential farming scenario I mentioned earlier. Residential farming on landfill and residential farming on plant site.

For the plant site, we happened to sit on a big chunk of rock, and we happened to be next to the second largest inland waterway which is the Columbia River, and we're also in the Northwest where we have a huge amount of rainfall. And so we have several circumstances that come together where we feel we can turn off the water based exposure pathways.

And this form of -- in this version of the residential farming scenario, everything -- all the buildings are knocked down, and everything stays on site. The farming on landfill scenario, we recognize that such may not be the case. But once the buildings are demolished the rubble may not remain on site.

For this scenario, we assumed that the below grade areas on site were back filled with the rubble, and the balance of the rubble was disposed at some landfill offsite. And consequently, for that landfill scenario, all the pathways are turned on. All we've done is reduce

the source term by that fraction that would be available to be removed off site.

MR. FAUVER: A question on that. Rubble disposed at offsite landfill. That is rubble with residual contamination?

MR. COOPER: Yes.

MR. FAUVER: That disposal be after or during -- after license termination or during decommissioning before license termination?

MR. COOPER: After license termination.

MR. EID: Question. What is the rationale for the water based exposure pathways off? What is the rationale that you used to exit off?

MR. COOPER: Well, the plant itself is on bedrock. It's a rather stable farm basalt. And so there's very few fissures, and it's a stable rock. So there is no wells per se or aquifers below the rock. Also, we're on the bank of the Columbia River on one side, and on the other side is an old channel of the Columbia River which is now composed of slews.

And so based on the larger water movement around us and the fact we sit on a rock, there's really no chance for the contamination to concentrate or remain in any significant fashion is what we propose.

MR. FAUVER: So, if I may, you're using the building occupancy numbers, and you're assuming that it will not be building demolition, but that the fact that there were demolition, you've done these additional evaluations?

MR. COOPER: Exactly. That's what we look at because we don't have any assurance that the building is going to stand for any number of years. And should these things happen, then it's plausible that the rubble could be carried somewhere or left there on site.

That drove us into this analysis of the surface contamination and the volumetric DCGLs and how they interact and which one would actually be bounding to make sure that we covered both scenarios. If we left the thing standing, would it be okay. If we rubblized it and

hauled it off, would it be okay.

And for the rubblization scenario, we made, again, a very broad assumption calling the concrete soil, and I know that's a very rough one. But again, for our screening scenarios, we felt that was a first approach that we could live with.

MR. EID: One other question. How did you address the issue of hot spots within the concrete?

MR. COOPER: Hot spots of the activator concrete? Let me get to that.

MR. EID: Oka.

MR. COOPER: I guess the short answer is that we haven't.

MR. EID: Okay.

MR. COOPER: Coming up with, again, what I call a site-specific screening DCGL set is a little bit of a challenge because we're combining radionucleides with different peak dose value times and different pathway sensitivities.

When we jump into this process, we're still naive, but we're learning. And even this morning from Theresa's presentation, we learned a lot more. But we thought we could just easily put together a source term and call this good. But we recognize that there's a lot of factors that are playing in the model, and it wasn't quite as easy as we thought.

So this is a consideration that has to be addressed in the screening DCGL set. Also, not all the radionucleide specific DCGLs will apply or be limiting all the time for all the pathways of a given scenario. The other item is the DCGL uncertainty versus the measurement variability.

This statement out of the SAB Report on MARSSIM at the bottom of the overhead, "It is likely that the uncertainty associated with the mathematical derivation of a concentration guideline would greatly exceed the variability of data from field samples." So in other words, the variability of the data will be a relatively narrow band compared to the uncertainty in the DCGL.

And, therefore, our focus is to clean up the site, number one. And then number two is to derive a DCGL we can live with whether it's a tight fit or loose fit because we recognize the DCGL -- the uncertainty is very large. And so we're going to clean up the site, find out what's left and see what we can live with from a DCGL perspective.

So whether our end value is actually 1.2 times, the DCGL is just slightly larger than our mean, or whether it's tens or hundreds of times larger than our mean, we're really not too concerned. The idea is the DCGL is -- the data mean is below the DCGL, and we meet the acceptance criteria for site release.

MR. FAUVER: Excuse me, say that again. Let me -- the argument is well founded, and I understand it. But the way you just said that was as if you were going to propose the use of the mean as a compliance point for your surveys somehow justified by the fact that there is some larger perceived uncertainty in the dose modeling. Is there an additional basis and argument that ties those things together maybe a little more quantitatively in your license termination plan?

MR. COOPER: I don't think I followed your question.

MR. FAUVER: I heard you say that you were using the mean -- in essence, I thought I heard you say you were going to use the mean of the data as your compliance point.

MR. COOPER: As also the statistical test will be applied to that mean also.

MR. FAUVER: The statistical test of --

MR. COOPER: MARSSIM.

MR. FAUVER: MARSSIM?

MR. COOPER: Yeah.

MR. FAUVER: Okay. You've got your 95 percent confidence level on your data set, and then you're going to somehow link that to the uncertainty in your dose models. It was kind of confusing -- that statement you made. I just didn't know if you could elaborate on that.

MR. COOPER: Okay, let me go back and restate it a little bit because it is confusing. As you'll see in the -- in fact, I don't want to jump into that yet. But there's some numbers that are relatively tight from a screening DCGL value. We're not worrying about those yet.

We realize that if we are able to meet those, the data -- our actual measured data will be very close to the DCGL value. Now on the front end, some people may be tempted to then play with the DCGL such that they can boost the DCGL value up higher so the data mean will fall way below the DCGL value when you come out the other end.

And our approach is, number one, we're going to clean up the site. And right now in fact we started to clean up the site remediating -- doing the dismantlement, decontamination before MARSSIM came out and what not. And so the criteria we've given our decommissioning folks is if it's detectable, remove it. And that's the approach we're taking.

Where, if we truly applied the guidance and the latitude it provides us and had we come into the process a little bit earlier, we could have used some of this to actually structure more of the way we were doing decommissioning.

But so now we're into the process. We're going to clean up the site. We've got some screening DCGLs. Some are way high. Some are way low. And then we come out the other end. Then we hope they're below the DCGL -- the data main, the goal of the DCGL and pass the statistical test that will be applied per MARSSIM.

And if it does, great. If it doesn't, then at that point in time we'll revisit the scenario, revisit the parameters, revisit the assumptions, and then look at taking that relatively low screening DCGL value and modeling that more specifically for that little circumstances and changing the DCGL, the finish line.

Does that give a little better --

MR. FAUVER: Yeah, that was better. Thank you.

MR. COOPER: Okay.

MR. FAUVER: And the reason you can afford to take this route is because of this basic premise that you're going to remediate anything above background.

MR. COOPER: Yeah, that gives us more latitude, more flexibility than other sites would have.

MR. FAUVER: I see.

MR. COOPER: And generally, what we end up with at the site is because of on a cost basis really it's just too expensive to take care of. And that will indicate to us that we need to revisit the screening process and see what we need to do there.

Now this is a busy slide, and the numbers per se aren't necessarily important. But we're trying to develop this screening DCGL set. First of all, we developed a radionucleide set of the nucleides we were interested there at the site. And to develop this list, we took essentially every detected nucleide in any of the samples we had taken and include a dose in our set.

Now many of these will be inconsequential from a dose perspective. Nevertheless, we want them to be presented and accounted for. And so that's why they're included in our set.

We then ran the building occupancy. These numbers include the published screening values we talked about this morning. Plus we've included other numbers for the Alpha, transuranics, and some other Beta-Gamma emitters that are not in the published screening value set. This uses the straight default scenario, default parameters is totally unchanged using DandD.

So if any of you use Version 1, these are the numbers you'll get for each radionucleide. Now if you introduce combinations of nucleides again, then you have different peak dose value times and, again, different pathway sensitivities.

You're going to start seeing a little bit of movement in your doses and the dose projections and the DCGL values as you mix these. So that was the only surface contamination

set we have. So we're going to call that our screening DCGL set for surface contamination.

The other three sets are for our volumetric. The first is the building renovation or demolition scenario. We again concluded what the NRC had already concluded -- that this scenario very seldom is limiting, and so, therefore, we discounted or set it aside and looked at all scenarios which are more apt to be limiting at our site.

These for us were the two residential farming scenarios. What -- the landfill scenario, as I mentioned, what we did, we just reduced the source term with all the pathways left on. For that fraction, the rubble was carried offsite and buried at a landfill. And the farming scenario onsite, we turned off the water pathways.

Now, again, I learned as I am learning and increasingly understanding the model, what we did is we turned off the uptake. We turned off the ingesting of the water by the animals and by the humans, the ingesting of the contaminated fish and the irrigation using contaminated water.

What we're doing is we're actually losing -- our source is dissipating as it goes into the groundwater, the aquifer, and it's leaving our scenario. Well, a better approach for us would have been to limit through turning off the infiltration. So we keep the source term essentially sitting on the ground for the direct exposure and for the plant uptake. And I guess introduction through the animal meat chain, too.

MR. ROBERTS: Just a quick question. Rick Roberts, Rocky Mountain Remediation Services. Could you explain a little bit why you chose to use a landfill for assessment in this case because I thought -- and the way I read the regulations is that -- the assessment actually stops at the time that you decommission the building.

You go to your DCM per square centimeters, and if you meet that, then the material could really go anywhere. But what I see happening is that an additional assessment being made after you've already met the building occupancy criteria that isn't explicit in the NRC regulations.

And could you explain a little bit why that you went that extra step which, maybe I'm wrong, but it doesn't look like that's required within the regulations.

MR. COOPER: Right. The problem we ran into is, again, we're looking at the site. I'm in a concrete room, and I'm applying surface contamination DCGL to all my surfaces except for one corner of the room where the concrete has been activated.

And a surface DCGL is not adequate for that corner of the room because of the activation throughout the concrete. And so when I apply volumetric DCGL to that corner of the room, that's not reasonable except as I look at that corner in relation to the whole building being rubblized.

And so I imagine if you're not worried about the volumetric contamination, it's a step you wouldn't need to look at. But we felt it's something we needed to at least consider and understand whether we formally did an evaluation or not. We need to know what's happening.

MR. ROBERTS: Okay. So that step really isn't a step that needs to be performed for, you believe, for other facilities. Or, I guess this goes to you, Dave. Is that an assessment that the NRC would require to demolish a building. I was looking at where the rubble goes after you actually meet your building occupancy standards.

MR. FAUVER: Well, the old policy was under Reg. Guide 186 that if you met the building contamination numbers and you could demolish it, and that would be it.

Well, now, as everyone knows, it's a dose base standard. So the fundamental compliance value is 25 millirem to a member of the critical group. Now we've taken a shot at it, and our guidance and we've got some generic stuff out there in the building occupancy scenario and a resident farmer scenario.

If it were to happen that there were another scenario at deliver the higher dose and another critical group under some plausible future land use or demolition of the building, the regulation would cover that.

MR. ROBERTS: Okay. So then we're saying -- I'm just trying to talk through this a little bit because I didn't ever realize this before. But even if you meet the building occupancy guidelines, you still need to look at a landfill where that stuff may go to because there may be a limiting dose there?

MR. FAUVER: No, I'm not suggesting that the regulations are requiring that. I'm saying that the regulations do call for the identification of the critical group. And that it could possibly be something other than resident farmer scenario or the building occupancy scenario. I believe that some of these things were generically looked at when DandD was being developed. I think they tore down a groundwater assessment of a building contaminated at these levels, although I can't get my hands on that. I haven't specifically asked the developer that they've done that kind of thing.

But in a general sense, you need to think this thing through. But I think in a generic sense, it may be useful for NRC to perhaps look at some of these generically and make some statements. But the general answer is you might want to think about that so you don't get surprised. But a detailed analysis submitted to the regulator would likely not be required.

MR. MCKENNEY: Chris McKenney, NRC. I think that another reason why this Trojan Plant probably did this is that their plant site analysis turned off the groundwater pathways. And at a landfill, they wouldn't be necessarily turned off if the rubble is moved off site if it was cleaned up. If the building was this rubblized on site, there's no groundwater. But just to be safe or to cover the various other scenarios you guys analyzed, if it was moved some place where there was groundwater pathways, would that be more limiting.

MR. GENOA: Paul Genoa, NEI. Help me, Jerry. You're residential farming on landfill. The doses are based on a resident on that offsite landfill, or are they based on a resident living on your site recognizing some of the source term is now gone to a landfill?

MR. COOPER: We've got the two scenarios. The landfill scenario is that fraction of the rubble that was not used to backfill the below grade areas on site. It was hauled

off and family living on it. The plant site scenario is a family living on all of the rubble. So all the buildings have been rubblized. They've been left on site. We recognize that would be a couple meters thick of rubble if they're living on top of that. That's a 100 percent of the source term.

MS. BROWN: Theresa Brown from SANDIA National Laboratories. Part of the problem, too, is that the parameter analysis and the building occupancy scenario are specifically for surface contamination -- not for volume contamination of walls. And so that's how they've addressed this issue of volume contamination without guidance from NRC on how to do that.

MR. ROBERTS: This is Rick Roberts again. I guess I would submit that if the NRC feels that these types of analyses are appropriate instead of in order to terminate a license, then there needs to be some kind of criteria set up for when those types of things need to be performed because it was my understanding before this presentation that those were -- you just looked at the building occupancy. If you met it, you could terminate your license. But I guess I'm hearing that that's not actually the case.

MR. EID: This is Boby Eid. I have a question. The NRC on this landfill is in municipal landfill anywhere within the county or the country, or it is landfill onsite?

MR. COOPER: It's an offsite landfill.

MR. EID: Now the rule in the criteria for onsite resident. I believe that's the critical group definition is for onsite. So this means you're having critical rule which is offsite. And for the municipal landfill, typically you have much, much more valuation of the source term into more rapid and more kind of waste that's being disposed than municipal landfill.

So have you in your analysis have you assumed what kind of valuation factor that you assume for the landfill.

MR. COOPER: Zero.

MR. EID: Zero valuation factor.

MR. COOPER: Yeah.

MR. EID: So why not assume, then, onsite landfill instead of having it offsite?

MR. COOPER: Why don't I assume landfill onsite?

MR. EID: Right.

MR. FAUVER: It's haulable onsite.

MR. COOPER: Would I leave the water pathways on or off?

MR. EID: What I'm saying that because this could be site specific. And you know, the site-specific criteria need to consider the site-specific conditions. So in your case, you may justify not having the groundwater pathways.

For example, if it is landfill. If it is some other case, maybe there is no justification for elimination of the pathways for the landfill.

MR. COOPER: Right.

MR. EID: So what I am saying in general terms that typically the scenario and the critical group should be onsite rather than offsite because this would be site-specific condition. If you try to generalize this as generic kind of analysis, so I believe it won't hold. But if it is landfill for onsite and there is justification that is a potential for that scenario, so this could be the rationale for this review them, maybe considered.

MR. COOPER: Okay. The plan -- the residential farm plan site, I infer from your remarks would be also -- I would refer to that also as an onsite landfill. In other words, where I rubblize everything and leave it there on the site versus carrying it offsite where I would then turn all the water pathways back on because I don't know where exactly it would be carried. I would have no control over its disposal as it happened post-license termination.

MR. EID: Because as the question was raised, this is subsequent of the decommissioning for moving the material and disposing it somewhere else.

MR. COOPER: Yes.

MR. EID: So I would say, you know, more we are interested in onsite analysis rather than offsite analysis.

MR. COOPER: Okay, I see what you're saying. We're going above and beyond

where you really intended to perhaps we'd go. Okay. Now we're looking at the two residential farming scenarios. And we want to only apply one of the two. We're trying to find out which one is most limiting.

I tried to bold the isotopes that are most limiting. They don't show up very well. But a few of them, for example, the landfill scenario, Carbon 14 is limiting. Metal BM-94, Cesium are limiting, and then we jump down to the uranium and some of the transuranics are limiting of the landfill scenario.

And the plan site scenario, the Tritium is limiting. Iron, Cobalt, Nickel, Strontium, Antimony, Europium. So we've got limiting isotopes in bold scenarios, and we only want to get down to one set. We didn't feel it was appropriate nor reasonably -- we felt we needed to be consistent with our model, apply one model and not take conservative values from wherever they came to make that our screening DCGL set.

We believe that violated an intent of our approach. So in the next step we did, we looked at the type of media we're dealing with that is contaminated, and what we would be doing with it.

For example, a soil contamination Cesium 137 and Strontium 190. Well, if you look, the Strontium number is limited the plant site. The Cesium 137 is limited by the landfill number.

Well, we concluded since, based on our site characterization that we would not be doing any type of large scale soil removal, therefore, the landfill scenario is not a reasonable application for soil. And so we discounted landfill, and we said, okay, plant site is the only reasonable scenario for handling soil. And, of course, we have some other scenarios such as activated concrete. In activated concrete, the isotopes that contribute most all the dose are the Tritium, the Cobalt and the Europium.

Well, if you look, the Tritium, the Cobalt and the Europium are all limiting the plant site scenario. And so based on these types of analysis, we concluded that of these two

modifications, the residential farming scenario, the residential farming and plant site was the one we should more appropriately use as the volumetric screening site-specific DCGL set.

So now we have a set of DCGLs that look something like this.

MR. THAGGARD: Excuse me, Jerry. I wasn't quite clear on that last statement you made about the Cesium. You said that because of the landfill one was more limiting, you were going to use the farming scenario concentration burial, is that correct? Did I misunderstand that?

MR. COOPER: For soil, the two isotopes we're most interested in are the Cesium and Strontium, the two that would probably give us -- be of concern. For these sets, the Strontium is limited by the plant site number.

MR. THAGGARD: Yes.

MR. COOPER: And then the Cesium is limited by the landfill number. So, again, the question remains which scenario would I apply, would I appropriately use. Now based on our site characterization, we found the soil there on site is very low levels of both Cesium and Strontium, and we would not expect any large scale remediation. Therefore, we would not expect any soil being removed from the site in large quantities and taken offsite somewhere and handled at a landfill.

Therefore, the appropriate scenario to address that soil which would be left in place would be the plant site scenario. That was the logic behind some of that. Now I'm presenting this to you as some of our thought, and this is by no means unique or profound or anything like that. It's just some initial thinking by us as we try to go through this initial iteration and present this to the NRC, establish a framework and then go on to the next step.

So -- and I may not be doing justice to some of our thought that went into this, either.

MR. THAGGARD: This wasn't a criticism of what you was doing. I just think that you may have some real difficulty in terms of how you present that information because if

may -- if you present a credible scenario, it's going to be difficult to not use the numbers coming out of that scenario.

And so it's going to be how you present the information.

MR. FAUVER: Another comment while you have this up. I assume you have a characterized radionucleide mixture at your site.

MR. COOPER: Yes.

MR. FAUVER: And that probably varies a little bit across site depending on the processes and what went on. It seems that this process might be more direct if you were to use that mixture or estimation of your mixture to run through your credible critical groups scenarios if they're deemed credible. And what I've heard you say is that in essence you don't think that for soil that the landfill scenario is credible regardless of how this came out. So you would exclude that on that grounds. And you'd be left with these remaining what you would call credible critical groups.

And then you -- I don't understand why you didn't just load in your mixture of radionucleides and see which one resulted in the highest dose.

MR. COOPER: That probably would have been easier. Yeah, that didn't occur to me.

MR. SAITO: Excuse me one second. Earl Saito, Combustion Engineering. Dave, there's something here I think either I'm missing or I don't understand. Are you applying some of the fractions here? I mean, you keep talking about the highest radionucleide like you get 25 millirem for each one of those, and it's not my understand that you do. So you have to apply some of the fraction as well.

MR. COOPER: Exactly. And I'm going to get to that in just a second.

MR. SAITO: Okay.

MR. COOPER: And Earl points out a very good point. These are radio nucleide specific DCGL values, and I have not identified a circumstance or condition there on our site

where we would ever apply these are they are presented here.

But what they are are building blocks. So what we would actually present to the NRC would look something like that -- would be a set of building block values and then along this line, we also identify and establish a framework within which these building block values would be used and applied for the various conditions and circumstances onsite.

We have multiple distributions. So we tried to stay away from distribution specific DCGLs recognizing that we may have tens or hundreds of distributions. And so instead, we're establishing building blocks so we can then apply as a distribution dictate.

Now these --

MR. EID: I have a question. Boby Eid. Can I assume that, you know, these DCGls are using the building occupancy scenario that it will not meet these building surface criteria, and you are going to the scenario where you have all your metrics scenario rather than surface contamination? Is that the reason behind that, or you are moving from the surface contamination criteria to the volumetric criteria? Is that the major reason behind it because it will not meet the criteria for surface contamination?

MR. COOPER: We want to use a surface contamination criteria where we can. However, we don't understand yet how to apply that in relationship to portions of the building that are activated and the surface contamination criteria would not be appropriately applied.

MR. EID: So it would be much higher like, you know, hot spots area, eradiated areas, and those are the ones that are trying to do the modeling in order for those -- they will not be the surface criteria. So what you do, you assume volumetric criteria then for those.

MR. COOPER: And later on, one of the other presenters has done some of this as we've done. They'll present it to you and show you what we concluded also when we did this.

You can see some of these DCGL values, particularly the transuranics. Also the Strontium number .4 people curies per gram. Some of these values are extremely low. But, again, in accordance with our approach I previously described, we believe that we can probably

live with these values. We don't know.

When we actually get to the point where we collect the data, maybe these values are such we can't live with them. At that point in time, we would then develop a site-specific DCGL or a site-specific model to address that parameter or that circumstance that we find that we can't live with. For example, a Strontium number or perhaps some very low Alpha emitters that we can't handle otherwise.

So right now we're going to leave them as is and not worry too much about them. Now the way the DCGLs are applied is several different ways. One is a surrogate ratio of DCGL where we actually have a surrogate radionucleide. And, of course, everything else was based like the hard to detects would be fractions of that detectible nucleide. And so we would then just develop some based on our distribution the surrogate ratio DCGL that we would apply there. Another type of DCGL mix we would apply, so to speak, is the gross activity for surface contamination. We would take the known distribution of the representation and convert that such that we can evaluate the DPM per 100 centimeters square as far as its acceptability.

We have the elevator measurement comparison DCGL for areas that exceed the DCGL. And then, of course, the unity rule of the sum of the fractions. Other ways we would specifically apply the radio nucleide specific DCGLs. Here's the example of the activated concrete reactor vessel shield wall. This is an eight-foot wall that's around the reactor vessel. It's approximately eight foot six.

So we took a core, a concrete core and we took different segments for the core and then characterized what kind of contamination -- what the distribution was. And at that point in the concrete sample. The tall point you see is the contact reading. And for eight centimeters into the depth of this wall, it was 90 mark per hour.

So just from a contact perspective, the question we're asking right here is how much do we remove of this eight foot thick piece of concrete much of which is activated. How much do we remove, and how much can we leave behind.

MR. COOPER: We recognize, too, if we determine we need to remove too much, then it affects the structural stability of the entire structure, and we end up removing a huge amount of concrete. So these are all considerations that we're looking at.

Now from a contact point of view, from a contact rate of the dose rate, you can see down to 57 centimeters which, by the way, was only a layer of rebar which measures 1.4 MR per hour. I assume that the concrete was similar.

But I need to remove at least 57 centimeters right off the top. And I'll need to go beyond that some distance. Well, I don't know how far, and this is where I would need to apply these DCGLs and then look at this from a remediation cost perspective and what it will do to this primary shield wall structure and what it will cause me to do.

As I go through and I apply the --

MR. FAUVER: Jerry, one quick question.

MR. COOPER: Sure.

MR. FAUVER: Did you do any correlation of your core results to your neutron transport analyses? Did you do a neutron transport analyses?

MR. COOPER: Yes, and we found it was pretty representative. We took four samples of different spots in the containment and compared that to the activation analysis we had performed just from modeling and based on affluence. And we found there was a correlation there.

MR. FAUVER: Good.

MR. EID: Excuse me, I have a question. You have from 482 to 457 depth. That is the increase curie for Cobalt-60?

MR. COOPER: Right.

MR. EID: What's --

MR. COOPER: That's what we found. When we took the sample, we measured it, that's what we found.

MR. FAUVER: One sample here.

MR. COOPER: And you can see the same thing with the Cesium-137. We go back 194 centimeters before we find anything. All of a sudden, boom, we find something.

MR. FAUVER: That's something.

MR. COOPER: And I think that illustrates that we can model all we want. But sometime reality just doesn't match up to our models. And so I can't explain all of it. So if we take this and just do a very simple comparison applying the DCGLs for the various isotopes, the volumetric DCGLs, then we see the Cobalt-60 DCGL requires that we take out about 100 centimeters and go about four feet deep into the structure.

And then if we look at some of the other ones, Cesium-134 and the Europiums, they require us to go at least three feet between 72 and 99 centimeters. Then, of course, if we'd apply the unity rule, then we'd probably have to go a little bit deeper. And so as we look at this and we start looking at how much concrete we're going to have to remove, we'll start comparing it with the cost of removing the concrete. And then we may have to come back and say, hey, hauling concrete soil may not be such a good assumption after all, and we may want to refine that assumption so we get better DCGL values that we can live with for this part of the project.

Another quick piece of actual data is the embedded piping data. For all we've done, we don't quite understand or know how we're going to model embedded piping. And this is piping that's embedded in concrete, and it would be relatively difficult to remove.

Everything that's exposed, we'll be removing. But we've taken samples from various systems from the pieces of embedded pipe in various systems. And these are the dose contribution fractions as we've applied them to the two different residential scenarios.

Right now, what we're collecting surface contamination data in the embedded pipe, running detectors down inside of the data. And we plan to take the surface contamination data, and there's our pipe in our block of concrete. And we're just going to model that as volumetric, change the surface to a volumetric concentration over the volume of the pipe for that

pipe that we grout.

Therefore, the grouted pipe and concrete, we're viewing it as a concrete block essentially. For the piping that we don't grout, we don't know exactly what we're going to do and how we're going to address it. But, again, we want to maintain the dose model. We want to maintain the umbrella approach that everything is dose based.

MR. FAUVER: Right. Did you use the surface number or a volumetric number when you looked at these dose contribution fractions? Was that your surface contamination you were looking at from your assessment inside your pipe, or did you make an estimation of what the inventory of activity was in the pipe, think of it volumetrically.

MR. COOPER: For these actual dose contribution fractions, we've taken samples of actual pipe and sent it off for lab analysis. So I cannot give you numbers that represent the volumetric concentration or the surface contamination concentration right now. But a surface contamination you have concentration.

So these numbers I give you right here are just based on running the known distribution through the scenario. But then what I will be doing is collecting the surface contamination data, and then I'll be correlating that with this distribution and then converting it from surface to the volume of the pipe. That is, the --

MR. FAUVER: Maybe I'll talk to you about it.

MR. COOPER: Okay. And again, that's just for the pipe that we choose to grout. When we grout the pipe, we eliminate a lot of potential pathways such as if that pipe was in place and rainwater, or maybe it was used as some part of a process, then we need to understand now erosion and corrosion and other type of mechanisms, concentrated mechanisms such that at the bottom of the pipe, there's not a barrel that a cow is drinking from or their child is drinking from or something like that.

So parts of the pipe will be grouted. Other pipes will not. And we don't understand yet how we're going to handle that from a dose-based perspective. You can see,

though, from the different types of samples we've taken, Cobalt is generally the principal dose contributor and Strontium, and then, of course, there's some contribution from Cesium.

We feel we can't ignore the Alpha contribution, though it's very small. We feel we need to address it in some form. I recognize that we're dealing with it or that it is taken care of in our scenario. The plant site is the dry scenario. The landfill is the wet scenario. You can see this changes things a bit.

Carbon 14 now becomes a significant dose contributor. Also, there's an interesting point, too, that we've discovered. All these samples except for that one come from dirty systems. They're pre-remediation samples. That one ox fill and drain tank piece of pipe came after we did some high pressure washing, hydrolyzing of the piece of pipe.

And it's interesting because our tracers, our easily detectibles are actually going down, and our Alpha contributions are coming up. Right now, we're in the process of cleaning our embedded pipe, and the cleaning folks come back to us and say how clean do you want it. And we had to think about this. Hey, if you get it too clean, we won't be able to see the activity, and that will be a little bit of concern.

We're not there. That's not our foremost problem right now. But it was an interesting thing that we identified the Alpha contributions are increasing, and our easily detectibles are decreasing.

MR. GENOA: Paul Genoa, NEI. I just caution you that hard to detects are hard to detect for a reason. And analysis is suspect. And so just be careful. What you're talking about really are some scaling factors and things like that.

You may be seeing artifacts of laboratory analysis there. So just take that with a grain of salt.

MR. COOPER: And again, this is based on a radio chemical analysis. We don't plan right now to do any type of field Alpha measurements in embedded piping. We don't feel that we can get any numbers that will really be meaningful, particularly after the pipe's been

cleaned. So I covered a lot of things today, and I appreciate your patience. I felt the need last night as I was reviewing this in the hotel room to quickly do a summary. So I covered so many things.

This is the points I wanted to summarize. Number one, guidance provided is a giant step forward in the right direction, we feel. And the guidance involvement from the very first step is a worthwhile objective in our minds. There's a lot of unknowns to our approach and what we want to do.

It is unclear, however, how that can be accomplished or how it will be accomplished. And it may be a licensee problem, and it may be NRC or it may be just a little bit of both.

Number three, the process allows a broad range of licensees latitude to adapt it, to fit industry site-specific conditions which I think is a marvelous plus. We're all not chafing under Reg Guide 186 or the other type of things we have to live with.

Number four, the default screening scenarios and the DCGls will need to be modified in some manner by most, if not all, reactor sites. That's something we need to look at as a segment of the industry.

Number five, the recognition of the iterative approach, particularly for complex sites, is key to an efficient process. More and more, we're converted more to the fact that this is an iterative process throughout almost from start to finish. And we need that process or that iterative flexibility to make this an efficient process for us.

And last, the uncertainty as to how the process will actually be implemented and the licensee regulated in its implementation. The greatest challenge, preserving the fluid process within the well defined decision making framework. And thank you for your time today.

MR. FAUVER: Any questions? Okay, thank you very much. That was excellent. Paul, do you think we should take a break now or is there something you want to put on first?

MR. GENOA: That's fine. We're going to follow up with four relatively short -- very short presentations today. Carol is going to have a more lengthy one when we wrap up. So we can take a break whenever you want.

MR. FAUVER: Let's do 15 minutes.

[Recess.]

MR. FAUVER: Paul, you want to go ahead and do the production?

MR. GENOA: Yeah, Pete Littlefield is going to talk to us a little bit here. And Pete, again, is with Duke Engineering, and he's working currently supporting the Yankee Rowe Project.

MR. LITTLEFIELD: I want to talk about some of the use we've made of DandD and RESRAD and just some very basic applications.

AUDIENCE QUESTION: Excuse me, do you have a presentation package because I don't think we have it.

MR. LITTLEFIELD: There was some out at the table. MR. FAUVER: It looks like this, Dennis.

MR. GENOA: I'm afraid that most of these have already been sucked. But the NRC did get a copy of every one of them when we put them out front.

MR. EID: The previous presentation we don't have copies. I made just quite few. And then I will give them to the reporter.

MR. FAUVER: We'll get some copies made.

MR. EID: For this presentation, there was on the table a bunch of them. I guess we run out of them. I will make copies during the break.

MR. FAUVER: Yeah, I'm sorry, the gal who was the receptionist earlier has a copy of every one of them.

MR. LITTLEFIELD: This slide just shows we DCGL analysis to try and get some screening level values for soil. We ran RESRAD. We ran the interim version of DandD, and we

ran finally Version 1 with program defaults on the left side, the left three columns. And then finally we replaced some of the parameters with some of the values out of NUREG 5512 and added a few site specific values where we had good data on site numbers.

The Cobalt number's pretty consistent, as you would expect. Cesium numbers, DandD giving you very low numbers and particularly as a final version even dropped the number for Cesium even lower than it was in the interim version down to the point where it's literally at background levels, and track for system would be very difficult. I'm not sure what's going on there, but I'm going to talk a little bit about that, and several of my colleagues are going to talk a little bit about that after me.

And Strontium-90, again, some fairly low numbers in the default mode out of DandD.

MR. EID: Excuse me. I have a question. I'm Boby Eid. The values for RESRAD, they were derived based on default RESRAD values, or based on site specific values? Can you explain this more? I missed what you said.

MR. LITTLEFIELD: The left hand column is strictly the program defaults, Boby.

MR. EID: Okay. Those are RESRAD default.

MR. LITTLEFIELD: Yes.

MR. EID: Okay. And the right hand --

MR. LITTLEFIELD: The righthand one is, again, using the same parameters in DandD and RESRAD right out of 5512, with the exception of a few, maybe three or four site specific numbers. Area was one site-specific number we put in the actual area.

MR. EID: Okay. You used Volume 1 values in 5512 Volume 1 or --

MR. LITTLEFIELD: Yes.

MR. EID: Or you used the DandD default screening values because they are different.

MR. LITTLEFIELD: Yes, I think it was the Volume 1 numbers.

MR. EID: Okay, thank you.

MR. LITTLEFIELD: Another application that we've tried to run just very briefly is, again, getting back into something that Jerry touched on is the rubblization of concrete. We tried to determine what difference it would make in surface contamination levels that would be acceptable if in fact we decided to rubblize concrete and then do a final survey on a rubblized mass, assuming that the rubblized concrete resided on our site.

So what you see in the left hand column is in fact the equivalent surface contamination -- acceptable surface contamination levels that would translate into 25 millirem per year given that the concrete was rubblized and placed on our site, assuming that the concrete was soil. We made no provision for the fact that there would be any pathways turned off. So all of the pathways in DandD are included in that column.

If you look at Cobalt-60, probably what you're seeing is a value of six or seven times higher than what DandD picks for screening level for surface contamination. The right hand column, by the way, is just the default values right out of DandD, and these are the numbers that are published that you picked up probably this morning out of the Federal Register.

So Cobalt 66, seven times higher if you go through the rubblization scenario. Interestingly enough, Strontium 90 comes out to be just about the same. And, again, the anomaly seems to be Cesium where in fact we're looking at a number that's five times or six times lower with the rubblization scenario than what you would accept under the conventional screening levels for surface contamination.

And, again, this seems to be driven by the fact that DandD is predicting fairly large doses for Cesium through water pathways, through vegetation, through food stuff, and we would expect to see that the predominant dose from Cesium being direct exposure from the ground plain.

MR. FAUVER: Pete, both of these are DandD?

MR. LITTLEFIELD: Yes, they are.

MR. FAUVER: And the second question is how did you -- what did you assume in your averaging in terms of the volume -- the volume conversion.

MR. LITTLEFIELD: Okay, yeah, we assumed a four inch thick wall. So a very thin concrete wall, yeah. That's a good point. And we also assumed that all of the contamination when we converted back from PT curies per gram in the rubble mass to surface level contamination, we assumed that it was all going to be detectible. In other words, that none of that contamination turned out to be embedded in the wall, and we couldn't detect it. So there was some simplifying assumptions that went into that. Yes.

MR. MCGUIRE: So can I ask if I understand what you're doing? What you're saying is if you took a four-inch thick concrete wall and rubblized it and then analyzed it by the resident farmer scenario, the dosage would be lower except for the Cesium so that certain building surfaces are more limiting scenario. Is that what you're saying?

MR. LITTLEFIELD: I guess I'd say it a little differently. What I'm saying is that if we decided to rubblize that concrete wall and then do a license termination after it was rubblized and put on our site, that those left hand column numbers would be the numbers that would be acceptable from a surface contamination standpoint.

So that if I did a surface scan on the concrete wall before it was rubblized, those would be the kind of numbers that I'd be looking for in order to finally achieve an acceptable concentration in the rubblized mass.

MR. FAUVER: Scott, you had a question?

MR. MURRAY: Scott Murray with GE. Are you saying that there's an inhalation pathway that is included in this any kind of an uptake? And if so, do we have a resuspension factor?

MR. LITTLEFIELD: No, Scott. That scenario is strictly the resident farmer scenario.

MR. MURRAY: Okay, okay. You said all pathways, and I was just curious.

MR. LITTLEFIELD: No, I meant when they're resident farmer scenario.

MR. MURRAY: Thank you.

MR. FAUVER: What that means is it's probably conservative.

MR. LITTLEFIELD: Yeah.

MR. FAUVER: That rubblized number.

MR. LITTLEFIELD: Yeah.

MR. FAUVER: Theresa was next.

MS. BROWN: I guess I'd like to ask a clarifying question. Now you're concerned that there's a difference between those two values that there's something wrong with the models, or that it's the scenario themselves that cause you a problem?

MR. LITTLEFIELD: I guess my concern is that of the very low number we got for Cesium, Theresa. And it's the same as I got on it when I did the screening for the DCGLs.

MS. BROWN: Right. And part of the problem is the difference in these exposure scenarios, the length of time that people are exposed because once you get to the residential farmer that was intended for the surface soil contamination exposure, you have much longer exposure times. You have higher inhalation rates during certain periods like when they're gardening and that sort of thing. There's al these compounding factors when you go from a building occupancy scenario to this residential farmer. I just wanted to point that out.

MR. LITTLEFIELD: Yeah, okay.

MR. FAUVER: Henry?

MR. MORTON: Yes, Henry Morton. Considering the way that DandD is now being managed, when apparently anomalous or apparently problematic results like this are found, who will be charged with resolving this within the code?

MR. EID: This is Boby Eid. I guess here we are comparing in this kind of specific case we're comparing apples and oranges. We're comparing results using two different scenarios.

The building occupancy scenario is different from the residential farmer scenario. The source term for the building occupancy is different from the source term for the residential farmer scenario wherein the soil other one building surfaces the occupancy time, as Theresa indicated, also is different.

So here, the comparison that it is not a fault. It is not a problem here. It's just you are using completely two different kind of assumptions, two different kind of scenarios. So the comparison here in this case is not valid. Here, we are talking about impact of something in the soil and impact on something on the surface of the wall. So we are assuming in the building occupancy that the building will be occupied by light industry workers. That's the assumption.

Whereas, in the left hand side, we're assuming that a residential farmer establishing his residency and establishing a farm on the side and the pathways, they are completely different and unique.

So the comparison here, I do not see forth. I don't see a problem. It is just the exposure pathways. And in this case, for Cesium as was indicated because the exposure time is different and the Cesium mostly the direct exposure is more significant in this case of, you know, scenario for the Cesium. That's why you will find so many consistencies in the value.

MR. MORTON: But if there's some problem in the coding, in the model, in the bio cumulation factor, in some transfer factor, the dose factor that is not apparent from the code that we have available to the user, if some apparent result that does not look sensible occurs, for instance, with the Cesium in a straightforward run, then who will work to resolve that.

MR. EID: Okay. I guess we're talking about two different things if we compare these two, my suggestion is not use it as example. But we are talking about something else.

MR. MORTON: Yes.

MR. EID: We are currently addressing the issue of input parameters to the codes. We realize there are some conservative parameters. The staff, we are working with them and Christine Daily in the previous workshop indicated that the mass loading factor for

plant deposition for example, needs to be changed. And we're working on that to change it. That's number one.

Number two, resuspension factor is another area we are dealing with. We would like to change it. Now there are some other areas the licensees will be using the code already. We'd like to hear it, and we have the website. We'd like to hear input where are these problematic issues that we can deal with.

So typically they will come, and the NRC staff both from analysis and research will look into it. And then we'll discuss it within the dose modeling group. We'll discuss it within the group that are dealing with the dose modeling, and they will provide the commendation for some kind of modification or changing those input parameters if they are problematic.

So we'd like to receive as much as you can feedback from the licensees on use of the DandD screen code. We'd like you also to realize that it is a screening tool. It is not a tool to give you realistic dose.

MS. BROWN: Henry, --

MR. MORTON: I guess more straightforwardly, if Pete thinks that there's something apparently wrong in the numbers that he's getting out of Cesium, who should he call to describe the problem to?

MR. FAUVER: I think Boby sort of answered that. Basically, Henry, that's what this is all about. We've put out a lot of announcements. What we're trying to do is to solicit feedback from people that are using it for real cases, and we're also trying to encourage folks to use it and try it. And to the extent they have any time to review it and to provide that feedback to us either through this workshop format, through the website or written comments, whatever you think is the most appropriate depending on the severity of the potential flaw that you find, we're in a two year -- now it's probably down to a year -- test period of the DandD code. It's a new code. We're comparing it to RESRAD. So that's what this is all about. Submit it and bring it in. Talk about it.

MS. BROWN: Theresa Brown, SANDIA National Laboratories. There's also a former process in place for software problem reporting that we follow. So we generate these reports quarterly. Anything that's deemed a critical problem, we just get the approval from the NRC to fix, and we do that and we issue a new fix.

MR. FAUVER: Theresa, how does the public comment feed into this? Is that a website at SANDIA?

MS. BROWN: There are, I think, three different ways to actually go about doing this. You can go through the NRC website and put comments in. Those are directed to Chris Daily, the project manager, and she forwards them to us. You can call Chris directly or send her e-mail.

You can also contact the DandD help site. There's an e-mail site in there. There's a help phone number that usually appears with the software and the instructions for installing the software. You can call that number, and that comes directly to us.

Anyway it happens, a problem report is generated. We all work to see whether or not it's a critical problem and decide whether or not to address it immediately or propose future fixes.

MR. FAUVER: Thanks. Bet you didn't think all that would come up from one slide.

MR. LITTLEFIELD: I think I've used up all my allotted time. Quickly, I went looking for parameters that may explain some of these things, and we've had some discussions with Theresa today, too, which have been very helpful.

But I'll just quickly just go through some of the parameter changes that we noted between interim version of DandD and the final version. One of note here for Strontium was the soil to plant concentration factor went from 1.6 to 64. Some of the consumption numbers went up specifically for leafy vegetables and for milk consumption, fairly significant change between the interim version and the final version of DandD.

And finally, one that you're going to hear a little bit more about in a minute. Also noticed on the KD factors distribution coefficients for both Cesium and Strontium. If you note that the big difference here between RESRAD which assumes a value of 1,000 for Cobalt and Cesium as opposed to now a value of about 10 for Cesium in the final version. All of those may have something to do with explaining why the numbers for Cesium and Strontium appear to be pretty low in the screening model.

Okay. That's all I have.

MR. GENOA: Perhaps -- Paul Genoa, NEI. The next three speakers or the next two in a row actually are just going to very briefly add on to the Cesium issue. So maybe we run through them and then ask some questions.

MR. FAUVER: Great.

MR. HOLLENBECK: Pete Hollenbeck, Duke Engineering Services working with Connecticut Yankee. Well, can you hear me? How many of you actually have run a DandD code Version 1? Okay, well, I had my first opportunity Tuesday afternoon before I hopped on the plane. I got some results that kind of surprised me. I just want to share them with you.

We have a project CY where we want to establish a small soil storage area -- temporary soil storage area where we could put very low levels of contaminated soil in there so that could be potentially used at license termination.

So we only want to put material in there that would meet the unconditional release criteria. So I'm involved with establishing the criteria for putting material into this area. So management came to me and said, well, what are the numbers, Pete. I said no problem, I have the February, 1998 draft version of the 1549. It's got some tables in there that have pica curie per gram values that equate to 25 millirem.

So I looked at those last year, and they looked reasonable to me. It was like 3.68 per Cobalt and 9.8 for Cesium 137. I had some experience with NUREG 1500, some RESRAD experience, and those numbers looked reasonable to me. So I didn't bother doing

anything about it.

Tuesday afternoon, I was informed that the latest version of 1549 did not have those tables. I said, oh, that's interesting. So I immediately fired up my version of DandD for the first time, and I threw in the 3.68 for Cobalt-60, and the code gave me a value of 25.2 millirem. I said life is good.

So I went off and talked to a colleague of mine who was using DandD for another purpose, and he told me to watch out for Cesium and Strontium. He said you get very high numbers. I said, oh, oh, back down stairs, fired it up and I threw in the 9.83 screening value from the table, and it came out with 278 millirem.

I didn't modify any of the parameters. This was both residential scenario. Well, after I got up off the floor, I called my colleague and said what's going on. He said the acquired pathway that's dominating. He said get rid of the pond. I said it sounds like a good idea. There's not going to be a pond in this little storage area. So I reran that, and that came up with 45. So it was still over the magic 25.

So I was getting concerned. I just did another run, and I just put in what we would consider background levels of Cesium about 1.6, 1.7, and the default scenario gave me 47.5 millirem which is still over the 25.

That's it. I didn't have a chance to validate the Strontium numbers. But I just wanted to bring it up today as what I would consider a pretty simplistic use of the code. I got some results I was surprised with, and I just want to make sure everyone's aware of that. Cesium and Strontium are important to the nuclear power industry. I got a result that I did not expect, and I think we probably ought to invest a little more time into some of the parameters that affect Cesium and Strontium.

MR. GENOA: Paul Genoa, NEI. The implications, of course, would be that every member of the public in the Northeast is receiving 40-some millirem from Cesium. That's probably not valid.

MR. HOLLENBECK: Yeah, the NRC guidance on background radiation puts a value on background Cesium at a much lower value than that probably in order of magnitude.

MR. EID: This is Boby Eid. Thank you for the information. I will look into it into more depth and analysis to see what is the problem and why these high dose values would be elicited or not, and we'll let you know. So that's high marked that there is a concern about the Cesium and Strontium values. We'll see if maybe Theresa has something for me on that.

MS. BROWN: I have the solution. I know why it's a problem, and it's because of the way the default parameter values are selected. And, again, that inherent conservatism of having to incorporate all the isotopes in to determine the set of default parameter values, it gives you that 90 percent confidence interval.

So for Cesium and Strontium, again, it pushes it up there. We have a much more confidence that you're not going to under estimate dose. That's the problem with the single set of default parameter values. That's the inherent conservatism. It's a problem with all of the alpha emitters that we have to come up with a single set of parameter bytes again for all isotopes. So that the solution is that's why the difference in the tables because the tables were generated with the output distribution for the individual isotopes. So that's why you have higher concentrations for single isotopes in those tables.

It's, again, a complicated process of coming up with those default parameter values using all the isotopes. The tables themselves single isotopes, you'd have higher numbers.

MR. EID: Also I would like to add to this more as I talked about before a few minutes ago, and we discussed in the previous workshop, we have the mass loading factor for plant deposition is significant factor. We've heard early that it is not sensitive factor, and this could be changed by a factor of 10.

I guess SANDIA and research, even they agreed on that. And we said we will change it in the code for the Monte Carlo version. We are discussing whether we can change

earlier or not. That's an area also we could modify.

I suspect that this factor we change Cesium and Strontium very substantially. That's another area we'll be looking into. But we thank you much for giving this information and for using the code.

MR. FAUVER: Theresa, help me out on this. What's the QA level on those tables that were issued in the back of Version 1549 that went to the Commission?

MS. BROWN: I think that was just a quick review to see if the output was in the right space -- in the right lines. That's extent of the QA on that table. You'd have to do more of it before you finalized that. But also I can't explain why there's differences between running the code with the default parameter values versus the values in the table.

MR. FAUVER: Well, because they were individual nucleide variants on the table.

MS. BROWN: That's right.

MR. FAUVER: I think you indicated that.

MS. BROWN: That's right. That's why there's a big difference for some of the isotopes.

MR. FAUVER: I guess where I'm leading with this is what would we need to do to make that available in the near term for use. Is that far-fetched or not based on QA and the --

MR. THAGGARD: Well, the solution is once we get the Monte Carlo version of DandD, that's going to largely solve this problem. I think that's what Theresa is saying.

MR. FAUVER: I recognize that.

MR. THAGGARD: And once we get the Monte Carlo version of DandD and get that available for people, I think that will eliminate this problem to a large extent.

MS. BROWN: I think in the interim the best solution would be to put in the appropriate source term in DandD and look at the parameter values and so a more site-specific analysis of the parameter values -- with the parameter values rather than using the defaults. It

would be the most expedient method in the case we have more than one isotope.

MR. FAUVER: Norm?

Mr. EISENBURG: Yeah, this is Norman Eisenberg. You know, the stamp made an explicit decision to put out the table so that it would be consistent with the default values in the code. I guess if you get feedback that it would be better to go ahead and have a table that's based on nucleide, we could do that.

But users would have to understand that you're not going to get the same result using code. Perhaps we can get some feedback on that.

MR. MASCIALLI: Steve Mascialli, Cabrera Services. I just wondered based on all this conversation is there a time frame established for the probabilistic version of DandD, or has any consideration been given to one that might be actually available?

MR. EID: The answer to this question, still we are actually trying to finalize the contract and the proposal to SANDIA. According to SANDIA -- do not quote me now, it is not official, possibly it will take about four to six months to complete this work.

MR. MASCIALLI: Thank you.

MR. GENOA: Next, we have Joe Darman representing Main Yankee.

MR. DARMAN: Can you hear me? I'd just like to reiterate that Cesium anomaly if I can figure out how to turn this on. When I first got the code, I wanted to compare it to some numbers that I'd seen in the past. So I compared the building scenarios to Reg. Guide 1.86. And with our plant specific nucleide mixes, there's seven different nucleide mixes there. You can see that the Reg Guide 1.86 numbers were about 5,000. And for most of our plant mixes for the occupational occupant DCGL, they come out pretty close to that 5,000 number. So I thought, okay, DandD is running pretty good here.

The bottom one there in the up ender smear, the QA transfer of the out uranius trench, that was dominated by Alphas, and we talked a little bit about that resuspension factor with Alpha. So I just ran a run here to see what would happen if I changed that resuspension

factor, how it would affect our plant specific nucleide mixes. And for the Beta-Gamma emitters, it didn't have a big change. But for our plant mixes, we had more of an alpha component. It helped us out.

Okay, then I got into looking at maybe what the resident farmer scenario numbers should look like. I pulled up this old bloomsberg document. It said Cesium maybe should be about 15 pica curies per gram. I took our plant specific nucleide mixes, put it into RESRAD. I think I may have used the PG-808 scenario C recommended defaults for RESRAD when I did these runs.

MR. EID: Could I just comment? The DG-808 has been superceded. So an implementation of the LTR. So I would suggest to you the current DG-4006 values.

MR. DARMAN: Okay.

I was just trying to get a feel for what the numbers should look like with our soil DCGLs. I'm looking at, you know, about this 15 per curie per gram number. So that looks good.

I think I also had -- let's see, I compared it to the numbers published in NUREG 1500, used those values, put into our plant specific mix. Again, I'm coming up with numbers that look pretty good -- up, you know, about 10 pica curies per gram anyway.

Now using the DandD Version 1, I'm coming up with real low numbers. All right, they didn't seem to be right or come up like .4 pica curies per gram, 0.8. Something didn't look right there.

I wasn't sure what it was, you know. Were we releasing sites in the past. Maybe not as good as we thought we were, or is there something wrong with the code. So I went to the NRCP Reports, and based on what's out in the environment, the NCRP says we should be getting about 1.4 millirem per year from Cesium levels where DandD predicts about 28. I don't think there was a problem in the way we were releasing stuff. I think it might be a problem in the code.

Being a novice at this, I'll admit, I went into and tried to play around with some of

the parameters to see if I could get something a little better. Again, I looked at it, okay, there's Potassium, Cesium, Uranium and Thorium were out in the environment. We got loads of data on that, and everybody, you know, I'm essentially a residential farmer out in the environment. I'm eating food, drinking water.

So I said, all right, let's look at how DandD is comparing to what NCRP reports for these isotopes. And just about in every case, it over predicted those four isotopes. So I went back to the letter reports, and I plugged in the KD values, the mean KD values that the letter report thought were mean values, and it helped out in a lot of the cases.

And then I went back and used from another report that I believe SANDIA published with the recommended plant mass loading factors, and you can see how that changed the dose. So I think there's something going on there. But exactly what it is, if it's a model problem or a parameter problem, I don't know.

MR. EID: No, I agree with you. I predicted the mass loading factor could be a significant factor, and we change the values. Or it could be other areas, and we'll look into the Cesium and Strontium for sure and take it seriously.

MR. DARMAN: That's it. Thank you.

MR. GENOA: We certainly appreciate that because Cesium is predominently. And we appreciate your thoughtfulness in reviewing that becaues it is so very important to the reactor community.

Now we have Art Paynter, GPU Nuclear representing Saxton Plant. We're going to get off the Cesium a little bit, I believe, for a brief presentation.

MR. PAYNTER: I just want to sit in my seat. I have some written notes, and it's just very brief. Before I start, I'd like to thank the NRC for having these workshops. I've attended several of them, and there's been some really good dialogue going on and there's been a lot of questions, although maybe some of them are unanswered. I think just to get the opportunity to get the questions on board has a lot of value. So it's a good process.

The only thing, we're in the middle of the process of decontamination or decommissioning, and it does kind of change our thought process, and we are waiting for some of the answers.

The Saxton Plant itself was operated from 1962 to 1972. It was a very small powered reactor. In 1972, we started to basically phase decommissioning. Fortunately for us, we had no fuel on site that was sent to the Savannah River Side.

Like I say, during this phase decommissioning, we did some soil remediation. And knowing that the new guidelines would to go to dose-based type of criteria, we've done some work with RESRAD while we were removing the soil and shipping it off to Utah.

And we continued to use RESRAD for that purpose, although DandD has come out, and it could be a useful tool with some modification, we've decided to stick with RESRAD for a number of reasons. One is because we had some historical information with that. We've had personnel trained with that, and we've developed a relationship with others to give us some consultation. So it's really not an effect that there's some wrong with DandD at this time. What we plan to do, then, eventually is to take our numbers and to put them into DandD. We tried to bounce them back and forth originally, but we're moving factors around. It's just too confusing. So we've kind of basically abandoned using DandD at this time and stuck just with the RESRAD.

We do have -- if you see, our situation is basically twofold. One is we'll have contamination remaining, residual contamination remaining in the soil. And then the second part of this, we'll have residual contamination remaining in our containment vessel.

The vessel itself, as you can see here, it's 110 feet from top to bottom, and it's approximatey 50 foot wide. About 60 feet of that is under ground, and it's marked by the 8' 12" elevation as the grade. We planned to decontaminate. All the equipment is basically removed now. We're going to decontaminate the services to a DCGL. And once that's released, we're going to cut off the bottom from the three feet below grade to the top and remove that and dispose of that appropriately.

The bottom section there will be filled in with dirt, and then it will be punctured some holes in it so we can allow groundwater to flow through there. It is sort of a complex model when you consider the fact if you look three foot below the grader, three foot below that 8' 12" elevation, that's normally where our groundwater goes. It sits sometimes about a foot below the ground to about six foot below the ground. So it averages about three foot. So it is pretty much a complex problem.

And maybe RESRAD won't be able to handle it. So we're hoping that we can use other methods, and we, you know, sure hope that you leave the door open with not just using these two that have been mainly discussed, but maybe using a Presto or something for site release.

Jerry's made several points about site characterization being an unending process. Those that haven't started decomissioning, it is. Matter of fact, we joke around saying that decommissioning is a site characterization supported by a system dismantlement because that's basically what happens.

But I just want to leave you with several questions or comments, and they don't need to be answered now. But we just need to get them onto the record and to maybe discuss them in a future time.

Boby there mentioned in the standard review plan for dose modeling, you know, you have to defend being conservative and defensible. We want to make sure that there's some guidance there so it doesn't turn out to be a science project. We realize there are some variables, and there are some other sources of information. But you know, we want to make sure that we're not needing to take 30 samples of everything to defend any kind of value we need.

So if we could have some guidance on that or what you will accept or not accept upfront, I think it will make our job easier, and it will make your job easier to review that. So we encourage that.

The other part we did see is when we were doing some soil remediation is initially we had some LD values, and it was one of the reasons I brought up the fact for Iodine earlier is that we looked at the heart of the tech nucleides. One of our engineers decided, well, let's just take this nucleides because, you know, for RESRAD site you have to identify them and they use them for dose purposes. What happens is we use these levels to see what kind of doses, and we're just kind of using some of our statistical parameters.

But for our site, if you had one pica curie per gram of Iodine-129, it gives us 155 millirem per year dose. Now realize that most people when they sample soil, they have probably had just the normal sampling techniques of three to four pica curie per gram. Oh, deep, so you were looking at an LD value there that could be between 5 to 800 millirem per hour.

Now you know, I don't know if that would be acceptable. So in your guidelines, we would appreciate to have some method as to how to handle these hard to detects, you know, background information that we would not necessarily need to account for them or, you know, if they are an LD value, what LD values will you feel comfortable with. And that would be make it a little bit more cost effective. We don't really want to go back and resample or do a lot of costly analysis. So if we could have some guidelines upfront, I think it would help us and others to prevent that in the future.

The other one is that I was brought up from Jerry's and I want to encourage it, too, is to give the guidelines to encourage the participation upfront between us and the NRC.

I don't know if some of the inspectors or the people we talked to are kind of leary to do that because maybe a potential conflict for interest or whatever. But they need to be guideline established for both of us so we know what to expect when we request to talk to them basic common as well as, you know, we'll put a notice out, and there will be an open meeting, and we'll discuss it there. So we're leary of doing that not because we have any problems. We know in open conversations sometimes the NRC tends to go to the more conservative and not the prudently conservative viewpoint. So we want to encourage if there's some kind of

guidelines for discussion that that will be set up.

And the last point would be to encourage this Monte Carlo development for the doses. I think that would help people out to use the DandD code for a more of a screening process without getting high numbers and having to worry about, you know, getting dose numbers out to the public.

You know, when you're doing a screening, that's the first thing people want to hear is that your initial results or your decontamination was 75 millirem per hour or 75 millirem or three times the limit. I don't think that's actually the purpose of the screening.

And the fourth one that I mentioned it before the final one is to please leave the door open so we could use other models. That's all I have. Thank you very much.

MR. FAUVER: Excellent set of comments. Just an administrative response related to the public meetings. Essentially any time that NRC meets with the licensee, it's a publicly announced meeting. That doesn't mean necessarily -- the meetings I've been involved with which have been many, it hasn't inhibited conversation. It's not necessarily the same participation that you see here, but it's just announced as a public meeting. So that shouldn't really be a hindrance, you know.

And we are strongly encouraging use of site-specifci models if it helps. Of course, there's a hurdle to overcome in justification of it. But I think if you look at groundwater models and this type of thing, you might find that there are a group of models that are already being used by NRC, for example, in something like the high level waste program or maybe in some low level waste analysis work that might be more familiar with to lower that hurdle a little bit.

MR. EID: Also I would like to add -- this is Boby Eid -- that we are developing probabilistic input parameter to RESRAD. So hopefully with the licensee the supplement will have some kind of understanding the degree of conservatism, and hopefully this should be available to the licensees when this contract is completed.

We did not still initiate -- we are initiating the contract. We still did not sign the contract, but we are developing the final scope of work for that kind of -- this will give more room to you as other -- those other models besides the DandD. As we said, DandD is a screening tool, and we encourage using other models. We never said that you cannot use other models for site-specific analysis.

MR. PAYNTER: All right. Yeah, I never meant to say that you did. I just - as the process go along, that just becomes the standard, and then everything else is too, you know, off the path to be acceptable.

One thing you mentioned that there's other codes. Is there a way to find out where they're located, or is that published some place?

MR. THAGGARD: Well, I know there's a NUREG document. I can't recall the number off the top of my head. At least for the low level waste program, we're SANDIA, I know, looked at a number of different computer codes when we was trying to develop dose modeling for low level waste. If you meet me in the corridor or something like that or e-mail address, I can give you that NUREG number.

And there is also a computer center. I don't know who's administering it now. But I can get that information for you, too. There's a number of different codes there.

MR. PAYNTER: That would be great maybe if we could even put that on the website or something where people can get additional information not only for myself, but for others. But I will give you my card.

MR. FAUVER: You can put it on the website once you get the information.

MR. PAYNTER: I'll be glad to.

MR. EID: For offsite releases, I would say there is MEPAS which is available for offsite assistance. It was used for one of the off sites. And then in addition, RESRAD also has the Beta version of offsite releases impact analysis. Of course, SANDIA is developing SEDDS, and they are developing suites of models. SEDDS still is not finalized, but you know, there is

NEFRAN code for contaminant transports that we have used in low level waste, and that's another option, too.

MR. PAYNTER: Yeah, we realize there's a lot of codes out there, but we want to at least have something that you're familiar with so we don't have to go from ground zero. So if you do have some of those that you were using, I think it would be beneficial not only to us, but for you, too. Thanks.

MR. GENOA: Okay, and now who do we have finally? Carol Hornibrook of EPRI. And we've really put a time crunch on her, and I apologize for that. This discussion has been good, and I know you're also excellent at pinch hitting. So I let you get the job done.

MS. HORNIBROOK: Dave, could you just give me the hi sign when I have my last five minutes.

MR. FAUVER: Okay, you've got plenty of time.

MS. HORNIBROOK: I wanted to bring people up to speed on where EPRI is on dose modeling kind of research that we're hoping to do and the approach that we're going t take.

Just to give you a quick update, in August, in one of the first workshops I believe the first one you had, NRC was interested in the research that we were doing. So we requested a technical workshop so that we could let them know what we had done so far, where we were going, what our thinking was, and also get some input from them.

In November, we actually had the meeting. It's really brief in terms of what was presented. But obviously they gave an update on SANDIA's review of the codes, RESRAD and DandD. We did a presentation on our single parameter code analysis for both RESRAD and DandD.

I didn't include that information per se because we've used the interim code, and we believe there have been some significant changes. Maybe we were right, maybe we were wrong. But we did use RESRAD 5.85, I think.

And what came out of those discussions was that there were about eight

potential areas where we could cooperate or at least people were interested. Both sides were interested in looking into them further. And I'll be going through most of these one by one.

So we're interested in doing a model comparison, and but, of course, we're coming at it from a commercial and nuclear power plant perspective. What I do need to get some clarification on is I'm intending to use RESRAD 5.82. I thought I was going to be able to use your probability code, but it doesn't sound like it if I'm going to get the data report out by the end of the year which probably would be most helpful to you. So I'm assuming its 1.0 is the code that I should -- okay.

I want to say here differently that's what EPRI's going to use, okay, on DandD.

MR. EID: You may modify some of the parameters if you were to internet if we decide that certain parameters like RF resuspension factor that could be changed without impacting the PDFs. Maybe there is a way where you could go, and we will announce on the internet. So you could modify that part.

MS. HORNIBROOK: If you did that, then we'll keep up with any changes that occur and try to keep current with that.

MR. FAUVER: Carol, can I?

MS. HORNIBROOK: Yeah.

MR. FAUVER: Theresa, is it unreasonable to consider that they might be able to get the hard to use version of the probabilistic DandD?

MS. BROWN: Let me talk to Chris, my project manager, and I'll see if we can release the version of DandD with the Monte Carlo driver on it to you.

MS. HORNIBROOK: Okay. We'd like to use whatever's the most useful to everyone. Let me also say that in that comparisons that we're going to do, there are two ways that we're going to approach it.

One is we're going to use a default values in RESRAD and in DanD, and later I address this. And we realize that some of those parameters actually have to be adjusted so that

there's apples and apples, oranges and oranges. So we take that into account.

The second thing is that we are going to run actual test cases. We're going to show that data with the NRC and also bring that up later. But that will be actual field data.

So there's two ways we're approaching these particular aspects of the code. The other thing is that it was our understanding that the NRC was going to look at the building scenario, and it sounds like you're just about done with that. And what we're going to address is the residential scenario. That's pretty much what we're going to be looking at.

As I said earlier, when we went to see the NRC and had the workshop, we presented our single parameter analysis. We looked at all the parameters, and we identified what we thought were the key parameters. And many of them were if they were about 10 percent impact on the code or higher, those were considered. We're going to redo that for the DandD code.

One thing that really came out of that workshop was that NRC was not really impressed with just a single parameter analysis. So we were reluctant to do a multiple parameter analysis. We had decided to do that, but on a more limited basis. We feel that it would be better from our perspective in terms of funding and what we can do in the time frame is really look at the key parameter interactions for infiltration dependent parameters like infiltration rate, solubility ratio, things like that, and then soil type specific parameters.

So we're really going to focus, but these are the areas that we think are really key in both of the codes. Okay. Another area that came up was source term in terms of an area of mutual interest. And maybe this slide could be better worded.

What we'd like to really look at is compare the code's capability to adequately address or handle our source term and nuclear plants. Okay, I mean, there are some instances when it was discussed earlier already if you have some disposal of some material, and it's not just in the 15 centimeters, you don't want to try to identify where instances like that do or don't occur.

We understand like everyone else that developing a good source term is the only way you're going to be able to really develop a decent dose projection from your models. We also realize that all the data that we use in this comparison and in any test cases that we share with the NRC we really want to document what the source term was we used, why we used it, why we thought it was representative or adequate in that particular situation. So we're going to go out of our way to make sure that's absolutely clear.

And then finally, we want to identify the necessary data collection. This is more from an industry perspective, and I heard that there was somebody here from the NRC that's also interested in this area.

Identify where there is available data that's easy for folks to get, that will really help them in terms of feeling comfortable with the data they're using in these codes -- whichever code they use.

MR. GENOA: I'm sorry. Paul Genoa. I want to clarify that. Those are parameter data input like KD factors. Where are those sources available because we just don't have geochemists or hydro geologists on site.

MS. HORNIBROOK: Right. Wherever we need it to supplement so that we have supportable, you know, why did you use this, why did you think this particular infiltration rate was correct for your site, et cetera.

Okay, as far as the code model assumptions, to my way of thinking, this kind of the first level -- whoops, of where you would want to be with these codes to understand is it really representative, is it really doing what you want the code to do.

And so on a conceptual basis we want to determine the applicability of all the assumptions. I mean, quite honestly at this point, we really feel like we have some question on the groundwater and the surface water submodels that are used because they're simplistic in order to be conservative. So just to give you an idea of the kind of things we're looking at.

And then we want to address each portion of the code to determine if improved

accuracy is necessary for its intended purposes. Looking at our particular situation, we really want to see what's the best use and also compare this idea of screening tool versus site specific when you go from using all the default values to actually putting in your specific data.

MR. THAGGARD: Excuse me, Carol. Are you aware of the recent NUREG document that was put out by P&L looking at the groundwater models and DandD?

MS. HORNIBROOK: I'm not. Are you, Menson, our researcher. Yes.

MR. THAGGARD: Okay. I just wanted to make sure you were aware of that. That might be something you might want to take a look at.

MS. HORNIBROOK: Okay, thank you. Thanks, Mark. As far as code parameters go, this is what I was mentioning before. When you want to look at input parameters for DandD and RESRAD, it's really important that you make sure that what you're trying to use as inputs for the parameters themselves are as close to being similar -- reasonably, otherwise you're actually trying to make the code do something with two different kinds of values or two different approaches. So we're going to try to tailor the code so that we can at least describe this is how it does it in RESRAD. It doesn't exactly fit when you want to do the same type of thing in DandD, and this is how we made our adjustments to accomplish this comparison.

Then there's also the interdependence of parameters. And there, again, we're going to select specific parameters -- the same ones that I identified earlier for the multi variable analysis, whatever I said there. We're going to look at infiltration dependent parameters and also soil type specific -- the sensitivity analysis. That's what we did.

And then finally, I just wanted to bring up a point on this interdependence. We're not always going to be able to come up with quantitative information. It's not always going to be possible. Because we understand some of the -- how the codes work and Sanyem who has done a lot of work for me on the disposal codes for low level waste, we kind of have a background. We have an understanding of how these codes work.

So we feel that if we have an understanding of how they're supposed to be

outcome, what it should be, take a look, get a feeling of whether or not that's how the code is working, and we can put some at least qualitative information together.

And a look at pathway analysis. And here, during the discussions that we had at that technical workshop, we're going to do a grouping. Obviously, for us it's 10 CFR and 10 CFR 1061, relevant nucleides that are found at nuclear power plants.

These are the ones we're going to focus on. We're also going to look at the key parameters that came out of our single sensitivity and multi sensitivity analysis that we conducted earlier.

I have elimination of pathways here. I'm not -- it was a topic that was brought up. To be perfectly honest, there's probably very few situations even if I were to say not a pond on the site. It just really depends. You really have to look at that carefully and make sure if there's anything we do think is not applicable, we have to really justify it.

As far as alternative scenarios, there's one already that we're interested in, and that's the embedded pipe scenario. But, again, from a residential perspective, naturability in terms of whether you grab the pipe or you dispose of the pipe, if you take down the building, how do you look at the dose implications of those options.

And then finally consevatisms again. We're just looking at our particular situations, and we identify where we think the codes are conservative or not. And then finaly on test cases, and if you'll note, I haven't identified which test cases we're going to do.

Obviously, I'd like to start from one simple one and go into the more complex situations that we find at nuclear plants. In presenting the data to the NRC, we'd also like to give them our evaluation of the two codes using the particular test data in mind.

The thing that we're finding out the more we wrestle with how we're going to approach some of the work that Mansun has already done, we realize there's two big things. One is you've got to get really good test cases so we can at least try in the spirit of opportunity before everything is finalized to get the real range of difficult situations that a plant will face so

that we can really feel comfortable that we gave it our best shot to try to figure out which code works where, when, how and why.

The other thing we're trying to get a good handle on is collecting as much data as we can from the plants themselves to see what the variability is, the amount the data they have, the kind of data they have, right down to how many might be on bedrock, how many are on sand so we get some kind of feeling for what they're going to be facing.

I didn't prepare an overhead on embedded pipe, but it's an area that we are specifically looking into. And the best I can say at this time because we are collecting data and starting to grapple with this question is that source term clearly to us is the biggest issue in looking at the dose for embedded pipe.

So what we're trying to do is get the best handle on what kind of data do you need to collect, how can you say that this is good data in order to develop your source term, and obviously you can put that into your models. The last thing is that -- and some of these points actually were brought up earlier by Mark and some other folks. Just a couple of things that we find make us uncomfortable at this point with the DandD code.

Obviously, the 15 centimeter problem where the activity is considered in that layer. The no cover and contaminated area. Also the activity in the aquifer. There's a long discussion on how your activity is or isn't diluted. It obviously isn't diluted at all by the aquifer. It's the volume of water that comes in versus the volume of water you actually pull out of the aquifer

Another thing that's of concern to us is that there's no absorption of nucleides in the sediments in the aquifer. And then concentration of nucleides on the surface. And the surface water, we find, is equal to that in that groundwater. At least that's our interpretation of what's going in, and that seems a little odd to us.

And then finally this one I don't feel that strongly about -- fish growing in contaminated surface waters are harvested and eaten continually during the year. Maybe, I

think, probably now that I think about it. I was thinking of the frozen ponds, but I got carried away, I guess.

But pretty much that gives you an idea of where we're coming from. Just a few pointers in things we've identified at this point. Are there any questions at all.

MR. EID: Yes, this is Boby Eid. You have any results that you can show us that could give us some kind of warning in using the DandD code?

MS. HORNIBROOK: No. Part of it is, as I said, there are a couple of things we wanted to get enough data and good data so that we could really do a decent comparison. And now that we have the codes or we think the versions that you would like us to use, it won't be long before you get some information from us.

MS. BROWN: Carol, Theresa, SANDIA. The other thing that you should get from us and remind me is the model comparison that we've done so far for the residential and the building occupancy scenario between DandD and RESRAD. At least give you a starting point for looking at all the assumptions that are inherent and some of the basic model differences.

MS. HORNIBROOK: Right. Is it different from the one that's on the web, or is that an earlier version.

MS. BROWN: I think that's a much earlier version. The one on the web is an earlier version. That's an early draft.

MS. HORNIBROOK: Thank you very much.

MR. FAUVER: Thanks, Carol. Well, that concludes the agenda for today. Just an announcement. For the fuel cycle facility form folks, we're going to have a short meeting as agreed upon somewhere in our conversations before the meeting -- after this meeting right here just for a few minutes as long as it takes.

Also, I guess, Paul, you were going to have some summary comments.

MR. GENOA: If there is time. I won't belabor them.

MR. FAUVER: Okay.

MR. GENOA: Again, Paul Genoa with NEI. Again, I want to thank you for this opportunity. It's important to us. We're willing to work with you to try to get through this guidance and resolve it so we can all do the job we want to do.

In capturing some of the issues that I heard yesterday in our task force and trying to amplify what I heard again today we think that for the most part the guidance is a big step forward in the right direction. I think that's important.

One thing that wasn't pointed out quite as clearly today but my understanding is from Jerry, they had the choice to go one way or the other. They chose the MARSSIM approach, and I think that's significant. So they're working their way through that, and they appear to think that's a useful tool.

We want to sort of applaud your flexibility and thought in developing the guidance. I mean, the guidance is laid out in a very flexible way. We hope you continue to allow us and craft guidance that allows that flexibility because there are a lot of variabilities out there, and that's important.

MR. FAUVER: Any other comments on that? Paul, could you also stick around for a period of time?

MR. GENOA: Yes.

MR. FAUVER: And anyone else from the task force is welcome, and anybody else is welcome actually to sit in. It's just going to be a clearly informal meeting to do some transitional stuff with the primary contacts for the workshop and NRC.

Well, thank you. Meeting adjourned.

[Whereupon, at 4:12 p.m., the workshop was recessed, to reconvene at 8:30 a.m., January 22, 1999.]