U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
CENTERS FOR DISEASE CONTROL
NATIONAL INSTITUTE FOR OCCUPATIONAL
SAFETY AND HEALTH

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ADVISORY BOARD ON RADIATION AND
WORKER HEALTH

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SUBCOMMITTEE ON DOSE RECONSTRUCTION REVIEWS

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THURSDAY
APRIL 13, 2017

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The Subcommittee convened via teleconference, at 10:30 a.m. Eastern Time, David Kotelchuck, Chairperson, presiding.

PRESENT:

DAVID KOTELCHUCK, Chairperson
JOSIE BEACH, Member
BRADLEY P. CLAWSON, Member
WANDA I. MUNN, Member
DAVID B. RICHARDSON, Member

ALSO PRESENT:

TED KATZ, Designated Federal Official
NANCY ADAMS, NIOSH Contractor
BOB BARTON, SC&A
HANS BEHLING, SC&A
KATHY BEHLING, SC&A
ELIZABETH BRACKETT, ORAU Team
RON BUCHANAN, SC&A
GRADY CALHOUN, DCAS
DOUG FARVER, SC&A
ROSE GOGLIOTTI, SC&A
JOHN MAURO, SC&A
KEITH MCCARTNEY, ORAU Team
JIM NETON, DCAS
STEVE OSTROW, SC&A
BETH ROLFES, DCAS
MUTTY SHARFI, ORAU Team
SCOTT SIEBERT, ORAU Team
MATT SMITH, ORAU Team
JOHN STIVER, SC&A
ELYSE THOMAS, ORAU Team
JOE ZLOTNICKI, SC&A

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10:34 a.m.

Welcome and Roll Call

MR. KATZ: This is the Advisory Board on Radiation and Worker Health. It's the -- well, actually, I didn't hear back from -- do we have Grady and Beth on the line?

MS. ROLFES: I'm here, Ted.

MR. KATZ: Okay. That's Beth.

Okay. This is the Advisory Board on Radiation and Worker Health, the Dose Reconstruction Reviews Subcommittee.

For roll call, let me just cover conflicts rather than the numbers, but we have a quorum.

(Roll call.)

MR. KATZ: Ok. So in going forward the agenda for today's meeting is posted on the NIOSH website. This program is part of the website, schedule of meetings, today's date, but there's not much to the agenda. I think it's easy to follow without it. And I think that takes care of matters.

Everyone who is not speaking, please mute your phones. That will improve the audio for everyone else. If you do not have a mute button, press * and then 6. That will mute your phone for this conference line. And then pressing * and 6 again will take your phone off of mute.

Please don't put the call on hold at any point because that will cause audio problems for everybody. So, no hold. Hang up and dial back in if you need to go for a piece.

And now let me continue with the rest of the roll call. So let's go to the NIOSH ORAU Team and see who's on the line.

(Roll call.)

MR. KATZ: Okay then. And with that and no further ado, Dave, it's your meeting.

CHAIR KOTELCHUCK: Okay. Very good. Well, let's just start with the blinds and let's just do them in the order that we got them. So let's do Lawrence Livermore National Lab first. Then we'll do Rocky Flats and then FMCP.

Okay? Good. And who will be doing that presentation?

MR. FARVER: This is Doug. I'll take that case.

Three Blind Review Cases from Set 23:

Lawrence Livermore National Laboratory

CHAIR KOTELCHUCK: Okay. That's good.

MR. FARVER: Go on down to -- well, let's talk about Lawrence Livermore. You can go down to page 6 and that's where it gets into the relevant background information.

Table 1.1 will show you the cancers that are involved. And then the next table on page 7 gives you a summary of the doses between NIOSH and SC&A. And as we look down, we can see that things are very similar. There's a little difference in the recorded electron dose, and there are some differences in the missed dose and the environmental dose, and so on, which we'll talk about. If we go down to the bottom, you see the combined PoC and it's very, very close. So overall the doses are very similar.

Okay. If we onto page 8, the employee worked at Lawrence Livermore for, gosh, 30 years

or so. A long time. Well, let's say -- I won't say too much about that. We know the cancers. You know where they worked. And we can maybe look at Table 2.1, but that just gives you an overall view of things. We're going to talk about the differences for each one specifically.

So [at] the top of page 10 we talk about the recorded photon dose. And both SC&A and NIOSH used the same photon distribution and came up with the same recorded photon dose.

Electron doses, Section 2.1.2, were a little different mainly because of location, because of the location of the cancers. NIOSH used an inverse correction factor for the one cancer that was on the brow, the eyebrow, and SC&A did not, so that results in a very small difference. Other than that they were very similar. Same years were covered. And so the difference is, you're looking at a difference between 125 millirem to 107 rem at the bottom of page 10. Not [as] much difference as photon dose. Now, there's a little bit more difference in the photon dose, partly because of the number of badge exchanges that were counted.

NIOSH assumed 246 badge exchanges. SC&A counted 317 badge exchanges. SC&A used an energy distribution of 75 percent [for] 30 to 250 keV, and 25 percent [for] greater than 250 keV. NIOSH used 100 percent greater than 250 keV, I believe. Let me get my table up.

Yes, they followed OTIB-17. OTIB-17 says that when you do the difference between the shallow and the deep dose, you always record it as 30 to 250 keV photon dose.

Okay. 2.1.4 is the missed electron dose. SC&A identified five places where the positive deep dose was recorded and a blank result for the shallow dose. SC&A interpreted the blanks as zeros and assigned them missed electron dose. It looks like NIOSH set the blank zero result equal to the deep dose result based on guidance in the external dose TBD. And according to OTIB-17, the missed shallow dose is only assigned when the shallow dose component is zero and the deep dose is non-zero. So if you assume it's zero, then you wouldn't assign it. And if not, then you don't. In other words, it's another very small difference,

between -- I don't know, not a whole lot, a few millirem.

Missed neutron dose, Section 2.1.5. We have a difference in the number of zeros. NIOSH assumed 165 zeros. SC&A assumed 259 zeros. They both used the same dose conversion factors and energy range. The other slight difference is NIOSH assumed the year period was one year less than SC&A assumed and it resulted in about 200 millirem difference in the total missed neutron dose.

Ambient external dose. SC&A did not calculate any ambient external dose based on their interpretation of PROC-60 occupational onsite ambient dose. SC&A assumed that the employee was monitored or missed doses were assigned for all years of employment. NIOSH assigned an ambient dose of about 146 rem proton, 156 millirem proton, 37 millirem --

CHAIR KOTELCHUCK: Pardon me, do we need to scroll a little bit more?

MR. FARVER: Okay.

CHAIR KOTELCHUCK: We're on the missed neutron dose.

MR. FARVER: Yeah, I see. I see where you're at now. Okay. So there is a slight difference. NIOSH made an assumption to assign the dose and SC&A did not.

Occupational medical dose.

CHAIR KOTELCHUCK: We need some scrolling.

MR. FARVER: I can see the medical dose on the screen.

CHAIR KOTELCHUCK: I do not. Mine has just been fixed here on page 11. Are others having trouble?

MEMBER MUNN: No, mine is on 12.

CHAIR KOTELCHUCK: Okay. What's going on? I can go over to my CDC machine and look at it until things straighten out here. Go ahead. I'm sorry.

MR. FARVER: Are we okay?

CHAIR KOTELCHUCK: I'll put myself back on mute.

MR. FARVER: Okay. Let's continue on with the medical dose. The DOE records show the employee received 11 routine X-rays for the time

period of employment. NIOSH calculated a dose of -- medical doses of 800 or so millirem to the back. And you see the other doses. SC&A calculated 11 routine X-ray exams and assumed a pre-employment exam. And that really amounts to the big difference in the doses. They were both entered the same way, but the only difference is one more exam.

Okay. Internal dose. We can probably go to the, yes, top of 13. The employee was monitored with urinalysis for, looks like, 4 years, 5 years out of the 30. And everything was less than detectable. Though SC&A made a lot of the same assumptions, there's two big differences. One is NIOSH assumed and they went through and calculated different solubility types. They assumed it was a natural uranium material and they determined a type-M uranium would be the most claimant-favorable. So the dose they came up with was about 5 millirem or so.

SC&A, based on the employee's work location and job title, assumed it was highly-enriched uranium, which explains the

difference in the dose. And when SC&A went through and did the calculation they determined type F uranium was the most claimant-favorable, resulting in about 100 times more dose. So you're looking at 400 millirem. But the big difference there in the selection of the type of uranium.

Then we go to the internal dose from environmental intakes. Both SC&A and NIOSH assumed that there was environmental intake. NIOSH assigned doses for the entire work period, but adjusted for some partial years. SC&A only assumed environmental dose for about 10 years because dose was assigned, internal dose was assigned for the other years. So NIOSH assumed or calculated about 400 millirem and SC&A was less than a rem, less than a millirem.

Top of page 14, Table 3.1 shows the overall comparison for the external and internal dose. You can see the total doses are pretty similar and the individual PoCs are very similar.

We can talk about the few differences. In the photon dose, there's a small difference in the energy distribution and the number of assumed

zero dosimeter readings. And NIOSH assumed different zero dosimeter readings. And also for the missed neutron doses there's differences in the assumed number of missed badge exchanges, and that's really the big difference in the neutron dose.

You get down to the next page, top of page 15. The internal dose: Both assumed a chronic intake based on half of the MDA. The two differences are SC&A assumed highly-enriched uranium; NIOSH assumed natural uranium, which led SC&A to a type F uranium and NIOSH to a type M. So basically the difference in uranium enrichment was the big difference.

And environmental intake just has to do with time periods. NIOSH assumed a 30-year period and SC&A assumed about a 10-year period, resulting in a difference in doses.

And that about sums it up. Any questions?

CHAIR KOTELCHUCK: Questions, anybody?

MEMBER MUNN: No, well done.

CHAIR KOTELCHUCK: A comment. I'm a little bothered by the fact that, if we go to internal dose over at Table 1.2 it summarizes it well. I mean, you have essentially half a rem difference. One does it through the different assumptions about uranium composition and the other with environmental intake. And those two happen to balance each other out, but you basically differ by a half a rem in each one of those two categories. That is, is that accidental? Should we view this as accidentally causing them to be almost identical, that the two cancel each other out but they're different kinds of assumptions?

MR. FARVER: There are, and this is one of the things that we've talked about before, the employee's job location and job title. Based on what the job title was and the building the employee worked [in], SC&A quoted the TBD for using, for justifying the highly-enriched [uranium].

So I don't -- I'm not that familiar with the site. I cannot tell you the difference, but it was page 18 of the TBD.

MR. SIEBERT: This is Scott. I can

address that if you would like.

MR. FARVER: Yes.

CHAIR KOTELCHUCK: Yes.

MR. SIEBERT: Okay. Yes, the main difference is, as Doug was saying, that they made an assumption that the employee was in the very limited areas where there's highly-enriched uranium, and we did not.

Doug's correct, there are some small areas at the site that have highly-enriched uranium. We had no indication at all that the employee was in those areas. One of them they could tie together is -- it's the ore-alloy [unintelligible] shop in Building 321C, and the individual was in the 321 area, but [was] never specified in the area that was using highly-enriched uranium.

That alone probably would not be enough for us. But if you look in the TBD, one of the things that's stated is somebody who was working in those areas, they would be doing bioassays for enriched uranium. And enriched uranium bioassay results are always in units of activity rather than

mass units. So all the sample results for the EE were in mass units, so that's why we make the assumption he was not working with the highly-enriched uranium.

CHAIR KOTELCHUCK: Okay. And that alone was, as we said, about half a rem, 0.4 rem.

MR. SIEBERT: That's all the difference for that one, yes.

CHAIR KOTELCHUCK: Yes. And that seems like a -- I mean, sounds to me as if that's a good justification for the decisions you made, but --

MEMBER CLAWSON: Dave, this is Brad. What about the time period where SC&A uses 10 years, and that's environmental, I think it was, the 10 years versus 30 years?

CHAIR KOTELCHUCK: I didn't pick it up. Let's talk further about that.

MEMBER CLAWSON: Did I hear that right, Doug?

MR. FARVER: Yes, and I believe that is because of the -- we assigned dose for the other years, internal dose, so we did not assign

environmental for those years. We just used the latter years, whereas NIOSH assigned it for the entire work period.

MR. SIEBERT: Yeah, and this is Scott. Yeah, it's based on the fact -- and we've discussed this at other sites as well -- if an individual is monitored for, say, uranium, you would not assign any environmental uranium during the timeframe they were being monitored because it would be included in the value that was part of the monitoring.

The difference for us is the TBD states that over the environmental period, the background period of all of his work, there would have been gross alpha, gross beta, tritium, plutonium-238, -239, and certain isotopes of uranium. What we did is we assigned, during the timeframe that the individual was -- the whole timeframe they were being monitored for uranium, we assigned the other things as well as we assigned the uranium during the timeframe they were not being monitored for the uranium.

The big difference why they got less

than one millirem and we got 400-and-some millirem is it's the environmental tritium for the whole timeframe. That's a pretty large component over that timeframe. And it's part of the environmental package that we normally assign.

CHAIR KOTELCHUCK: Okay. So really those two -- the difference between those two are linked, are they not, in the sense of covering -- the period that's covered for missed uranium then is not tallied for environmental, which makes sense.

MR. SIEBERT: Well, yes and no. I mean, they're partially linked because of the uranium, but it just happened to balance out that their assumption of highly-enriched uranium came out to a dose that was pretty darn close to the environmental tritium over the same time -- same points of timeframe. So those two aren't necessarily linked, but they're partially -- they partially offset each other.

CHAIR KOTELCHUCK: Right. Right. And -- but that's a -- I mean, that's satisfying to me to hear this discussion.

This is one of those, I think, unusual cases. I don't think we've had many [cases] where the PoCs are greater than 50 percent. I don't think we've looked at many blinds where that's been the case. If someone would refresh my memory, I don't think we have had too many. And it's good to see that they agree quite well.

MS. GOGLIOTTI: We have not had that many, but I believe there's like selection criteria limited to how high the PoC can be and ways to look at it. So I believe it's pretty close to 50 percent, which is --

(Simultaneous speaking.)

MR. KATZ: Yeah, the top end is 52.

CHAIR KOTELCHUCK: That's right.

MR. SIEBERT: And I believe the difference is we've had four and they were all right between 50 and 52.

CHAIR KOTELCHUCK: Yeah. So this has good agreement and it's good agreement on the far side of 50 percent. So any other comments?

MEMBER CLAWSON: Dave, I've got a question.

Scott, when you were talking about this, you were saying the environmental dose is because you brought in the tritium, is that correct?

MR. SIEBERT: That is correct, yeah.

MEMBER CLAWSON: So my question to you, Doug, is what did you do for that tritium? Is there -- are we off in that aspect or is there another way that you guys were looking at it?

MR. FARVER: Let's see. I am not sure if we included tritium.

MEMBER CLAWSON: Well, I was just looking at the difference between these two, and that's a fairly good sized number.

CHAIR KOTELCHUCK: Sure.

MEMBER CLAWSON: And I understand what Scott's doing. I'm just trying to understand what both sides did.

MR. SIEBERT: Brad, this is Scott. My guess is -- I'd have to look at the statistics -- but my guess is because SC&A assigned their environmental later in the employment period, in like the '80s and '90s, most of the tritium

environmental was earlier on in the site history, if I remember correctly. So if they weren't assigning environmental while there was uranium monitoring in the earlier years, that's why there would be a bigger difference than would necessarily normally be assumed.

MEMBER CLAWSON: Okay. I understand that.

MR. KATZ: Brad, they didn't -- I think SC&A didn't understand the nuance between environmental covering other exposures than uranium. And since the uranium was covered, they weren't using the environmental for that period. So I think that's the case, that NIOSH has had a -- has a more nuanced understanding of how to apply that environmental --

MEMBER CLAWSON: Okay. I just wanted to show that that's actually a fairly big difference there. And I just wanted to try to figure it out, but I appreciate that, Scott.

CHAIR KOTELCHUCK: Yeah. Well, I mean, I think that that's -- pardon?

(Simultaneous speaking.)

MS. GOGLIOTTI: I'm not sure that that nuance is always applied at all sites.

MR. KATZ: Well, yeah, I have no idea. It just sounds like it was supposed to be applied here and it was correctly here.

CHAIR KOTELCHUCK: Right. Which suggests to SC&A that while the results came out quite similar, and that's very good, maybe in the future SC&A should -- you should make sure that you pay close attention to that, or closer attention, because clearly there are -- tritium intake is important.

Okay. Well, is there any further discussion by the Subcommittee Members about this? If not -- hello?

MEMBER RICHARDSON: Hi. Yeah, this is David Richardson.

CHAIR KOTELCHUCK: Hello, David.

MEMBER RICHARDSON: I think that the fact that there's good agreement in the final result is one important piece of information. I mean, this is one of those examples where differences that balance each other out is -- I

think to your point, like, is it just a happy coincidence or not is something we could think about in the future calculating, something like the sum of the squared difference at each of these calculations as well, so that we would sort of aggregate divergence. If we're focusing on quality as opposed to kind of just focusing on the final number and the Probability of Causation results that comes out of that. But if we're interested in kind of differences in quality between two evaluations, we might also want to look at something that integrates up the differences, like sum of squared differences.

CHAIR KOTELCHUCK: The differences between the --

(Simultaneous speaking.)

MEMBER RICHARDSON: Yes, at each of the intermediate steps of the calculation. So where we use the underestimates in some places and overestimates in other places, those are all disagreements and we could have something which would quantify that.

CHAIR KOTELCHUCK: That would be a good

idea. It will involve a fair amount of work. I was also going to suggest later on in the discussion, but since it's coming up now, just to say that it might be nice, when we finish these six blind cases, for the SC&A folks to look at the differences in the totals rather than the sub-parts, the differences in totals and the differences in PoCs for sort of summarizing the tables, that we see what, if you will, the average differences are. And what you're suggesting is something a little bit more -- a little finer, much finer.

MEMBER RICHARDSON: I mean, even it's at the internal dose, external dose and occupational, environmental, for each of those components, it shouldn't be that much work. You've got basically sets of numbers that are --

(Simultaneous speaking.)

CHAIR KOTELCHUCK: I think -- is it reasonable to do -- I mean, let's ask for our Committee Members and others --

MR. KATZ: Well, let me raise a question first.

CHAIR KOTELCHUCK: Okay.

MR. KATZ: I think, until you have this discussion with the Subcommittee and NIOSH and SC&A, a discussion as to the differences, as we just did, you don't know which was actually correct. And like in this case, both of NIOSH's -- the differences, NIOSH was correct in what it applied. And so I'm not sure what you're gaining there by doing any kind of analysis on differences when one was correct and one was not. What are we learning from the difference between the incorrect method and the correct method?

CHAIR KOTELCHUCK: Well, let's say this: I have not viewed our past differences between the two as one was correct and one was not. I viewed them as two independent reviewers. You might argue here that one -- I mean, the justification that NIOSH gave for what it did made sense to me. But I would still not say that, well, overall we ought to accept what NIOSH did. And I think it's important that they were as close as they were on as many of the measurements that were done, or the assessments that were done.

So, to me, I don't view this as, if you will, one group won the battle. It seems to me that they both did a good job and that I do accept, in many cases, that the NIOSH folks have a much clearer sense of what's going on in each facility than SC&A, in a sense due necessarily to NIOSH's task and ORAU's task. But I still think, to my mind, an assessment of the differences and a more detailed assessment of the differences between the two for what will now be I think 26 cases, I think is warranted.

However, I don't think -- I'm personally not ready, just as one Member of the Committee, I'm not ready to suggest that we do that until we finish this set of six, which would be at the end of the next meeting.

MR. KATZ: Okay. I mean, that's fine. But there are clearly instances where there are errors on both sides, clear errors. And where there are errors I'm not sure that you have what you're saying, which is two equal but different approaches. So, but that's fine. I mean, it's up to the Subcommittee how it wants to go forward on

this.

CHAIR KOTELCHUCK: Yeah, well, if there are errors on both sides, then the Subcommittee is failing in its job. I think we are looking at -- we're trying to check -- we're looking at and approving the work that was done. And the initial assumption certainly is that these are both equally valid independent assessments. And by the way, SC&A says that in the reports clearly we're not deciding who's right and who's wrong.

MR. KATZ: Right, SC&A does not believe it's its position to do that. It's up to the Subcommittee to make judgments about that.

CHAIR KOTELCHUCK: Right. What do other Subcommittee Members think about this conversation Ted and I are having?

MEMBER MUNN: I'm so glad you asked. I've been biting my tongue.

It might be instructive for us to go back to our original mission: why are we doing this? And if our reason for doing this is to gain more statistical information, then what we're discussing in terms of pursuing further the

differences that we do see in these things, then this discussion in my view is valid.

If, on the other hand, our purpose in doing this is different, then perhaps we are attempting to gild the lily to no good end. If our purpose in doing this is to ascertain that a group of trained scientists are performing the duties that are assigned to them within the parameters that we have established for them, then we're okay the way we are, simply because, as has been pointed out already, what we've seen is -- and what we intended to see, I think, is whether different approaches to the same information would give us a statistically significant difference in result. Because there's, as someone else has already pointed out, there isn't always an absolute right way and an absolute wrong way. There are several ways to approach a number of questions.

The question was, given the same information, are the assessments that are being made reasonable and can we expect them to continue to be reasonable based on what we know? If what we're seeing as a result of this is a severe failure

in accommodation of the rules we set up, then there is something to be gained by trying to identify how we can change that.

But we have two groups of individuals, both highly trained in doing the specific things we're asking them to do. For the most part, there's no issue about how to interpret the information that's there. When there is some difference in interpretation, if it is something that we should be changing, then it's incumbent on us to try and identify what that is. But I don't see that that's the case here.

MEMBER CLAWSON: This is Brad. I had questions because we were in two different areas and we had two different things, and, you know, we came out fairly close.

Dave, I know that you have been with this in the long run, but what I was trying to find out is what the difference is. I'm not as elegant a speaker as Wanda or anybody else. I always look at it like this: we've got two different ways to skin a cat, but we still got the cat skinned. But are there -- we can't say which one is right and

which one is wrong. And that's why I was wondering about the 30 years versus the 10 years.

But the way that NIOSH looked at it I thought was very good. And I think I truly believe that, in what we were trying to do, it had been accomplished here. I don't feel that we need to analyze it more. This is why I think we're here today, is to be able to go through these, get a better understanding, and if there is something that's reaching out and grabbing us that something isn't quite right, then it's up to us as a Subcommittee.

I don't see that we would -- and I'm agreeing with Wanda, so don't anybody say or anything like that, but I don't think that we would gain anything from this. I think this is very good and I like the way that this is. You know, think about this: you've got two different people and one of them has been doing an awful lot for this one site and then we come in and we do it the same way, pretty close. We don't know all the nuances or anything else like that and we still come out this close. That, to me, I tip my hat to both sides.

This is really good and I think, my personal feeling is that I don't think that we gain anything more from this, Dave.

I just had questions and I wanted to clarify in my mind on how the approach is and how they were different. And I was satisfied with them. I think they both did a good job.

CHAIR KOTELCHUCK: Well, it may be the statistician in me, but I feel like we have some really good data. Overall, I'm very pleased with the results that we've gotten so far with the blind dose reconstructions because they have been quite reasonably close to each other given the complexity of the calculations and the different assumptions that must be made in the absence of perfect measurement data in the field.

But I do think that we have our hands on something with these calculations comparing the two independent and well-qualified groups that we may be able to spot something where there is a difference such that we could improve our -- we can approve our assessment and our procedures going forward, and I don't want to throw it away. So,

and I'll tell you right now, when we get down to the third one here today, I have precisely that concern. But we'll talk about that when we get there.

But basically I feel as if there is information to be gathered overall for our claimants. The fact that we come to similar conclusions with two independent studies is very important and very satisfying. And for the claimants, they should know that with all the different assumptions that are made and all the complexities two different groups come out the same, almost the same. And in particular, so far we have not had a situation where the two independent groups come out on different sides of the decision matrix of compensating or not compensating.

So that's very good, but I still think there are things to learn. And it may be -- I'm open when we get to it -- because we're not ready quite to make a decision. But when we get to it, we may want to form a little subcommittee. Not everybody wants to spend a lot of time on that. I

just feel like the information is there. I don't want to throw it away. That was my take.

MEMBER CLAWSON: Well, and we have a record of that. And you know what, Dave, there may be some that come up that are very intriguing. I never close my mind to learning and understanding this better. But the one thing that you did say is, you know, to the claimants, these have been blind, and so by looking at them as blinds I've been impressed that we've come out this good. Because we've been involved in setting up how the blind is going to be done. I already feel pretty good, but you know what, that being said, I'm not ever against keeping the information or whatever and how we go about it, but I feel pretty good about this one.

CHAIR KOTELCHUCK: Well, folks, is this -- unless there's further discussion, maybe we ought to accept this as a Subcommittee and move on. Does that sound reasonable, folks?

MEMBER CLAWSON: It is with me.

CHAIR KOTELCHUCK: Good. Good. Okay. Hearing no objection, we accept this, with thanks. And let's move onto the second one, which

is the Rocky Flats Plant blind case.

Rocky Flats

DR. BUCHANAN: Okay. This is Ron Buchanan. And if you'd pull that up, we'll start out on page 8.

CHAIR KOTELCHUCK: Now, Ron, before we start on this one, could I ask, there were a number of typos in this paper, and I don't know whether you want me to wait until the end? Some of them are pretty obvious and other ones are slightly embarrassing, like the difference between prostate and prostrate, which appears a few places. And I think those are important enough to deal with.

Do you want me to wait until you're finished and then give you mine, or would you like me to just briefly interrupt? All I have to do, I think, is just point them out.

MR. KATZ: Or we could just send an email, Dave, and catch all these editings offline.

CHAIR KOTELCHUCK: Oh, you know, that's a good idea. Okay. So I will do that. I'll send those offline. But, I mean, there are always small typographical errors and it's no big

deal, but there were a few that came to my notice and were a little bit prominent. So I'll send that.

MEMBER MUNN: Always worth changing, David.

CHAIR KOTELCHUCK: Yeah. Okay. Very good. Well, let's, Ron, go ahead. I'm sorry. That's cleared up now.

DR. BUCHANAN: Okay. Thank you. Okay. We'll go back one page, Rose, to page -- or Table 1.1 on page 8. Yeah, there we go.

Okay. This was a Rocky Flats case for a worker that worked there in the late '60s, '70s, and '80s as a craftsman at this facility. And we see that Table 1.1 there contains the cancers.

And, Rose, that first thing he's talking about a typo is the last word on cancer No. 3 should be obviously -- it should be temple, not bladder.

CHAIR KOTELCHUCK: Ah, very good. Thank you. Right. Now, if I may just, for a second, just so that I understand what's going on, the last line of text before Table 1.1, they're not

all three skin cancers. It says three skin cancers listed in Table 1.1.

DR. BUCHANAN: Yes. You're correct. That should not --

(Simultaneous speaking.)

CHAIR KOTELCHUCK: Okay. Good. Because that actually confused me for a while. Okay. So temple and we'll drop the skin in the one above.

DR. BUCHANAN: Right.

CHAIR KOTELCHUCK: Okay. Good. Good. Do go ahead again.

DR. BUCHANAN: Okay. So we see that SC&A and NIOSH -- and in this discussion I'll just talk about the two DRs instead of keep repeating that. Both DRs used the best estimate method and resulted in PoC less than 50 percent. So we had no major issues there.

So if we go down to the next page, page 9, on Table 1.2, it shows a comparison of the methods used and received at -- I won't go through -- well, not comparison of the method, comparison of the doses. And we see we had

recorded doses, both photon and neutron. We had missed dose, we had coworker dose, we had ambient dose, medical dose, and internal missed dose from plutonium, americium, DU and RU, and pure americium. And we came out with doses very much similar, in the 10 rem range. And both PoCs were less than 50 percent and similar.

And so if we go down to now page 10 on Table 2.1, and we see that we have a comparison table there. And we'll go over all the similarities. I'll just highlight the differences and then discuss those in more detail.

For this dose reconstruction, most of the doses came out similar. The main difference was that NIOSH used the RFP, Rocky Flats Plant, calculational workbook. SC&A used the TDB-6 and did the hand calculations. They used Weibull. SC&A used normal and log-normal distribution, whereas NIOSH used Weibull, normal, and log-normal for recording the doses. And what this does is if you come up with the same dose but you put the distribution in, it'll be slightly different total doses the way they total the Weibull.

Missed doses, number of zeros, we counted 68. NIOSH used 71. And you might say, well, why just counting zeros is there a difference? Well, perhaps it's been discussed in the past, but I'll refresh your memory: It's that this isn't clear-cut, this list of numbers that you look at for the number of zeros. You have to look at the badge exchange frequencies and also how they changed their accounting methods during the years.

And so, you have to look at gaps. Was this a quarterly exchange? Did the person not exchange it and keep it for six months? Was it a yearly exchange? And then, do you fill that in with gaps? Do you fill it in with zero? Do you fill it in with coworker? So throughout this presentation we'll notice that there are slight differences mainly in how we address those gaps in the dosimetry records, whether we count them as zeros, get adjacent quarters to fill in a missing quarter, or do you count it as a worker dose.

We'll see the recorded neutrons are very similar. The missed neutrons, they counted 75. SC&A counted 72. We see that on the coworker

dose the main difference there was a difference in the months. They counted 12; we counted 14. And they applied a 0.65 factor to the 1969 shallow dose and we did not because we didn't find that the TBD stated that.

And so, we'll go down to the next page and the tail end of that table. And we see that the main difference there is that when they used the uranium internal missed dose assignment, they use a Workbook ITIW and we use the older CADW to assign them. And so a slight difference there. So we see that the main difference is how we counted zeros, coworkers, et cetera, and the dose distribution for this dose reconstruction.

So we want to start on the recorded dose. Down the page just a little bit there we see that the EE was monitored on a different basis throughout the work history. And so that's some gaps, but the recorded dose we're fairly well there most of the time. And so, NIOSH used the method of using the dose conversion factors to assign doses to the three cancer sites.

And so we did also. NIOSH used a similar

dose. The only difference was Rocky Flats had a very complex method there in '69 and '70, which you have to go through some equations to determine what the shallow dose, the penetrating dose, and the total dose was -- and from [that] the total dose. And so, it kind of depends how you approach this and how you address it.

We did go in and use the NDRP data which does sometimes give additional photon dose. And so we came out with very similar doses, but slightly different. And you see we summarize those in Table 2-2 on down a little bit, and we see that they all ran similar, around 1 rem for all the organs, and also the less than 30 keV were similar doses also except that we used some of the different equations for '69 and '70 than they did, so it came out with slightly greater doses in the shallow dose.

Our next item is missed photon dose. Again, this is when the worker maybe wasn't badged. So we assigned a one-half LOD value. NIOSH counted 71. We counted 68 over the period. And we're saying that we both assigned about 0.8 rem to each of the cancer sites. And the main difference was

the way we assigned the zero missed dose. And NIOSH also used the Weibull distribution for some years, which moderately changes some of the total dose calculated. NIOSH also used a range in the dose conversion factor while SC&A used constant modal values from IG-1. And so, they're close, but there's slightly different methods there.

So that brings us down to the recorded neutron dose. If you scroll down a little bit there. We see that Rocky Flats did have monitored neutron dose most of the time. But the doses, they weren't usable, so we used N over P values for '71 through '76. And so they've assigned according to the dose conversion factors. They're given in Table 2-3. And we see that both NIOSH and SC&A used the same conversion factors. And they assigned about one rem of recorded neutron dose to each organ and so did SC&A.

Then we see that the main difference on the top of page 14 there is that NIOSH used some Weibull and logarithmic, log-normal distribution. And SC&A used just the log-normal distribution. And so that there were similar matches. The doses

were similar, very close, and the distributions were slightly different, but close.

Let's move to the next section, which is missed neutron dose. And again, NIOSH added up 75 badge exchanges with zero or less in LOD over two readings. SC&A counted 72. And there is an error there. If you go down to where it says NIOSH entered the missed neutron dose as in IREP with neutron energies of 100 percent [of] 30 to 250 keV, that's obviously incorrect. We entered it according to the Table 1 we just looked at. And so that "100 percent [of] 30 to 250 keV" should be removed.

Next paragraph shows that NIOSH assigned about one-and-a-half rem to each cancer site, and SC&A assigned a similar amount. The main difference was in the number of zeros and the distribution factors used and the dose conversion factors used. We used the same dose conversion factors that NIOSH used in Monte Carlo, so we had a range of dose conversion factors. SC&A used a constant modal value.

So now there were gaps in the record

for -- well, for '69 and '70, coworker dose was to be assigned for any zero readings where there weren't any dosimeter badges. Or sometimes during this period Rocky Flats had assigned zero even if the badge wasn't read. And so in that case, you should [use] coworker dose at Rocky Flats during '69 and '70.

And so it depends on what you counted as a badge cycle. NIOSH used three months for coworker dose necessary in '69 and nine in '70. SC&A counted 9.6 in '69 and 5.6 in '70. Did I say that? NIOSH used nine months in '69 and three months in '70. And we used a slightly greater number the way we calculated it. And NIOSH assigned slightly less than we did, and the difference was the way we calculated the coworker dose.

Now, this was somewhat offset by the number of zeros. And so, in this case, usually pretty much it washes out, but we did the same thing on it, but used a slightly different interpretation of the data, the recorded dosimetry data.

Now, the shallow dose, this is where our

main difference was. We calculated the less than 30 keV photons because it was a plutonium handling facility. So you assign less than 30 keV photons, just beta dose. And so we both assigned similar doses, except in calculating the 1969 dose NIOSH divided by the factor of 0.65, which came from the open and closed window, a difference of 0.35; 1 minus 0.35 is 0.65. And those are covered in equations 3 through 6 of the Rocky Flats TBD-6.

And we did not find that they specifically said to apply that 0.65 factor to the coworker dose, so we did not. And so we came out with a slightly less dose than NIOSH did for the shallow dose for '69 and '70.

Now we want to go to the next page. It's the neutron coworker dose. Or not the next page, but down a little bit. We used the coworker to assign doses during the '69 and '70 period. Again, NIOSH assumed nine months for '69 and three months for '70. And we assigned 9.16 months for '69 and 5.67 months for '70. And so this would come out slightly different in the dose assigned. And those are summarized in the Table 2-4 there.

You'll see they're similar, but our doses are slightly larger because of the more months. We used slightly more months.

Onsite ambient is the next subject. We see that according to TBD-4 -- or no, Procedure-60 actually-- that gives the details on this, that from prior to 1970 and after 1990 that Rocky Flats used to assign ambient dose because they subtracted that out of the badge readings. And so you need to add that back in. And so that was four millirem a year. And we see that we both assigned a total of several millirem there for the work period. And we both agreed and assigned the same dose, so there's no issue on that in this case.

Okay. We'll go to occupational medical dose here. We see that there are some records of X-rays. And there was a pre-hire AP and lateral scan. And we see that they used the TBD -- I mean, excuse me, OTIB-6 -- to assign doses to the organs, and we both assigned the same dose and had no issues with that. Okay. And assigned as a normal distribution of 30 percent uncertainty. We both did that.

So that brings us down to internal dose on the next page. We see that the worker had urinalysis in the '60s for uranium, americium, plutonium. And had whole body counts in the '60s, '70s and '80s. And all of the results were less than the minimum detectable activity or limits. And so what we did was assign missed plutonium, missed uranium, and then pure americium.

So if we look at the plutonium, we both looked at the uranium -- I mean, excuse me, the urinalysis information -- and that they used one-half MDA in the IMBA program to back-project the intake. And also looked at the whole body counts for plutonium and decided which one would provide the most claimant-favorable or upper bound limits on the intakes.

And so both dose reconstructions found that type M plutonium provided by the urinalysis would provide the best estimate dose. And we'll see that the next table there on page 18, Table 2-5, is a summary of that. You see that we had similar projections, very close to the amount of intake. And we used the Chronic Annual Dose Workbook, and

NIOSH used the ITIW Workbook, to assign the annual alpha doses to the organs. And we [see] down there at the Table 2-6 that the comparisons were very close for the missed uranium.

We can go to missed -- I mean, excuse me, missed plutonium. We go to missed uranium now. I was reading the next slide. NIOSH and SC&A both found that the EE was monitored for uranium intake, however, all less than MDA values. And so we go through the process of assigning missed uranium intake.

Now, in this case, we assumed different pathways. NIOSH assumed 100 percent uranium exposure from U-234 and calculated, you know, used one-half MDA to back-calculate the intake and used the ITIW to assign dose of about around 50 millirems to each of the dose -- to each of the organs. Whereas SC&A assumed that exposure to DU as recommended in Section 52 and 56 of TBD-5. We used one-half the MDA and used that in the CADW to do the dose. But first we looked at the background level of the whole body counts to determine what that would project and found out -- compared that

to the urinalysis and found that the urinalysis is more claimant-favorable. So we used that data.

And so we then used that in the CADW to do the dose calculations and came out about half a -- excuse me, about 50 millirems to each organ. So we used different paths, made different assumptions, used different methodology, but ended up with very similar doses.

We see that our last item on internal intake was americium. The worker did have americium analysis and it's less than the MDA. And so we assumed that this was probably for pure americium, working on the pure americium-241 project, or around it. And so, both DRs assumed that and used -- NIOSH used their ITIW to assign dose of about 100 millirem to each of the organs. SC&A used the IMBA to do a projection of the intake and a CADW to estimate the dose. And again, around 100 millirem to each organ.

And very similar doses. A slight difference, the only thing I can see, we had very similar projections of intake, was the workbook used to assign the annual doses resulted in a

slightly different total dose.

We'll go to page 20 for incidents. Both DRs evaluated the documentation that was available, the CATI and the DOL, DOE records, and found no incidents that would really change the way the DR was done. The worker was monitored externally, internally over most of the period of employment and we did not find any incidents that would change our dose reconstruction methods.

So Section 3, Table 3-1 on the next page, summarizes our conclusions. And we see that the total doses assigned were around 10 rem to each organ. The PoC was less than 50 percent in both cases.

And as I've discussed during this presentation that our main difference was the type of distribution used. The Weibull would result in slightly different total doses. And the method used to determine the shallow dose in '69 and '70 and the coworker dose in '69 and '70 were slightly different. And the use of ITIW and CADW to assign annual doses result in slightly different dose distributions.

And let's see, there is a correction on that page. Let's see, on page 21. If you go down, it says assignment of coworker shallow photon dose. Down at the last sentence of page 21. NIOSH identified 9 months of photon exposure in requiring coworker dose for 1969 while SC&A required -- assumed 9.61 months in '69 and 2 months for '70. Okay. The part where it says, "While SC&A assumed 9.61 months for 1969," that should be deleted because we're still referring to NIOSH's 9 months and 3 months.

And so the next page then tells what SC&A assumed. So that's an area we need to address.

MS. GOGLIOTTI: Okay. Ron, I'll take note of it and we'll correct it.

DR. BUCHANAN: Yeah, okay. And so, like I say, the main differences were assuming zeros, coworker months, gaps and the distribution factors. So [these] were our main differences. So that's open for questions now.

(Pause.)

MEMBER MUNN: Did I lose you?

MR. KATZ: No, no, no. You're on. You're on.

DR. BUCHANAN: No, I'm done. If there are any questions. I'm done.

MEMBER MUNN: I interpreted that Ron was saying he was done.

MR. KATZ: Is Dave still on?

MEMBER MUNN: But I didn't hear anyone else saying anything.

MR. KATZ: Yeah, I'm not hearing Dave. Is Dave on? I'm worried we might have lost Dave Kotelchuck, but --

MEMBER MUNN: Oh, dear. I hope not.

MR. KATZ: Either that or, Dave, we can't hear you if you -- maybe you're on mute. I don't have an email from him, so I don't have any --

CHAIR KOTELCHUCK: You're right, I was on mute. I'm sorry.

MR. KATZ: Oh, okay.

CHAIR KOTELCHUCK: And that's why there was silence. I spoke right after he finished and I said it was a very nice presentation and the results were quite similar. And, good. But I was

hoping to hear comments.

Wanda, were you about to say something?

MEMBER MUNN: No, I wasn't. I was just waiting for any other --

CHAIR KOTELCHUCK: Right. Okay.

(Laughter.)

CHAIR KOTELCHUCK: Alright. You're right, we had some noise out on the streets here in New York and I --

MEMBER MUNN: How odd.

(Laughter.)

CHAIR KOTELCHUCK: Right. So I hit the mute and forgot to that I was on mute.

MR. SIEBERT: This is Scott. If you want to a couple of clarifications, I'd be happy to add just a small couple things.

CHAIR KOTELCHUCK: Sure.

MR. SIEBERT: Number one, with the number of zeros being counted, Ron is exactly correct. At Rocky Flats it's extremely complicated to determine the number of zeros based on the timeframes that people are monitored as well as dealing with the NDRP data and then putting that

all together. So the fact that those numbers are very close to each other, I was very heartened to see that. That's good.

There's also some slight differences based on the fact that we use the best estimate method that's outlined in OTIB-1 and Procedure-6, that there's some averaging and so on. So that's how there's times, if you notice, in comparison we'll have a number like 6.5 zeros, which sounds really odd, but when you do an averaging methodology as outlined in that document, that's why you'll see some of those differences. So that was good.

The other thing I just want to point out is people may have been hearing about something they haven't heard before, and I want to clarify. The ITIW tool, all that is is a workbook we can use to take results that we ran in IMBA to get doses and put it in a format that is an IREP format easily put into IREP. The reason it's called that it's ITIW is it's IMBA To IREP Workbook.

So every time they're talking about us using that tool versus them using CAD, what really

happened is, because we are in best estimate territory, we ran the doses through IMBA so we weren't doing the overestimating assumptions that were in CADW. So that's why there's going to be some slight differences on the internal doses as well.

MEMBER MUNN: That does help. Thank you. At the time that I read it I thought I don't really know about this, but then there are many workbooks that we're not familiar with, at least I'm certainly not.

MR. SIEBERT: And we do love our acronyms, don't we?

MEMBER MUNN: Oh, yes, we do. Especially the TLA from the SLAs.

CHAIR KOTELCHUCK: Very good. Okay. Other comments?

(No response.)

CHAIR KOTELCHUCK: I will say it's -- I have some discomfort looking on -- just like on that summary Table 1.2 that the total doses for each of the three cancers are higher for SC&A by 0.3 to 0.5 rem, and yet the PoC is smaller, right? So

you'll have -- SC&A has higher doses but smaller PoC. And I assume; and correct me if I'm wrong -- no -- rather not correct me, tell me was it primarily the fact that some different distributions were used?

MR. SIEBERT: Yes, I would say the differences are, yes, number one, the distribution for especially the external dose based on these best estimate processes in Monte Carlo. And as well, there's -- as I mentioned before, there's -- they assigned slightly more internal dose than we did. That's why their numbers are slightly higher.

CHAIR KOTELCHUCK: Yes.

MR. SIEBERT: But the distributions out there, those are going to be pretty close to the same, so it's mostly going to be distribution-related.

CHAIR KOTELCHUCK: Yes. I'm worried. Looking from the outside it looks -- it is disturbing, right? And maybe it's the story of a little knowledge is a dangerous thing. But you have higher dose and smaller probability of getting

cancer on the job. But what that just really tells us, the kinds of spreads that are put in between PoCs as we use different distributions.

On the other hand, the PoCs are clearly close together. I mean, they are -- and they're on the same side of compensation with NIOSH's being a little higher, which is fine.

MR. SIEBERT: This is Scott. I was guessing -- when you mentioned the Fernald case, which we'll get to --

CHAIR KOTELCHUCK: Right.

MR. SIEBERT: -- I'm guessing that is also your question on that one.

CHAIR KOTELCHUCK: Pardon?

MR. SIEBERT: I was guessing that's probably also your question on that one. It's probably going to the same answer.

CHAIR KOTELCHUCK: And that's interesting. Okay. Well, we will do that because that one there we had a much bigger difference in PoC than we've had in many of the others, and it's important to understand why. Yes, but may well be. May well be. Anyhow --

MEMBER MUNN: Dave, from one perspective though that's very good. If you're looking at the perspective of some that we have adopted, that we're going to use the most claimant-favorable methods for doing what we do. Then the fact that the end results are so near, but that slightly different approaches still put you in the right ballpark and that the ones that are being used by NIOSH create a slightly larger percentage seems to me to be good from a claimant point of view.

CHAIR KOTELCHUCK: I agree. I agree. And overall the blinds are -- I think are reassuring --

MEMBER MUNN: I agree.

CHAIR KOTELCHUCK: -- to the claimant population, that things are not determined by the fact that a particular reconstructor is -- makes poor choices or better choices, but that it doesn't really matter terribly. And the PoCs are about the same and certainly the decisions are the same.

Folks, any other comments or shall we accept this as a Subcommittee?

MEMBER MUNN: Yes.

CHAIR KOTELCHUCK: Okay. Any objections, concerns?

(No response.)

CHAIR KOTELCHUCK: Okay. Then that is accepted.

Now it is almost noon. We have one last blind to do today, the FMCP. What do people think? I mean, I'm -- we might -- since we talked to the other people about doing the -- coming in at around 1:30 after lunch, I'm happy to go another half an hour and see how far we get on the other. Hopefully we might complete it. Would others be willing to go onto the third one now for another half an hour?

MEMBER MUNN: That's fine here.

CHAIR KOTELCHUCK: Okay. Anybody else?

(No response.)

CHAIR KOTELCHUCK: Okay. Then let's go ahead to the FMCP blind.

Fernald FMCP

MS. K. BEHLING: Okay. And this is Kathy Behling. This is a Fernald case and I'll

have Rose go to page 7 and we can look to see that there were two cancers associated with this particular case. And that is shown on Table 1-1. Here we go.

CHAIR KOTELCHUCK: Yes.

MS. K. BEHLING: And in this particular case both SC&A and NIOSH calculated doses that were similar and came to PoCs that were less than 50 percent. And so if we go onto page 8 on Table 1-2, we have the comparison of the doses. And as you can see, the external doses are all nearly the same. The environmental dose for SC&A is slightly higher, just minor difference and a difference in the energy distribution, which I'll talk about later.

Also there is some difference in the internal dose. Again, in this case SC&A's dose is slightly lower. We'll discuss that. And as was mentioned, even though the doses were very similar, there is some difference in the PoCs which I will get to when we get to the -- near the end of this discussion. But as we said, both methods came in less than 50 percent.

So if we move on to page 9, this

individual was monitored -- was actually employed a very short period of time, slightly less than one year, but the individual was monitored for external and internal exposures. And if we go to Table 2.1, here's the comparisons that we put together. And pretty similar. And I'll get into details. A little bit of difference in the missed photon dose associated with DCFs that were selected. Also dose distributions for the coworker, the unmonitored photon doses.

Onsite ambient dose. If we go to the next page, there was some difference in the energy fractions that were selected and also the DCFs that were selected. If we go on to internal, here I'll get into that in more detail. The difference had to do with the selection of percentage of the uranium intake. Then finally, the results. So some difference in the method used for the timeframe associated with the environmental internal doses.

But if we move on, the individual was -- they were monitored for a brief period of time, but all the monitoring results were zero, therefore

they were treated as missed doses. And both NIOSH and SC&A assumed five zero badge exchanges. And those also assumed 40 percent energy fraction of 30-250 keV and 60 percent of greater than 250.

If we move on to page 11, for the first cancer, both SC&A and NIOSH used the exposure to dose Hp10 DCF from the IG-1 guidance. For the second cancer, NIOSH went into Table 4-1A and selected the isotropic geometry, and that resulted in NIOSH and SC&A coming to different conclusions on the DCFs that should be used because, for the second cancer, SC&A actually looked at Table 4-2 and assumed -- based on the job category assumed that information from 4-2 indicated that the likely geometry would be AP. And so therefore they used AP DCF. And so that resulted in some difference, but in actuality when it came to final doses, the doses were nearly identical, one millirem difference on the first cancer.

If we go on, there was also another brief period of time where there was no monitoring. Both NIOSH and SC&A used a coworker model and they used the 50 percent coworker model to calculate the

doses. They had a slight difference in approach for calculating the fractional year, but both -- like I said, both did assign a 50 percent coworker. The only difference was in the dose distribution. Let's see here. Okay. NIOSH entered this dose into IREP using a triangular dose distribution where SC&A entered it as a log-normal distribution with a GSD of 1.52.

If we go on then to onsite ambient dose, even though the individual was either assigned missed or coworker dose, according to PROC-60 it states that you also assign an onsite ambient dose after 1985. So both SC&A and NIOSH selected site average external doses from Table 4.3 for the Fernald TBD.

Now NIOSH used a triangular isotropic exposure geometry which was applied for the triangular distribution. And hold on one second. My computer is going to go blank on me here. Okay. Didn't want to lose my screen. Excuse me.

They -- as I said, NIOSH used the triangular distribution for the isotropic exposure geometry and applied it as a Monte Carlo, which

resulted in the data being entered into IREP as a Weibull distribution. And SC&A used the exposure geometry of AP -- an AP geometry and the DCFs were entered as a mode of the distribution. And it was entered into the IREP as a normal distribution with a 30 percent uncertainty. Again that resulted in a slightly higher dose is assigned by SC&A for the external onsite ambient dose.

Medical doses. Both methods used the records and there was one new-hire PA chest X-ray done. Both methods assumed the same -- assumed just one chest X-ray, used the same procedure, the TBD associated with Fernald, and came to the exact same result. And both methods also entered that data into IREP in the same manner, as a 30-250 keV with normal distribution and a 30 percent uncertainty.

Now when we come to internal doses, the individual was monitored for internal uranium via urinalyses, but because it's such a short timeframe, it results in a large overestimate of the intake rates, therefore both methods used what was available at the time, which was OTIB-78, which

is the internal coworker model. I think that is no longer -- OTIB-78 has now been incorporated into Fernald's internal TBD, so that's no longer available, or no longer being used.

Okay. Is everyone still there? Can you hear me?

CHAIR KOTELCHUCK: Yes.

MEMBER CLAWSON: I can hear you, Kathy.

MS. K. BEHLING: Okay. I'm sorry. I just heard something.

MR. CALHOUN: This is Grady. Can anybody hear me?

CHAIR KOTELCHUCK: Yes, Grady.

MR. CALHOUN: Yes, I just got an announcement said mute off.

CHAIR KOTELCHUCK: I can hear you, Grady.

MR. CALHOUN: I've been sitting at this phone since the beginning.

MR. KATZ: So, Grady, that's my -- my theory was that the operator somehow muted you. Maybe you muted -- she muted everything coming from your house. I don't know.

MR. CALHOUN: Well, it's actually the office and Beth is on.

MR. KATZ: Oh.

MR. CALHOUN: What's weird is my cell phone wouldn't even work.

MR. KATZ: Yes, I know. You said that.

MR. CALHOUN: So I'm on.

MEMBER BEACH: And this is Josie. Yes, I've been trying to talk, too, and nobody could hear me, so I was wondering what was going on.

CHAIR KOTELCHUCK: I noted that you as a Subcommittee Member have been silent. So was Grady.

MEMBER BEACH: Well, I kept trying to talk.

CHAIR KOTELCHUCK: I wondered, but I'm glad to hear that *you* aren't silent, but that your technology silenced you.

(Laughter.)

CHAIR KOTELCHUCK: Welcome back.

MEMBER MUNN: They were in the famous cone of silence.

CHAIR KOTELCHUCK: Yes. Alright.

Thank you, folks.

Do go on.

MR. KATZ: Yes, sorry, Kathy.

MS. K. BEHLING: That's alright. I wanted to be sure everyone could hear me because I heard the same announcement.

CHAIR KOTELCHUCK: Right.

MS. K. BEHLING: Okay. We'll move on with the internal. As I indicated, both methods did use the coworker model in OTIB-78. And those selected a 50th percentile uranium and compared all the various solubility types: F, M and S from the Tables 5-1, 1, 5-2 and 5-3. And type S solubility was the most claimant-favorable for both. Both methods assumed that.

According to OTIB-78 they use a specific activity of a two percent enriched uranium. Now NIOSH assumed that the uranium represented 100 percent of uranium-234, which is a conservative assumption, where SC&A used the activity fractions identified in OTIB-78, which indicate 76.9 percent of uranium-234, 2.68 percent of uranium-235, and 20.4 percent of uranium-238.

The other thing I'll mention is that when NIOSH initially did their dose reconstruction, they were working with, I think Rev 1 -- oh, Rev 2 of OTIB-78. And when SC&A did this dose reconstruction, the Rev 3 was out, and that resulted in a slight increase in the values, uranium values in Tables 5-1, 5-2 and 5-3. Both methods also considered intake from recycled uranium, and so they calculated doses for plutonium-239, neptunium-237 and technetium-99.

The biggest difference here -- and you can see the doses were similar, but the biggest difference was NIOSH entered their data as log-normal distributions with a GSD of 3, and SC&A entered these values. And this was 63 rem, so it represented the majority of the dose for this case and not -- that was entered into IREP as a GSD of two. So that is what resulted -- and I'm jumping ahead a little bit here, but that is what resulted in the difference of a PoC of 48 percent assigned by NIOSH and 40 percent assigned by SC&A, even though the doses were very similar.

And lastly, both methods assigned an

environmental internal dose, and they based that on maximum annual intakes from the Fernald TBD-4. The difference in dose here, SC&A's dose is slightly less because NIOSH assumed that dose for a full one-year period and SC&A used the actual number of months to assign that, which would have been 9.5 months. So that resulted in SC&A's environmental dose being slightly less than NIOSH.

And if we go to the summary table on page 15, again doses pretty similar, approaches similar, a little bit of difference in energy fractions and DCFs based on geometries assigned. But as I indicated, the big difference in the PoCs is -- was due to the GSD of two entered by SC&A for the uranium doses and GSD of three entered by NIOSH.

So does anyone have any questions?

CHAIR KOTELCHUCK: Dave. How would you determine -- how was the decision on the geometric standard deviation chosen and on what basis did you choose that? I know often it does seem that one seems to choose it out of general practice, but anyway.

MS. K. BEHLING: Okay. Quite honestly

the TBD specifies that the GSD should be a minimum of three. And so from my perspective NIOSH was correct by applying the GSD of three and SC&A should have also applied that.

CHAIR KOTELCHUCK: Aha. Okay.

MS. K. BEHLING: Now I will ask if SC&A -- if the author of the dose reconstruction had a reason for doing a GSD of two that I'm not aware of, they may speak up.

DR. BUCHANAN: Okay. This is Ron. Okay. I haven't looked at this case for a while, but I see on page 14 it's stated there that OTIB-78, page 12 said use a log-normal distribution with uncertainty of two.

MS. K. BEHLING: Okay. And the reason that I didn't pick that up; and I apologize, is because OTIB-78 is no longer being used and I went to the TBD, which does specify a GSD of three. So I should have gone back to the OTIB-78 to determine if that is what was said. And if that's what you're telling me, then I guess that would correct for the guidance at the time.

MR. SIEBERT: Well, this is Scott.

That version -- I believe that's incorrect. I believe it's always stated three.

DR. BUCHANAN: Hang on. Let me check here real quick.

CHAIR KOTELCHUCK: Sure.

DR. BUCHANAN: Could have been an error.

CHAIR KOTELCHUCK: Sure.

MS. K. BEHLING: And as I said, I -- because this is -- the OTIB-78 is no longer being used. It wasn't available on the web site. I could have gone into -- and I just didn't do that, because when I looked at -- everything has been -- that was in 78 has now been incorporated into the TBD-5, the internal, the Fernald internal dose TBD --

CHAIR KOTELCHUCK: Yes.

MS. K. BEHLING: -- and it specifically does say in there to use the GSD of three.

MR. KATZ: It's okay, Kathy. That's what these discussions are for, to hunt down the reasons. So no worries.

CHAIR KOTELCHUCK: Exactly.

MEMBER CLAWSON: Kathy, this is Brad. I have a question, though. You know that we've got a new internal that has come out for Fernald, correct?

MS. K. BEHLING: I am looking at Revision 2.

MR. KATZ: Yes, Kathy may not be aware because it just came out, but --

MEMBER CLAWSON: Yes, it just came out. I was just wondering if --

MS. K. BEHLING: Okay. I --

MEMBER CLAWSON: -- you knew that part of it's going to change. I was wondering for my own personal interest of dealing with Fernald of how this is going to change stuff.

MS. K. BEHLING: Well --

MEMBER CLAWSON: I'll talk to you about it in a month or two.

(Laughter.)

MS. K. BEHLING: Okay. But generally the GSDs are, as a minimum, three. That's what -- in most cases, I believe. So I have to admit that I was a little surprised that SC&A did use two.

MS. BRACKETT: This is Elizabeth Brackett. We've always had a minimum of three for the GSD for the coworker studies. There is a step where we look at -- we calculate the GSD based on ratios of the difference in 84th percentiles, and if it's less than 3, then the final value was set at 3. So I can't find a copy of OTIB-78 at the moment, but possibly the preliminary table was being looked at before the final table that was set at two, three because it had come out less than three.

DR. BUCHANAN: Well, I was looking on page 12 of 78 of Revision 3, 8/19 of 2015. It says, select a log-normal distribution in IREP with the calculated dose entered in parameter one and the associated GSD as parameter two.

MS. BRACKETT: Oh, that just means --

(Simultaneous speaking.)

DR. BUCHANAN: That was parameter.

MS. BRACKETT: Right, that's a column --

(Simultaneous speaking.)

DR. BUCHANAN: Yes, okay. I see.

Yes.

MR. SIEBERT: Ron, if you look at the table that's right there --

DR. BUCHANAN: Yes, it says three. Yes.

MR. SIEBERT: -- you've got -- defines the, yes, the GSD.

DR. BUCHANAN: Yes, okay. Yes, you're correct. I read that statement incorrectly.

CHAIR KOTELCHUCK: Aha. Now if this is -- and this is very helpful. If this is in fact -- if there was an error, then it seems to me that -- well, I was about to say you should recalculate it, but this is a blind test and errors are human. So maybe that -- but in this case there is a clear error.

MS. K. BEHLING: There is an error.

CHAIR KOTELCHUCK: Okay.

MS. K. BEHLING: And the other thing I will mention is we do our blinds and put out the results to you all and we tell you this is our dose and this is our PoC.

CHAIR KOTELCHUCK: Right.

MS. K. BEHLING: So when I get the data to do the comparison, I don't feel -- and correct me if I'm wrong here, I don't feel that it's appropriate if I find an error like this to point that out at this point and say we're going to go in now and change our PoC. I'm afraid that that might look odd or --

CHAIR KOTELCHUCK: It would be, yes.

MR. KATZ: You're 100 percent right, Kathy.

CHAIR KOTELCHUCK: Correct. And even though there was an error made in this case, and errors are made in all dose -- in the dose reconstruction process, errors are made and we hope they're very small in number and very few in number. But you're right, you don't change it. And that is the way. And in fact I was about to enter into an area of error by saying, “Oh, you made a mistake. Why don't you recalculate and let's see what it really looks like.” And the answer is this is what it really looks like as it stands.

MS. K. BEHLING: Right.

CHAIR KOTELCHUCK: But I'm glad we --

I mean, I'm very glad that this allows us to see where an error was made and --

MS. K. BEHLING: And I guess -- excuse me. I don't mean to interrupt you.

CHAIR KOTELCHUCK: Go ahead. No, please do.

MS. K. BEHLING: I guess what it also points out is it does also show you the importance of the GSD and these distributions and what kind of an impact that that will have even when the doses are similar. So it points something out. I think this is --

(Simultaneous speaking.)

CHAIR KOTELCHUCK: Most certainly. Most certainly and usefully. And if and when we do some calculations about the differences between the I believe the 26 blinds, I'm not sure exactly 26. -- this may be in fact outside of the -- this may be the tail end of that distribution and statistically significantly different in terms of what the percentages are.

So, comments by other Subcommittee Members?

MEMBER MUNN: I think much more importantly than any of the numerical issues involved is that this particular exercise we've just seen demonstrates the ethical standard of our contractor. I don't think you can ask for more than that.

CHAIR KOTELCHUCK: Well, that's certainly true.

So are other -- I have a question about something earlier. Early on when you were doing this, Kathy, you mentioned that the person spent -- in the first couple of pages -- I'm trying to find it. Yes, on page 9 you say an Energy employee who worked at FMCP for slightly less than a year. Now the person -- I looked at the appendix. I mean, the person worked and was getting measurements made between '93 and '08, 15 years. And I wondered why you said worked for a year. And they certainly did not get 60 rems in a year. So I don't understand what that sentence was about, the first sentence in 2.0, Comparison Methodology.

MS. K. BEHLING: Okay. And where are we talking about that?

CHAIR KOTELCHUCK: At the -- in the text on page 9, 2.0, Comparison Methodology, the very first line says --

MS. K. BEHLING: Right.

CHAIR KOTELCHUCK: -- this case represents an EE who worked for slightly less than one year. Now that may be a true statement, but obviously they also worked either at that site or another site for many years before. Excuse me, for many years after. That sounds like the person's first year of work in fact from my notes. If you go to Appendix A, you can see measurements have been made over 15 years.

MR. SIEBERT: Well, it does --

MS. K. BEHLING: Go ahead, Scott.

MR. SIEBERT: Yes, this is just a clarification. Yes, the employee worked from -- those dates are correct. They worked for less than a year at the site. What you're probably looking at is the fact that the internal dose continues to be assigned after the intake occurs through the date of diagnosis.

MS. K. BEHLING: Date of diagnosis,

exactly.

CHAIR KOTELCHUCK: Ah.

MS. K. BEHLING: The diagnosis for the first cancer was 2012 and the second cancer was -- oh, no, I'm sorry. 2011 for the first cancer and 2012 for the second cancer. So obviously the doses will go --

CHAIR KOTELCHUCK: I see. Alright. That explains it. And that is 250 -- yes --

MS. K. BEHLING: Yes.

CHAIR KOTELCHUCK: -- that's 250 days, not much -- it's less than a full year, from May 3rd to April 20th. No. No, no. No, no, no. That's -- I'm sorry. That is about a year, that is 250 days, work days. Okay. So my question is answered.

Any other questions, folks?

MEMBER MUNN: None here.

MEMBER CLAWSON: This is Brad. I'm good.

CHAIR KOTELCHUCK: Good. Good.

MEMBER BEACH: None here either.

CHAIR KOTELCHUCK: Good. And this was

a -- both the first and last discussions were very useful in my opinion, and [I'm] very glad we had them.

So I -- we're ready to close on this and Subcommittee approves. Any objections?

MEMBER MUNN: None.

CHAIR KOTELCHUCK: Okay. Good.

And --

MS. K. BEHLING: Dr. Kotelchuck, can I -- if we're finished with this last blind, I would just -- when you're done with that, I'd like to ask one question before we go to break.

CHAIR KOTELCHUCK: Absolutely. Go ahead.

MS. K. BEHLING: Okay. I just wanted to remind you that -- and I'm not even sure how I remember this, but back in January of this year, I had sent you a memo regarding one of the blinds that was done very early on, I think in the 17th set. And that was the Allied Chemical and Dye Corporation that we had a great deal of discussion on.

CHAIR KOTELCHUCK: We certainly did.

MS. K. BEHLING: And a lot of that discussion centered around the surrogate data issue. And you had asked me during one of the meetings to provide you with this memo that just recapped what we have done on that particular case, and it was -- and I did send a memo out, like I said, on -- it was January 10th, 2017.

CHAIR KOTELCHUCK: What date, ma'am? Excuse me?

MS. K. BEHLING: Yes, January 10th, 2017. And if you'd like, I can forward this to you again.

CHAIR KOTELCHUCK: Yes, please do.

MS. K. BEHLING: But -- okay.

CHAIR KOTELCHUCK: I don't remember it.

MS. K. BEHLING: Okay. And obviously it's been a while, but we can -- what I think the bottom line on this was is there was some discussion as to whether this Allied Chemical case should be sent on to the Surrogate Data Work Group, because I think that --

MR. KATZ: Kathy.

MS. K. BEHLING: Yes?

MS. K. BEHLING: This is Ted. I mean, that was already done. We did that actually before even Christmas, but --

MS. K. BEHLING: Oh, really?

MR. KATZ: So -- yes. Anyway, that's sitting with the Surrogate Data Work Group. And the Surrogate Data Work Group then wanted some more information from NIOSH, which it has received. And that's on the plate for Dr. Melius to set up a Work Group meeting.

MS. K. BEHLING: Okay.

MR. KATZ: But that's all good and ready including I think your materials. But go ahead and send them again just so I can make sure that the Work Group got everything it should have gotten. But I'm pretty sure it included your material that you're talking about from January, Kathy.

MS. K. BEHLING: Okay. And, yes, all I was trying to do was lay out a timeline as to what I -- I was not aware that that case did get sent, and I just wanted to verify that.

MR. KATZ: It did. Yes, it did.

MS. K. BEHLING: Okay.

CHAIR KOTELCHUCK: And what was -- to whom was it sent, by the way?

MR. KATZ: I'm sorry. So this was a case where --

CHAIR KOTELCHUCK: I remember the case.

MR. KATZ: Right. The Subcommittee basically was done with it.

CHAIR KOTELCHUCK: Right. Okay.

MR. KATZ: But the surrogate -- but Dr. Melius wanted to look at the surrogate data issue specifically for that case and explore that a little further with that Work Group.

CHAIR KOTELCHUCK: Excellent.

MR. KATZ: So that's what we've sort of --

CHAIR KOTELCHUCK: It's the Surrogate Data Work Group?

MR. KATZ: Exactly. Which I think --

(Simultaneous speaking.)

CHAIR KOTELCHUCK: Yes, good.

MR. KATZ: But anyway, that's what happened there.

MS. K. BEHLING: Okay.

CHAIR KOTELCHUCK: Well, good.

MS. K. BEHLING: Yes, very good. Thank you. I'm sorry.

CHAIR KOTELCHUCK: Good. No, I'm glad -- no reason to be sorry. Glad you raised this. So it is now almost 12:30 and so we're right on schedule. We will come back at 1:30, say, and we'll start with the -- it was the AWE, I believe, was what you wanted to started with.

Okay. So, folks, thanks very much for a productive morning. And we'll return in one hour.

(Whereupon, the above-entitled matter went off the record at 12:27 p.m. and resumed at 1:38 p.m.)

MR. KATZ: I think we're ready for the AWE discussions.

Category 1 and 2 cases from Sets 19-21 including cases covering Oak Ridge, the Gaseous Diffusion Plants, Savannah River Site, Hanford, AWE sites and Other DCAS sites from Sets 14-18

CHAIR KOTELCHUCK: Actually, we're going to start with the four-eighty -- she was asking that we start with the --

MR. KATZ: Oh, yes. Okay.

CHAIR KOTELCHUCK: -- 482.

MR. KATZ: Four-eighty-two, right. Right.

MS. GOGLIOTTI: Yes, and Joe, were you able to get through all of this?

(No response.)

MS. GOGLIOTTI: If you're on the line and can hear us, press *6.

MR. STIVER: I just got an email from Joe that he is online, but he was needed, so --

MR. ZLOTNICKI: This is Joe Zlotnicki. Can you hear me?

MR. KATZ: Yes.

MS. GOGLIOTTI: Thanks.

MR. ZLOTNICKI: Yes, I was on double mute.

MS. GOGLIOTTI: Sorry about that. I

don't know what happened.

CHAIR KOTELCHUCK: Okay.

MS. GOGLIOTTI: So we're going to start with 482.1. We asked Joe to call in. This is why we're going a little out of order here. And this is a Hanford and Lawrence Livermore National Lab case, but the actual issue is surrounding Hanford.

And, Bob, actually I'll let you take it from here.

MR. BARTON: Sure. Thank you, Rose. Everybody can hear me now, right?

CHAIR KOTELCHUCK: Yes.

MS. GOGLIOTTI: Yes.

MR. BARTON: Okay. Great.

Okay. So this is a case in which, based on a facility that the EE worked in, there was a potential for exposure to what we're calling low-energy photons. That's photons less than 30 keV. And what was done in the original dose reconstruction was to say because of that sort of unique exposure term, if you had open windows, which is generally considered the beta measurement, it wasn't going to be considered [as]

electrons. It was actually going to be considered to be low-energy photons.

And what we noticed during the audit was that these were being applied up until about 1957. Specifically we were looking at the missed doses, and from 1957 to 1971 there was no application of that dose component. And then again in 1972 it picked back up again. So that's sort of what necessitated the finding.

And we have a response from NIOSH. Unfortunately we brought it up at the last meeting, but we weren't able to open it, or at least I was not able to open it up for that meeting. We've since gotten the file. It's a two-page file with a couple of tables in it. And it's a pretty complex issue with -- which is why we have to bring in our sort of external dosimetric expert, Joe Zlotnicki.

And thank you for calling in, Joe.

But before getting started, I think it would be helpful to have NIOSH or I guess whoever owns this response to sort of walk us through why -- I think I understand why, but I don't want to get it wrong -- why sort of, the activity from 1957 to

1971, we weren't really seeing the application of those low-energy photons, but then before and after that period we were.

So I see Rose is bringing up the NIOSH document, so if Grady or Scott or one of your folks want to sort of walk us through that, I think it would be helpful for everyone.

CHAIR KOTELCHUCK: Great.

MR. SIEBERT: Yes, this is Scott.

Matt, are you on the phone?

(No response.)

MR. KATZ: Matt, you may need to un-mute.

MR. SIEBERT: I think you got it.

MR. SMITH: I just did. I just did.

MR. SIEBERT: Okay. That's Matt Smith, our external dosimetry expert.

So take it away, Matt.

MR. SMITH: Okay. I don't have the Skype view in front of me, but this is a little bit of a different era at Hanford. It's the era where they went to a multi-element film dosimeter. And so you end up with values for -- that are titled

-- beta, X-ray and gamma. And you're correct, as you read through it, it's kind of a complex set of logic that you have to go through to determine what are you going to assign as measured and missed doses?

With respect to the question at hand, in the Audit Report in Appendix B from SC&A, I'm kind of going from Figure 9 in that report, the issue specifically was brought up for a situation where the beta value was reading zero, the gamma result was positive, and then the X-ray result was zero. I believe the question then follows: Why is there no missed low-energy photon dose applied?

The write-up kind of goes into the scenarios you could have with respect to those three values, and this one certainly -- if you look at the write-up, it falls into the situation or scenario that's shown in row number 1 of Table 1, that is in the write-up response. In other words, again the beta value is zero, the X-ray value is zero and the gamma result is positive.

What the tool then assigns is a measured photon dose in the 30 to 250 keV range, but no missed

low-energy photon dose. And the question then follows: Why no less than 30 keV? The rationale then hinges on what we see in Table 6-4, which is in the Hanford TBD. That particular table is on page 31 of 265. And it's data that comes from a study done by Wilson and others that looked at their --

MR. SIEBERT: And, Matt, I'm sorry. Matt, I'm sorry. This is Scott. I just want to point out to everybody else it's on page 2 of our response, a copy of that table in case you want to go down and look at -- yes, there you go. Sorry, Matt. Thanks.

MR. SMITH: Thank you, Scott. I'm kind of going [on] blind without seeing what the rest of you can see.

As you look at that table, if you take a look at a source that is showing low-energy -- in other words, photons below 30 keV, you can see the result is beta zero, X-ray positive, gamma zero. So what we're -- what the tool of logic is doing in this situation is taking a look at what is measured there, which is positive for gamma, and

making the determination that the source that we're seeing is likely well above 30 keV.

If it was a source that contained low-energy photons, we feel that we would be seeing value in the X-ray column. We can see even at a very low exposure level, down around 40 mR, that we've got positive value in the X-ray column. So without there being a positive value in the X-ray column that's why the tool makes the logic decision not to assign missed low-energy photon dose.

And I'll stop right there since that was the main question in the Audit Report. There's obviously other scenarios, but I won't go through all of them right now.

MR. BARTON: Well, I do thank you for that, Matt.

At this point I think we might want to hear from Joe Zlotnicki about the technical aspects of using the X-ray, the trigger point. And then after that, like you said, you don't want to go through the other scenarios, but since you provided them in your response, I think we kind of have to.

But first I think we need to talk

about -- essentially if I'm hearing this correctly, and I'm going to try to bring it down to my level, is that if there's no recorded dose in that X-ray component, then it's assumed that there is no exposure potential to a source that was less than 30 keV and thus no exposure would be assigned, either a miss or measured. Is that correct? In other words, the X-ray is kind of a trigger point. Say if you have positive X-ray, it's possible that you were exposed to that low-energy source in the specific facility. So if we see a positive X-ray result in the badge measurement, then it's possible that that lower energy photon source would exist. Did I have that basically correct?

MR. SMITH: That's a good summary, yes.

MR. BARTON: Okay. Joe, I don't know if you're still on the line, if you want to dive in first?

MR. ZLOTNICKI: Sure. A couple of things. I think everything was sort of explained fairly clearly.

If you look at Table 6-4, you'll notice that for 16 keV X-rays the dosimeter dose for an

exposure of 40 mR showed beta zero, X-ray 40 and gamma of zero. If you go down a little bit and look and look at cesium-137, which we would consider high-energy gamma for a 50 mR exposure, you had zero beta, zero X-ray and 50 gamma. So clearly the way this is laid out, likely practice isn't quite as neat as that, but at least in terms of how this table is presented there's a pretty clear differentiation between the X-ray and the gamma. If it's a high-energy gamma, you can see it. If it's a low-energy X-ray, you can see it.

The real question is twofold: One is what happened to some extent. And there could be a lot of one and a little of the other and vice versa. And the second issue is I just realized -- and I've been in and out of this process for years, but not the whole time. I just realized that with missed dose in general we only give one missed dose. We don't give a missed dose if there's nothing seen on a dosimeter.

I don't think we give a beta missed dose, an X-ray missed dose and gamma missed dose where someone could reasonably have been exposed

to them. As far as I know, we only give one. And that may be the problem here. This was saying there's a positive gamma. We're then saying there's no missed X-ray dose.

So I'll stop there because I think that's already maybe the crux of it.

CHAIR KOTELCHUCK: Hello? Can everybody hear me?

MR. SMITH: Yes, this is Matt. This -- in other words two helpings of missed dose. We don't double dip on the missed dose front. The tool and the approach with Hanford definitely is what I would say claimant-favorable in nature. Following again what's in Table 6-4 and when the tool was first put together many years ago; I'm just kind of jumping back to that Table 1 of our response, here's scenario number 2, in other words, row number 2 in that table. Here's the scenario where we've got positive value in the X-ray, positive in the gamma. And therefore, we are assigning measured photon dose 30 to 250, measured photon dose of less than 30 because of that X-ray being positive.

Then we're taking the additional favorable step of counting a low-energy photon missed dose for the zero that's in that beta column. So again, going back to the Table 6-4 and just taking the scenario probably where you see 59 keV there and realizing, hey, 59 keV is indicative of working with a plutonium source term. So therefore, we took the favorable approach in which we'll find some missed dose there.

Kind of going back though to what Joe pointed out, row number 3, if you've got a zero, zero, zero scenario across the board for all three categories, we assign one missed dose and one missed dose only. And we put it to the mid- range photon category for photon energy assignment. What's the rationale there? We're doing that again to be claimant-favorable. That's the particular energy range that carries the most -- the highest PoC when it's run through IREP.

I'll just go ahead and proceed on the two remaining scenarios. Number 4 is where we've got a positive value in the X-ray column only. So there we go ahead, we assign the photon dose as done

in scenario number 2. And then we also assign missed photon dose because of the zero in the gamma, 30 to 250.

The very last one, if we were to have a positive value in the beta category but then zero X-ray, zero gamma, we take a favorable approach. We assign the electrons. For beta dose, it's low-energy photons and missed dose as 30 to 250 keV photons. All of that's favorable for --

(Simultaneous speaking.)

MR. BARTON: This is Bob. I have questions on those last two entries.

MR. SMITH: Yes.

MR. BARTON: So for entry number 4 where we have the positive X-ray and the zero for beta and gamma, I think there might be a little bit of a typo in the tool results. But basically what we're assigning is the measured photon less than 30, which corresponds to whatever the X-ray positive was. Missed photon, because the gamma is zero. And then nothing for the beta. Zero. Is that correct? Because it would be double dipping between the gamma and the beta entries for missed

dose?

MR. SMITH: I believe we're saying the same thing. The missed dose in that scenario is going to be again applied in that more claimant-favorable energy range, so we do it 30 to 250 keV.

MR. BARTON: And it also listed measured photon dose, 30 to 250 keV.

MR. SMITH: Yes.

MR. BARTON: So I assume that shouldn't be there, right?

MR. SMITH: I'm --

MR. SIEBERT: This is Scott. Yes --

MR. SMITH: I don't have all my notes in front of me, but I'm referencing Table 6-2 and 6-7.

MR. SIEBERT: Correct me --

MR. SMITH: So probably -- go ahead, Scott.

MR. SIEBERT: Yes, correct me if I'm wrong, Matt, but my understanding is remember that X-ray value is not a stand-alone value. It gets -- really gets portioned out between the shallow and

the deep dose. A percentage goes into both of those. So if the X-ray dose is positive, it's basically considered as a positive shallow dose and a positive -- a portion of it's a positive deep dose as well. Does that make sense, Matt?

MR. SMITH: Thanks for the refreshing reminder, Scott. That's -- and that's why I cited Tables 6-2 and 6-7 in that response. You will see those tables do discuss the way that Hanford did the split on the X-ray component of the dosimeter.

MR. BARTON: Okay. For row 4 the two measured doses, where it says measured photon and has the two energies, that's all for whatever the X-ray report is. And then the missed photon is for the zero gamma. And then the zero beta is ignored essentially.

MR. SMITH: Not necessarily ignored, but we're are handing out a -- we are going to give a missed dose, and we're going to give it in a favorable fashion.

MR. BARTON: Okay. Alright. I think I understand that one.

If we move onto row 5, however, here

you've got a positive beta, a zero X-ray, zero gamma. And if I understand the response correctly, if you have a zero X-ray dose, then you are not exposed to a source that has less than 30 keV photons, because that would have been picked up by the X-ray part of the multi-element dosimeter. Is that -- that's correct, right?

MR. SMITH: Yes, and then you see why there's a footnote here. We probably put this approach in many years ago as a claimant-favorable way of assigning the dose. We're calling that positive value in the beta -- we're calling it low-energy photons. We're also --

MR. BARTON: Which it probably shouldn't be, though.

(Simultaneous speaking.)

MR. SMITH: -- assigning missed dose. Again, see the footnote. This approach was initially taken to be claimant-favorable. Current evaluation of this approach indicates that only missed photon dose should be assigned for deep organ dose since the likely source term would be an electron emitter.

MR. BARTON: Right, but if the --

MR. SMITH: Certainly --

MR. BARTON: -- tool was taking that positive beta and still assigning it as less than 30 keV photons, that would not be correct. That's what I'm seeing. Because I'm just manually working with the tool and putting it in a situation where you have a positive beta dose, a zero X-ray and zero gamma. As far as I can tell, and these things are really complex, the tool still returns a positive low-energy photon dose where, based on the arguments I'm hearing, it really shouldn't.

MR. SIEBERT: But let me clarify. This is Scott. What we are presenting in the table is how it is presently conducted based on the information that was understood a while ago in the TBD. We have been looking at this issue for a while to determine if that's the most appropriate approach and we're honing in on what may be the more appropriate way to do it, which is the footnote A. However, that has not been a decided factor at this point, so no documents have changed to reflect that. It's just an interim step at this point.

Matt, is that a fair assessment?

MR. SMITH: It sure is.

MR. BARTON: Okay. So if it came to the point where the approach using the X-ray as a trigger, as I put it before, then the tool would have to be changed?

(No response.)

MR. BARTON: Is everyone still there?

MR. SMITH: Say that again. If the X-ray was --

MR. BARTON: If you had a positive beta and zero for the other two components, then the correct thing to do would be to only assign the gamma deep dose, the 30 to 250 keV and that no low-energy photons should be assigned because there's no positive X-ray component.

MR. SMITH: Well, it's probably -- as stated in the footnote, it's probably more likely that this is an electron emitter. In the end -- well, I don't want to speak to the final outcome that we're going to do with scenario 5. It certainly is a complex one. I don't know if it's a common one. It certainly is a rarity when we look

at other sites like Savannah River.

Keith, if you're on, if you can -- if you have any historical perspective on how often we see a positive beta with absolutely zero in X-ray and gamma. Everyone on the phone could probably appreciate that likely fairly rare situation.

And, Keith, you're going to have to do the *6.

MR. McCARTNEY: Okay. This is Keith. Can you hear me?

MR. SMITH: Oh, yes.

MR. McCARTNEY: Yes, I don't have a handle on what the bulk data looks like as far as how often that will occur. I don't look at the raw data all that often.

MR. BARTON: Well, if I might, as part of the original response; let me see, I want to get the exact quote, it says, the appearance of omission of missed shallow dose to deep organs where a plutonium facility work has been previously identified by NIOSH and has been evaluated by the Tool Development Group and principle external dosimetrist -- which, Matt, I assume that's you.

So I guess my question is has this been in process for a while, or when did this issue start being looked at, particularly in relation to when this DR took place? And it kind of almost sounds like it's still being evaluated. Is that correct, that no determinations have been made on exactly how -- or no final determinations have been made on exactly how dosimeters, during this particular period at Hanford, are going to be interpreted and parsed, if you will?

MR. McCARTNEY: The method that's in the tool certainly has been there probably well over 10 years. This particular method -- Keith can refresh me if I'm wrong -- but it probably went into the tool along the same time when OTIB-17 hit the street. This particular question came my way from two different avenues during the past year. I believe I wrote this particular response late in 2016.

MR. BARTON: I guess -- so at the time this DR was done, the interpretation on how you take that X-ray component and then interpret low-energy photons with the beta component was not actually --

had not actually been discussed or nor was it really part of the overall dose reconstruction program for Hanford in this particular dosimeter?

MR. McCARTNEY: That would not be correct. It was likely discussed. And like I said, those discussions likely took place over a decade ago when the tool for Hanford was first put together -- not first put together, but when it was provided after OTIB-17 came along.

MR. BARTON: Well, I think this issue almost kind of goes well beyond obviously this one case, and it almost seems like it's a technical issue related to the Hanford site as a whole, and that -- have final determinations been made? For instance with the written response that we have now, would that be something that would be added to the TBD to explain exactly how these dosimeters during this sort of complex time should be interpreted?

MR. McCARTNEY: Again, it's something that could be added. It will probably help clarify the issue.

In terms of responding to the comment

on the claim itself, that was kind of the goal of what this effort was. When it comes to revising TBDs, when we get that direction, we'll take that direction.

MR. BARTON: Right, and this is sort of a situation where the original finding raised the question and then we got responses. And that at least for me raised more questions about whether the tool is acting in accordance with this policy. And I think at least for that line 5 it's not, based on how I've been sort of manually entering these different scenarios, but it also sounds like that tool has not been updated in a very long time. And so, it might not be reflected on this specific issue.

MR. SMITH: And Keith can tell you what's wrong with it, but the tool is doing what Table 1 states that it's doing.

MR. McCARTNEY: It is doing that. That's correct.

MR. SMITH: And the question came to me both on scenario number 1, which is the first row, and then folks had questions, and this group has

had questions about what about this scenario. What about the alternate scenario? What about scenarios 4 and 5?

So I stepped through all those and at the same time took a look at everything else that was available to us and the tools put together to come up with this summary of what the rationale is or as it was put together as it is now. Does that mean that everything is set in stone? I think you can tell by our footnote on the last one that we're maybe taking a closer look at that one.

But at the same time I believe the last scenario was a fairly rare occurrence, whereas the ones we see certainly in row one and row three are quite common.

MR. BARTON: There's one scenario not included here, and that would be positive, zero, positive. And again, based on my manipulation of the tool, positive, zero, positive still returns a low-energy photon dose, whereas -- because that X-ray is zero, based on the discussion in your response, it doesn't appear that it should.

MR. SMITH: So positive beta, zero

X-ray, positive gamma?

MR. BARTON: Correct.

MR. SMITH: And the question again was what?

MR. BARTON: When you put in a positive beta, zero X-ray, positive gamma, the tool returns obviously the measured gamma, but also the measured beta as low-energy photons even though the X-ray component is zero. And so it shouldn't have triggered the application of those low-energy photons because the X-ray is zero. And again, that will be scenario 6 in this table, which is not --

(Simultaneous speaking.)

MR. SMITH: Okay.

MS. GOGLIOTTI: Bob, you're missing that they're assigning the beta dose as low-energy photons.

MR. BARTON: No, I realize that, but what they're saying is that if there's no X-ray component, the X-ray is zero, that it's not possible that they were exposed to a source that included low-energy photons. So if X-ray is zero, there should be no low-energy photon assignment

just as a stand-alone rule.

MR. SMITH: I also have to think about this in terms of -- I believe the question on the computer is saying for deep organ exposure, if we have a positive beta on skin, we would tend to -- we would assign that as electrons. In this situation I think what our aim was as we put the tool together was to take a favorable approach to things. So by assigning the measured gamma 30 to 250 keV -- again realizing the X-ray is zero, but we've got some value there in the beta column. We've decided to assign that as low-energy photon.

If it's truly electrons, and we're talking about a deep organ, we could go one step further and say we should not assign any dose at all based on what's in that column. So our thought process was -- I don't know if it's -- if the tool is tying it into the facility at Hanford, but certainly I think our thought process was if you're at a facility like PFP where you have a plutonium source term, we're being claimant-favorable by calling what was in the beta column low-energy photons. If it's truly electron, you could

totally wave it off and not assign anything.

MR. BARTON: Yes, I agree with everything you just said. What I'm trying to point out is that the tool itself is not necessarily logically consistent with the technical arguments we see here. And aside from whether those -- the technical arguments, which I'll let Joe jump back in, because really I just wanted to talk about how the tool implements what is discussed here as far as that X-ray dose being the trigger to assign the low-energy photon dose. I don't think it works in all situations. But that's a matter of does the tool do what we're saying it should do in all situations regardless of what at least for me is sort of a new concept of using that X-ray dose as a trigger. And again, this might be only applicable to Hanford from '58 to '71. I think those are the years.

But aside from any technical concerns we had, which again, Joe, I'll let you jump back in, I think there is a little bit of a problem with the tool. If this method were to be accepted, I don't think the tool is doing everything that you

folks want it to do.

MR. CALHOUN: This is Grady. Let me just ask a question, because I'm kind of confused here. Are you saying that if there's a mixed field that we should somehow be assigning a blend low-energy photon dose that add up to whatever the missed dose number would be instead of choosing one or the other?

MR. BARTON: Well, Grady, I'm looking at the situation, too, and that's essentially what you're doing is measured photon for the gamma, measured photon for the X-ray, because those are both plus, and then on top of that missed dose for the low-energy photons. So if it's correct there, then -- I mean, I'm just trying to follow the logic argument to each of these different scenarios, and what's there is not seemingly to me in the tool. I mean, I don't know if you folks want to take a harder look at that.

MR. CALHOUN: Well, I mean, what we're doing though is -- the LOD is going to be a number and we're going to assign whatever radiation results in the highest Probability of Causation.

So if there's an electron component and a low-energy photon component, we're not going to try to parse those and make those add up to the LOD. Am I missing -- is that what you're trying to say or not? I'm confused.

MR. BARTON: I'm going to have to apologize. I'm not sure I followed your question.

MR. CALHOUN: I'm just not sure what you're thinking we should be doing.

MR. BARTON: Well, let me just say how this started up, is that beta is not beta at all for this claim. Beta is assumed to be entirely low-energy photons until you get to this period from 1957 to 1971 in which we're saying, well, we have this added piece of evidence, which is the X-ray dosimeter element. And if that X-ray element is zero, then there's no way that those low-energy photons were there, so we're not going to assign it. However, that does not seem to be logically consistent with what the tool is doing. That's what I'm saying.

MR. ZLOTNICKI: This is Joe. Grady, I think what you -- I think you summarized the issue

quite well, in that when we have missed dose or LODs, you have more than one missed dose, potentially. You could have a missed -- there's obviously on a photon beta film dosimeter there's a missed or an unmeasurable beta dose, an unmeasurable low, medium, and high X-ray dose, and an unmeasurable limit of detection for the gamma. So you've got potentially a mixed field which you could imagine followed some complex shape of the most dose you could put on that badge and still miss it.

It's a little complicated because if you have a little more in one -- for example, beta and X-ray overlap in the open window to a great degree. And so you can have more of one and less of another and still miss it and vice versa.

So I think that the issue is that there seems to be, potentially, some inconsistency in what happens with that sort of assigned missed dose, if there was absolutely nothing measured versus if there was something else measured in another category, like gamma, what are we putting in the X-ray column and so on?

I would also add that the sort of sixth scenario of beta, no X-ray, and gamma is a pretty long shot. I don't know the algorithm for Hanford, but I find it hard to imagine that you could get a positive result in the beta and gamma column and nothing in X-ray. But I don't know that. I just think that, the way one constructs algorithms, you would wish you could do such a good job of separating out the beta. I don't think anyone normally manages that, especially not that well.

MR. SMITH: And we certainly don't see it in the Table 6-4 examples.

MR. ZLOTNICKI: Yes, it's too difficult. So I think it's a consistency question of assigning missed dose and do you assign multiple missed doses? Or when you get a measured dose, does that mean I don't need a missed dose for another category? I think that's the crux of the issue. And it probably goes beyond Hanford, by the way.

MR. SMITH: I'll just take it back. That discussion might be for a different Subcommittee. For the purposes of what was in the

audit report, I believe we've answered that question and I stand by what the tool is doing as a claimant-favorable approach to dealing with what was brought out in Figure 9 of the audit report.

MR. CALHOUN: That probably is the best path forward. I mean, this is looking like -- I don't agree that it's a problem, actually, but it seems like it's something that could be more into an overarching-type issue. But I really believe that what we're doing is the claimant-favorable approach, because we're not ever leaving any of these blank. We're satisfying what the LOD is and assigning a radiation dose that results in the highest PoC of whatever is the most likely radiation that's present. So I agree that I think this particular issue on this Subcommittee, we've gone as far as we can on that.

CHAIR KOTELCHUCK: Yeah, it seems to be that way, too. I mean, I feel like I don't feel competent to decide it for a general case and how broadly it's applied. But it does seem to me that you've taken a claimant-favorable approach by always by making an assignment.

So I'm not quite sure that would suggest that we could close it out. And the question is should we refer it to another -- either a Hanford Working Group or Procedures Subcommittee. I don't know. What do others think? What do other Subcommittee Members think?

(No response.)

CHAIR KOTELCHUCK: Can anybody hear me?

(Simultaneous speaking.)

CHAIR KOTELCHUCK: Okay. Fine. Fine. Good. Okay. Just in case I was on the wrong *6.

MR. SMITH: Could you -- could we just tackle the first part of your comment first?

CHAIR KOTELCHUCK: Okay.

MR. SMITH: Is there a concern that it's a claimant-favorable process that's taken and it's simply one of logic now, or questionable logic --

CHAIR KOTELCHUCK: Good question. Good question. I think it is claimant-favorable. What do other Subcommittee Members think?

MEMBER BEACH: Dave, I just realized that Wanda and I can't answer, so --

CHAIR KOTELCHUCK: Oh, thank you very much. So we have --

MEMBER CLAWSON: So it's me.

CHAIR KOTELCHUCK: It's you, Brad, and me.

MEMBER CLAWSON: Yeah, so I think it is claimant-favorable, but I do agree with him there's something odd in this. So I'm just trying to figure out who we'd hand this off to.

CHAIR KOTELCHUCK: Yes.

MEMBER CLAWSON: Because I don't really think that it would be the Hanford Work Group because --

MR. KATZ: No.

MEMBER CLAWSON: -- we're not dealing with that. I think this would be in the Procedures or something.

CHAIR KOTELCHUCK: Yeah.

MR. KATZ: This is Ted. I mean, when we have generic issues like this, that's where they'd go.

CHAIR KOTELCHUCK: Right.

MR. KATZ: Right?

CHAIR KOTELCHUCK: Well, I'd be more than happy. There's also a part of me that we don't need -- we're not pressed with a time deadline that we must decide this today or immediately in the future, and that I could easily send it to the Procedures Subcommittee and essentially would argue that it's not our purview. Should we come back to it again or consider it out of our purview at this point?

MR. KATZ: So, Dave, it sounds like you and Brad, the standing Members, you can close this as far as the Dose Reconstruction Subcommittee. If it's claimant-favorable and you think that the case is fine as is, you can close the case and still ask Procedures folks to take a look at the generic issue to see if those issues generically with how missed doses, mixed missed doses, is being handled.

So you can do both. You can close it for you and let this case be put away and then send the issue over to Procedures to look at.

CHAIR KOTELCHUCK: But I worry -- I

mean, that is a reasonable scenario except for the fact that I feel Procedures may argue that it's not claimant-favorable. I think it is -- and, Brad, you think it is -- but I don't feel confident in that judgment.

MR. KATZ: Well, yeah, if you just don't really feel like you have a handle on how this applies even in this case, then -- and you want to have the whole procedure looked at, not that it's a huge procedure, but want this approach, general approach looked at, then, well, the Procedures Subcommittee can look at it.

That's not going to happen quickly, but certainly they can do that. If they do that, I think SC&A will need to write a little White Paper for the Procedures Subcommittee to consider. And then we'll need to get a response from NIOSH to address their view on the whole matter. And then we'll take it up there. That's fine.

MR. CALHOUN: Yeah, this is Grady. I'm really thinking that this is going to be pretty much of a non-issue, but I agree that we should run it to ground. I'm still not convinced that there's

a non-claimant-favorable issue here, but I agree that, just to put this to bed, if you want to, we need a real concise write-up of what exactly is the problem and why it's a problem and what would be suggested. And then we'll see if that's correct.

MR. KATZ: Right.

CHAIR KOTELCHUCK: That would sound good.

MR. SIEBERT: This is Scott. Can I just be clear on who is writing that?

MR. KATZ: So SC&A needs to write up the problem. And then following that, a little brief memo, White Paper, whatever you want to call it. It doesn't have to be extensive, but it just has to be clear and complete. And following that, then, Grady, your view of -- Scott, your folks can give a response to that, and that can be taken up by Procedures.

I mean, it can be taken up by the Subcommittee, if you want. You can just keep it here and get that -- but if SC&A is proposing that this is not even just specific to this case, but it's a generic issue, then I would suggest it go

to Procedures.

MR. CALHOUN: Here's what I propose, is that SC&A writes up the problem in a lot of detail, because from what I'm understanding, I don't understand it all. So they send it back to us and we'll take a look at it and see if we can respond. And then after that response we'll determine if it needs to go as an overarching Procedures Group issue. But we'll take a stab at responding to it first for this Subcommittee after we receive a very detailed write-up of what you think the problem is.

MR. SMITH: I think that's good.

MR. CALHOUN: Is that okay?

MR. SMITH: I think that's good.

CHAIR KOTELCHUCK: Sounds good. Sounds good.

MS. GOGLIOTTI: Shouldn't this go to the Hanford Work Group instead of Procedures?

CHAIR KOTELCHUCK: Pardon?

MS. GOGLIOTTI: Shouldn't this go to the Hanford Work Group instead of the Procedures Work Group?

MR. KATZ: No.

MR. CALHOUN: Not yet, because I think it's going to come back as not a problem.

MR. BARTON: If I might add, this is Bob, when I'm mentioning what I call inconsistencies between what the workbook is doing and what's logic pattern is based on response concerning X-rays and low-energy photons, I don't believe that it's not favorable to the claimant. I believe it is favorable. I just believe it's also inconsistent with your logic pattern and technical policy here.

And so I think it would -- I mean, I believe that it is claimant-favorable, but I also believe that the tool is not performing in line with all of the scenarios painted here and the concept that the X-ray dose is going to act as a trigger to assign low-energy photons.

CHAIR KOTELCHUCK: Well, let me ask this. If the two consultant groups both believe it's claimant-favorable -- I'm not sure you're speaking, Bob, for the consultant group; you are speaking as an individual professional. But if the group, if you would say that SC&A and NIOSH/ORAU

are agreed that it's claimant-favorable, then I would close this for the Subcommittee and send it to Procedures, which was the first --

MR. CALHOUN: I still want to take a shot at proving that it's not a problem.

CHAIR KOTELCHUCK: Well, I'm open to that, but if both sides think it's not a problem. I understand, inconsistency should go to Procedures, but do other -- I mean, I don't know. We're not taking a vote between consultants. You may want to hear that, but if it's claimant-favorable and both sides agree that it's claimant-favorable at this point, then I feel like we ought to close it for the Subcommittee.

MEMBER CLAWSON: Dave, this is Brad.

CHAIR KOTELCHUCK: Yes.

MEMBER CLAWSON: I agree with you. I think that we ought to close it, but I think that we ought to -- I'd kind of like to get a read-back of it though, too, just because we've dealt with this a little bit. But I'd send it to the Procedures Group kind of as an overarching issue, or it may not even turn out to be anything.

CHAIR KOTELCHUCK: Yes.

MR. KATZ: Well, that's why -- let's get the paper and Grady's response before we actually send it to Procedures just so that -- I don't want to waste that Subcommittee's time with something that ends up being clear to everyone, if it should end up clear to everyone, that it's actually resolved somehow.

MEMBER CLAWSON: Okay. That's sounds good.

MR. KATZ: Because they're going to have to do their homework on this and so on and whatever. It's just easier I think than -- keep it in this ballpark, even if you want to close the case, and we'll hear at the Subcommittee and then if necessary will send it over the next time. There's nothing lost in doing that.

MEMBER CLAWSON: Okay.

CHAIR KOTELCHUCK: Okay. So you're saying it's easier to actually get a write-up?

MR. KATZ: Yeah, for sure.

CHAIR KOTELCHUCK: A write-up in the Subcommittee?

MR. KATZ: Yes.

CHAIR KOTELCHUCK: Okay. It doesn't seem to me that way, but you know what, that is reasonable. I don't want to do too much tasking. And I'd be open. All that means is that we'll get something back at the next meeting and we will close it, hopefully. Okay. I'll buy that.

Brad?

MEMBER CLAWSON: Yes, I'm good with that. And maybe if we get a write-up, I'll even be able to understand it better.

CHAIR KOTELCHUCK: Okay. That's good.

(Laughter.)

CHAIR KOTELCHUCK: Alright.

MEMBER RICHARDSON: This is David.

CHAIR KOTELCHUCK: Yes, go ahead.

MEMBER RICHARDSON: Just to kind of follow up once more on this. I guess I would lean towards our mission is not simply to -- I mean, if there's an issue of logic or if there's a calculation that's not doing what's intended, regardless of whether it's claimant-favorable or

not, I think that's within the scope of what we're supposed to be evaluating. So, I mean, that would be my view of it.

So I think Ted's suggestion, then, is reasonable and it's a way to move forward, but I don't feel comfortable with simply saying, "it may not be right, but it's claimant-favorable" as the litmus test for what we're doing.

CHAIR KOTELCHUCK: Okay. So that's a further argument for going ahead with getting something written up for the Subcommittee before we send this to Procedures, right?

MEMBER CLAWSON: Correct.

CHAIR KOTELCHUCK: Okay. Then we're agreed. I think the three of us are agreed and therefore that's our -- that's the decision, if you will.

So that takes care of that for the moment. And let's go on now. Do we want to go to the AWE cases?

MS. GOGLIOTTI: Yes, let me just get that pulled up.

CHAIR KOTELCHUCK: Okay.

MS. GOGLIOTTI: And, John Mauro, are you on the line?

CHAIR KOTELCHUCK: John?

MS. GOGLIOTTI: John, if you're on the line and can hear me but can't talk, press *6, please.

CHAIR KOTELCHUCK: Okay.

DR. MAURO: Can you hear me?

MS. GOGLIOTTI: Yes.

CHAIR KOTELCHUCK: Yes.

DR. MAURO: Oh, it's very unusual -- okay. I'm okay now. Very good. Thank you.

MR. KATZ: We have to give special credit to Bob Barton for giving us the solution for this meeting.

Begin AWE Cases

MS. GOGLIOTTI: Yes, thank you, Bob. Okay. So we're going to start with tab 360, which is the BONUS Reactor in Puerto Rico Nuclear Center.

MR. SIEBERT: Just to be clear -- this is Scott -- this is from the 14 through 18 sets, AWE, correct?

MS. GOGLIOTTI: Correct.

MR. SIEBERT: Okay. I just want to make [sure] we're all on the same sheet of music there. Thanks.

MS. GOGLIOTTI: Yes, we have not responded to the 19th and 21st sets.

MR. SIEBERT: Okay.

MS. GOGLIOTTI: For AWEs, anyway.

Okay. And this finding states that there was a failure to discuss neutron exposure potential. And we have talked about this case several times in the past.

And, John, actually I'm going to turn it over to you now.

CHAIR KOTELCHUCK: Pardon me, before we get started, are the Bethlehem cases closed?

MS. GOGLIOTTI: No.

CHAIR KOTELCHUCK: No, they're not? Okay. Well, we want to go to BONUS because we need the persons that are here with us.

MS. GOGLIOTTI: Yes.

CHAIR KOTELCHUCK: Okay. Fine. Fine. Okay. Thank you. Do go ahead. Sorry.

MS. GOGLIOTTI: John?

DR. MAURO: Okay. I was just waiting to get the green light. Yeah, I'm looking at the BONUS Reactor, 360. And I'm going down, there's a list there, some are in progress and some have been closed.

MS. GOGLIOTTI: Yes, but we're on finding No. 2.

DR. MAURO: Oh, very good. That's what I'm looking at, and that has to do with neutron exposures.

I looked into this and what we have here is we've all agreed that there is, in the BONUS -- by the way, the BONUS Reactor is a BWR 50 megawatt electrical experimental reactor that was in Puerto Rico. And very often when you're dealing with reactors and you have some external exposure -- by the way, that issue has been resolved and we're comfortable with the one rem per year penetrating external exposure. The issue here is, well, what about neutron exposures?

And I think, as Rose pointed out, this was discussed before, and there is a little ambiguity on whether the reported measured doses

from penetrating radiation in the data set, which demonstrate that the one rem per year is a good number for most workers, and the exceptions are known because they were certain events, that for this particular person the one rem per year is good.

The question is, is that one rem per year penetrating? Is that the sum of the external gamma plus neutron, which could also be a contribution to penetrating dose? And that's usually a good question, especially for reactors. And Grady made the case that, well, yeah, the weight of evidence, as indicated in SRDB 9255, page 7, is that it appears that they did -- that the exposures that we're looking at are really the sum, the penetrating, the sum of neutron plus photon.

And I looked at that and, you know, it's hard to say. So we're in a difficult situation in that is it really clear-cut that in fact they captured the neutron exposures? And I, for one, could agree. However, at the same time I could see someone arguing, well, let's take a look at other BWRs, perhaps such as the BWRs at INL. There's a 50 megawatt thermal BWR there, and look at the types

of exposures there. I don't know if that's a good way to sort of convince yourself.

MS. GOGLIOTTI: I think you're actually talking about No. 3, but that's okay. We can go to 3.

DR. MAURO: Okay. Am I looking at the wrong number right now? Is that what you're saying?

MS. GOGLIOTTI: Well, Finding No. 2 had to do with the neutron summary.

DR. MAURO: Yeah, that's where I'm at. I'm looking at 360.2.

MS. GOGLIOTTI: That's the one, yes.

DR. MAURO: Right. And that has to do with the neutron contribution to dose and whether or not that's been captured. And the argument is made that, yes, in the external penetrating dose as derived and assigned to this worker does include a neutron dose. And there is some language in the write-up that would indicate that it's likely that that's the case, or that there wasn't very much neutron contribution.

And my perspective is I would accept

that. And, in fact, I think there is also a recommendation in here already from the 3/23/2017 meeting that SC&A recommends closure. I don't believe I was involved at that time, but now that I'm looking at it, I would agree with that also. But I just wanted to --

(Simultaneous speaking.)

MS. GOGLIOTTI: -- that's the response that we entered, but --

(Simultaneous speaking.)

MS. GOGLIOTTI: -- records from the SRDB that basically established that neutron monitoring was happening. But our question was really, is the summary table inclusive of that neutron monitoring?

DR. MAURO: Yes, and that's what I'm trying to explain. And it's difficult to judge whether or not it includes or it doesn't. I've seen lots of these types of handwritten printouts where the penetrating radiation is reported separately, gamma from neutron, and where it's been combined.

And all I could say right now from

looking at that, it's difficult to judge, but the weight of evidence appears to be that, yes, they've captured the neutron exposures also. But that is very much a subjective judgment. But I would agree with that and agree that this issue could be closed on that basis, but I wanted to make sure everyone else was comfortable with that.

CHAIR KOTELCHUCK: That sounds good and I'm onboard with that. It does seem to me the argument is persuasive that it has been taken into account. What do others think?

MEMBER MUNN: I agree.

CHAIR KOTELCHUCK: Yeah. We're all -- all of us are now participating, so.

MEMBER MUNN: Yes, we're back.

CHAIR KOTELCHUCK: Right. Brad, Josie?

MEMBER CLAWSON: Yes, I'm good.

CHAIR KOTELCHUCK: Okay.

MEMBER BEACH: I'm good also.

CHAIR KOTELCHUCK: Okay. Very good. Dave?

MEMBER RICHARDSON: Yes.

CHAIR KOTELCHUCK: Okay. Good. So let's close on that. And then let's go onto 3, the 360.3 that you started to do a moment ago.

DR. MAURO: Okay. Yeah, I'm looking at 3 right now, and this has to do with the internal dose. And I'm just quickly refreshing . I read it before just to make sure that this is the one I'm thinking it is. I believe this has to do with a surrogate data issue.

Now, for this worker, I believe zero internal dose was assigned. And the argument given was, well, listen, we do not have any internal dosimetry data for this worker. Just like they didn't have any external, they didn't have any internal.

And in this case they said, okay, how are we going to assign some doses, internal doses, to this worker? And there's a lot of different ways in which you could come at this problem. And the way I started was first to say, okay, if you go into the SRDB, the number is in here somewhere where they give tables of the exposures of workers. I believe it's SRDB 16915.

And in there they give you lots of data for this facility for both external exposures, but they also have at the end tables for internal exposures. And those tables are blank, and the reason they're blank is the heading says you only really need -- and the text that goes with it -- you only really need to report internal exposures if they're above one-half the maximum allowable concentration.

And so, what we have here is a circumstance that could say, well, one could argue that this person may have experienced some internal exposure, but it was below the reportable level, which according to those tables is one-half the -- and at that time it would be the MPCs, if you're all familiar with the maximum permissible concentrations. And so one can argue, well, maybe one-half that value should be assigned, not zero. Okay?

Another strategy could be to assign zero, which is what was done, because there's a belief -- and I'm having a little trouble with this, the belief that there was no internal exposure.

Another strategy would be to default to what I believe is OTIB-33, which says the following: If you have a circumstance where there's a reason to believe that a person may have experienced internal exposure but you don't have any records and you want to assign some internal dose, and you know that there was a fairly robust health physics oversight program, one could say that, well, you could argue that if there was some potential for internal exposure and there was a good health physics oversight program -- I believe the number that's used is one-tenth the MPC as being the possible exposure. Because if you're above that, the procedures, I believe at that time, in 1960 this was, it might have been, and I might need a little help here, that that's when you kick in respiratory protection. So if you're above one-tenth an MPC in an occupied area, you want the worker to wear respiratory protection.

So another strategy could be to assign 10 percent. And if you were to do that, that would be an effective dose of on the order of 500 millirem per year.

And then there's the last approach, the approach that was elected to be used by NIOSH, which was to say, well, let's use as our surrogate the outdoor airborne concentrations and associated exposures at INL as a default. Well, I tell you I really have -- that's in fact what was done. That's my understanding, and please correct me if I'm wrong.

I have a real problem with that because it comes nowhere near meeting the surrogate data criteria. In other words, there's a whole string of five criteria for when you use surrogate data. That is so far removed from this circumstance, the INL outdoor levels, that I really can't -- now, I'm not saying that you've got a significant internal exposure problem here, but I'm saying that strategy for assigning some internal exposure, which in this case would be zero -- and the reason it's zero is that if the derived internal exposure is less than one millirem per year, you assign zero. So the actual approach that was used here, and the surrogate data strategy, I have a problem with.

I think there are other strategies.

The ones I mentioned before seem to be more defensible. And it would assign some dose. For example, right now he's receiving one rem per year whole body external. And in theory if one wants to go with the one-half approach that's in that SRDB that I mentioned, the one half of the MAC or the MPC. Or if you want to go with the OTIB-33 approach, which is 10 percent of the DAC, the derived air concentration, strategy, that would seem to be a way to assign some internal dose.

And it seems to me that that would not be unreasonable when you look at the reactor itself. I had a chance to look at the design of the reactor. The whole reactor, everything, is inside a dome in containment and there's a potential for airborne radioactivity to be generated from the steam that's being produced in this reactor and sent off to a turbine. And there's a control room. So it seems to me there is a real potential for internal exposure, and assigning zero seems to be difficult to support. And that's my story.

And, now, I don't know if I have all the

facts correct. So, certainly, Grady, if I got the facts wrong -- but if I got the facts right, you could understand the rationale for my conclusion. And I'm not sure if you would agree with our conclusion or not, but I guess there's two steps to this. One, did I tell my story correctly about the nature of this reactor and also the nature of the applicable regulations? And given that, I feel that the approach used could be improved and some dose should be assigned.

MR. CALHOUN: Yes, this is Grady. I guess I'm not in a real firm position to argue that, John. We don't have a ton of stuff on that site. We thought that what we did was somewhat reasonable. I see your point, too. I don't know where to go from here other than try to come up with another response.

MEMBER MUNN: And, of course, one of the reasons why you don't have a ton of stuff on it is because there was never a ton of stuff there.

MR. CALHOUN: Right.

DR. MAURO: There was an air sampling program and there was an attempt to monitor

internal exposures. And when you look at the tables in that TBD -- I'm sorry, that SRDB 16915, you'll see the table where they give you -- there would be numbers in there if they were above one-half the MPC.

The way in which the radiation protection program worked at this facility at that time, which was in the 1960s, around '64, was that you didn't worry about it if it was less than one-half the maximum permissible concentration. And they did not record anything.

But I would not assign zero. I would find a way to say, well, within that context what would be a reasonable approach to assign some internal exposure? And I offered up a few strategies that I would be more comfortable with.

CHAIR KOTELCHUCK: Well, Grady, I mean, you're acknowledging that there's some merit to what's --

MR. CALHOUN: Yeah, I'm not in a position to --

(Simultaneous speaking.)

CHAIR KOTELCHUCK: I mean, it sounds to

me as if it might --

MR. CALHOUN: I think we might just take another look and come back.

CHAIR KOTELCHUCK: Exactly.

MR. CALHOUN: That's all I can say.

CHAIR KOTELCHUCK: Exactly. I think we should just leave it in progress awaiting your further thinking and response. And then let's take a look at it again.

MEMBER BEACH: Dave, that sounds reasonable.

CHAIR KOTELCHUCK: Okay. Others?

MEMBER MUNN: I don't what else we're going to be able to do with it.

CHAIR KOTELCHUCK: Yeah.

MEMBER CLAWSON: I'm good with it.

CHAIR KOTELCHUCK: Okay. Then I think that's what we will do. So that will be in progress.

MS. GOGLIOTTI: Okay.

CHAIR KOTELCHUCK: Alright.

MS. GOGLIOTTI: These next few we've carried along, but I think that we got caught up

in this past argument and we can actually close these next few out. And they both are very similar. And the reason that they're two different findings has to do with our table. And the findings state that there was a failure to address monitoring described in the CATI report, and also the dose reconstruction was inconsistent with the interview.

And on both of those NIOSH agrees with us that they could have done a better job addressing those things. But then our discussion kind of deteriorates and goes back into Finding No. 3, and I don't think that we need to keep this open for that. Finding 3 we're already leaving open.

CHAIR KOTELCHUCK: Yeah. Okay. Again, others?

MEMBER MUNN: Nothing to add.

CHAIR KOTELCHUCK: Okay.

MR. KATZ: Rose, can you just clarify? So which are you suggesting be closed?

MS. GOGLIOTTI: Four and five.

MR. KATZ: Oh, thank you. Okay.

DR. MAURO: They're basically

redundant with -- everything really collapses back to the issue I just described.

CHAIR KOTELCHUCK: Right. Right.

DR. MAURO: So the others are just extraneous.

CHAIR KOTELCHUCK: Yeah. Okay. Four and five are closed. Good, I'm glad you asked. Okay. Good. What would the next one be? Let me just look at my --

MS. GOGLIOTTI: Now we can jump into the 409, which is the Bethlehem Steel case. And I'm not sure how the Subcommittee wants to proceed with these given the discussions that have gone on at the last meeting and also in the memo that we sent out, as well as the email from Grady.

CHAIR KOTELCHUCK: Now, I'm not -- I reviewed these myself. I'm sure others have, too. I don't recall in my notes why these were left open. They were --

MS. GOGLIOTTI: Well, I think the crux of the issue is that when SC&A does a review of a TBD that we haven't reviewed -- so when we're doing a dose reconstruction of a TBD that we haven't

reviewed -- John typically does a kind of mini-TBD review just to make sure that the TBD is appropriate.

CHAIR KOTELCHUCK: Okay.

MS. GOGLIOTTI: This was kind of a unique instance where we did review the Bethlehem Steel TBD. And then there was a lot of work that went on. And some of those findings were resolved. Some of them would be included in a subsequent revision.

That TBD was canceled and was replaced with another document, and then was subsequently revised again. And SC&A has not reviewed either of those subsequent documents.

CHAIR KOTELCHUCK: So there's TBD-02103, is that it?

MS. GOGLIOTTI: Off the top of my head, I don't know the TBD number.

CHAIR KOTELCHUCK: Yeah, but --

MS. GOGLIOTTI: So that was what generated these findings. So they're more TBD-related than they are dose reconstruction-related.

CHAIR KOTELCHUCK: Yes.

MS. GOGLIOTTI: NIOSH came back and responded to almost all of the findings with a generic, this response here.

CHAIR KOTELCHUCK: Yes. Yes. I'm going to -- if you don't mind, I'll take a look myself now. Thank you. The question is whether it's worth going back over --

DR. NETON: This is Jim Neton. I might be able to shed a little light on this.

CHAIR KOTELCHUCK: Could you?

DR. NETON: Yeah, there's been some back and forth, as Rose pointed out, about the reasonableness of entertaining a second review of the Bethlehem Steel Site Profile given all the work that went into closing it out, oh, 10 years or so ago.

I did review SC&A's memo that was issue on the findings that was dated March 29th, 2017, and it looks like SC&A has reconsidered some of these findings and closed a number of the ones that were issued against the Site Profile.

It seems like the -- and I agree with

their write-up where in the original review of the Bethlehem Steel Site Profile there were --the Board did vote to close the findings -- I mean, the Site Profile review. But in a sense they left some items open that would in today's world be considered in abeyance. So I do agree that those things were out there and SC&A did not formally close those issues.

So in light of that I think we're willing to re-review some of these findings, and especially in the light of what SC&A's put out in March where I think there's only -- I didn't add them up, but I think maybe four findings left that are still open for discussion. And we'd be prepared to do that. That's not reflected in the Board Review System right now.

CHAIR KOTELCHUCK: That's right, it is not. Correct. Correct.

DR. NETON: And so I don't know whether it would be best to wait to get this matrix updated and then we can respond or whether we just want to do this sort of ad lib as we go today. We're prepared to discuss either way.

CHAIR KOTELCHUCK: Well, if you're prepared to review 409 and narrow down the issues that are still open, then it seems to me we should accept that and continue and then look at our next meeting to discussing what remains.

What do you think, Subcommittee Members?

MEMBER MUNN: I hate to even express a comment.

CHAIR KOTELCHUCK: Sure.

MEMBER MUNN: We have, as been pointed out, labored long and hard with Bethlehem Steel. And we have, I think, in the minds of almost everybody, accepted the fact that it was well worked. The claimants were graciously treated. The decisions with respect to their coverage has been certainly claimant-favorable.

And I guess my question is, are any one of these outstanding items of considerable significance with respect to dose reconstruction? I question that. I haven't sat down and gone back through each of them to parse them out in my own mind, but given the attention that was focused on

it early on, I think it's unlikely that there are any truly significant issues that have not been adequately addressed.

So how we resolve what's out there right now, I guess, without a small refresher course on what exactly are these, quote, "in abeyance" terms, each of them, and a decision as to whether this might be of real impact to any outstanding claims, if there are going to be any in the future, would I think be instructive for me.

CHAIR KOTELCHUCK: Right.

MEMBER BEACH: Dave, this is Josie. I think SC&A has submitted their paper. NIOSH says they're ready to review it. I see no harm in going through both sets.

CHAIR KOTELCHUCK: Yeah. I tend to lean that way. This is not a case, I think, of resolving outstanding cases that will come before us. This really is trying to learn as much as we can about -- to review the procedures and make sure that the procedures -- but you know what -- no, that's not a good argument. Sorry, I retract the argument.

(Laughter.)

CHAIR KOTELCHUCK: I'm not -- I don't think I'm coming to a good logical conclusion, but I support Josie's feelings that if there is an SC&A report and NIOSH is willing it over and report to us, maybe it will narrow the -- certainly narrow the grounds that we have to make a decision on. Of course, those of us who were not there when we went through the Bethlehem Steel cases, it's easier for us to say we didn't have to suffer as the more senior members of our group have. But I think it's worth accepting the offer that NIOSH has made.

MEMBER BEACH: Why not?

MR. KATZ: Yes, I mean, this is Ted. I mean, Jim's on the line and he's ready to respond, so we might as well just -- even if you want him to philosophize about what might be the best course.

CHAIR KOTELCHUCK: Right.

MEMBER BEACH: Agreed.

CHAIR KOTELCHUCK: Right. Okay. So that sounds good.

DR. NETON: Well, but before we do

that, I mean, the BRS has not been updated, so I don't know how -- we would have to work off of this memo.

MR. KATZ: That's fine, Jim. That's fine.

CHAIR KOTELCHUCK: Yes.

MR. KATZ: We'll update the BRS after the meeting. That's fine.

DR. NETON: Yes, because it's going to be substantially different. I think some of these went away and others we made these observations.

CHAIR KOTELCHUCK: Good. Good.

MS. GOGLIOTTI: I can certainly update it after the meeting. I didn't want to include that in here on the off chance that we might disagree.

MR. KATZ: Right. And, Rose, if you need the transcript after, that's fine. We can wait for that, too.

CHAIR KOTELCHUCK: Very good. Alright. That sounds like a resolution.

MS. GOGLIOTTI: So is your intent then to go over them now or do you want to wait until

next meeting to do that?

CHAIR KOTELCHUCK: Next.

MR. KATZ: Now.

CHAIR KOTELCHUCK: Oh, I thought we were going to go over it next meeting.

MR. KATZ: Well, Jim's ready to discuss it now, so why not --

CHAIR KOTELCHUCK: Because --

DR. NETON: We don't have anything to provide in writing, but we can talk about these.

CHAIR KOTELCHUCK: I did not see the -- and it's the -- I was busy on other things, but I did not --

MS. GOGLIOTTI: I did not include this with the meeting materials, and I apologize.

CHAIR KOTELCHUCK: Right. So I didn't get to review that, and so I reviewed the BRS, which is as I now understand a little behind. I would -- personally I would prefer to wait until the next meeting. I'm not ready to make a judgment. But if other people are, then that's okay. If other people feel like they've had a chance to -- have other people -- well, have other people read the

SC&A statement?

MEMBER MUNN: Don't think so.

MEMBER BEACH: Yes, Dave.

CHAIR KOTELCHUCK: You have?

MEMBER BEACH: However, I have no objection to having the BRS updated and discussing it next meeting, too. So I'm fine either way.

CHAIR KOTELCHUCK: Yeah. Well, I feel as if, if it's being presented to us, we should be prepared as Subcommittee Members. And I'm not. I'm only prepared for discussing what's in the BRS, which is out of date. So would it be alright, folks? Let's do it next time.

MEMBER CLAWSON: This is Brad. That's what I'd like to do.

CHAIR KOTELCHUCK: Okay. Then we'll do that.

(Simultaneous speaking.)

MS. GOGLIOTTI: -- and then if you can just give us a little preview response of what you're planning to discuss in the BRS also. That way we can be on the same page.

CHAIR KOTELCHUCK: Okay.

MS. GOGLIOTTI: Alright.

DR. MAURO: This is John Mauro. Just a quick question. So Jim has had an opportunity to look over the issues that require some discussion on Bethlehem Steel. It sounds like he's prepared to talk about it right now, but the preference of the Work Group is, well, let's wait until we load up the BRS and everyone has a chance to look over the material that SC&A prepared.

But, Jim, are you preparing to write something up, or for the next meeting simply give an oral presentation?

DR. NETON: No, I think, John, if the BRS is updated in a fairly timely manner, I think we should be able to put our responses in there in time for the next meeting.

DR. MAURO: Very good. That's all I needed. That's great.

DR. NETON: They're not going to be really long. I think that --

CHAIR KOTELCHUCK: No, no need to. Right. Short.

DR. NETON: Should be addressed in a

fairly short manner. I think there's only four or so that I've noticed that really require any kind of discussion. And so, yes.

CHAIR KOTELCHUCK: Good. Alright. Fine. I think that's appropriate and good. I appreciate that. We appreciate that.

So, now, let us see, it is now 3:00. This sounds like a good time for a break because we've been on since 1:30. Let's take a 15-minute break and then come back at 3:15 and continue on. How does that sound?

MR. KATZ: Sounds good.

CHAIR KOTELCHUCK: Okay. See you all at 3:15 Eastern Daylight Time. Bye-bye.

(Whereupon, the above-entitled matter went off the record at 3:00 p.m. and resumed at 3:18 p.m.)

CHAIR KOTELCHUCK: Where are we next? Are we at ElectroMet, 430.2?

MS. GOGLIOTTI: Actually maybe I should switch gears, if that's okay with you. I know that Hans really has prepared well for his and I want to make sure that we get to it today. So

does anyone have any objections if we just switch gears temporarily and go to tab 434, which is one of the DCAS sites, 14 through 18 matrix?

CHAIR KOTELCHUCK: Okay.

MR. SIEBERT: This is Scott. And I apologize, I'm totally fine with that, I just want to point out we also have -- this is a day for trying to push things out. We have two X-ray findings in a couple of the different sets, our X-ray expert is retiring at the end of the month, and if we can discuss those today, it will be much easier for all of us than if we do it -- so after the ElectroMet, or whatever you're moving onto, if we could maybe prioritize those, I would really appreciate that as well.

CHAIR KOTELCHUCK: Surely. And which ones are they?

MR. SIEBERT: They are in the 14 to 18th Other DCAS set, which it sounds like we're going to now already.

CHAIR KOTELCHUCK: Correct.

MR. SIEBERT: 369.3.

CHAIR KOTELCHUCK: Oh, yes, certainly. Okay. Just someone, Rose, somebody keep good track because skipping around like this makes it hard for me when I'm drafting the next agenda. So --

MS. GOGLIOTTI: Trust me, it makes it hard for me, too, but we'll keep really good track and make sure --

(Simultaneous speaking.)

CHAIR KOTELCHUCK: Right. Okay. But I'm chairing. I can't keep good minutes and chair. So that's fine. Let's go to the DCAS site and Hans and --

MS. GOGLIOTTI: And, Kathy, is Hans on the line?

(No response.)

MS. GOGLIOTTI: Kathy, *6.

(No response.)

CHAIR KOTELCHUCK: Okay.

MS. GOGLIOTTI: Well, maybe we'll start with --

MS. K. BEHLING: Okay. Can you hear me now?

MS. GOGLIOTTI: Yes.

CHAIR KOTELCHUCK: Yes.

DR. H. BEHLING: Can you hear me?

CHAIR KOTELCHUCK: Yes, Hans.

DR. H. BEHLING: Okay. I'm having problems sometimes with this phone. And, Rose, are you going to give Kathy the ability to pull up the slides?

MS. GOGLIOTTI: I'm having trouble even pulling up the matrix here, so hold on a second.

MEMBER BEACH: Kathy, I pulled mine up but it took an extra long time.

(Pause.)

MEMBER CLAWSON: Well, while we're waiting, Hans, it's been a long time since I've heard your voice. It's good to hear you again.

DR. H. BEHLING: Is that good or bad?

MEMBER CLAWSON: That's good. That's good.

CHAIR KOTELCHUCK: My wife and I are planning a trip to Berlin later this spring and it's nice to get used to hearing a slight German accent.

DR. H. BEHLING: Yeah. Yeah. No, it's a great town to visit.

CHAIR KOTELCHUCK: So I hear.

DR. H. BEHLING: I was there not too long ago with Kathy here. And I was born in Berlin, as you may know.

CHAIR KOTELCHUCK: Yes.

DR. H. BEHLING: And we didn't spend much time there. We were bombed out in '43, just one week after I was born. But I did get a chance to visit a little bit later. And again, of course, the issue of the war. And it wasn't until in the late '90s that I was able to actually go back and visit for the first time as an adult.

CHAIR KOTELCHUCK: Ah. Interesting. Interesting. Well, it is at the center of much of the world's activity, progress, politics, whatever, actually for more than a century, for a couple of centuries. We look forward to it.

But, anyway, are we coming up? There we are. Okay.

MS. GOGLIOTTI: I've got it on the screen and --

CHAIR KOTELCHUCK: There we do.

(Simultaneous speaking.)

CHAIR KOTELCHUCK: We've got it. Okay. Very good.

MS. K. BEHLING: Yeah, I'll see if I can take control. And if not, I'll just give some instruction.

CHAIR KOTELCHUCK: We're going to 435.1. Is that the first one?

MS. GOGLIOTTI: No, 434.1.

CHAIR KOTELCHUCK: Okay.

DR. H. BEHLING: And these are two findings that I just want to briefly talk a couple minutes to give a background as to what these findings represent.

It was back in late 2013 that we were given the go-ahead to actually review a dose reconstruction that involved the Westinghouse Nuclear Fuel Division. And I looked at that particular one and provided my review of that and submitted the report in February of 2014. And in context with the SC&A review of the DR and today's discussion about findings, the 1 and 2 findings

that we're going to be discussing, it's important to note that this particular dose reconstruction was based on something other than what we normally would expect up to that point in time. That is, a Technical Basis Document for Westinghouse, which didn't exist.

And for the guidance in the reconstruction of dose NIOSH employed a document entitled, "Dose Reconstruction Methodology for Westinghouse Nuclear Fuel Division, Cheswick, Pennsylvania," which was issued in February of 2013 as a template.

Now, that was the very first time we ever encountered a dose reconstruction that was based on a template. And as a matter of fact, it was much of a real chore for me to actually go through it, because the document, this template, was not referenced in the actual DR report, and the document had never been acknowledged or identified to SC&A prior to the DR.

And what was more confusing to me at the time when I had to look at the DR was the fact that this template is actually imbedded, and it's not

imbedded as a document such as an attachment, but it is actually basically cut and pasted into the dose reconstruction as needed, so that when you look at it, you are somewhat confused as to what we were dealing with.

And since that time we've obviously had a number of discussions regarding the Westinghouse facility and the DR. And as a result of these discussions, whenever SC&A is asked to review a DR that employs a template which has not previously been identified or reviewed, our review of the DR has to not only look for compliance with the template, but since this template has never been really vetted, we also have an obligation therefore to actually assess the merit of the numbers that appear in that guidance document.

CHAIR KOTELCHUCK: Okay.

DR. H. BEHLING: And just to give you an overview, I want to go to Slide No. 1, which is the first slide. And that really is an overview as to what this whole issue is about. Both the findings that we're going to discuss briefly really are associated with occupational external dose.

The first one is for the occupational external dose during a residual period. And, as you all know, when we do a review, one of our obligations is to actually verify each number that is potentially important to the dose reconstruction.

And with regard to the external dose during the residual period, this is what the template was providing us with in terms of where this number came from. And the number that we're really interested in here is in the center of the page there. It has no table. And this is one of the things that most templates have. They don't even have a table number, so I can't really refer to the table number. But it is the number of 32 millirem or 0.032 rem that we were looking essentially establish as a legitimate number as a function of the exposure during the residual period.

And in behalf of that, NIOSH assigned external doses that would have resulted from residual -- and I'm reading under 2.2 there -- that explains what NIOSH is doing. NIOSH says it's assigning external doses that would have resulted

from residual contamination as given by the following statements and derived annual doses. And I just want to read this into the record:

"External dosimetry should only be used to limit residual exposures. Residual exposures are calculated based on contamination levels -- and I underlined contamination levels -- calculated below and applying the dose conversion factors from the EPA Federal Guidance Report No. 12 for contaminated surfaces and submersion." These doses are provided in the table below.

And this is the number 32 millirem that I was attempting to assess based on those four lines of guidance documents that were contained in the DR, which are -- which reflected the template that goes with that particular facility.

My response, as you see down there below, is that -- and I'll just read that again. It's says: "NIOSH provides inadequate information for characterizing qualifying contamination levels at the Westinghouse Nuclear Fuel Division."

Residual contamination would have been contributed by multiple and complex sources

because that's also -- it's not incorporated in this statement here, but in other areas of the template, I was informed that the sources for creating the 32 millirem for external exposures during the residual period could have come from multiple and complex sources that included unspecified quantities of 2 percent enriched uranium, as well as depleted uranium from the Fernald Environmental Management Project. Also plutonium from the Hanford facility and natural thorium from unspecified sources.

When I looked at that, I said how do I go about verifying 32 millirem based on the complexity of potential options that were available? And this is going to be my discussion today in support of my finding that is stated below, [an] unsupported method for determining photon dose during the residual period.

And let me just go now to Slide 2. And as I said, we have discussed this any number of times in the past since we issued our original draft report for this DR. And you can see here a summary of what they are in -- back in 2015, 9/13/2015. We

had obviously discussed this, and of course NIOSH responded that they had basically used DCFs from the EPA Federal Guidance Report Number 12, which we already knew about, and applied that to contamination levels, which I also knew, but didn't have a clue as to what they were.

And so we went back and forth a number of times. And it wasn't really until you come to the bottom here where Scott Siebert, less than two weeks ago, on the 31st of March, 2017, of this year, provided us with two documents as attachments. The first one -- the first attachment is the actual Westinghouse template which we received for the very first time only two weeks ago. Heretofore, whenever we had access to that template, as I said, it was embedded in the dose reconstruction and very fragmented.

This template now that we have received for the first time only two weeks ago, it's a very short template. It only consists of six pages and covers the entire guidance for the reconstruction of doses. Okay?

The second attachment that was

submitted two weeks ago to us, and I'm not even sure that we actually received it on the 31st, but it's been less than two weeks, was a spreadsheet that attempted to explain how NIOSH derived that number of 32 millirems for external dose, whole body during the residual period.

We then go and spend some time in trying to get everyone to understand what it is that that spreadsheet has actually provided me in terms of informing me regarding the origin of the 32 millirem per year that we just mentioned in the previous slide.

So let me go to Slide 3, which is the spreadsheet that I received less than two weeks ago. And that requires a substantial amount of explanation. And I don't know how well everyone could read the slide. It's very small, and it's small print, but I need to point out a certain number of things.

This guide on the top portion of this slide is really a spreadsheet that defines how NIOSH divides the deep dose from photons associated with natural thorium. And these are -- the values

that you're going to see here are those highlighted in yellow. And as I said, the potential source terms for creating this could have been natural thorium, a plutonium mix of 12 percent, 10-year-old recycled nuclear fuel and recycled 2 percent enriched uranium. Okay? So those are the options. But the ones that are highlighted are in fact the ones used that were there to derive the 32 millirem that I've mentioned.

And so let me go through. On the very top left hand corner, one of the critical elements that you have to have available to you is an understanding of what is the actual starting surface contamination defined in disintegrations per minute per meter squared? For this calculation, and I will talk about that at length in a few minutes, is the assigned value of 2.83E^6. That means 2.83 million disintegrations per meter squared was in fact the assumed starting contamination on the basis of which person would be exposed to 32 millirem from two source terms.

The first is the surface contamination that's on the floor that the person might be

standing on. And that's obviously expressed in dpm per meter squared. And as the -- in the second column of the top table, you see the 2.83E^6 dpm per meter squared. And it's not only applied to the natural thorium, but for all the other ones. It's a common starting contamination value. Okay?

The next column right over is the resuspension factor. And they use the standard NIOSH resuspension factor of 1 times 10 to the minus-6. In other words, if you have a surface contamination of X, you will resuspend one millionth of that. And that's the next column.

In other words, if you apply the resuspension value of 1E to the minus-6 times the surface contamination of 2.83 million dpm per meter squared, you will end up with the value in the next column which says that, not only will you be exposed to surface contamination in terms of external radiation levels, whether there's photons involved, simply staying on that contaminated surface will give you dose, but also NIOSH, as it was described earlier, wanted to incorporate an immersion dose.

In other words, when you have a resuspension value 1 to the minus-6, you also will be enveloped by air that contains 2.83 dpm per cubic meter of air. Okay? That's less than three dpm per cubic meter. And that's a value I hope you will keep in mind.

And I won't go through the other columns because they're quite complex, but they are basically dose conversion factors that are devised from the EPA Federal Guidance Document Number 12. And when you go through that, you will obviously see the effective contamination DCF on behalf of the source term that is the contamination on the ground. The next one is the effective submersion DCF when you're enveloped -- when you're standing -- it would be like standing in the -- passing plume of a radioactive release that's upwind from you. That's the submersion dose.

And when you go -- and then of course you go over, and you get obviously the dose rate. And then the work hours per year, which is 2,000. And when you move a part of those values together on behalf of natural thorium, you end with the

effective whole body dose on the right hand side, which is 0.032 rem per year, okay, which is according to the 32 millirem. So we know what in essence it did. Okay?

In the next one below, and I'll go just hastily through that, this is the shallow dose. This is the dose that will be likely to be received as a result of the exposure to a beta component. And that would only affect obviously the skin. In this particular dose reconstruction, we found this wasn't even mentioned, but I need to correct that, because as I said, we also have to look at the template independent of whether or not some of the components of the template were even applied in the dose reconstruction. And the reason it wasn't applied here is because the cancer involved in the EE here was such where the shallow dose would not affect an impact.

But anyway, when you get over there, it seems like you're using the same values that I just mentioned to you, the 2.83E^6 dpm as a starting value of the surface contamination, and also using the issue of the resuspension, which was obviously

less than 3 dpm per cubic meters of air. When you come to the very far right hand side, you'll see the shallow dose, and the shallow dose based on this calculation turns out to be 171 millirem per year.

Okay. And of course that would be the starting point for 1973. When we go through the left hand side of the slide, you will see for 1973 the OTP reduction factor is 1.0 between your starting point for obviously getting the 95th percentile value of the next general dose. Deep dose as well, the 95th percentile value of a shallow dose contributed by the beta component.

Anyway, so having gone through them, I can certainly understand how the value of 32 millirem was defined by NIOSH. However it is not a complete understanding. And the reason is that the starting value of the residual surface contamination of 2.83x10^6 dpm per meter squared for 1973 is simply thrown into this calculation. This is the one, the very first number I pointed out to you.

That is core, which is -- obviously directly affects the -- all the other calculations

that we just went through. In other words, if you doubled that value, the starting surface activity by 2, instead of 2.83 into something like 5.6 or something, you would actually then realize you would end up with a deep dose that was twice the 32 millirem and twice the shallow dose of 171.

So the first question we have to ask, how did this number come about? Where did NIOSH get this number? So that in essence, had I even had more detailed information, the absence of that starting contamination value would still have been an evasive goal for me to determine.

But the second variable that you have to understand also defines those numbers is that the natural thorium that you see in this slide here is really not a single radioisotope in question. In fact, it is the sum total of three isotopes which are identified in Slide number 4. And that is the issue of what contributes to natural thorium as defined by the contribution of thorium-228.

And, Kathy, can you point out where I'm pointing at?

Right there is natural thorium you see

here. And you see the activity fraction. Okay? And for thorium-228, the activity fraction is 0.084, which means that it represents approximately 8.4 percent of the total activity. So when we talk about the 2.83 times 10 to the minus 6 dpm per meter squared, the contribution of thorium-228 will be expected to give 8.4 percent. For thorium-232 the contribution is only 1.45 percent, and the largest contribution to that activity is radium-228 at 90.15 percent.

In other words, when we look at the dose contribution for the external dose, it is not equally contributed. What it is is that there is obviously -- NIOSH has decided to use an activity fraction that somehow or other for natural thorium has puzzled me. The question is, when I think of natural thorium, in other words, unprocessed thorium, you would expect them to be in equilibrium.

And this is -- and the second issue that I would not have had knowledge about. And the first -- the question that I will leave with NIOSH is an explanation as to why the activity fractions

that they used for external were anything other than the secular equilibrium fraction, meaning that the thorium-228, the thorium-232 and the radium-228 that you see in that upper left hand corner should have been equal in terms of their fraction of contribution to the activity. We find 2.83E^6 dpm per meter squared.

So the only thing I think concludes here is that perhaps the activity that was cited here was in fact not activity that represents natural thorium, but perhaps thorium that has been processed, and that these activity fractions represent thorium tailings. When you have thorium tailings, you've basically removed a major part of the thorium with limited amounts removal of the radium-228.

And so, my feeling is that perhaps the term that is used here that these -- this whole external dose derivation model has simply misplaced the word thorium tailings as opposed to natural thorium. And that assumption, however, would obviously still have a questionable impact as we'll see in a few minutes. Because when the

assumption of secular equilibriums for natural thorium was in fact assumed as shown in the template for assessing internal dose -- and I'll go to Slide 5.

Kathy, can you please go to Slide 5?

Okay. Slide 5 comes directly out of the Westinghouse Nuclear Fuel Division template, and it represents page number 4 out of the six pages for the template. And here you -- obviously in dose reconstruction methodology, that involves natural thorium ratios for internal.

And I'm going to point your attention to the table. Again, there's no real number associated with it. And for natural thorium, we see obviously we have these five radionuclides that are part of the thorium-232 series, of which only thorium-228, thorium-232 and then radium-224 are alpha emitters. And anyway, what it really suggests, independent of how you want to interpret that, the assumption is that they are in secular equilibrium.

And for the internal exposure, again I will briefly read for the record how that was

explained. And this is -- I'm reading below the table there: “Air monitoring results are reported in both units of microcuries per milliliters of air and in dpm per cubic meter. In most cases, the dpm per cubic meter results are more legible on record.” And so forth. These results are largely from stationary air samples collected on a daily basis, et cetera. And I will continue then:

The results are reported as gross total alpha activity. A daily weighted average was established based on the breathing rate of 9.6 cubic meters. And that obviously represents a breathing rate of 1.2 cubic meter per hour in an 8-hour day that then totals 9.6 cubic meters per day.

In turn, and this is very important down here, it states that: “These air sampling data that represent this particular table up here were defined in a total of 15 different SRDBs that are cited here and were evaluated..” -- as I will read here further on – “were evaluated for the years '71 and '72, the operational period for the sites and these data. Inhalation/ingestion intakes of 95th

percentile were determined as provided in the table below."

But let me go and -- before I show you that table that these documents are now referencing in terms of their inhalation/ingestion dose, let me go and just briefly tell you now, as a result of looking at the spreadsheets that I just identified for you, we have a conflict here. For external dose, NIOSH assumed obviously activity fractions for the natural thorium that don't seem to be the dose for a natural thorium process, mainly that they're not in secular equilibrium.

As I mentioned above, the thorium-232 has an activity fraction of 1.45 percent; thorium-228, 8.4 percent. And the bulk of the activity fraction goes to radium-228 at 90.15 percent. Secular equilibrium would obviously establish the values of 3.33 for each of those three radionuclides.

So for internal exposure, the natural thorium did in fact assume secular equilibrium, which I just showed you. And so now, you have a question: which of the activity fractions that were

identified for the external -- why are they different from those of the internal, when in fact, as I will show you in a minute or so, they represent the same potential exposure pathways?

And if it turns out the activity fractions that was defined for external doses are correct, then the internal photon dose of 32 millirem and shallow dose of 131 millirem per year are correct, and the reference only to natural thorium needs to be changed. As I've said, if that were the case, then that's easily done.

However, if the activity fractions used for external dose assessments are now applied to the internal dose assessments, that currently assumes secular equilibrium. Then the reduction of internal inhalation/ingestion would be 35 lower than we would expect. And this is something that I'm going to show you on Slide number 6.

MR. SIEBERT: Well, real quick. This is Scott. It seems like we're getting really deep into the weeds. It may be helpful at some point to have a written --

DR. H. BEHLING: Oh, I do.

MR. SIEBERT: Fine, but let me back up a second. What I'm going to say is -- Mutty, do you want to address what we talked about with Westinghouse?

Mutty, you may have to hit *6.

MR. SHARFI: Hi, can you hear me?

MR. SIEBERT: Yeah, there you are.

MR. SHARFI: Yes, we identified the activity fractions inside the external calc, and it was updated in 2014. This claim was done in 2013. And so the current methodology -- and what we provided you with was what was used at the time the DR was done -- the current methodology actually uses the natural thorium ratios, which actually reduces -- which ends up in a reduction in the dose conversion factor.

DR. H. BEHLING: Yes, and let me just -- and I realize you would probably come to that conclusion, but let me just finish up. But I can make a point here.

In Slide number 6, you do have -- again, this comes from the actual template itself. It comes from page 6, the last page of the template.

And it tells you what -- for the un-monitored operators and general laborers, what the daily ingestion rate would be expected to be. And the number I want to focus on is the 965.121 dpm per day.

So if you then go back and say, okay, what does that mean in terms of air concentration? As I've mentioned before, if you assume 1.2 cubic meters per hour, for an 8-hour day, that means 9.6 cubic meters. And if you divide 965.121 dpm per day by 9.6 cubic meters, you end up with 100 dpm per cubic meter of air. Okay?

Now let's go back there and say this is what you would have in the air concentration. Compare that to the very slide where I said if you start out with 2.83E^6 dpm per square centimeter, and you apply a resuspension value of E to the minus-6, you end up with only 3 dpm, 2.83, less than 3 dpm per cubic meter.

And then now you compare that to what you would expect in terms of air concentration that justifies and/or explains the 965, which is 100. So when you divide 100 dpm per cubic meter that

would be assumed for the calculation of inhalation and ingestion by the 2.83 dpm that you had calculated for the submersion dose, under the external dose, you have a factor of 35-fold difference. Okay?

And the same thing now that if I want to continue that extrapolation, saying what if you assumed that you actually had an air concentration of 100 dpm per cubic meter and say, well, what does that represent in terms of the contamination level that gives rise to 100 dpm per cubic meter, and you use the E to the minus-6 resuspension? You would end up with a starting contamination level of 1 times 10 to the minus-8. In other words, 100 million instead of 2.83 million. That again is not surprising, a factor of 35 difference.

And so when I looked at those values, I said there are inconsistencies here that I cannot reconcile. And Mutty, you may have explained it to me, and I may have --

MR. SHARFI: You wouldn't use the resuspension to calculate down, because that 95th percent -- the 965 is the operational air

concentration. Then you have to settle it, not resuspend it. Then you do a reverse resuspension. You do a settling calculation. So you do a depletion rate of the air and calculate the new surface contamination for the start of the residual period. And that's what you use in the future.

DR. H. BEHLING: Well, yes and no. We're using circular reasoning here because we're calculating for 1973. This is now the residual area -- time period. And the submersion dose --

MR. SHARFI: Contamination is what you're -- you need a starting point. It's not related to the operational air concentration. It's related to what is settled from operation ceasing. This is covered all under 6000. This is -- any time you switch from the operational to the residual period, you settle the operational air concentration to a residual contamination rate. Then you resuspend that to get your new residual air concentration.

DR. H. BEHLING: Well, I considered that circular reasoning because for '73, you obviously calculated an air submersion dose that

says you are going to get that additional small incremental dose from the resuspension of air like --

(Simultaneous speaking.)

MR. SHARFI: Submersion air dose is not settling.

CHAIR KOTELCHUCK: Pardon? Mutty, say that again?

MR. SHARFI: That submersion air concentration is calculated based on the resuspension of the settled contamination level.

DR. H. BEHLING: Yes, of course. I know it is. But if you expect to incur 965 dpm per cubic meter per day, that translates into 100 dpm for resuspended activity in one cubic meter of air during that time. And what does that represent in terms of the actual contamination that gives rise to that?

MR. SHARFI: Okay. Prior to 1973, we have 100 dpm per meter cubed, and we let that settle to get a contamination level of about 2 million, or 200,000 dpm per cubic meter. Then air concentration for 1973 is based on the resuspension

of that new contamination level.

DR. H. BEHLING: I don't follow that reasoning, I'm sorry.

MR. SHARFI: This is what's done in every AWE per Battelle-6000.

DR. H. BEHLING: I just don't follow that line of reasoning. If you're there in 1973, and you're exposed to 100 dpm per cubic meter in air that you're breathing, that just --

MR. SHARFI: You're not.

DR. H. BEHLING: That has to come from a source term that comes from the surface contamination. And if you use the resuspension factor that we conventionally used in OTIB-70 of 1E to the minus-6, that would suggest you have 10 to the 8 dpm per square meter. Simple as that.

MR. KATZ: Well, I wonder if we need to get John Mauro on the line since he's very familiar with TBD-6000 and the whole issue of resuspension.

MS. GOGLIOTTI: I can certainly get him on the line. I might recommend that we write something up and send it to NIOSH.

MR. CALHOUN: Yes, that's the only way

we can do that.

CHAIR KOTELCHUCK: Yes.

MR. CALHOUN: This is way too much to deal with right now.

MS. GOGLIOTTI: I agree. Plus I want to get to the X-ray stuff --

CHAIR KOTELCHUCK: Okay.

MS. GOGLIOTTI: -- so we don't lose --

CHAIR KOTELCHUCK: Right. Right. That is an issue.

DR. H. BEHLING: Can I make a final concluding statement? And this is just a very short -- it's just one thing. When we deal with a template, and we are asked to review the template in addition to the compliance of the template in DR, we're facing with an incredible chore in trying to understand. It took us three years to get this document from I guess NIOSH that involves the spreadsheet. And without that, I would have been absolutely, in no way in a position to verify that number. And this is an issue that we do face routinely, and it's costing obviously a lot of --

MR. KATZ: Well, Hans, this is Ted. I

mean, I'm not sure why or what transpired for that, but all you need to do is get me involved on the front end or something, because you guys can get on the line with NIOSH and get that sorted out on the first moment. So there's no reason to go for three years doing that.

DR. H. BEHLING: Well, we had discussions multiple times. I mean, I said I can't do this. There is not enough data. And they responded, oh, we used Federal Guidance Report 12 and we used residual contamination. Well, as I just went through this, the whole process with you, there's no way I could have even come close to coming up with --

CHAIR KOTELCHUCK: Well, you've settled -- I understand what the debate is about now, that is, whether you use what is called the submersion data or -- and whether you add to that the --

DR. H. BEHLING: No, no, no, no. It doesn't go to that extreme. It means I identified the critical components for SC&A to reconstruct the doses. I would have meant among all the other

things the starting contamination level that was assumed and of course the activity fractions I would have assumed and the --

CHAIR KOTELCHUCK: Okay.

DR. H. BEHLING: Maybe a couple other parameters.

MR. KATZ: Alright.

CHAIR KOTELCHUCK: Okay. Yes, I'm --

MR. KATZ: Hans --

(Simultaneous speaking.)

CHAIR KOTELCHUCK: You have to put something in writing to -- if there's a disagreement between the two consultants, the Subcommittee has to have something in writing that the Subcommittee can, quote, "decide upon or decide among."

MR. KATZ: Yes, Dave?

CHAIR KOTELCHUCK: Yes?

MR. KATZ: Hans is now speaking to just having all the documentation he needs to be able to do a template review. And all I'm saying is, whatever transpired in this case, in future cases we just need a meeting up front to get all the

documentation on the first instance, instead of --

CHAIR KOTELCHUCK: Yes.

MR. KATZ: -- whatever the prolonged experience was and why ever it was. But I don't think we need to retread that -- this --

CHAIR KOTELCHUCK: True, but --

MR. KATZ: -- going forward. That's all.

CHAIR KOTELCHUCK: Right. But right now we have this case. We have to have something in writing.

DR. H. BEHLING: Okay. And --

(Simultaneous speaking.)

CHAIR KOTELCHUCK: And we've got to call this. Hans, it's been a half an hour --

DR. H. BEHLING: Okay.

CHAIR KOTELCHUCK: -- that you've gone through this, as I recall. It's been 25 minutes. We have several things. We have other people who are also leaving, so that we have another person. I don't --

MEMBER BEACH: Dave, can I just ask a --

CHAIR KOTELCHUCK: Yes.

MEMBER BEACH: -- quick question?

CHAIR KOTELCHUCK: Sure.

MEMBER BEACH: I just want to understand. Hans, were you aware there was a template, or just that two weeks ago you became aware of the template, or did you just not have data for the template, but you knew there was one?

DR. H. BEHLING: No, I knew the template -- as I said --

MEMBER BEACH: Okay.

DR. H. BEHLING: -- templates are usually embedded in the dose reconstruction.

MEMBER BEACH: Okay. I just wanted -- because I have that issue with the templates, and I wanted to know if you were aware there was one.

DR. H. BEHLING: Yes.

MEMBER BEACH: Okay.

DR. H. BEHLING: And I will quickly say I'm sorry I didn't get anything in writing, but I was only -- this was a very complex issue going through this, trying to decipher everything that I just provided in a very quick, hasty way.

MEMBER BEACH: Yes.

DR. H. BEHLING: I did not have time to give you something in writing.

CHAIR KOTELCHUCK: Oh, that's okay, but we do need something in writing. And we can't -- like it's hard for us to deal with more than that.

There was another issue that we had to talk about because somebody from NIOSH is leaving. I don't know if 15 minutes will allow this.

But which is that? Which cases?

MR. SIEBERT: The first one is in this set as well, 369 point -- observation 1.

CHAIR KOTELCHUCK: Okay. Yes, W.R. Grace.

MS. GOGLIOTTI: Okay. Kathy, if you could give back control there.

MS. K. BEHLING: Okay.

MS. GOGLIOTTI: And that looks like I've got control now.

MS. K. BEHLING: Okay.

MS. GOGLIOTTI: Alright. 369, Observation 1?

CHAIR KOTELCHUCK: Yes.

MS. GOGLIOTTI: With this one, I actually think that with the information NIOSH provided we're prepared to close this out.

CHAIR KOTELCHUCK: Yes, I see. Briefly, somebody speak to it.

MS. GOGLIOTTI: I think that we had some confusion as to what the filtration was representing. And once NIOSH clarified that, the issue was resolved in our minds.

CHAIR KOTELCHUCK: Right, I see. Right. This is an observation, and it's been clarified. I could accept that with that brief discussion.

So Subcommittee Members?

MEMBER MUNN: I have no problem with your recommendation.

CHAIR KOTELCHUCK: Yes. Given that time is short, but also given that there's a clarification made, we're all okay, can I close this, please?

MEMBER BEACH: Yes.

CHAIR KOTELCHUCK: Okay. Let's go

onto the first finding.

MS. GOGLIOTTI: Was there another X-ray one that you wanted to talk about?

MR. SIEBERT: Yes, there's one more X-ray one, which is actually the 19th to 21st set for Oak Ridge GDPs.

MS. GOGLIOTTI: I think I know exactly which one you're talking about.

CHAIR KOTELCHUCK: 359.1, we're not -- oh, it's closed. I'm so sorry. Great.

MS. GOGLIOTTI: But we're jumping now to Oak Ridge.

CHAIR KOTELCHUCK: Oak Ridge? Okay. Oak Ridge. 19 to 21, Oak Ridge. Okay. I did not -- and please tell us which one. I did not review that. I did not know that we were going to over it, but that's fine. Let's --

MS. GOGLIOTTI: What's the number on that?

MR. SIEBERT: 458.1.

MS. GOGLIOTTI: 458.1.

CHAIR KOTELCHUCK: Okay.

MS. GOGLIOTTI: Alright. There's

been a lot of back and forth on this one. Our finding initially was that NIOSH used the female lung instead of the male lung. NIOSH provided us with some additional information, directed us to a different document that we weren't previously using. But it also brought to our attention that there was a properly collimated beam, even in the early years at these sites, which is the Oak Ridge sites, all three of them.

CHAIR KOTELCHUCK: Yes.

MS. GOGLIOTTI: And for a properly collimated beam, it's our opinion that this particular organ, I don't want to give away anything, is located in -- outside of the primary beam of a chest X-ray. And so our argument -- maybe I should let NIOSH go from here, actually.

MR. SIEBERT: This is Scott. I'm going to turn this over to Elyse Thomas.

CHAIR KOTELCHUCK: Okay.

MR. SIEBERT: Elyse, you may have to do *6 to be heard.

MS. THOMAS: How's that? Can you hear me now?

MR. SIEBERT: Yes.

CHAIR KOTELCHUCK: Yes.

MS. THOMAS: Okay. And can I not mention the organ we're considering here or not?

MS. GOGLIOTTI: Let's just say it's part of -- it's --

(Simultaneous speaking.)

MS. THOMAS: Well, anyway.

MR. KATZ: Elyse, we don't have any details on this other than organ and the whole big site, which is huge, so I think you're fine mentioning it.

MS. THOMAS: Okay. The organ we're discussing is the small intestine. And there is not a specific dose conversion factor for that organ. And so the dose to that organ has to be determined using some other dose conversion factor. And the critical thing for the dose is whether the organ is in the beam or out of the beam. So that organ is really located all over from the upper abdomen and the lower abdomen. And even for a properly collimated chest X-ray, it's possible that portions of that organ that are up under the

diaphragm and near the liver and gall bladder and spleen could be in a properly collimated beam.

And so the dose reconstructor used a substitute dose conversion factor of the lung as a more claimant-favorable assumption. If the dose reconstructor would have used a substitute dose conversion factor in the lower abdomen, that would be representing a situation where it's out of the beam and would result in a lower dose.

So in the case where there's not an organ-specific dose conversion factor to use, the dose reconstructor used a more claimant-favorable option. Does that make sense?

(No response.)

MS. THOMAS: We don't disagree that that's claimant-favorable, but we don't interpret OTIB-6 to mean that. OTIB-6 specifically says use the dose correction factor for the ovary as a substitute organ in the lower abdomen such as -- and although the lower intestine isn't mentioned, the colon is mentioned.

CHAIR KOTELCHUCK: Right.

MS. GOGLIOTTI: And most people would

say the colon would be above the lower intestine. I don't think that that's even in debate. And if you're going to include the colon in the lower abdomen, then you should be including the lower -- or the small intestine also in that same category. That would be my logic.

MS. THOMAS: I mean, I don't think we're ever going to know for this particular person exactly where that organ is and whether it was in the beam or not. So --

MS. GOGLIOTTI: I agree, and perhaps OTIB-6 needs to specifically say for these instances use that, but the lower intestine is not mentioned in OTIB-6.

CHAIR KOTELCHUCK: Well --

MS. GOGLIOTTI: So is it claimant-favorable? Yes. But from OTIB-6, I think that's a reasonable interpretation that it's on you, the lower abdomen would include the small intestine.

CHAIR KOTELCHUCK: Sounds like it. The question is, is OTIB-6 being interpreted correctly? And choosing the lung appears to

contradict OTIB-6.

MS. THOMAS: I don't think so. I mean, the small intestine is not mentioned in OTIB-6.

MS. GOGLIOTTI: Correct. However --

CHAIR KOTELCHUCK: Colon is.

MS. GOGLIOTTI: -- the colon is.

MS. THOMAS: Yes, but the small intestine -- the colon. The small intestine is a much larger organ in terms of --

MS. GOGLIOTTI: Yes.

PARTICIPANT: And how are they differentiated? It's essentially the entire abdomen.

MS. THOMAS: Yes, I had submitted a cross-sectional diagram to Scott when I --

MS. GOGLIOTTI: You did, and it's actually listed --

(Simultaneous speaking.)

MS. THOMAS: Yes.

MS. GOGLIOTTI: Oh no, I closed it.

CHAIR KOTELCHUCK: Can we see it?

MS. THOMAS: Anyway, the cross-sectional diagram --

MS. GOGLIOTTI: Yes.

MS. THOMAS: The bottom of the chest and --

MS. GOGLIOTTI: I do agree with that, but this is the transpyloric plane, and I don't see how -- I understand that it's showing that the lower intestine or the small intestine can be in the claim, but is that -- is there something with X-ray that I'm not getting where that claim is always included in the chest X-ray?

MS. THOMAS: Well, I mean, you can't say that it couldn't be. It's very possible it could be.

CHAIR KOTELCHUCK: I wish there was a section, not a horizontal, but a vertical. I mean, I'm concerned that my understanding of the biology of the location of the duodenum is -- where does it lie?

MS. GOGLIOTTI: The duodenum would be about right here.

MEMBER BEACH: Yes, it looks like it's right in the middle.

CHAIR KOTELCHUCK: Yes.

MS. GOGLIOTTI: And so -- and my interpretation with duodenum would be the small intestine reference here.

CHAIR KOTELCHUCK: Yes.

MS. GOGLIOTTI: It seems like the stomach is connected --

(Simultaneous speaking.)

CHAIR KOTELCHUCK: Yes.

MEMBER BEACH: Yes.

CHAIR KOTELCHUCK: Yes.

MS. THOMAS: Yes, let me read a sentence from -- this is right from OTIB-6. And it says: “For properly collimated beams in general for chest, thoracic and cervical spine X-ray, a DCF for lung is used for other organs in a thoracic or -- or upper abdominal cavity.”

So I don't know how -- I don't think OTIB-6 is inconsistent with what the dose reconstructor did. Or I should say that the other way around. I don't think what the dose reconstructor did is inconsistent with OTIB-6.

MS. GOGLIOTTI: Yes, I would say that that's a gray area in OTIB-6.

MS. THOMAS: It is. It's a gray area because we never really know for any given individual where exactly their organs lie. Some people have kidneys that are in different locations. We never really know that for a given individual, so we have to --

MS. GOGLIOTTI: I agree, but at that point, you might as well just assume everything is part of the primary beam in the main torso.

MS. THOMAS: Well, I think that's a little bit of a stretch, but it is claimant-favorable.

MEMBER BEACH: It is claimant-favorable.

MEMBER MUNN: Well, it's hard to imagine. I mean, even people who are familiar with X-ray are hard-pressed to assure that the colon is always as clearly differentiated as you want it to be. And since the placement of the small intestine is arguable with any single organism, I think, the probability -- you wouldn't anticipate that the entire organ had been exposed, but that's not the argument here, as I understand it. They're

recommending -- the idea is that a portion of it might have been, and it would be not unreasonable to assume that there's a possibility.

MS. GOGLIOTTI: Right.

MEMBER MUNN: So it's kind of a catch-22.

MS. GOGLIOTTI: So for my first argument here, the small intestine, every single time you assume that the small intestine is part of the primary beam when it's properly collimated or not properly collimated, is that a consistency that NIOSH always does? Because I'm not sure you could argue that. Or maybe that's something you always do, but I don't see evidence here that that's consistent.

MS. THOMAS: Well, I don't know that I can categorically say that, but I think I could say that dose reconstructors would, if they had a choice between using this substitute organ dose conversion factor or this one, they would choose the claimant-favorable one. That I think I could probably categorically say.

MR. CALHOUN: This is Grady. This is

another one I don't know where we're going with this.

MS. GOGLIOTTI: And I don't think we're going to come to a resolution.-

MR. CALHOUN: We're not. It seems like two people that seem to know what they're talking about, have a difference of opinion. And I don't really see any proof that we're wrong from SC&A's standpoint, so I just as soon we just leave it the way it is and move on because there's -- it's just going to be we agree to disagree. And I think that's all that [this] is.

MS. GOGLIOTTI: I agree, but I'm just going to -- I want to point out that the Board has been focused on areas where there's consistency which could potentially impact the case. This is a consistency issue. I mean, with that, the Board can do what they want with it, but I want to point that out.

CHAIR KOTELCHUCK: Yeah. But the Subcommittee has to do something with it. I mean, we've got to take a stand, if you will, one way or the other.

By the way, we're at what, 369.3, or it's W.R. Grace.

MS. GOGLIOTTI: This is 458.1.

CHAIR KOTELCHUCK: Pardon?

MS. GOGLIOTTI: This is 458.1.

MEMBER MUNN: 458.1.

CHAIR KOTELCHUCK: 458.1? Okay. Because I'm looking at the -- I'm just looking at the -- I'm looking at the Skype. So, now let's see. Yes, there it is, 458.1. Okay. Sorry.

So I think we -- look, time is running short. It's 4:15. I think we should talk about it again. I don't think we're ready.

MR. KATZ: This is Ted. Can you hear me?

CHAIR KOTELCHUCK: Yes, I can.

MR. KATZ: Oh, can I just make a suggestion?

CHAIR KOTELCHUCK: Yes.

MR. KATZ: Because I think, I mean, both sides have agreed it's claimant-favorable and that it's a gray area in terms of it's an uncertainty. And in cases of uncertainly you're

supposed to do what's claimant-favorable. So I think you guys can actually close the case.

On the other issue that Rose raises, which is a reasonable issue, is, well, is it handled consistently, I think then you need to have an analysis to see whether or not it is handled consistently. Maybe this is always handled consistently. Rose doesn't know yet, but she didn't do a review of that. But we could do -- we could look at that separately. That's really an issue for the Procedures Subcommittee, or Dose Reconstruction can have it. You can talk it either way. But I think you can close the case if both sides agree that this is claimant-favorable and it's reasonable to do since there's uncertainty about the location of this organ.

MS. GOGLIOTTI: I agree, Ted.

MR. KATZ: Yes.

CHAIR KOTELCHUCK: Subcommittee Members?

MEMBER MUNN: I agree.

MEMBER CLAWSON: I agree with Ted.

CHAIR KOTELCHUCK: Okay. I'll go

along with that. I'm not quite actually convinced but I respect -- then let's go with that. Close it and refer to the Procedures Subcommittee.

MR. KATZ: Yes, well, even that, I mean, before even -- Rose, can I just -- Dave, with your leave, let me just ask Rose to -- Rose, why don't you just look at a sample that's -- not looking at you, Rose, of course, but someone just take a look at a sample of dose reconstructions where this comes into play and see if they've been handled consistently. You have lots of dose reconstructions that you have in your files already that you could probably catch a few to just see.

MS. GOGLIOTTI: Yeah, I'm sure that we have them there.

CHAIR KOTELCHUCK: Good. That would be helpful. And could you report back to us next time? And then we will perhaps refer it, or perhaps not.

MS. GOGLIOTTI: Okay. Yeah, we can absolutely do that. And we'll just --

(Simultaneous speaking.)

CHAIR KOTELCHUCK: Good. Good.

Okay. Let's -- folks, we need to pick a date.

MEMBER MUNN: How far out are you looking?

MR. KATZ: Yes, well, it has to be at least two months out these days given this administration. So it would have to be two months or more out.

CHAIR KOTELCHUCK: So that's the middle of June.

MR. KATZ: Yeah. And then the second question is a little -- do we have plenty of work or will we have plenty -- we have three more blinds to discuss from this set, right, Rose?

CHAIR KOTELCHUCK: Right.

MS. GOGLIOTTI: Yes.

MR. KATZ: But beyond that, do we have plenty of fodder that will be ready in two months' time? And that question is to both sides.

MS. GOGLIOTTI: I would like to get started on another matrix if NIOSH is close to getting us another -- responses for that. That would give us plenty to talk about. We still have a full matrix that we haven't discussed, but --

CHAIR KOTELCHUCK: Which one?

MS. GOGLIOTTI: The Oak Ridge matrix for the 19th to 21st set, other than this particular case, we have not discussed at all.

CHAIR KOTELCHUCK: True.

MS. GOGLIOTTI: And then there's two matrices that NIOSH has not responded to. And that's all of our findings.

MR. SIEBERT: Right, and this is Scott. I believe we're almost done with one of the other two that are outstanding. I'm assuming that we'll get uploaded probably halfway between now and the next meeting.

And I do have a question, since you mentioned the rest of the Oak Ridge cases. Did SC&A categorize these Category 1 and 2 for that set and I just missed it or --

MS. GOGLIOTTI: We did. That was in the meeting files. I can send it to you separately, if you'd like.

MR. SIEBERT: Yeah, that would be really helpful, because digging through all those files I -- it's hard for me to get the files over

on the ORAU -- on the DCAS server. We're going to have to do some shifting. So that would be very helpful. Thank you.

MS. GOGLIOTTI: Okay.

MR. KATZ: Okay. So then the --

MEMBER MUNN: May I suggest the last week in June?

MR. KATZ: For scheduling, yeah, we can start with that week, the week of June 26th. How does that week look to start with?

CHAIR KOTELCHUCK: It's okay with me.

MEMBER BEACH: It's fine with me.

CHAIR KOTELCHUCK: And, Brad?

MEMBER CLAWSON: Yeah, it looks good.

MR. KATZ: Brad, is there a better day, a worse day during that week?

MEMBER CLAWSON: No. If it's the 26th, I've just got -- I would have had to have left by now --

(Simultaneous speaking.)

MR. KATZ: What about the 27th?

MEMBER CLAWSON: That would be better, to tell you the truth.

CHAIR KOTELCHUCK: Which one?

MR. KATZ: The 27th of June.

MEMBER CLAWSON: Twenty-seventh.

CHAIR KOTELCHUCK: Okay with me.

MR. KATZ: Is that okay with you? Okay. So let's do that as a tentative date.

CHAIR KOTELCHUCK: And, David, are you still on the line?

(No response.)

CHAIR KOTELCHUCK: Okay. So you need to check with David and John.

MR. KATZ: So, well, first, let me just check and see. The 28th, 29th and 30th, are those all also fine for everyone on the line?

MR. CALHOUN: Okay with Grady.

MEMBER BEACH: Except the 30th, if possible.

MR. KATZ: Okay. The 28th and 29th okay?

MEMBER BEACH: Are good.

CHAIR KOTELCHUCK: Yeah.

MR. KATZ: Okay.

MEMBER CLAWSON: The only one that

doesn't work for me, Ted, is the 28th because I've got a three-hour meeting that would have been --

CHAIR KOTELCHUCK: Okay. So we have the 27th with the 29th as backup.

MR. KATZ: The 29th as an alternate. So let me just get one more date, because that's all the same week and who knows, the other date may be --

CHAIR KOTELCHUCK: Yes, right. I'm worried that -- right, and I'm also worried that I have grandfatherly duties, and it might come that week. If it doesn't, I'm going to be fine.

MR. KATZ: Okay. So then let's skip the following week, because that's the week of the 4th of July. That's usually terrible for scheduling.

CHAIR KOTELCHUCK: Right.

MR. KATZ: But let's talk about the week of July 10th. How is, for example, the 11th?

MEMBER BEACH: Fine.

MEMBER CLAWSON: That's good with me.

CHAIR KOTELCHUCK: Hey, good. That's one is more likely to be good for me.

MR. KATZ: Okay. So that's another tentative.

CHAIR KOTELCHUCK: Right. Honestly, if I had my choice, I know I could do the 11th. I'm not sure I could do either of the other two, but I'm pretty sure it's okay. I could check within a day or two.

MR. KATZ: Okay. So just to make it easy, let's just make that our favored date.

CHAIR KOTELCHUCK: Would that be okay, folks?

MR. KATZ: Is that okay with everyone else?

CHAIR KOTELCHUCK: Did you say July 11th? And then the backup will be one of the two days in the previous week.

MR. KATZ: The backup will be the 27th or the --

CHAIR KOTELCHUCK: And I will be there, if need be.

MR. SIEBERT: This is Scott. Let me throw this out. I don't know if it impacts anybody, but I believe July 11th is during the HPS

meeting this year.

CHAIR KOTELCHUCK: Ah.

MR. KATZ: Oh, wow. That's terrible this year.

CHAIR KOTELCHUCK: Yes, okay. That sets it back. Well, then --

MR. KATZ: And that really is no good, because that may impact -- I don't know, Grady, does it?

CHAIR KOTELCHUCK: Surely.

MEMBER MUNN: Yeah, too many people.

CHAIR KOTELCHUCK: Okay. We'll --

MR. CALHOUN: I'm fine. I'm not going, but we need Scott here.

MR. KATZ: Yeah, we do need Scott, yes.

CHAIR KOTELCHUCK: Well, make it the 27th and 29th.

MR. KATZ: Oh, no, but we still need another week. So then --

CHAIR KOTELCHUCK: How about the following week? Now, excuse me, the previous week.

MEMBER MUNN: But that's a holiday.

CHAIR KOTELCHUCK: Is it?

MS. GOGLIOTTI: The annual meeting --

MEMBER MUNN: No.

CHAIR KOTELCHUCK: No, no, I'm talking about the previous week in June, the week of June 19th.

MEMBER MUNN: Is that enough time to get --

MR. SIEBERT: This is Scott. I'm out that week.

CHAIR KOTELCHUCK: Okay. Fine.

MR. KATZ: Okay. No, and actually the following week -- I'm out at a meeting that following week.

CHAIR KOTELCHUCK: Okay.

MR. KATZ: That puts us to the week of -- oh, wait. Okay. So that means let's look at the week of July 24th. So how about the 25th? That's a Tuesday again for Brad.

MEMBER MUNN: We have ABRWH. We have a full-scale meeting, don't we?

MR. KATZ: No. No, that's in August. I'm talking about July.

CHAIR KOTELCHUCK: Yeah, okay.

MR. KATZ: July 25th.

CHAIR KOTELCHUCK: Okay.

MR. KATZ: Does that work for everyone?

MEMBER BEACH: Sure.

CHAIR KOTELCHUCK: Sure.

MR. KATZ: Okay.

MEMBER BEACH: Ted, it's not perfect for me. My grandson is due, but you know that's up in the air, so --

CHAIR KOTELCHUCK: Yes.

MR. KATZ: Oh, yes.

MEMBER BEACH: But I'll know more closer, so.

MR. KATZ: Then if you're waiting on a -- that could be any time then.

MEMBER BEACH: Well, that's the date, that's the due date, so --

MR. KATZ: Oh, no, but the due date is no more accurate than --

MEMBER BEACH: Exactly.

MR. KATZ: Yeah. Okay. So that's a tentative backup date. Tentative.

CHAIR KOTELCHUCK: Okay.

MEMBER MUNN: Backup? Okay.

MR. KATZ: Okay. And, Dave --

CHAIR KOTELCHUCK: And I'll check on my thing very quickly.

MR. KATZ: Yeah, if you'd just get back to me, I'll switch which is the actual date if, Dave, if you tell me in the next couple days --

CHAIR KOTELCHUCK: Oh, I will. I will. I'll find out fast.

MR. KATZ: Okey dokey.

CHAIR KOTELCHUCK: Alright. Thank you, all, folks.

Adjourn

MR. KATZ: Yes, thanks, everybody.

MEMBER CLAWSON: We'll see you.

MEMBER MUNN: Bye-bye.

MEMBER BEACH: Bye-bye.

(Whereupon, the above-entitled matter went off the record at 4:25 p.m.)