CENTERS FOR DISEASE CONTROL AND PREVENTION

NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH

ADVISORY BOARD ON RADIATION AND WORKER HEALTH

TELECONFERENCE OF SUBCOMMITTEE FOR PROCEDURES REVIEW MEETING

WEDNESDAY, JUNE 21, 2023

The meeting convened at 11:00 a.m.

EDT via video teleconference,

Josie Beach, Chair, presiding.

Vet Reporting

Certified Court Reporters

PO Box 72314

Marietta, GA 30007

678-646-5330 ext. 514

reporter@vetreporting.com

Members Present:

Beach, M. Josie, Chair

Cassano, Victoria, Member

Valerio, Loretta, Member

Ziemer, Paul, Member

Registered Participants:

Roberts, Rashaun, DFO

Adams, Nancy, NIOSH contractor

Barton, Bob, SC&A

Behling, Kathy, SC&A

Buchanan, Ron, SC&A

Calhoun, Grady, DCAS

Carver, Mr.

Gogliotti, Rose, SC&A

Griffiths, Richard

Habighurst, Ashton, HHS

Mangel, Amy, SC&A

Sharfi, Mutty, ORAU

Taulbee, Tim, DCAS

TABLE OF CONTENTS

Advisory Board on Radiation and Worker Health Teleconference of Subcommittee for Procedures Review Meeting Wednesday, June 21, 2023 1
Proceedings 4
Welcome and Roll Call 4
Carryover Items from February 16, 2023, Meeting 6
PER-049 7
PER-092 9
Peak Street 18
PER-73 19
TBD-5000 31
OCAS-TIB-009 52
Newly-Issued SC&A Reviews 65
OTIB-87 66
RPRT-0085 77
Preparation for August 2023 Meeting 92
Newly Issued Guidance and Supplemental Topics 97

PROCEEDINGS

(11:00 a.m.)

WELCOME AND ROLL CALL

DR. ROBERTS: Okay, so good morning, everyone. Welcome to the Advisory Board on Radiation and Worker Health. This is a meeting of the Subcommittee on procedures review. I'm Rashaun Roberts, DFO for the Board. There is an agenda for today. It's on the NIOSH website for this program under scheduled meetings for June 2023. You can find the agenda and all the presentations and other materials for today.

Since the subcommittee will be discussing a number of different documents, some of which might involve specific sites, we do need to address conflict of interest. If a conflict does happen to come up during the course of the meeting, subcommittee members and others do need to recuse themselves from the discussion where their conflict of interests might apply. So, as we move through the roll call, subcommittee members and others please state where you have a conflict of interest.

So, we'll start with the subcommittee chair, Beach.

CHAIR BEACH: I'm here, and I'm conflicted at Hanford.

DR. ROBERTS: Cassano?

MEMBER CASSANO: I'm here. No conflicts.

DR. ROBERTS: Valerio?

MEMBER VALERIO: I'm here. All New Mexico sites, Pantex, and I believe Nevada test site is still on there.

DR. ROBERTS: And Ziemer?

MEMBER ZIEMER: I'm here, and I'm conflicted at Oak Ridge X-10.

DR. ROBERTS: Okay. All right. It looks like all the members are here. Let's move on to DCAS and ORAU.

MR. CALHOUN: Hi, this is Grady Calhoun. I am conflicted at the Fernald site.

DR. TAULBEE: This is -- this is Tim Taulbee. I am conflicted at Mound.

MR. RUTHERFORD: This is Lavon Rutherford, and I'm conflicted at the Fernald site.

MS. MARION-MOSS: Lori Marion-Moss, and I'm conflicted at the Mound.

MR. SHARFI: Mutty Sharpie, conflicted at the Mound.

DR. ROBERTS: Okay. Anyone else for DCAS/ORAU? Okay. Let's move on to SC&A.

MR. BARTON: Bob Barton, no conflicts.

MR. ANIGSTEIN: This is Bob Anigstein, no conflicts.

MS. BEHLING: Kathy Behling, no conflict.

DR. BUCHANAN: Ron Buchanan, conflict at Los Alamos.

MR. CARVER: Joseph (ph) Carver. I'm conflicted at Oak Ridge and Savannah River.

MS. GOGLIOTTI: Rose Gogliotti, no conflicts.

MS. MANGEL: Amy Mangel, conflicted at Pacific Northwest National Laboratory.

DR. ROBERTS: Anyone else for SC&A?

MR. GRIFFITHS: Richard Griffiths, no conflicts.

DR. ROBERTS: Okay. Anyone else for SC&A? Okay. Let's move on to HHS and contractors.

MS. HABIGHURST: Ashton Habighurst, no conflicts.

MS. ADAMS: Nancy Adams, NIOSH contractor, no conflict.

DR. ROBERTS: Any other HHS folks or contractors? What about the departments, DOL or DOE, other departments?

DR. ROBERTS: Okay. Are there any members of the public who want to register their attendance?

Well, thank you and welcome, again. I do need to go over a couple of additional items before I give the floor to Josie Beach who chairs the subcommittee. So, in order to keep things running smoothly and so that everyone speaking can be understood, everyone please be sure to keep your phone on mute -- of course, unless, of course you're speaking. If you don't have a mute button, press star six to mute. If you need to take yourself off mute, press star six again.

The agenda, the presentations, and background documents that are relevant to today's meeting can be found on the NIOSH/DCAS website. As I mentioned before, all of these materials were sent to Board members and to staff prior to this meeting.

So, with that, Josie, I will go ahead and turn the meeting over to you.

CARRYOVER ITEMS FROM FEBRUARY 16, 2023, MEETING

CHAIR BEACH: Okay. Thank you, Rashaun, and good morning, everyone. Thanks, Kathy, for sharing the agenda. I do want to make note, there is one item on the agenda that's not correct. It's under carryover

items b,

providing an additional case for SC&A. That that shouldn't have been on there. I believe it was just copied and pasted. So, other than that, any other changes that we need to make to the agenda? Any other movement?

All right. I don't believe we got anything for the first three items. And I'm assuming NIOSH is just going to walk us through those; is that correct, Lori or Tim? Our first item --

DR. TAULBEE: That is correct, yes.

CHAIR BEACH: -- PER-49. Okay. Well, are you -- who's going to carry that?

DR. TAULBEE: PER-49 is actually going to be Lavon.

MR. RUTHERFORD: You got a lot of noise back there.

CHAIR BEACH: Somebody's got some sirens going.

DR. ROBERTS: If everyone could, please, mute their telephone unless they're speaking.

PER-049

MR. RUTHERFORD: All right. I think we got that done. Well, this is LaVon Rutherford. And for PER-49, we were asked to provide some information in response to -- I've got to pull it back up here. -- basically, a write-up on why the -- you know, it changed when the original estimate was done with OTIB-2, and then we did the -- when we did the PER, OTIB-2 had been cancelled, so we change that dose assessment to use the actual urine bioassay data that was for that individual. And the question that came up well, why was the -- basically, why was the intake so high given that they were using the urine bioassay instead -- versus the overestimate. And we

provided a response to that. We sent that response to Kathy Behling. We also sent the -- we provided the inv files and the -- for a -- a -- the inv files and the actual xl files for using the bioassay data and not doing such a huge overestimate. So, we provided all that information to SC&A. I haven't heard a response yet on that.

MS. BEHLING: And this is Kathy Behling. Yes, we initially did request the inv data, and we have a team of people looking at this right now just so that we can all convince ourselves and have a complete understanding of -- of what the differences were. And then the inv files, after we looked at those, we had some additional questions and in, I think, the beginning of May, I contacted LaVon again and asked for some additional data, which he did provide. However, since we didn't get that data or the requested data until the beginning of May, we have not, as a team, been able to come to any conclusion yet because we're just starting to look at that data. But we will have some response definitely for the next meeting.

CHAIR BEACH: Okay, that sounds good. So, that takes us into the hypothetical intakes. All -- all the stuff that we talked about last meeting, correct?

MS. BEHLING: Correct. Yes, --

CHAIR BEACH: Okay.

MS. BEHLING: -- Josie. That was the presentation that I made and as LaVon indicated, this came up -- this is -- this is on our agenda because during our presentation to the full Board, there were some questions. Actually, when we look at the PER, we were looking at external doses, but we took note of the fact that the hypothetical intake ended up being less

than the actual bioassay datas -- data, and so we brought that to the Board's attention, and they asked for a follow up. And that's --

CHAIR BEACH: Right.

MS. BEHLING: -- where we are with that.

CHAIR BEACH: Okay. So, that'll carry over to the next meeting with SC&A as the as the lead on it.

MS. BEHLING: That's correct. Yes.

CHAIR BEACH: Okay. Thank you.

Any questions or comments, subcommittee members? All right. Hearing none, I think we can move on to the next item, b, which is PER-0092.

PER-092

CHAIR BEACH: I think NIOSH was to provide written response to observation 4 and finding 1. I didn't see anything, so I don't know if that got done or if you're just going to walk us through that. NIOSH?

MS. MARION-MOSS: Yes, this is Lori, Josie.

CHAIR BEACH: Hi, Lori.

MS. MARION-MOSS: Hi. I did provide a written responses to the one finding and the four observations associated with subtask 4 for this particular PER. Basically, what I was -- what I provided SC&A was the -- a write-up of that Scott Seibert's (ph) responses during the last committee meeting, and that was --

CHAIR BEACH: Okay. I didn't -- I didn't see that, so I didn't realize that had gone out.

MS. MARION-MOSS: Oh, I apologize. I sent that out to Kathy, and we

have not seen a response to those, if any's required. But the sub asked that we put back responses in writing --

CHAIR BEACH: Right.

MS. MARION-MOSS: -- purposes, and that was done.

CHAIR BEACH: Okay, great. Kathy, any -- was it clear? Any comments? I think we were able -- we wanted to close it out, but you guys wanted to look at the writing --

MS. BEHLING: Yeah. And in fact, we've been going on the directions here. PER-92 is the Weldon Springs Plant. And Lori, did you put that out on the virtual volume -- volume? I have to -- I'm trying to recall.

MS. MARION-MOSS: No, that was provided --

MS. BEHLING: (Indiscernible) --

MS. MARION-MOSS: -- in the email on June 6th.

MS. BEHLING: Okay. All right. Ron, I guess you did not have an -- did you have an opportunity to look at that, Ron Buchanan? Are you on the line?

DR. BUCHANAN: Yes, I'm on the line. This is Ron Buchanan. And yes, what that consisted of, I received that email, and what NIOSH had done was to finding 1 was we found that NIOSH assigned external dose to the constant distribution. When PER-92 said differently, and their response was NIOSH agrees that applying the maximum of the average is not necessarily maximizing when using a content distribution. Instructions to dose retract -- constructors does say to use the normal distribution. We have looked into this matter and discovered there were nine claims with this error -- error. All claims had less than one percent POC, so there is no impact whatsoever.

Additionally, we are updating the DR tool such that a warning is issued to dose reconstructors reminding them of the use of the normal distribution. So, NIOSH did look into that finding and found out that there was an error, and that they look back at other claims for Weldon Springs that was supposed to use this distribution and found -- and reworked the claims and found that there was less than 1 percent POC and it didn't impact, and additionally, they're updating their tool. And so, that was finding 1 that we had -- had.

Now, we hadn't given any response -- formal response to that. It sounds reasonable. I guess my question to NIOSH is when you went and reworked -- did you rework the claims or just look at them and say oh, 1 percent, we don't need to rework them?

CHAIR BEACH: Tim has his hand up, so I think he has a comment on that, possibly, or something else, Tim? Can't hear you.

DR. TAULBEE: Sorry, I forgot to -- the mute person. Anyway, sorry. I don't have a response to Ron on that because I'm actually not sure as to whether, you know, we went back and reworked the entire claim or just looked at that 1 percent. But I did want to ask, would it help if I put up the actual email that Lori sent in --

CHAIR BEACH: Yeah, I --

DR. TAULBEE: -- right now?

CHAIR BEACH: Yeah, I don't think everybody got that. I don't know. Lori, did you send that to the -- to everyone or just to Kat -- to SC&A?

MS. MARION-MOSS: I just sent that to Kathy.

CHAIR BEACH: Okay. Yeah.

UNIDENTIFIED SPEAKER: Kathy, --

MEMBER ZIEMER: Yeah, this is Ziemer. I -- I looked in my emails. I didn't receive any on June 6th.

CHAIR BEACH: Yeah.

MEMBER ZIEMER: But I do -- I do think we need to have it in the record formally.

CHAIR BEACH: Yeah, I --

MS. BEHLING: That's what -- my apologies for not putting that up. Thank you, Tim.

DR. TAULBEE: So, now you all can see that email, which Ron was going for. And Ron, I'm sorry, I don't have an answer from that as to whether they -- whether OURA looked at the full -- reworked the full claim or just looked at the -- the PC.

DR. BUCHANAN: Okay.

DR. TAULBEE: I don't know if anybody on the -- that's on from ORAU knows that off the top of their head or not. If not, we can get back to you on that.

DR. BUCHANAN: Okay. What I suggest then, get back on that. And then I'd like to cover observation 1 through 4, because I think we can close those out. What this was, was they weren't -- of course PER-92 had to do Weldon Springs. And we reviewed some cases, 2 cases, and had these -- had that finding which we just covered and are the observations 1 through 4.

Now, observation 1 through 4, we flagged those as observations, because in the rework of the cases, it was not stated, you know, specifically

in the DR that there was an overestimate. And now, they were less than 45 percent, so NIOSH says they were an overestimate, and that's fine. But when we did review, we just flagged them as a dose reconstruction observation in that observation 1 they used -- did not use a dose recon -- a (indiscernible) prostate. It was less than 1. They used 1 and used it as overestimate. And they said that they did that because the POC was less than 45 percent. We would agree with that on an overestimate, but we pointed out in a normal dose reconstruction, you wouldn't do that.

And observation 2 did not -- NIOSH did not always incorporate the date of cancer diagnosis. Same explanation there. And then observation 3 did not include the diagnosis date -- date for cancer one for external dose, external ambient dose, same explanation. And for cancer one for environmental dose didn't include the date of diagnosis. In other words, you know, they -- they carried the dose all the way through the end of the year, as opposed to -- say the cancer occurred in June and just assigning half the year of dose. And in an overestimate, that's true, like I say, it didn't specifically state that, so we flagged it as an observation, which in normal DR you would prorate those -- those values.

So, we have really no issue on observation 1 through 4 because they were an overestimate and which is done in that case, if -- it stated they were doing an overestimate.

And on finding 1, we would just like to know if the POCs were recalculated or if they just looked at them. And I would like to see an example of one of those. I think that they -- SC&A doesn't need to look at all nine claims. I'd like to see an example of one of those that they

reworked, and then we can write up an email -- since this came in form of email, we can just write up an email with our response to the whole group, including the members of the subcommittee.

CHAIR BEACH: (Indiscernible) --

DR. BUCHANAN: Kathy, you want to add anything to that?

MS. BEHLING: No, Ron. The only thing I was going to ask the subcommittee is, are you in agreement that we can close the four observations?

CHAIR BEACH: I -- this is Josie. I have no trouble closing the four observations. I would like this email sent out to all of us if possible.

MS. BEHLING: Yeah, I apologize --

CHAIR BEACH: Lori, --

MEMBER ZIEMER: This is --

MS. MARION-MOSS: I can get that email.

CHAIR BEACH: Okay.

DR. TAULBEE: I would like to --

MEMBER ZIEMER: This is Paul. I -- I'm okay in closing those as well.

CHAIR BEACH: Loretta?

MEMBER VALERIO: I'm okay with closing those as well. Thank you.

CHAIR BEACH: And any other comments on that?

MS. BEHLING: Is Tim trying to (indiscernible)?

DR. TAULBEE: Yes. I'm trying to address finding one a little bit here. Because when Scott was through this back in February, he indicated that, you know, the -- you know, he went through, and they looked at all the claims that had this error. And if it was, you know, the result of the 2 BRS

and there's no impact as shown here, all the claims were less than 1 percent, and, you know, those BRS had been cancelled. And I have a note here that this subcommittee actually closed finding 1 and just wanted to see this in writing back in February.

CHAIR BEACH: Yeah, I think I would agree with that, but I think once the writing came out, and Ron has an additional question, I think we should follow through with that, which is why we asked for it in writing.

DR. TAULBEE: Okay. I mean, we can here, but if the PC is less than 1 percent, you know, whether they just looked at the PC 1 percent or whether they reworked this whole claim, it's really not going to change this, because we're talking about whether it was a constant or whether we assigned the normal distribution. So, this is really a small error that we've already corrected. And, yes, we can go through and do this and respond. If that's what you want, we will do so, but I really think this can be closed as is.

MR. BARTON: This -- this is Bob --

CHAIR BEACH: Ron, --

MR. BARTON: -- Barton. Based on my notes from the last meeting, basically, what we were looking for was, again, in writing, basically a BRS-style entry just to document the discussion from back in February, so I think that's consistent with what Tim just said. So, I think it was generally accepted, we just wanted it -- to have it officially in writing for when the BRS comes back so we can update it as such and track it so it's documented.

MEMBER ZIEMER: Josie, this is Paul again. My notes from the February meeting, I -- I show that it was recommended to close but was put in abeyance. And that means that, I think, we're satisfied with it, but we

wanted to see that final wording that you're talking about.

CHAIR BEACH: Yeah. Yep, I agree with that. Ron, comments on that? Are you --

DR. BUCHANAN: My --

CHAIR BEACH: -- comfortable with that?

DR. BUCHANAN: Yes. This is Ron with SC&A. Yes. If the Board is okay with that. I know, you know, just from a dose reconstruction point of view, it's not going to change the outcome of the cases, and so I really don't have a problem with that if the Board's satisfied with it. We can carry it through, and I can look at one of those or if you're satisfied that they did their due diligence, then I have no issue with it.

CHAIR BEACH: And we already know you're changing the tool at this point; is that correct, Tim? That's underway?

DR. TAULBEE: That is correct. Yes.

CHAIR BEACH: Okay. Victoria, we haven't heard from you. Or what's your thoughts, anything?

DR. ROBERTS: And I'm hearing some noise in the background. If people could, please mute their phones.

MEMBER CASSANO: Were you asking me for my --

CHAIR BEACH: Yeah, if --

MEMBER CASSANO: -- input on it?

CHAIR BEACH: -- comments or questions.

MEMBER CASSANO: As long as the principals involved in this have no issue with it, I am fine at this point.

CHAIR BEACH: Yeah, --

MEMBER CASSANO: If NIOSH and SC&A were in agreement, then I'm okay.

CHAIR BEACH: Gotcha. I -- I know Ron would like to look at another case, and I -- I don't know how much trouble that would be for you guys, Tim, to let them take a look at something.

DR. TAULBEE: Well, normally, this would simple, but as you -- as you know, it's all the IT issues, it ends up becoming more difficult. So, I mean, it's doable. We can do it. But is it really necessary, is, I guess, what I'm questioning here.

CHAIR BEACH: Okay. Well, hearing Ron said he would like to but it's not necessary if the -- if the subcommittee's comfortable, Paul, Loretta, you comfortable with just closing as is?

MEMBER ZIEMER: This is Paul. I'm comfortable with that. I assume we'll have -- have the final information in writing at least in the record, so that's all we need.

CHAIR BEACH: Okay. I'm fine with that also. Loretta?

MEMBER VALERIO: I'm fine with that, Josie. I'm good with that.

CHAIR BEACH: All right. We'll go ahead and close this. We will -- we will get the final in writing sent to us and then, Ron, I think you're still going to send something or are we done? We were talking --

DR. BUCHANAN: No, no, I'm okay. That's okay.

CHAIR BEACH: Okay.

DR. BUCHANAN: If you want us to send an email out, we can, or if you want to use this post that you had to close it out, that's fine too.

CHAIR BEACH: I think we can just go ahead and close it out. I would

like to have this for the record though, the email that Lori had sent out earlier.

DR. BUCHANAN: Yes, that's important.

CHAIR BEACH: All right. Thank you.

MS. MARION-MOSS: Josie, this is Lori. I will forward this email to all Board members --

CHAIR BEACH: Okay.

MS. MARION-MOSS: -- including, and I could also move it into the ECP if you like.

CHAIR BEACH: Sure, that would work. That's what -- I had gone on the virtual volumes and looked and didn't see anything new for the meeting. So, yeah, if you put it there, that's fine.

MS. BEHLING: And Josie, I will also update the BRS with their responses and our discussion today.

CHAIR BEACH: Okay. The --

MS. BEHLING: The temporary --

CHAIR BEACH: The temporary BRS?

MS. BEHLING: Yes, the temporary BRS. Uh-huh.

CHAIR BEACH: That sounds great, thank you. Sounds like we might be getting closer to the real BRS, but not sure yet.

PEAK STREET

All right, and if everybody's ready, our next item was Peak Street, and NIOSH was going to provide additional cases, and I believe the additional cases were provided; however, I don't think the subcommittee saw anything on that. So, I believe this is in SC&A's court right now?

MS. BEHLING: Yes, this is Kathy. We did receive two additional cases. They came in somewhere mid -- about April 23 or fourth, something like that. So, we will start looking at those. And as we did with the previous two cases, I think we will present that to the subcommittee in the form of, perhaps, a -- a memo. I think Doug is going to be working on that. And if that's okay with you?

CHAIR BEACH: Yeah, that's fine.

MS. BEHLING: Okay. And perhaps --

CHAIR BEACH: And so, we'll see that possibly for the next meeting?

MS. BEHLING: Yeah, possibly. Uh-huh.

CHAIR BEACH: Okay. Anything else on that? And if not, we can move on to -- I think Ron's ready for Birds -- or do you have -- on PER-073, Ron, did you have a presentation or just the write-up you sent us, just the memo?

MS. BEHLING: And that is actually Bob Anigstein.

CHAIR BEACH: Oh, okay. Sorry.

MS. BEHLING: That's okay. And Bob, are you on the phone?

PER-73

MR. ANIGSTEIN: Yeah, this is Bob Anigstein. I'm ready to talk about PER-73.

MS. BEHLING: Okay. Do you want me to show that or are you going to show -- show it? Would you like --

MR. ANIGSTEIN: Excuse me?

MS. BEHLING: Would you like me to display that on the screen?

MR. ANIGSTEIN: Sure. Just my -- the memo.

MS. BEHLING: Just the memo.

MR. ANIGSTEIN: Right. Okay. I'm pretty much gonna talk from that. Okay. What happened with the PER-73, this goes back to, I believe, around 2017-2018, where there were only four claims for -- for -- four cases that -- that were submitted as claims. And once we -- the report on -- the PER review included --

CHAIR BEACH: Bob, can you hold on --

MR. ANIGSTEIN: -- seven observations and one finding. And now --

CHAIR BEACH: Bob, -- sorry, Bob. Kathy, were you going to put that on screen? So far, I only see the agenda. Kathy, are you there?

MS. BEHLING: Yes, I'm here. I'm sorry. I was on mute. I thought that I had the -- I thought I was sharing this.

CHAIR BEACH: Yeah, so far, it's just the agenda, so thank you.

MS. BEHLING: Okay. Let me see if we can put that up. Are you -- okay. Yeah, --

CHAIR BEACH: I have -- I actually have it up on my other computer, but others might want to see it.

MS. BEHLING: There it is. Do you see that?

CHAIR BEACH: No, it says -- nope -- there it is. Yep. Now it's up. Thank you so much.

MS. BEHLING: Sorry.

CHAIR BEACH: And sorry to interrupt, Bob. All right.

MR. ANIGSTEIN: I'm pretty much going to read -- summarize --

CHAIR BEACH: Sure.

MR. ANIGSTEIN: -- I mean, I'm -- pretty much from the memo, so I

don't know if the screen display is -- add -- adds anything additional. I don't have the screen up right now, so I'm just talking from my --

CHAIR BEACH: Well, that's okay.

MR. ANIGSTEIN: -- printout.

CHAIR BEACH: -- but others might want -- others might want to see it, so that's why I wanted to make sure it was up. No, Bob, go ahead. You're good.

MR. ANIGSTEIN: Okay. Let me know when I should go ahead.

CHAIR BEACH: Yeah, go ahead.

MR. ANIGSTEIN: Okay. What caught -- what caught the attention of the program was discovered -- we have as the -- two of the Board Members (indiscernible) have copious experience with a company called GSI, stands for General Steel Industries, who had an iron foundry -- a steel foundry, sorry, Granite City, Illinois. And you -- due to some activism on the part of one of the claimants or family member of one of claimants, we got copious information on that site. There were a number of workers still living in the area who had retired, who had survived, and there were meetings. And we had a great deal of information.

And then we found Birdsboro had a very similar history and this caught the attention of the program. Both facilities use betatrons to X-ray -- to -- to radiograph castings for are -- they had contracts with the US Army for -- to provide Army tanks or (indiscernible) of Army tanks do -- during the Korean War in the '50s. And so, it was natural to assume well, maybe they're similar.

The reason they came under the aegis of this program is that they also

handled uranium connected with the nuclear weapons program preparing uranium samples, eventually for use in the Hanford Reactor. We know very little about what they did with the uranium, but it was enough to put it in the program and to have a part of 1951 and all of 1952 was part of the AWE program.

And so, it seemed the exposure -- the directly -- the external exposure for uranium, as everybody realizes, is not very large. There were not very copious amounts of uranium. However, the same workers that handled uranium might well have been exposed to radiography sources. So, in the initial finding, we assumed that the radiography sources, including the betatron and an X-ray machine, could have been subjected to the same workers who had done work with uranium to additional external dose.

However, NIOSH did some further research on this and came up with a document that we were not aware of at the -- did the original work that there was a separate facility built for the radiography of the Army tanks. So, there was a 250, I think, kVp X-ray machine and a 24 -- at that time, there was only 22, actually, megavolt betatron. However, we're satisfied with the NIOSH presentation that the -- those were separate. It was 500 yards away from the main Birdsboro foundry, and they had separate payrolls even though it was for -- for business purposes, they freely intermingled with each other and jobs -- jobs shifted back and forth.

But we'll concede that it's probably likely that the betatron that -- unlike the case at GSI, where we came across one surviving worker, not a claimant who had the interesting job that he was a working in laboratory during the week, but he had the qualifications and experience and on

weekends, he moonlighted for the same company as a radiographer. So, here was an example of somebody who might very well have been exposed to uranium and also might very well have been exposed to external radiation during radiography. And if such -- if this person -- there always some hypothetical person who had -- who is now deceased, his family may not know about his additional work, the details of his work, so -- so, the decision was made at GSI that all workers, except there was those that are obviously worked in an office whose full-time job was administrative work, secretarial work, clerical, and so forth, would be assumed to have been operators of radiography just to be on the safe side. So, it was natural during this review of Birdsboro -- well, maybe the same situation was there.

Now, NIOSH -- I'm being repetitive now -- established that no, the radiography with the betatron was a separate operation, and it's unlikely that the same workers were exposed during the -- during that period. And we -- we concede that that's a reasonable assumption. However, at GSI, the greatest exposure was radium sources. Radium sources were used at GSI up until the mid '50s, late '50s, when the state radiation control persuaded them and pressured them to stop doing that because of the personal radiation exposure hazard. However, I had -- but that was -- that came later. That came in the late '50s.

At Birdsboro, by reviewing the case, the individual cases brought by SC&A, myself, we found that there was one worker who is now -- one deceased worker whose family was interviewed as part of the CATI (ph) program, computer -- I think they use a different acronym now, but it was originally called the computer assisted telephone interviews. And he had --

there were a number of surviving claimants, and they all uniformly said that their parent was -- used cobalt 60 and radium sources for radiography during the coverage period. He was employed before, during, and after the covered period. And he -- they have and they even -- they didn't furnish, but they said there was a photograph of him using radium source or at least a mock up at that moment using the fishpole technique.

Now, the fishpole sounds like just like a -- makes you think of Mark Twain Tales of Mississippi -- a long pole, maybe -- maybe five-six feet long, like I say, pole, a string tied to the end of the pole, and the other end of the string with a hook or some such, was a radiation source, an isotope source, and the most potent source from a radiation dose standpoint would have been Radium-226. And there was no shielding. I mean, the -- when it was not in use, the source was kept in a lead shield with a hole in it where your only -- unless you stood right above it, you will not get any (indiscernible) radiation exposure.

But during the placement -- but then they had to use, take the pole, walk over to where the casting was, put the source in the designated spot, put the film behind the casting, and take a radiograph. And there was a very significant radiation exposure. We did the -- the MCMP analysis for the GSI, and not knowing any other details except what I just gave you, I would assume -- we would -- SC&A would assume that, that was the potential source of exposure to this one worker that is family both in CATI interviews and also they -- each family member there was a survivor filled out a form provided by the Department of Labor. There was an employment history, and they all uniformly said that their parent was exposed to radium sources.

So, then the other pieces -- so, we know at least one worker was a claimant who -- who was -- whose family were claimants. Whether it -- did use radium sources during the covered period during which he might have been assumed to have been exposed to the uranium also and never came out of the program. The second -- and then there was also -- there also as part of the claim, each of the survivors, the claimants, filled out an employment history form, and they all uniformly said that the parent was exposed to radium and cobalt sources.

Then the other piece of evidence that makes this a likelihood is there was a -- we have a -- SC&A has a former metallurgist who was working in the -- active in the -- in the 1950s, a later discovered period, and I asked him, was this a likely -- was it likely that they -- that since they were producing steel castings for various customers -- it was a large operation -- was it likely that they did radiography. And he said why don't you check on the ASTM Standard -- ASTM stands for American Society for Testing and Materials, the original name. Now it's called The ASTM International. And by doing the research, we found that, in fact, ASTM during the 1950s and to this day, would sell the radiography standards. What they were do is they would produce radio -- radiograph film, exposed films for sale to whoever -- whoever wants to buy it. And this was just changed over -- over a period of time. This is a minimum acceptable level of quality for your casting.

And so, the foundry would -- a foundry, steel foundry, would have an agreement with the customers, not only would they ship them the casting, they would ship one with each casting -- we did -- GSI did that -- with each casting, they would fur -- furnish a radiograph, say, here is the X-ray film,

just like medical -- I won't make the obvious comparison.

So, then the question came up, was this a practice during the 1951-52 period, and I we found on the website for ASTM, a description of the radiographs that were -- that were offered for sale for comparison purposes, and that there were -- depending on the -- there were different radiographs depending on the thickness. So, using the zero to 2 percent -- zero to 2-inch -- excuse me -- radiographs, we found that there was a specific radiograph standard for radium sources. And it said it's not used anymore or rarely used, but at that time, there was one. Tt was called E-71. And the first edition of it was 1947, then it was two more additions later in the -- in the '60s. I forget the exact date now.

So, when you say therefore it was a common enough -- excuse me --

It was a common enough practice that ASTM was in the business of furnishing comparison radiographs. So, there wasn't -- I'm being repetitive. It was common practice at that time. Now, we don't have documentary evidence that Birdsboro, in fact, did that, but it's reasonable to assume that they would. Why would a customer who's paying for the casting not require that they -- proof of quality, that they show a radiograph that they made, Birdsboro would have made of their own casting. They would have compared it. They would have their own technical expert compare it to the one they purchased from ASTM as a reference and said okay, this is at least as good as every -- imperfections are no worse than the standard, and the standard we already have an agreement with our customer, that this would be an acceptable casting if it meets the standard. So, we say we know that -- so, we know that at least one employee was engaged in such work,

and we also know that it was a likely practice at that time for a steel foundry. So, we believe that the possible exposure, potential exposure, to radium sources should be included in dose reconstructions for claimants from Birdsboro.

So, any questions?

CHAIR BEACH: Thanks, Bob. Any questions from subcommittee members?

MEMBER ZIEMER: This is --

MEMBER VALERIO: I don't have any, Josie.

CHAIR BEACH: Go ahead, Paul.

MEMBER ZIEMER: Hi, yeah. So, I was on the -- actually, chair -- chaired the General Steel Industry's subcommittee. Bob described it very well. But that was a very common practice at that time. I -- I think, Bob, you're also suggesting maybe the -- the sort of modeling that was done at GSI might be transformable to Birdsboro. There -- there are some specifics at a site that has to be taken into consideration. But at GSI, for example, I think we had a longer work week than 40 hours, and you have to adjust for things like that. You also have to make some estimates as to how often such radiographs are made. And so there was a certain amount of modeling, actually a lot of modeling done at General Steel Industries to come up with a -- an exposure model for -- for the -- the workers there.

They also had some issues on where things are stored and so on. But in any event, the likelihood of radium being present, in my mind, is -- is pretty -- pretty high.

CHAIR BEACH: Yeah, and I was on GSI also. And --

MEMBER ZIEMER: That's right.

CHAIR BEACH: -- remember those discussions.

MR. ANIGSTEIN: Well, I would -- I would suggest that I didn't do a full blown-production on this. But there is a precedent for using surrogate data. In other words, if we don't -- if we have little information about the site in question, but there was another site where there is good information, we just say well, we will just assume, for lack of anything else. So, we know nothing about the details of the radiography except what I just presented at Birdsboro, but yes, Paul is entirely correct to call that, that there was -- they had copious documentation at GSI. There was one worker advocate -- I won't -- (indiscernible) from mentioning his name, but subcommittee members will know who I'm referring to --

CHAIR BEACH: Exactly.

MR. ANIGSTEIN: -- was extremely diligent and active in recruiting former workers. So, we have a very good picture, and my understanding of the -- our program is that you can use surrogate data if it's the same period. GSI was active in defeat 1951-52 a period. It was probably their covered period also -- I think not '51. I think it started in '52. But anyway, that's pretty close.

CHAIR BEACH: Yeah, I think we probably need to hear from NIOSH on what their thoughts are on your write-up.

MEMBER ZIEMER: Yeah, exactly. And incidentally, at General Steel, there was some limited film badge data saying that associated with the -- with the betatrons, but in any event, probably a little better documented there. But again, the surrogate data issue could be considered. But yeah,

you're right. We need to -- NIOSH needs to take a look at Bob's response and -- or SC&A's response and -- and see what they think.

MR. ANIGSTEIN: I haven't looked at it -- I haven't looked at it recently, but my recollection is that the film badge -- the available film badge data from RS Landauer starts about 1960 when radium was no longer used.

MEMBER ZIEMER: Right. And it was specifically in the cobalt '60 era, keeping in mind that during the radium -- radium is never controlled by the NRC, it was -- or the what was then the Atomic Energy Commission. It hadn't -- I don't believe the state at that time had any -- in the early '50s, the -- the Illinois regulatory group was not in action yet either, so.

MR. ANIGSTEIN: Well, actually, I seem to recall, and it would be contentious, that they stopped using radium because the state would not allow it. We know the AEC was not involved with radium because it's not a reactor byproduct.

MEMBER ZIEMER: Right. And most of the states stopped using it mainly because of so many of those radium sources were leaking. That was -- that was the -- one of the major problems was leaking sources. But in any event, those are other details that we probably don't need to spend time on. But in any event, yeah, eventually the states are the ones that halted the use of it.

MR. ANIGSTEIN: Right, yes. So, unless there are any further questions, I rest my case on that.

CHAIR BEACH: Thanks, Bob. NIOSH, any comments?

DR. TAULBEE: Yes. This is Tim. We -- we got Bob's memo about

two -- two weeks ago, and thankfully, you know, Bob and SC&A are concurring on the -- you know, the use of the betatron was in a separate facility. We will evaluate the Radium-226 and Cobalt-60. In fact, we've already started doing so and will incorporate what we find from that additional research into our response to Bob's memo here, as well as the seven observations that we still owe you-all a response on. So, that's our plan for going forward. And we'll -- we'll update you at a future meeting. Thanks.

CHAIR BEACH: Thanks, Tim. And no -- no suggestion when that might be ready?

DR. TAULBEE: Unfortunately, --

CHAIR BEACH: (Indiscernible) --

DR. TAULBEE: -- no. Not at this time. I --

CHAIR BEACH: Okay.

Dr. Taulbee: I -- I don't -- I -- I don't know. This is kind of -- a little bit of new information. We did do -- you know, have some, I believe, from the original finding, radium and Cobalt-60 was initially mentioned, and we focused on the betatron primarily in our first response. And we'll focus on the radium and cobalt specifically on this one.

CHAIR BEACH: Okay, sounds great. I guess we can carry it over. And if you're not prepared, you can let us know when the agenda comes out for the next meeting.

DR. TAULBEE: That sounds good. Thank you.

CHAIR BEACH: All right. Thanks, Tim. Any other follow up on Birdsboro? If not, thank you, Bob. Appreciate your thorough summary.

And we do have the one finding, and as Tim stated, the seven observations, so we will just carry that over.

TBD-5000

CHAIR BEACH: If there's no other comments, we can move on to TBD-5000. I'm not sure quite where we are on that. I know we had a paper from SC&A last March. I don't know --

MR. ANIGSTEIN: That is correct. Yes, that is a memo dated March 27th.

CHAIR BEACH: Yeah, --

MS. BEHLING: Josie, this is Kathy. I'm sorry. I'm trying to share that on my screen. Are you seeing it?

CHAIR BEACH: Yes, we are.

MS. BEHLING: Okay. Okay, great. So, Bob, we are going to present that when you're ready.

CHAIR BEACH: Okay. And I'll turn that over to Bob. Thanks.

MR. ANIGSTEIN: All right. Now, the -- made one presentation at the September -- last September's meeting, and we had 13 observations on -- for the benefit of anybody who -- just very quickly, Battelle 5000 was a procedural document that was produced in, I believe, 2007. And I'm just looking at my -- yeah. And it was apparently -- had fallen into disuse, but the subcommittee showed -- saw that it was still -- technically it was still active, or it could have been used for dose reconstructions. And consequently, we were tasked with reviewing this. And we did a fairly thorough, I think, review. It's a fairly long document.

And it resulted in 13 obser -- our review disclosing 13 observations.

So, I will go through the -- my question for subcommittee is five of the observations were closed at the last meeting, should I mention them, or should we just skip over them and just use -- just talk about the ones that were not closed?

CHAIR BEACH: Yeah, if we -- if we closed them, let's skip over them, if everybody's in agreement to that?

MR. ANIGSTEIN: Okay.

CHAIR BEACH: Yeah.

MR. ANIGSTEIN: All right. In that case, I will start with observation two. Observation two has to do with the resist -- the ROS method, regression and order of statistics, which deals with what happens if you have a set of data, set of measurements, and some of them are censored. By censoring, they fall -- mostly they fall below the limit of detection, the LOD. So there is -- they're recorded, we may even have values for them, but they're not reliable values because the instrument and a methodology used simply could not reliably detects such low values. In a few less common cases, that will be -- and so these will be the left sensor. The data reads from left to right, so the left -- and the left-hand, some of them would be blanks.

Likewise, it's conceivable sometimes that the measurements exceed the limits or is it that the count rates will be so high that the instruments cannot reliably report them, so those because the right sensor. That's a less common -- so they were using this ROS method, and there was a criticism -- not really the most up-to-date methodology. The ROS method, essentially, conceptually, you fit the data to a lognormal distribution, and then you just

take into account the fact that there are some off to the left, data points that are often not on the graph and it adjusts the other -- the other readings to account for that.

So, NIOSH responded that there are more method -- more modern methods, and they presented three reports and -- including one that we actually had recommended in our initial review. A statistician, it -- textbook article called Helsel, H.E.L.S.E.L. And so, NIOSH actually mentioned, yes, that's one of the methods that they are now using. They are not using the initial ROS method. So, we're satisfied that they have -- that they answered the observation by saying they're no longer using that method, they're using a different method, the multiple imputation method. And they actually referred to Helsel and the -- R package is called NADA -- NADA. And so, we're satisfied that they replaced the method. We did not do a deep analysis of that because that would be out of scope. But we did say that the multiple imputation method has replaced that. And therefore, we recommend that the observation two be closed.

CHAIR BEACH: Okay, thanks, Bob. Let's go ahead and talk about that and take action before we move on. Other subcommittee members agree with that recommendation?

MEMBER ZIEMER: Josie, this is Paul. I certainly agree with that one --

CHAIR BEACH: Thanks. Perfect.

MEMBER ZIEMER: -- that we should close.

CHAIR BEACH: Okay. Thanks.

MEMBER CASSANO: Yes, and --

CHAIR BEACH: Victoria?

MEMBER CASSANO: Yes. I agree with that, with the recommendation.

CHAIR BEACH: Thank you. And Loretta, you okay with that as well?

MEMBER VALERIO: Yes.

CHAIR BEACH: Okay. So, I think we're all in agreement. I agree also that we take SC&A's recommendation and close observation two.

MR. ANIGSTEIN: Okay.

CHAIR BEACH: All right. You can move forward.

MR. ANIGSTEIN: Go on -- go on to observation four, which is something we found called the mirror, and there was two methods. Mirror image and preserved mean variance. This is something that we at SC&A are not aware of any technical backgrounds. Is this a good theory? This is something that -- without making serious comments, was sort of an ad hoc methodology, which is simply not part of the modern statisticians tool chest. And NIOSH responded that they are not -- that they agree. They are not using this methodology, that they have a new way they do -- way of handling normal noise and lognormal signal, which is a computational challenge, because it's well accepted that environmental samples and clinical samples follow -- typically follow a lognormal distribution. Whereas, random errors, what we call noise, just -- if you make the same measurement 10 times, you get 10 different values. So, this is -- the -- these values follow a normal distribution. So, the question is how to combine the lognormal with the normal. And they have produced ORAUT report 96 multiple imputation applied to bio -- bioassay co-exposure models as a methodology for handling this situation, and therefore, they are not using the already -- the mirror

image as a preserved mean and variance method. And consequently, we, without having -- we did not do an in-depth analysis of the new methodology, but we're satisfied that this is a methodology which avoids those earlier methods which we do not consider to be valid. And so, again, we recommend that the observation be closed.

CHAIR BEACH: All right. Thanks, Bob. All in agreement with that? Anyone not in agreement, you can go ahead and comment.

MEMBER ZIEMER: Well, I'll just comment that some of these statistical things are still a bit of a mystery to me. I'm very dependent on the -- the help of -- both of NIOSH and SC&A. And I'm confident that they have appropriately analyzed, and so I'm good with the agreement to close.

CHAIR BEACH: Thanks, Paul. That --

MEMBER ZIEMER: Just be aware that I -- I -- I -- I -- I can't personally say that I fully understand that methodology, but that's -- on many of these things, we are dependent on the experts who we have employed to do this.

CHAIR BEACH: I -- I agree. And the comments under this one that they didn't -- that Bob didn't do an in-depth technical review, just fortunately for us, he didn't need to at this time. But I agree with you, Paul, it is -- we have to depend a lot on the experts. So, I'm in agreement with that. Victoria, Loretta, you good for closing?

MEMBER VALERIO: This is Loretta. I'm in agreement, Josie.

MEMBER CASSANO: I'm in agreement as well.

CHAIR BEACH: Okay, thanks. So, we are in agreement to close, and Bob we can move on to the next item. I don't think you have answers for

the five, six, and eight at this time, correct?

MR. ANIGSTEIN: Excuse me?

CHAIR BEACH: I said I -- I'm not aware of you that you had anything -- any written responses for five, six, and eight --

MR. ANIGSTEIN: Yes. For observation five, we're waiting for -- NIOSH said they in -- they intend to make -- to issue a separate report. Observation five, as a reminder, is that the TIB 5, the Battelle TIB-5000 applies. There was a ICRP assessment of the ability of the ICRP publication 30 modelled -- I'm sorry, I said that wrong. They did -- there was a -- there was an evaluation of the ICRP 30 models. What those -- that's something that goes back to the, if I'm not mistaken, 1970s, 1980s, and they applied that to the current ICRP 66 model and applied this -- the same critic -- criticism and uncertainty, and we flatly disagreed with that because the lung model -- it was a new lung model produced by the ICRP in report six -- publication 60, a thick volume that described it... So, it's just not valid to say well, whatever applies to the ICRP 30 model applies also to the ICRP 66 model. And NIOSH announced that they will be producing a report on that very topic, but they -- we have not heard about it yet -- since. So, the subcommittee at the time of the last meeting agreed that the -- this remains open. So, and we, SC&A, was in agreement with that. So, it stays -- it stays open unless there -- there's no new developments that we are aware of.

Then observations six -- is there any questions about observation five?

Observation six overlaps observation five. It starts off with the fact that the GSD of 10 was applied taking the data from Christofano (ph) and

Harris, which -- which is seven -- seven different plants, uranium enrichment, uranium randling (ph) plants, and they applied the GSD of 10, which is enormous to me, a factor of 10. You know, give it -- give or take a fact -- factor of 10. And that is, in our mind, too large to apply to a -- to a single situation, to a single client. And NIOSH agreed with that; however, they also said that they -- that they're using a GSD of 5 as a default value and DRs. We agree with that. That was part of part TBD-6000, which SC&A reviewed the two -- two different editions of it. We reviewed them both, I believe. And we agree that five is a reasonable number.

But also, I have said that using GSD of 3 four biokinetic modeling, and we asked that they produce more data. They justify that and (indiscernible) that. The only justification that they came up with was an email, which no longer exists, no longer retrievable at the very, very beginning of our -- of this program in the early 2000s. So, that's not the -- that doesn't count anymore. So, the Board also -- the subcommittee also voted that the observation six should also be left open.

Is there any -- any -- any questions or further discussion on six?

DR. TAULBEE: This is Tim. If I could interject here, we are working on the report, and it's currently in development. And we expect to have it released by our project plan sometime in November.

CHAIR BEACH: Sounds good. Thanks, Tim.

MR. ANIGSTEIN: Okay. So, I will go on to observation seven.

CHAIR BEACH: Okay. Thanks.

MR. ANIGSTEIN: Observation seven, was about a specific example of how to handle data. They had six measurements of an operation that took

place -- it was assumed to take place at the Lake Ontario Ordinance Works, and there were radon measurements made. It was that they were opening covers, I believe, and removing covers from drums. And there was -- as it happened, there weren't -- on two different days -- two successive days, they were minutes apart with three measurements on each day, and of those six measurements, three were high, quite high, three were quite low. And they -- but they were not, like, one day and the second day; they were taken from the two days, three measurements were high and three others were quite low. And they assumed for -- as an example, calculation, these must be from separate populations, and we will treat them separate. We will -- instead of this being 24 minutes per shift -- let's say was 12 minute -- two 12-minute periods, one exposed to a low concentration, one is with a high concentration, and we find that not valid. The mere fact that the measurements are different does not mean that it's -- that the situation -- that they come from a different population and that this is not a valid application. And NIOSH's response was that they don't use this methodology, and that they have a specific procedure for evaluating radon exposures at the Lake Ontario Ordinance Works and they assume a -- based on measurements made, they assume a fixed value, the claimant's -- made a claimant-favorable assumption that there is a fixed value of radon -- fixed concentration of radon that the workers are assumed to be exposed to.

So, we agreed that the methodology -- with NIOSH that the methodology in OTIB-5000 is not used anymore, and that there is a new methodology to replace it, which does not use statistics, it just uses fixed upper -- upper-end value of radon concentration. So, we recommend that

the observation seven be closed.

CHAIR BEACH: Any questions subcommittee members?

MEMBER ZIEMER: I have a question on this one. And I -- this may be a question for NIOSH, but what's the value to the bounding value in this case? That wasn't clear to me.

DR. TAULBEE: Paul, could you repeat that please?

MEMBER ZIEMER: I was asking whether or not the 108 picocuries per liter was considered by NIOSH to be a bounding value, or is this more of a statistical average, or is -- what -- what is -- what is the identity of that number?

DR. TAULBEE: Okay. Thanks for the clarification. I don't know. I'm gonna have to get back to you. Maybe if -- is there somebody online that might know that answer from ORAUT? I'm not hearing anybody speaking up. We'll have to get back to you --

MEMBER ZIEMER: Well, -- well, --

DR. TAULBEE: -- on that, I think --

MEMBER ZIEMER: This may be a geometric mean looking at the other information about the multiple categories, and they have a geometric mean for each category, and then they have this number. So, I was trying to relate the two or that the number to that identification of those three geometric means. So, I -- unless it's clear, I -- I don't know. Bob, do you have -- what is your understanding of that?

MR. ANIGSTEIN: Well, I -- our conclusion was simply we did not confirm the value of 108, we simply took a more limited view of our task and said they are not using those -- that statistical method, which was the only

objection. They're using something else now. We don't -- we were not tasked with every -- with a detailed review of the methodology for Lake Ontario. We -- were simply said that is the statistical analysis valid; we found it was not valid, but they're not using such a method. So, it's no longer an issue. So, we recommend observation seven be closed without passing on -- we did -- whether the current methodology for LLOW is, in fact, valid.

MEMBER CASSANO: This is Tori Cassano. My -- I -- I -- I -- if I'm following this correctly, it sounds like we still have a lot of questions on this concerning the new methodology, so why would we be recommending closure? It's more questions than a comment.

CHAIR BEACH: Yeah. SC&A wasn't actually tasked to review the new methodologies on these, just the Battelle TBD-5000, so that would be considered extra tasking, I believe.

MEMBER CASSANO: Oh, well, I -- I'm not sure how to approach that then.

CHAIR BEACH: Yeah.

MEMBER ZIEMER: This is Ziemer again. I wasn't necessarily asking that -- that SC&A evaluate this. I -- I might be simply asking the basis for the 108 if -- if NIOSH is able to come up with that, I -- I -- I'm -- I think I may be suggesting that we just keep this open for -- for clarification. I'd like to be comfortable with where this 108 came from.

CHAIR BEACH: Yeah, that's under --

DR. TAULBEE: This is Tim.

MEMBER ZIEMER: And that I'll -- and I'll -- This probably was done

somewhere else, and I either missed it or we -- we -- we don't have to solve it today necessarily, but just for -- maybe for my comfort level.

DR. TAULBEE: -- I -- I pulled up the Lake Ontario Ordinance dose reconstruction methodology to try and get to this while we've -- we've been speaking here. And what this value is, this is for other buildings that they're on site that were not part of the K-65 residue. And 108 is a geometric mean with a GSD of 7 for that particular indoor value for radon. So, it -- it's not --

MEMBER ZIEMER: So, 108 is -- well, but it is the --

DR. TAULBEE: It's based upon --

MEMBER ZIEMER: It's the --

DR. TAULBEE: -- 12 samples.

MEMBER ZIEMER: It is the geometric mean?

DR. TAULBEE: That is correct, --

MEMBER ZIEMER: And it's a --

DR. TAULBEE: -- and it's based upon 12 air samples, and the GSD is 7.

MEMBER ZIEMER: Okay. That's -- yeah, that's pretty high. Okay. Okay, if that's the case, then I'm fine with that. That -- that certainly would be claimant favorable, too then.

DR. TAULBEE: Thank you.

MEMBER ZIEMER: That's where it came -- that's where it came from.

CHAIR BEACH: Okay, thanks, Tim, for looking that up. We appreciate that.

Paul, are you satisfied and comfortable with --

MEMBER ZIEMER: Yeah, yeah.

CHAIR BEACH: -- closing that --

MEMBER ZIEMER: Yeah, that's -- that -- exactly satisfies me. Thank you. I am -- I'm okay for closing in that case.

CHAIR BEACH: Okay. Others? I agree with the closing at SC&A's recommendation.

MEMBER CASSANO: I'm good with that.

MEMBER VALERIO: I'm good with that, Josie.

CHAIR BEACH: Okay. We'll go ahead and close seven, and Bob you can move on to eight.

MR. ANIGSTEIN: Okay. Observation eight is sort of a technical issue. It refers to the new methodology -- I mean, new a few years ago -- used by NIOSH and promulgated by NIOSH to evaluate inadvertent ingestion during the residual period, the AWE site residual period. And they have a procedure that was written by our former colleague (indiscernible) of doing inadvertent ingestion during the AW period, during -- during the active operations period. However, they found out that that is not really transferable to the residual period.

So, they did come up with a new methodology and the equivalent of that is based on hand-to-mouth transfer. In other words, there is a contamination on surfaces that the worker encounters during the day, and some of that becomes ingested. And there are three different NUREG documents and all of which are NUREG CR documents. CR stands for contractor. And the position of the NRC on the -- on the new (indiscernible) is they simply paid for the -- for the research, and here it is, but the agency does not actually adopt it. So, there was -- the initial one was NUREG 5512

SC&A was involved in critiquing it on behalf of NRC back in the 1990s. And it was considered volume one. It was authored by Kennedy and Strenge. And it contained a value based on very limited data publications of what should be the type D -- what area of the contaminated air zone should the worker be assumed to adjust?

And then there was a revision to the 5512. Seven years later, the contract was given to -- the first one was the Pacific Northwest, then the contract was given to Sandia National Laboratories, different organization, different authors. They did a much more detailed study and came up with a fairly similar rate. But then there was a third one, NUREG CR 6 -- 6755. They came up with is still-different rate. So, we're talking about differences of a few percent. However, we feel it's important that there be a sound basis. And so, the -- the NUREG 55 -- NUREG CR 5512, volume three -- volume three is our estimation, a much, much better documented, much more detailed value and it comes out to not very different. So, the value -- the volume three val -- volume three value is 1.1 10 to the minus 4 meters squared per hour transfer. That seems like a very acceptable value.

Now, doing some detailed statistical run, a different set of authors, NUREG CR 6755 came up with 1.12 times 10 to the minus 4 meter squared per hour. So, 1.2 and 1.11, there's a 2 percent difference. So, essentially more claimant favorable. Speaking for SC&A, we were very happy to accept either of these two values that NIOSH chooses to use -- not the one times 10 to the minus 4. That was 10 percent lower and also not as well documented, not as -- not as well founded.

And so, this discussion will take place at the last meeting, SPR

meeting, in -- last September. And at that time, the subcommittee decided that they need more information as to which of the three values NIOSH is using. So, we have not heard back from NIOSH since then, so at that time, it was left open, and it's --

CHAIR BEACH: All right. Thank you.

MR. ANIGSTEIN: -- still open.

CHAIR BEACH: Right. Okay. Thanks. Tim, any comments on that?

DR. TAULBEE: Yes. The current value we're using is 1.12 from the NUREG CR 6755, that is what we are currently using now. In the past we may have used 1 -- 1.1 or 1.0; we're actually not sure. But going forward, 1.12 times 10 to minus 4 has been the most recent value that we have been using standardized across all the sites, and that's what we're continuing to use. If the subcommittee wants us to adopt SC&A's value at 1.1, that's fine with us as well. We could go either way. It really is -- it's such a small difference, you know, the 2 percent, it's really not going to make a huge difference. So, whichever it is that you-all prefer is where we'll go forward. But right now, we're using 1.12.

CHAIR BEACH: 1.12 and then 10 to the minus 4, right?

DR. TAULBEE: That's correct. Yes.

CHAIR BEACH: Comments on that, Bob, since you hadn't gotten that before now?

MR. ANIGSTEIN: Oh, that's -- that fine by SC&A. It's slightly more claimant favorable, and it has a valid justification, so we're -- we're -- we're comfortable with that.

CHAIR BEACH: Okay. And recommending closing this at this time,

then?

MR. ANIGSTEIN: Yes.

CHAIR BEACH: Okay. Other subcommittee members, are we in agreement with closing this out?

MEMBER CASSANO: No objection.

MEMBER ZIEMER: I agree.

MEMBER VALERIO: No objection, Josie.

CHAIR BEACH: Okay.

MEMBER VALERIO: And just real quick, Josie, just to -- just real quick to clarify, NIOSH -- what Tim said was that NIOSH is currently using the 1.2 times the 10 to the minus 4 value, that's correct?

CHAIR BEACH: Yes, that is correct.

DR. TAULBEE: One point one --

MEMBER VALERIO: Okay, thank you.

DR. TAULBEE: -- two times 10 to the minus 4.

MEMBER VALERIO: 1.12?

CHAIR BEACH: Yeah.

DR. TAULBEE: That's correct.

MEMBER VALERIO: Okay.

CHAIR BEACH: Okay.

MEMBER VALERIO: Thank you.

CHAIR BEACH: Yeah, and I see no reason to change that to SC&A's recommendation unless you-all want to, and it sounds like Bob's comfortable with the 1.12. Okay, we can go ahead and move on to --

MR. ANIGSTEIN: Yes.

CHAIR BEACH: -- I think we --

MR. ANIGSTEIN: Okay. So, --

CHAIR BEACH: -- our next --

MR. ANIGSTEIN: -- we skipped --

CHAIR BEACH: -- (indiscernible) --

MR. ANIGSTEIN: -- that was observation eight. We skipped to observation 12, --

CHAIR BEACH: Okay.

MR. ANIGSTEIN: -- the next open one. And observation --

CHAIR BEACH: I think -- I think nine is still open.

MR. ANIGSTEIN: -- 12 --

CHAIR BEACH: Bob, I think nine is still open.

MR. ANIGSTEIN: Nine? Nine, --

CHAIR BEACH: Yes.

MR. ANIGSTEIN: -- 10, and 11 were closed.

CHAIR BEACH: Oh, it says --

MR. ANIGSTEIN: -- at the last --

CHAIR BEACH: It says recommended that observation nine be closed, so, it doesn't show is closed.

MR. ANIGSTEIN: No. I -- I have --

(Whereupon, multiple attendees spoke simultaneously.)

MR. ANIGSTEIN: My record shows that SPR voted to close observation nine as a --

CHAIR BEACH: I'm just saying the write-up in your paper says --

DR. TAULBEE: Josie, it -- on the next page at the top, it --

CHAIR BEACH: Oh, yes, I see that. Thank you. Thank you. Okay. Moving on.

MR. ANIGSTEIN: I'm sorry, I didn't hear...

CHAIR BEACH: Now, I -- you can go ahead and continue. Thanks, Bob.

MR. ANIGSTEIN: All right. So -- so, that brings us to observation 12. And 12 I was reading -- 12 was -- there was a basic misconception in OTIB-5000 about how to handle thoron exposures. So, thoron, otherwise known as Radon-220 is pretty short lived, less than a minute. And the direction in -- I'm sorry. Excuse me a moment.

The direction in TIB-5000 is to assume a lognormal distribution with a mean value of .02 to represent an equilibrium factor. Well, there are two things wrong with that. One is that it's not the commonly accepted today, the equilibrium factor is much higher than that, but twice -- twice -- twice as high. And second, the concept of the equilibrium factor does not really apply to thoron. For -- for IREP input, for radon -- radon two -- a little confuse -- I'm gonna go back to the physicist and (indiscernible) method and simply refer to it as Radon-220 and Radon-222. Radon-222 is the more common -- commonly acquired radon exposure.

So, the exposure -- the way I read (indiscernible) -- input -- IREP input is handled for radium -- Radon-222 is taking the measured concentrations and using -- relying on the data for uranium mining operations where there's copious data that shows the rate of lung cancer for a given radon concentration. Such data -- there's no such reliable good data for thoron. And consequently, the way that NIOSH now handles thoron is

they don't use equilibrium factor. They do a dose calculation. Because the exposure to thoron cannot be -- cannot be evaluated based on the -- on the epidemiology of the exposures to radon. So, since they are no longer using that methodology -- we don't know if they ever did use that methodology -- we recommend that the observation 12 be closed.

CHAIR BEACH: All right, any questions on that one? Everybody in agreement?

MEMBER ZIEMER: Yes.

MEMBER VALERIO: This --

MEMBER ZIEMER: -- looking for a response, yes, I agree, close it.

MEMBER VALERIO: This is Loretta, I agree.

MEMBER CASSANO: I agree. This is Tori. I agree.

CHAIR BEACH: All right. I also agreed. Bob, we can go ahead and close 12 on your recommendation.

MR. ANIGSTEIN: Yes. And then should I go on.

CHAIR BEACH: Yes, please do.

MR. ANIGSTEIN: Okay. And then the final one, observation 13, and let me just simply read the observation is that even if the true underlying distribution of concentrations were lognormal, there is no reason to believe that the distribution of the uncertainty parameter -- representative parameter is also lognormal, and that was touched on by one of the earlier observations also. And NIOSH -- well NIOSH responded but did not answer the question. It simply said that are more modern methods dealing with these uncertainty distributions and they are no longer using the method described by the Battelle TIB-5000. However, as the subcommittee

observed, NIOSH has not -- did not state what method they are using.

So, the subcommittee at that time, the last meeting, or the September meeting, voted to leave it open until NIOSH produces more information.

DR. TAULBEE: Okay. This is Tim. I'm trying to figure out how to best answer this. The -- as noted, this particular method is not used in dose reconstructions. You asked for what methods are we using? Well, report 97 is a good example of what we are using now. We tend to use more Monte Carlo methods for uncertainty and propagate it through Monte Carlo -- propagate uncertainty through Monte Carlo method. Report 97, SC&A has already been tasked to review. It actually deals with GA -- or BZ to GA sampling, which is what this particular section of TIB-5000 was dealing with and where this issue initially came up. So, that's an example of the methods we are using currently. So, if you look at report 97, there's multiple ways that the data is being combined in there and -- and that -- that is how we are doing the uncertainty these days, these -- using these modern methods. So, again, SC&A has already been tasked to review report 97. I know that's underway. I -- I would actually recommend that you close this, because it -- there's -- if there's an issue, that's where we should be discussing it is then with report 97, not in this particular case, for a method that we're no longer using --

CHAIR BEACH: Yeah. I --

DR. TAULBEE: -- or not using at all.

CHAIR BEACH: This is Josie. I would agree with that, Tim, that we should discuss it under report 97 when that's available. And other subcommittees (sic) thoughts?

MEMBER ZIEMER: Well, I -- this is Ziemer. I agree with that. I'm wondering if -- do -- do we need to -- when we recommend closing on this one, put in the record, a sentence or two that summarizes what Tim just said, as our --

CHAIR BEACH: Yes.

MEMBER ZIEMER: -- basis for closing?

CHAIR BEACH: Yeah, I agree with -- absolutely agree with that. If -- Kathy, I don't know if, Kathy, if you're capturing these?

CHAIR BEACH: Yes, I am, Josie. I will -- I will make sure that gets into the temporary BRS.

CHAIR BEACH: Okay.

(Whereupon, Chair Beach and Member Ziemer speak simultaneously.)

MEMBER ZIEMER: I would favor closing with that addition.

CHAIR BEACH: Okay, thanks. Other subcommittee members agree?

MEMBER CASSANO: I agree --

MEMBER VALERIO: I agree with that, Josie.

CHAIR BEACH: Okay. With that --

MEMBER VALERIO: Sorry. This is Loretta, I agree.

CHAIR BEACH: Thanks, Loretta. That just leaves us with 5 and 6 open at this time, all others are closed; is that correct?

MR. ANIGSTEIN: Five and six are open.

CHAIR BEACH: Correct. Yeah, five and six, so we'll -- we'll just move -- carry that forward. I don't know how far along NIOSH is on the answer to that. Tim, I -- I'm -- I'm assuming you -- did you say November or was that for some- --

DR. TAULBEE: That's correct.

CHAIR BEACH: -- thing else?

DR. TAULBEE: November --

CHAIR BEACH: November?

DR. TAULBEE: -- is when we expect to produce our report, and then I imagined SC&A is going to want to review it.

CHAIR BEACH: Yeah.

DR. TAULBEE: And so, it probably -- we won't be ready to discuss this again at the next meeting, I imagine, but perhaps the one after. I'm not sure.

CHAIR BEACH: Yeah, that sounds great. Okay. Any other questions on this? TBD-5000? If not, Bob, thank you for your reporting and Tim for jumping in when needed.

And I think we can -- let's go ahead and go with the next one unless people are ready for a comfort break now. I was -- my thought was we would go through f, and then before we got into the newly issued SC&A reviews, we'd take a -- take a break, so.

MS. MARION-MOSS: Josie, this is Lori. For the record, if we can correct that. It's not TBD-5000 -- it is (break in audio) 5000.

CHAIR BEACH: Oh, so the TBD doesn't belong in there, okay. So, Battelle 5000. We'll take that off and correct the record.

CHAIR BEACH: Appreciate that. All right. Kathy, I think you're up.

MS. BEHLING: Yes, I am. Can you see my screen?

CHAIR BEACH: Yes.

OCAS-TIB-009

MS. BEHLING: Okay. All right. This is what we've promised several meetings ago, and we're finally getting to it. And just as a reminder, when we -- when I initially prepared the list of the subcommittee approved documents that were ready to -- to show to the full Board. I lay -- labeled several of the documents as not suitable for matrix. And right now, because I don't have access to the BRS, I have to go through transcripts to -- to make certain decisions. And the reason that I -- I labeled some of these as not suitable for matrix is that based on my review of -- of the transcripts, there appear to be maybe excessive discussions, maybe involved multiple documents, that type of thing.

So, today's example typifies this type of -- these types of documents that fall under this particular category. I would just suggest that as I moved through this presentation, I would ask the subcommittee to consider whether the approach that I've used seems appropriate. Have I included too much detail? I guess, in general, we need to determine what is an adequate amount of information that you feel is necessary to share with the full Board. So, bear with me as we go through this, and then I'll ask for your opinions at the end, or you can ask questions as we go.

Okay. This -- this particular OTIB is -- that we're going to discuss today is the OCAS-OTIB-9. It still has OCAS attached to it because it was reviewed back a long time ago. It was -- or it was issued a long time ago, back in April of 2004 and the -- TIB is estimation of ingestion intakes. Now, this TIB provides guidance on estimating ingestion intakes for unmonitored workers. And it includes estimates for both operational and residual periods.

It uses ambient air concentration measurements to estimate in -- daily ingestion in the workplace.

So, SC&A reviewed this TIB-9 back in June of 2006. And back then, we -- this is part of one of those sets of procedures that we reviewed. It was the second set, I believe. And we actually identified -- I mentioned this before, back when we initially started reviewing procedures, we used to have a checklist that had review -- observations and review concerns. And they -- we -- we -- we categorize them as a once -- one through five, and if it got anything less than a five, it became a concern or a finding. Back then we didn't have a BRS. And so there were several concerns listed in that review. However, when the BRS came into existence, they were all -- all those concerns were consolidated into one finding that was entered into the BRS.

And that finding states that the fundamental scientific approach reconstruction -- yeah, reconstructing ingestion exposure has flaws that could lead to underestimate -- an underestimate of ingestion doses under certain circumstances. The subcommittee found that just -- this finding to be an overarching issue at one of the meetings, and they actually transferred this to -- what NIOSH created was the NIOSH OVER-0002. And it was in -- it was titled workplace ingestion.

Okay. After numerous subcommittee meetings and discussions on TIB-9, NIOSH issued a white paper, and that was issued on October 23, 2012, and presented its approach to how they would go about estimating ingestion intakes. They did concur that the parameters -- they initially concurred that maybe the parameters that we were -- that were listed in TIB -- the nine model, they were based on assumptions that -- that have not

been empirically demonstrated to be valid. And if that was found, they agreed to revise this approach.

In reviewing our report, NIOSH characterized this finding in the BRS into two general issues. Issue one was the potential lack of an association between measured air concentrations in the workplace and surface connect -- contamination. And issue two was how do we model the transfer of surface contamination to the GI tract through inadvertent ingestion. And we just heard Bob Anigstein talk about that in one of his observations.

Okay. For issue one, SC&A had several concerns regarding surface contamination, and they felt assuming contaminants that are 5 microns in size particles would likely see a significantly underestimate contamination levels. And at rolling -- at uranium rolling mills, airborne part -- particles are likely to be a few microns to large, visible particles. And so, the settling velocity for these large particles increases dramatically, and there's really no limitation for their ingestion.

We also felt that surface contamination builds up over weeks or months or longer, before reach -- reaching equilibrium. And therefore, NIOSH at the -- NIOSH's assumption that equilibrium is reached in 24 hours, we felt was without a scientific basis, and maybe unconservative (sic).

And finally, we identified that surface contamination may not be the result of settling, but may include things like liquid -- liquid spills, milling, grinding, cutting, welding, etc. Sorry. So, to gain a better understanding of the relationship between the air -- air and surface contamination levels, NIOSH analyzed air and smear samples from both Simonds Saw and Bethlehem Steel, uranium rolling operations, and also Superior Steel during

a test -- test rolling and Vitro Manufacturing, and that included approximately 240 air samples and 150 contamination smear samples. They paired that data and plotted it, and it was determined that the measured surface contamination levels were proportional to the air contamination levels.

In doing a linear regression analysis, it showed that surface contamination was about 116.7 times higher than the measured air concentration. So, for -- now, this slide shows SC&A is concerned regard -- regarding modeling transfer assumptions for surface contamination to GI tract in the TIB-9. Assuming a 10 percent transfer of surface contamination, to now from -- from one hand appeared unrealistic to us. We felt that in a hot, dusty environment, an uninformed radiation worker was likely to wipe or contact their face with both hands repeatedly throughout the day. And ingestion may involve other modes of intake such as smoking cigarettes, direct deposition on -- on the lip.

So, to determine the daily ingestion rates for loose contamination, NIOSH used the -- and -- and this is mentioned earlier -- but NIOSH use the NC -- NRC computer program RESRAD-BUILD as their ingestion parameter, which is based on an extensive review of the literature. This model uses an hourly ingestion rate that equals the surface contamination measured in the workplace times the effective transfer for ingestion of removable contamination.

And here's what was mentioned earlier, the NUREG CR 5512, volume three, assumes the default ingestion transfer rate of 1.1 times 10 to the minus 4 square meters per hour. And this actually corresponds to an

ingestion of about 0.5 milligrams per day. Therefore, if we assume an eight-hour workday, the obviously, the ingestion rate would be 8.8 E (sic) minus 4 square meters per day.

So, the -- the equation on this slide shows that the daily ingestion of loose radioactive material equals the NIOSH derived surface contamination level of 116.7 times the measured air concentration times the NUREG ingestion of 8.8 E (sic) minus four square meters per day. And this results in a daily ingestion of 0.103 times 10 times -- times the measured air concentration.

So, NIOSH compared that equation to the ingestion intake equation listed in TIB-9, which uses a multiplier of 0.2 to the measured air concentration in the workplace. So, based on that comparison, NIOSH concluded that using the empirical data and mean value for that NUREG default ingestion value of 8.8 minus four square meters per day predicted intakes that are about one-half of those used in TIB-9. And NIOSH indicated that even though these assumptions are simplistic, it still produced estimates of ingestion that are in reasonable agreement with the NUREG predictions. So, TIB-9 also includes an ingestion source term for contaminated food and beverages. And given the uncertain -- the uncertainty inherent in these values, NIOSH felt it's not unreasonable for them to continue to use TIB-9.

In addition, NIOSH pointed out that under TIB-9 -- TIB-9 approach, ingestion will always be a fraction of the inhalation exposure. And for uranium intakes, the uptake across the gastrointestinal tract is low. The ingestion pathway contributes less than 0.6 percent to the dose for soft

tissues under all -- you know, considering all solubility types, and ingestion would have the maximum contribution to the GI tract (indiscernible). And the highest contribution to a dose is 3.4 percent for the lower large intestine when we consider type S solubility is inhale. And in addition, NIOSH applies a geometric standard deviation for ingestion of 3 and in some cases, they even apply a GSP of 5.

So, it was just -- it was also discovered by -- that TIB-9 had been improperly applied during the residual period as do -- at DuPont Deepwater and some other sites. After a -- AEC activities end, it's inappropriate to use the resuspension factor to estimate an air concentration and then multiply that by 0.2 to calculate the daily ingestion intake. Using this multiplier is inappropriate because TIB-9 assumes an active source or process is generating the airborne activity. So, if a resuspension factor of 1.1 times 10 to the minus 6 meters value is used, that would predict an air -- an airborne activity that was grossly under represented by the airborne activity that was actually depositing the surface contamination. Therefore, NIOSH recommended to apply TIB-9 during the residual period, the air concentration on the first day of the residual period should be equal to that that was present at the end of the operational period. And then we can -- you can apply the TIB-70 source -- source depletion techniques to decrease the ingestion intakes over time. So, NIOSH stated that they will review how ingestion is being estimated during the residual period at all the sites and will issue PERs as necessary.

So, SC&A responded to NIOSH's white paper at the November 1, 2012, subcommittee meeting. Our first concern was that most of the data

on ingestion from hand to mouth is from studies in the -- in a residual -- I'm sorry in a residential setting, which may not represent an industrial environment. Also, the data in NUREG CR 5512 and RESRAD came fully from Pacific Northwest -- Northwest Lab and represents one set of data. And SC&A identified an independent EPA study that looked at the World Trade Center workers and used the model for transferring pesticides hand to mouth. So, this -- in the EPA study, they found that soft surface ingestion rates were about 2.25 centimeters per hour, and this transfer rate agrees with NIOSH. However, for hard surfaces, the ingestion rates were 11.25 centimeters per hour -- centimeters square per hour.

NIOSH responded to the World Trade Center study through an email on January 4, 2013, and indicated that the EPA document was developed to identify contaminants of primary health concern to support planned residential cleanup efforts. And EPA's methodology was really focused on exposures to residents and not qualify -- qualifying exposures to cleanup workers. And therefore, NIOSH felt that their ingestion parameters that were developed in RESRAD are still the best available set of data for estimating ingestion exposure.

So, we closed -- we closed finding one by -- SC&A considered that the difference between the World Trade Center study and the TIB-9 and the uncertainties involved, that the agree -- the agreement between the hand and mouth was reasonable. SC&A also noted that the difference in the hand-to-mouth ingestion model between workers and residents has more to do with the exposure duration than the transfer rates. So, SC&A did recommend closure, and at the February 5, 2013, meeting, the

subcommittee closed TIB-9 over -- overarching -- overarching two finding one.

So, this shows, as I said, an example of -- of one situation where this did not fit the typical matrix. And we had about, what, 16 slides to present one finding. I will also make mention that in preparing this presentation, I decided to revisit all of the, quote, not suitable for matrix documents. And I guess, in going back now that we've moved forward so much, probably a lot of them could be put into more of a matrix style than this particular one. And so, they may be a little bit more complex, but I still think they would -- would fit into that matrix approach -- approach.

The only other thing I'm going to say is for a lot of these, I unfortunately, will need to request Lori's -- Lori Marion-Moss's assistance to provide the BRS entries because that -- perhaps if I would have had that data from the BRS when I compiled this list, some of these documents would not have maybe fallen under this not suitable for matrix. So, as we move on, I hope that I can perhaps rely on Lori to -- to help me focus my presentation and get something into more of a matrix style approach.

So, I guess, the question is, is this too much data to present to the full Board? What are your thoughts as to how we move forward?

CHAIR BEACH: Thanks, Kathy. One thing I'll say is, it is a lot of information; however, I know going back over the last several years and several discussions, it's important -- important that the Board understands why we got to where we got. One of the things I was thinking as you started this was, we -- when we present this to the full Board, I think we need a preamble slide or just a discussion of what you're doing so it's

understood. I mean, we've gone through a lot of the ones on the matrix that we've closed out, but it needs to be understood that you are presenting information that has been closed out by the subcommittee; we're just reviewing for the full Board the facts. I just think it's important to -- to give that little talk ahead of time. Other --

MS. BEHLING: Okay.

CHAIR BEACH: -- subcommittee members?

MEMBER ZIEMER: Well, I guess the --

MEMBER VALERIO: This --

MEMBER ZIEMER: real quest -- there's two parts to the question. One is what you put in the records of the matrix, I guess, the other is what you present to the Board. I think, Kathy, when we realize this is just one finding, and really the labyrinth of information we had to go through to -- to close this out, to me, it is almost too much information for the Board of -- I -- I'm -- what I would struggle with is to find a suitable amount that's suff -- is adequate for the Board's decision with the opportunity for individual members to explore in more detail if they wished. And the same would be on the matrix. I think in the matrix, sometimes what we've done in the past is -- is have something that you could click on in the matrix to open up details on a particular finding where it's a solution. But I -- I'm struggling a little bit to think if we had a presentation where we have multiple findings just for one sight, this is just a -- becomes an expansive amount of detail for the Board, for the full Board in my mind.

MS. BEHLING: Okay. In this particular case, it just so happens that the NIOSH white paper was posted on the website, and so that is something

that we could -- we could link to, and so we could reduce a lot of the discussion on -- on that topic, because they could refer to that white paper. So, that's an option in this particular case.

CHAIR BEACH: I think that's a good suggestion. And Loretta, and I think you were trying to make a comment earlier?

MEMBER VALERIO: I was. I wanted to thank Kathy for the information. Being fairly new to this workgroup, this gives me some -- you know, back when all this started, I wasn't even on the Board. So, the detailing, it helps me understand better the process and what has happened over several years, as you mentioned. But on the other hand, I also agree with Paul that, you know, when it comes to the Board, if there's a situation where we were reviewing different -- for several findings, it could be very -- I want to use the word cumbersome, but it can be a lot to have to read through. So, having the white paper and knowing the history and so -- I'm kind of on the fence on this, because I -- I appreciate the information that's given to us, but when you're in a board meeting, that's a lot of information to relate to the entire Board. Does that make sense?

CHAIR BEACH: Yes, that does make sense.

MEMBER VALERIO: But I do appreciate Kathy's work on this.

CHAIR BEACH: Yes.

MEMBER ZIEMER: And one -- one thing again, let me -- this is Paul again. It's not unlike the other -- the subcommittee on dose reconstruction. They -- they have to summarize what they have done as a subcommittee, but we -- they -- we -- we can’t rehash everything that they did in detail. I think that's the reason we have workgroups and subcommittees to do a lot

of the detailed work, and we're dependent on each other to do that in a way that -- you know, we rely on each other to say yes, they have looked at this in detail and that they are summarizing what they did, and if -- if I want to see all that detail, I have the opportunity to, but otherwise, I will rely on their recommendations. And so yeah, well, I'll leave it at that.

CHAIR BEACH: Yeah, Paul, I agree with that. So -- so, Kathy, I think what you're getting is that too much information, potentially, and if we could link other files so that if somebody is curious can walk down that lane, so to speak, and then maybe shorten it a bit.

MS. BEHLING: I agree. That's why I decided to put a lot of detail into this one to get your opinion.

CHAIR BEACH: Yeah. And Victoria, what do you think? As a new subcommittee member, what did you think?

MEMBER CASSANO: I -- I am a little conflicted, but I think that a synopsis of what was presented here with the link to the -- the document on the website would be fine for the full Board. I mean, I appreciate the in-depth analysis and it did help me understand a lot of what went into this whole determination, but I -- I think that considering that this is going to be a one-day meeting in August, if we were going to present this in August, that there's probably TMI, it's probably too much information. And I think a lot of people would struggle to follow it, like I did in this meeting, even though I pre-read this. I think it's too much information.

MEMBER ZIEMER: On this particular one --

MS. BEHLING: How do you --

MEMBER ZIEMER: -- wouldn't be --

MS. BEHLING: Huh?

MEMBER ZIEMER: This is just an example, right? You're not presenting this at the meeting, or -- I assume, or is this on the agenda?

CHAIR BEACH: No. We haven't come up with the agenda. That's subject to discussion later on in this meeting of -- of what we want to do to present. I think our time is shortened at the upcoming August meeting, so it -- we'll --

DR. ROBERTS: Actually, --

CHAIR BEACH: -- we'll discuss what --

DR. ROBERTS: -- (indiscernible) --

CHAIR BEACH: Oh, go ahead, Rashaun.

DR. ROBERTS: Sorry, Josie. But no, you had -- I think you requested the 90-minute slot, and so --

CHAIR BEACH: Okay. I wasn't --

DR. ROBERTS: -- (indiscernible) --

CHAIR BEACH: Yeah, Rashaun. I wasn't sure if that was going to be reduced to an hour or not, so.

DR. ROBERTS: Right, right. But it -- right now, it's 90 minutes.

CHAIR BEACH: It's still 90. Okay. All right. So, I think we'll talk about that on item three before we close out today. So, this is potentially one that could be presented, but maybe in a shorter version, correct, Kathy?

MS. BEHLING: Correct. In fact, that would be beneficial for me since, you know, we're coming up quickly on the August meeting. And what I can do is -- which I -- I always do get your approval, but I'll pare this down, and maybe we can -- if we have 90 minutes we can, at the end of this meeting,

add a few other approved documents. And then I can have you all approve that before we send it off to the full Board.

CHAIR BEACH: Okay.

MS. BEHLING: I understand now. I have a better understanding. I agree. And I think Paul had mentioned even at one of the full-Board meetings, is it really the Board's job to reassess all of these issues or do they take the advice of their subcommittees and work groups and assume that they have thoroughly reviewed all these issues and -- and come to certain conclusions for certain reasons. And so, I -- I agree with paring this down, but I, like I said, did include this level of detail just so that we could make a decision on that.

CHAIR BEACH: Okay. Yeah, and I think in this case, the trail that what we've done is important and maybe not the finer details. Just to note that we had looked into this extensively and those as -- the subcommittee came to the conclusion of closure and we're looking for agreement, not rehashing. So, I agree with that. Okay. Any other comments on this before we move on?

I'm gonna say we should take a break, Rashaun and other committee members, that is 15 minutes adequate or would you like more time, lunch break, time? I know I ask this every subcommittee meeting. Is it okay --

MEMBER VALERIO: (Indiscernible) I'm good with 15 minutes.

CHAIR BEACH: Okay.

MEMBER CASSANO: Fifteen minutes is fine.

CHAIR BEACH: Okay. Let's --

MEMBER ZIEMER: I can do 15 minutes. That's good.

CHAIR BEACH: All right. So, let's take a break until, my time, 10:30, --

MEMBER ZIEMER: Okay.

CHAIR BEACH: -- 1:30 Eastern.

DR. ROBERTS: Eastern, great.

CHAIR BEACH: So, we'll take a 15-minute break -- 16 actually, thank you.

MEMBER ZIEMER: Very good.

NEWLY-ISSUED SC&A REVIEWS

DR. ROBERTS: I do have 1:30 p.m. Eastern time. I'm going to take a quick roll call. Hopefully everyone's back. Okay, starting with Beach.

CHAIR BEACH: I'm here.

DR. ROBERTS: Cassano?

MEMBER CASSANO: I'm here.

DR. ROBERTS: Valerio?

MEMBER VALERIO: I'm here.

DR. ROBERTS: And Ziemer?

MEMBER ZIEMER: Here.

DR. ROBERTS: Okay, great. Josie, over to you.

CHAIR BEACH: Okay, thank you. I see that the white paper for ORAUT-OTIB-0087 is up. I think we probably need to start with the slides though. And Ron, are you pre -- ready for that?

DR. BUCHANAN: Yes, I'm ready. Kathy, can you present the slides?

MS. BEHLING: Yes. I --

CHAIR BEACH: Okay. And you are ready?

MS. BEHLING: -- apologize. Can you --

CHAIR BEACH: -- ready, thank you.

MS. BEHLING: -- see --

CHAIR BEACH: Yes, we can see that, --

DR. BUCHANAN: Yes, we can --

CHAIR BEACH: -- thanks, Kathy.

MS. BEHLING: Okay.

OTIB-87

DR. BUCHANAN: Okay, so if you're ready, this is Ron Buchanan with SC&A, and I'll be presenting our review of OTIB-87, which is concerned with extremity doses for the Mound exposure to Plutonium-238. And I'd like to acknowledge my coworker, Richard Griffiths, for his contribution to the statistical analysis in this reporting.

Now, the progress of this OTIB-87 was issued by NIOSH in 2017. It provides information to use to determine the ratios to assist in assigning extremity dose. And some employees at Mound were only issued whole-body dosimetry; however, when they worked or handled Plutonium-238, there's a chance that they was exposed to higher doses to their extremities, which includes the forearm, wrist, hands, and fingers in compared to the whole-body dose. And if ED -- extremity doses -- results are available, of course, they'll use those. Some of them were monitored on their extremities but some were not. If not, then this OTIB provides ratios to apply these whole-body dosimeter, which most everybody would have if they was working around plutonium, but they might not all have extremity doses and

so -- dosimeters. And so, this OTIB covers it, that area.

Next slide. Okay. So, (indiscernible) was in October of 2022, the SPR tasked SC&A with a review of OTIB-87, and we performed that review and issued an uncleared version in April of '23 and then we issued a cleared version in May of '23.

Now, use the data for this OTIB came from a Mound 1972 extremity dose study, which monitored personnel working with the PU-238 operations. PU-30 -- 238 is usually used as a heat source so it inquires -- it requires that encapsulation and handling, milling, and that sort of thing. And so, they handle these things in glove boxes usually, and so the hands can get greater dose than whole body would register. And so, the -- the wrist badges were used for determining gamma exposure using TLDs and neutrons, of course, at that time, they used the NPA film. And the work was performed in, like I say, such as glove boxes around PU-238 and the -- for various lengths of time reading -- ranging from a couple of weeks to up to 22 weeks, and the dosimeters was changed out two weeks.

Okay. Now, there was two studies, the one I just talked about with the wrist to the whole body, and then we had one that was '72 and '73 also at Mound, performed by the same method, same people, and this determined the -- the people working in glove boxes wearing lead-lined rubber gloves and used the gamma and neutron dosimetry methods as they did in the previous study. Now, however, for the fingertips, they could only do the gamma measurements because they used TODs on the fingertips to determine the dose of the fingertips, and they range from three to 10 days of exposure during dosimetry change out.

Next slide. Now, NIOSH used these -- this data from these two studies to determine the ratio of the left wrist to whole body and the right wrist to whole body gamma and neutron exposure, and also the left finger to the left wrist and the right finger to the right wrist gamma ratios. Like I say, the NPA film wouldn't work on the fingertips, but they did use TLDs for gammas, and that was limited to a few applications.

Next slide. Okay. This data that NIOSH analyzed and has in OTIB-87 is summarized in Table 5-1, which summarizes the wrist-to-whole body dosimetry for both lest -- left and right wrist compared to the whole body for 28 employees handling PU-238 at Mound different operations, there's nine different operations that are categorized. And they found that this ratio for gamma dosimetry was best represented by a Weibull distribution and figure 5-1 OTIB-87 presents a summary plot of that distribution comparing the gamma wrist-to-whole body ratio. NIOSH decided -- determined that the Weibull distribution with a value 1.3, (indiscernible) 1.9, and a location of .34, best fit the data.

Next slide. Okay. Then we had the neutron dosimetry in Table 5-1 again, summarizes neutron wrist-to-whole body for dosimetry points for 28 employees for nine different operations, and NIOSH found that the wrist-to-whole body dosimetry was best represented using a lognormal distribution and figure 2 of OTIB-87 provides a plot of that data. And NIOSH determined that lognormal distribution with a (indiscernible) metric mean of 1.5 and a standard (indiscernible) 2.5 was most appropriate for this data. So, now that was the wrist-to-whole body, now the second study was wrist to finger -- or excuse me, finger to wrist gamma dosimetry data analysis and Table 5-2 of

OTIB-87 summarizes that data both the left and right hand for six workers for three different operations. Less workers and less operations did the fingertip study. And NIOSH found that because there was limited data that a fit comparison couldn't be determined, therefore, they recommend using a normal distribution (indiscernible). And for this limited the data set, NIOSH did calculate average ratios of left hand -- finger to the wrist of 3.18 with a center deviation of .5 and a right finger to wrist ratio of 2.76 with a deviation of .85. And so, they recommend that unless it's known if they're right- or left-handed to use the most conservative ratio of 3.8.

Next slide. Okay. So, now, this was NIOSH's analysis of the data and as they used it in OTIB-87 that I just reviewed. Now, we're looking -- SC&A's review of OTIB-87. And to do this, we evaluated the original recorded Mound data. We went back to the (indiscernible) looked up the original data and compared it to NIOSH's use of the data. And they used the data in five -- in Table 5-1, 5-2, and figure 5-1 and 5-2 of 87. We also look at their recommended dose reconstruction recommendations in Section 6 of OTIB-87. So, we also performed a statistical analysis of the data used in OTIB-87, and we have that in our attachment to our main report we issued in May.

Next slide. So, evaluation of the original Mound data, SC&A reviewed the data provided by Mound, and we found that the measurements were conducted using acceptable dosimetry methods. However, we did find that the quantity of data was somewhat limited, only had data from 28 employees where the wrist-to-whole body ratios and only data from six employees for the finger-to-wrist ratios. And we also see large variations in

resulting ratios from .3 to 7. In other words, you would multiply the whole-body dose by .3 up to point -- all the way up to 7 to determine the wrist ratios, as we see in Table 5-1, for both the gamma and neutron ratio values range between .3 and 7.

Next slide. And then there also was a variation assumption operation, like I say, there was nine different operations. We reviewed the wrist-to-whole body ratios to determine if there's a correlation between the ratio values to the operation or if it's just random values throughout the nine different operations. And we find that the wrist to left -- right and left wrist-to-whole body ratios varied (indiscernible) with a fiber operation for both gamma and neutron doses. And we summarized those in Table 1 in 2 of our recent report and looked at the descending ratios as a function of operation, and you can look at that table if you'd like more details on that. And we also examined more details on nasty and attachment A of our recent report.

Next slide. Okay. So, some of the analysis of the original data NIOSH's use of it in OTIB-87, we find that -- finding one, that when applying the ratios to other operating periods, even at Mound or other DOE sites, NIOSH would use -- have an understanding that exposure conditions are similar to those used in 87. Realize these were, you know, for a limited amount of time, you know, several months at a certain facility and a certain location. So, considering the variations in the wrist-to-whole body ratio values as a function of operation, especially it is important to apply the Mound extremity ratio values to ERs from other operating periods or other DOE sites to first -- certain that the condition of exposure of the Plutonium-238 are encompassed by the Mound operations. In other words, if

somebody's not working and under similar conditions, he could have a lower ratio, which you'd be conservative to apply the Mound ratios, but they could have a higher ratio too, which would underestimate their assigned dose at a different facility or a different time, even at Mound.

Next slide. So, now we did evaluate Table 5-1 and 5-2, and we came up with several observations. In that -- observation one, we have found a 2 increase from the Mound data not included in OTIB-87. We found that NIOSH included all six entries of the Mound data for the finger to wrist whole body exposure in Table 5-2. So, Table 5-2 has all the data available for the finger information; however, it -- it appeared that we could not find the -- the fifth and sixth data entry. We found the first four that was used in 5-2 in 5-1, but we didn't find the last two. And this omission of using those two would not greatly affect the results, however, it would be useful to know if there was a reason that NIOSH did not use the last few entries that was used in Table 5-2 why they were not used in 5-1.

Next slide. Okay. So, then that was evaluation of Table 5-1 and 5-2, and then we have Figure 5-1 and 5-2. That leads us to our second observation in that when we counted the details of the number of ratio values in Figure 5-1, we find that it states there's 55 when they created the Weibull distribution curve; however, we only counted 45 valid wrist-to-whole body gamma ratios as reported in Table 5-1. And also see that the figure in 5-1 says there's a mean ratio of 2.116 with the mean ratio -- if you calculate it in Title 5-1, it's 2.143. And then we have a similar thing for neutrons in the Table -- Figure 5-2 reports 53 values and -- or as there's only really 43 valid wrist-to-whole body neutron ratios in Table 5-1. And we see that

Figure 5-2 also lists the minimum and mean neutron ratio as .179 and 2.551 respectively, while those -- if you do the calculation in Table 5-1 it's .27 mean and -- let's see the -- the wrist-to-neutron ratio in Table 5-1 is .27 and the ratio is 2.502. So, we -- you know, it's not a big issue, but there are some discrepancy between the figures in tables in OTIB-87.

Next slide. Okay. We have -- like I say, we did statistical analysis of the raw data itself and we found that in the summary the attachment to our report is quite detailed that Richard Griffiths devised and wrote up; however, I'll just summarize it here. Is it the start -- the data is sparse, and it varies in -- in Table 5-1, so we suggest that the estimated ratios in OTIB-87 are likely quite imprecise and there're several issues that suggest this. The sparsity of data, relatively few number of operations, outliers, there're some large outliers in the ratio measurements affecting the fit, and then linear relationship was assumed, however, there might not be a linear relationship which wrist dose and whole-body dose for all the different operations. And the operational types indicate there is a relation share between the ratios for different operations. In other words, some operations might have a different ratio or categories of ratios than the others, which suggests the need for a different estimation methods for the different type of operations for it to be valid. However, we do have a solution to that problem.

Next slide. We have the results of our analysis and it's Attachment A to our report. And from that attachment, we find finding two, which is a suggestion by SC&A that considering the limitations of the data, that it might be more appropriate and claimant favorable to use a rounding ratio, such as other -- upper limit of confidence interval instead of a distribution or average

ratio value. Since the data is pretty limited and you probably -- not a whole lot of DRs are done with this, the use of an upper limit -- reasonable upper limit applied would make sure that it encompassed the dose and bound the dose. Next slide. NIOSH did recommend in section six of the OTIB to determine the gamma to wrist using the Weibull distribution for gamma and the lognormal for the neutron and the finger-to-wrist extremity doses to use 3.18 for the left, 2.76 for the right, and if it's unknown, use a conservative 3.18, so that's a recap of what they recommend.

Next slide. And so, we conclude from our evaluation that the original recorded Mound data used to construct Table 5-1 and 5-2 and the DR recommendations are reasonable, however, we present -- performed our own statistical analysis of the recorded data, and we identified two findings and two observations as I just discussed. Finding one is that -- cautions when applying the ratios to other operating periods or DOE sites. Now, we bring this up because we did have dose reconstruction -- Pantex Plant, which -- that used this method and we've seen no justification in the DR report anyway why this could be applied from Mound in the '70s to the Pantex case whenever this worker was exposed. And so, it perhaps can be used, but there needs to be some due diligence in assuring that the ratios are applicable.

In finding two, in the long run, we think that the -- it's uncertain as to all these ratios are, it could be more appropriate to use an upper bounding for dose reconstruction. And observation one was concerned with the -- where the data was not entering in the Table 1 -- Table 5-1 where it did appear in Table 5-2. And observation two was some discrepancy in the

number of ratios and values as what's listed in Table 5-1 as compared to what actually appears and Table 5-1 and 5-2.

So, I think that's my presentation. Open for discussion.

CHAIR BEACH: Thanks, Ron. I appreciate that. I was surprised when I read this that there was such limited data. I would think there would have been a lot more of the finger rings used therefore having more data for this though. It's not really a question, just -- I was curious about that.

DR. BUCHANAN: Yeah, it shows a limited application. There's not been too much work done that I -- you know, I've worked a lot of sites, and I don't recall a lot of sites so addressing this issue.

CHAIR BEACH: Right, thanks. Other subcommittee members, questions for Ron?

MEMBER CASSANO: I do have a question about using what -- the upper bound of the confidence interval. I would presume that in looking at these, because you have such limited data, that the confidence interval must be rather broad, and especially if the outliers are included in that evaluation. I'm just wondering -- while I -- I see how it is much more employee beneficial, might use not be actually way overestimating exposure?

DR. BUCHANAN: Yes, you could. But in the past, we've always erred --we'd rather -- we'd rather overestimate than underestimate. Perhaps, you know, statisticians can address this, but if you remove some obvious outliers and you come -- you can -- you could come up with a reasonable upper bound, not necessarily extreme. But I would say, you know, if that was developed, then you'd have to address obvious outliers and come up with a reasonable upper bound.

MR. GRIFFITHS: Hi, yeah. This is Richard Griffiths. So, I'll try to address this a little bit too. I think, you know, the concern is, obviously, that there's so little data and there's -- you know, we see so much variation in the ratios that were used in, you know, that were observed, that using something like just an average or some the -- even the parameters, even putting in empirical distribution, like's done in this paper, that the parameters even from those are -- are really unstable. So, clearly if we would've used the --you know, used something like just an estimated average, and these are estimates, we might be, you know, very much underestimating truth of an actual -- the actual ratio that's in population. So, you know, we haven't -- we didn't specify exact what the upper bound would be, but it since it would -- it's -- you know, it could be very client unfavorable to actually use an estimate that just because of a particular sample of data that we had is, you know, affected greatly and is rather small in comparison to an -- you know, the actual ratio that's in the population.

So, it's just -- it's -- you know, yes, the confidence interval would probably be really large, and I think that's -- I think that's, you know, something to point out here too we don't even know what the confidence interval would be. We don't know what the standard errors are on these estimates. And I think -- I think it would go a long way to answering some of the questions, you know, about what this would actually look like in practice if we -- if -- if that were addressed with the actual, you know, uncertainty and precision of these -- these numbers were. But I -- yeah, I think, you know, the reason for recommending using an upper bound is basically that using an average value subject to such uncertainty could be

very much client unfavorable.

MEMBER CASSANO: Yeah, no, I understand that. It sounds like given the (indiscernible) of the date, you're sort of in between a rock and a hard place. And I would agree that it is much better to do err on the side of the -- the employee than -- or the claimant than not to. So, thank you for the explanation.

MEMBER ZIEMER: Yeah, this is -- this is Paul Ziemer. I might add to that, that follows the usual practice of taking the distribution, which in many cases lognormal. The Weibull distribution sort of looks like a normal -- lognormal anyway, but going toward the upper tail of that to assure that you are, in a sense, bounding what could be. I'm -- I'm looking right now at Figure 1 of the actual report. I don't think you showed this slide on -- on the slide reason presentation, but I'm looking at the -- the wrist-to -- to-whole body doses for a -- I guess it's twenty -- it goes 1 to 28. I guess each of those is a person, right? And -- and the range on those is everywhere from close to 1 to up to 7 times, so it's really a very broad range of parameters that -- with only 28 people. It's a big spread. So, you have the -- you have the possibility that the -- the actual numbers could be up toward 7, even though there's not many that are up that high on the ratios.

CHAIR BEACH: Paul, I think you stumped everyone --

MEMBER CASSANO: (Indiscernible) as an issue. I understand the -- I understand the difficulty in doing it, and I would concur that better to err on the side of the -- of the claimant than not. So, but I just wanted to mention that as a possibility. Thank you.

CHAIR BEACH: Thanks, good discussion. NIOSH any comments,

or...?

MR. RUTHERFORD: Yeah, Josie, this is LaVon. Tim and Lori are both conflicted on this, so I will say we are developing responses to the findings and observations, and I don't think we have a good date for when we'll have that, but we are working on those.

CHAIR BEACH: Okay. That's pretty much what I thought, so we -- any other questions or comments? If not, we can move on to the next presentation. Okay. Thank you, Ron. And I think we're ready to move on, and we will carry this over.

MS. BEHLING: Okay. Josie, this is Kathy. Are you seeing my slide -- my slides?

CHAIR BEACH: Yes, we sure are.

MS. BEHLING: Okay. So, if you're ready, I'll start with report 85.

RPRT-0085

MS. BEHLING: This is our review of ORAUT report 85 and that is probability of causation valuation for ICRP 116 anterior-posterior, isotropic, and rotational geometries. Now I'll start off by saying that I'm making this presentation, however, Ron Buchanan and Doug Farver did most of the heavy lifting, like John Maher (ph) would say when -- and they performed all the -- all the calculations, and I peer reviewed everything and wrote the report, but it was certainly a team effort here.

Okay. We need to go back on this discussion to -- back to 2005. I think IG-001 was one of the very first documents that SC&A reviewed. And IG-001 is our external dose reconstruction implementation guide. In that review, SC&A determined that when applying rotational and ISO and DCFs,

it could lead to an underestimate of the external dose. Thereafter, NIOSH had recommended to the dose reconstructors that they only use the A-P geometry. However, NIOSH recognized that for certain cancers, specifically, bone, red marrow, and surface, the esophagus, and the lung, the A-P geometry for the dose -- the dosimeter worn on the chest was not the most claimant favorable. So, they developed correction factors for the rotational and isotropic geometries, DCFs for these organs.

Now, NIOSH are currently in the process of replacing the IG-001 DCF values with the ICR -- ICRP publication 116 dose conversion coefficients. And this is what prompted the issuance of report 85. NIOSH wanted to determine if the -- the rotational and isotropic DCFs that they had developed that are listed in IG-001 are still valid. So, to assess the most claimant favorable exposure geometries, NIOSH derived a POC and a dose for all of the ICRP 116 organs, and they have a table in report 85 that lists 33 different IREP models. They did this for male and female, and they assessed for neutrons. They assessed 32 neutron energies and 20 photon energies. And also, they looked at exposures from three exposure geometries, the A-P, rotational, and isotropic. They calculated doses for personal deep dose equivalent, the HP-10, and also exposure dose, and they assessed this for dosimeters that were located at four different locations that would be placed in different locations on the worker's body; the center chest, left collar, the center waist, and the left chest pocket. So, for their POC calculations, doses -- they calculated doses using irradiation geometry factors that were previously developed in their report 86. And report 86's correction factors for use with ICRP publication 116, isotropic and rotational dose conversion

coefficients.

They assumed -- for IREP, they assumed a five-year work period for the individual starting at page -- eight -- 35 and had a latency period of three years for leukemia, seven years for the thyroid, and 10 years for all other cancers. They applied a dose of 2 rem per year, and that was entered into IREP as a log -- as a normal distribution with a 30 percent uncertainty. I'm sorry, I forgot to change that slide. There you go.

They also do -- did a dose-only calculation. And in this calculation, they assumed 500 millirem of measured dose and 500 millirem of missed dose. The measured dose was assumed to be a normal distribution with 30 percent error, and the missed dose was assumed to be a lognormal distribution with a GFC of 1.52. Doses were combined with the ICRP 116 dosimeter -- yeah, DCC, dosimeter coeff -- co -- yeah, DCCs, and the report 68 IGF values for the four dosimeter locations. And they used the Monte Carlo method to come up with these doses. NIOSH also utilized the DCC distribution data developed in -- in a report that they had previously published, and that's report 69, which is updated ICRP 116 dose conversion factors and comparison to ICRP 74 dose conversion factors.

So, as a result of the POCs and the doses that were generated in report 85, NIOSH could not identify any concise geometry determinations as were listed in Table 4.1A of IG -- of IG-001. I -- I -- I will just make a -- stop here for just a second because IG-001 has two tables listed as table one -- Table 4.1A. We had pointed that out to NIOSH many years ago, and they just -- it hasn't been changed. The table we're talking about is on page 39. I'll just make mention of that in case you actually go in to try to look at

that table.

They found that --- what they did find is for most radiation typed organs and dosimeter locations, the AP and the rotational geometry is delivered the largest POC. Exceptions included the female adrenals where the ISO was more predominant for photons and, with few exceptions, the dose-only results were in close agreement with the POC results.

So, SC&A evaluated NIOSH's technical approach and report 85 documentation for assessing the most claimant-favorable geometry. NIOSH did rely on data from reports, as I mentioned, 86 and 68 and 69. And I just want to make mention, SC&A has not previously been tasked to review these two reports, therefore, our assessment of 85 just uses that data without verifying their accuracy.

Okay. So, first SC&A compared report 85 Table 2.1. And this table lists the IREP models that NIOSH used for all of the ICRP 116 organs and tissues. And we compare that to OTIB-5, which is the internal dosimetry organ, external dosimetry organ, and IREP model selections by ICD 9 code, that was rev. 5. I know it has changed to rev. 6, and we're using ICD 10, but as part of report 85, they still use rev. 5. And SC&A agreed with NIOSH -- NIOSH's selection of IREP models. There was the muscle that was listed there that's not in OTIB-5, but they used connective tissue, which is appropriate. For calculating POC doses, SC&A first had to derive the IGF using -- we didn't use Monte Carlo methods, so we use an arithmetic mean value of the IGFs that were listed in report 85. And then rather than calculating the IGFs for all of the energy ranges that were assessed by NIOSH, we just focused on those that are typically used in dose

reconstruction, and those included the photon energies of less than 30 keV, 30 to 250 keV, and a greater than 250 keV. And for neutrons, we looked at neutron energy ranges of less than 10 keV, 10 to 100 keV, 100 keV to 2 MeV and 2 to 20 MeV.

And since the report 85 IGFs were derived from report 68, we compared our values, our arithmetic mean values, to report 68. We found that there was reasonable agreement between the report 85 and the report 68 energy values; however, we did identify some deviations in several of the report 85 rotational and isotropic neutron IGFs.

And that -- I'm sorry -- that became our observation one. I apologize for not changing the slide again.

Okay. All right. Observation one. SC&A questions why NIOSH -- NIOSH's neutron IGF for several dosimeter locations differ from those in report 68. Using report 85 IGF values, SC&A's mean female and male IGF values for several of the neutron rotational and isotropic dosimeter placements were generally about 20 to 25 less than those reported in report 68. There was only one exception where SC&A's value was about 24 percent higher. That was the rotational centered -- center chest for less than 10 keV. All the others were -- all the others were lower values, and they -- they focused in on the neutron values -- neutron ranges of 2 to 20 MeV.

So, this led SC&A to question why NIOSH's report 85 IGF values differed from those of report 86, and they stated that that was the -- report 86 is the basis for -- for developing or listing their IGFs in report 85.

Okay. Hold on one second. Just a second. So, SC&A, considering the -- the vast number of iterations that were assessed by NIOSH, for this

evaluation, we just -- we determined that it was appropriate to only look at a subset of the data. So, we looked at just a subset of the photon and neutron energy ranges. We looked at only two dosimeter locations, and we looked at only eight cancers. For the energy ranges, we looked at just the photons that are 30 to 250 keV, and for neutrons we evaluated the 0.1 to 2 MeV, MeV neutrons. We also only evaluated two of the four dosimeter locations and those that we considered were the -- the most prominent or that we would expect for the EEs under this program was the left chest pocket and the left collar, and so those were considered in our assessments. And we looked at eight female and eight male cancers, and that was the lung, the esophagus, the red bone marrow, the adrenals, bladder, breast, sinus, and prostate for the male and ovaries for the female.

So, SC&A's method for assessing the DCF values, NIOSH derived DCF values using Monte Carlo techniques and data from ICRP 116 as well as report 69. So, SC&A derived DCF by calculating the mean value of DCF listed in report 69. This -- the review of 85 did require SC&A to become familiar with data contained in ICRP 116 and report 69, so I'm going to give you an overview of that. The reason my -- okay. My -- I -- I'm -- I'm confused by some of my slides here.

This slide presents an over -- presents an overview of the pertinent data in ICRP 116. ICRP 116 lists values picograys, which are absorbed dose per unit fluence. These values are called dose conversion coefficients and these DCCs are listed for male and female organs for A-P, rotational, and isotropic exposure geometries. The DCCs are listed for 55 photons energies between 0.01 and 10 MeVs and 68 neutron energies between 1E-9 to 10,000

MeV.

And okay. An overview of report 69. This report derived DCF values by applying neutron and photon fluence conversion factors to the ICRP 116 values. It lists photon and neutron organ DCF, organ A-P, P-A, rotational, and isotropic geometries for all of the ICRP 116 cancers. And photon DCFs are separated into 20 energies between 0.01 MeVs to 3 MeV, and neutrons are DCFs are divided into 33 energies between 1E-9 through 2MeV.

So, SC&A's approach to deriving DCF values, first, report 69 provides an example equation showing how they calculated photon and neutron DCF values. And we did evaluate that -- those equations, and we found them to be appropriate. We did take issue with some of the terminology used in those, but that we will discuss in a later observation. So, since report 69 is photon DCF values for 0.2 MeV and 0.3, to derive -- SC&A averaged those two values together to come up with our 250 keV photon energy DCF. To derive the range of DCF values for photons, which is 30 to 250 keV, we used the eight DCF values that were reported in report 69, plus that arithmetic -- arithmetic mean value between 0.2 and 0.3.

The main neutron DCF value for SC&A, we calculated that using the ten DCF values that were listed within the range of 0.1 to 2 MeV in report 69. We calculated DCF values for the 8 female and the 8 male SC&A-selected organs. For calculating POC values, SC&A used our derived IGF values for the left center pocket and the left collar, and also, we did that for the A-P, ISO, and rotational geometry. We calculate -- we -- we came up with DCF values for those three geometries.

And then using report 85 assumptions, we generated POC values

assuming 2 rem of measured 30 to 250 keV photon dose, and there is .1 to 2 MeV neutron dose for -- for five years. We also used the IREP Enterprise edition for calculating the POCs, and the doses were entered into IREP as normal distributions with a geometric standard deviation of 30 percent.

So, we compared our POC values to those listed in report 85. We found that this was a close comparison between what NIOSH calculated and what we calculated. We expected some differences since NIOSH used the Monte Carlo method and we just used average values. The majority of SC&A POC values were sent slightly less than NIOSH's and we had no findings or observations about their POC calculation.

For the dose-only values, we assumed the exposure of 1 rem for photon -- for the photon and neutron doses. Since we didn't use Monte Carlo methods, we didn't have to split doses into 500 -- measured in 500 millirem (indiscernible). We used again the ice -- SC&A derived IGF values and DCF values to calculate the doses again for the dosimeters that were placed on the left -- left inner -- or left collar and left -- yeah, LCP -- I'm sorry -- for the A-P, the ISO, and the rotational geometry.

Doses were calculated again for the eight female and eight male organs. And based on a comparison to the NIOSH dose -- doses, we showed a relatively close agreement. Again, some differences were expected because of the approach used. And most of -- again NIOSH's doses -- or SC&A's doses were slightly less than NIOSH doses.

Since SC&A's IGF values for the A-P geometry were 1 for the batch locations, because the incident angle is -- is zero, we -- as part of our review, we checked the subset of the report 85 organ doses and found that

in general 30 to 250 keV photon doses and neutron doses were at -- were within a few percentage points for all of the four batch locations. However, we did note that a few organs at badge locations NIOSH's AP doses differed more excessively -- more excessively than we were expecting, so that resulted in observation two.

In observation two, SC&A questions why NIOSH's A-P doses deviate beyond expected values. We did expect some small variance in doses because NIOSH used NMCP -- M -- MCNP and a 4-point averaging for the runs; however, for the male lung, we found that the variance was a little bit more significant than we expected. Same thing with the female lung, and for the male small intestine wall. And I should emphasize that we just looked at a small subset at the -- of this data, and we did identify a -- you know, those observations just by looking at a subset.

Okay. So, lastly SC&A evaluated the report 85 documentation, and we noted that NIOSH's explanation of their approach and method was relatively brief. It did rely on several supporting documents, so we needed to spend a relatively lengthy period of time understanding those documents and NIOSH's approach for using them. But we found that some of the key terminology to be a bit inconsistent and confusing, and that led to observation three.

So, observation three states that NIOSH the terms "DCC" and "DCF" incorrectly. In report 85, there's an equation to 2.1, and they use DCC incorrectly because the dose conversion coefficients in ICRP 116, you actually have units of picogray per square centimeter, and that needs to be divided by the fluence conversion factor, which is shown in the -- in equation

3-2 and 3-3 of report 69. So, therefore, we concluded DCC in equation 2.1 should actually be DCF.

And although we didn't cite this as an observation, we're just making a comment that we also felt that the title of report 69 appears to be incorrect because, again, ICRP 116 does not use the term dose conversion factor or DCF, which is used in the title of report 69. We think that maybe a more appropriate title would be updated ICRP 116 dose conversion coefficients and comparison to ICRP 74 dose conversion coefficients.

So, in summary, SC&A evaluates an (indiscernible) approach used in 85. We agree that using the ICRP 116 DCC values -- that it -- the IG-001 Table 4.1A values are no longer valid, and it would be difficult to generate such a table. We had three observations.

The first was question why NIOSH's neutron IGF for several of the dosimeter locations differ from those in report 68. We also question why NIOSH's AP doses for a few cancers deviated beyond expected values and had some difficulty with the term DCC and DCF and they -- the use of those by NIOSH. So, do you have any questions?

CHAIR BEACH: Thanks, Kathy. That was a good reporting on a complicated subject matter. Subcommittee members, any questions?

MEMBER CASSANO: No.

MEMBER VALERIO: No, Josie.

MEMBER ZIEMER: None -- none here.

CHAIR BEACH: Okay. So, I don't have any either except for what's the value, Kathy, would you say, of report 68 and 69 being reviewed? Are those on our list at some point?

MS. BEHLING: They should be, I guess, on our list. They are not our list yet, but it's something that I will include in the future because as we get to the -- last time we had a long list of things that weren't reviewed, and we selected four -- I think four documents and there's still four remaining, so that's why I didn't add those this time, but I think it's worthwhile.

CHAIR BEACH: Okay.

DR. TAULBEE: This is Tim. Can I interject here?

CHAIR BEACH: Sure, okay.

DR. TAULBEE: First, I want to point out to the subcommittee that we have not implemented ICRP 116 yet, so that's important to keep in mind here in dose reconstruction in general. And second, report 85 was for informational purposes, you know, for us to begin to evaluate the effect of us implementing ICRP 116 and what effects it's going to have on our dose reconstruction process. We're still in the process of developing documents and methods for this, so I kind of feel like it's premature to be reviewing all this, but if you want to, okay. You know, that's okay.

I do want to thank, you know, SC&A for the comments. I think they're -- they're quite good from the standpoint we're taking the observations under advisement as we do the implementation. At this time, we don't plan to respond to these observations directly because we haven't implemented the methodology yet. You know, again, we appreciate the comments, and we're taking them under advisement.

You know, observation one, basically the results or the values in OTIB-85 has the correct values of SC&A going back to and compared to our OTIB-68, and those single point estimates appear to be an error just when you

look at some of the figures in there. It's like, okay, we missed that in OTIB-68, and we'll make that, you know, correction.

The other thing that's very difficult to do here is to compare point estimates to how this implementation's going to go, because we're using Monte Carlo method and looking at distributions and we're sampling from those distributions. So, you know, yes, you can look at point estimates and you'll come up fairly close. Sometimes will be close, sometimes you won't. It depends upon the shape of that that conversion coefficient. But that's something to keep in mind here.

For observation two, you know, actually, you know, thanks to SC&A for pointing that out. We're going to look closer at that one because something doesn't look quite right there with the modeling, and we'll go back and look at it. But again, none of this has been implemented yet.

And as for observation three with the terminology, you're -- you're absolutely right, you know. And when we're going through the implementation, we'll be more cautious with our terminology and try and be very specific. I do take a little bit of exception to the title recommendation in the last slide. While they are correct, you know, neither ICRP-116 or one -- or 74 state dose conversion factors, they are dose conversion coefficients, we're not there directly comparing those two coefficients. We're actually comparing what we ended up using for organ doses. So, we'll work on a better title from that standpoint, but neither our title nor SC&A's recommendation is correct really. So, those are some of my initial thoughts here, and I guess I'd welcome feedback from the subcommittee on that.

CHAIR BEACH: Okay. So, --

MS. BEHLING: (Indiscernible) --

CHAIR BEACH: Yeah, go ahead, Kathy.

MS. BEHLING: Yeah. I'm sorry to -- to interrupt you. I also should just -- if you don't mind, like I said, this is a joint effort. I don't know if Ron Buchanan or Doug Farver have anything else to add to the presentation. I want to -- I should have given them maybe an opportunity to --

CHAIR BEACH: Yeah, I don't think anybody's shy; they probably would have, go ahead.

MS. BEHLING: Okay.

DR. BUCHANAN: This is Ron with SC&A. No, I have nothing to add to it. I do think that we should consider we seriously review 68 and 69 in light of what Tim said because these are very detailed documents, and they take a lot of time and resources to go through. And so, if they're going to be changing or not used in the near future, I would say, you know, I would wait, but then if there's something that they will be used as is for any changes in the future with OTIB-87, well, then we should review them. So, that would depend on that if they are going -- if they're outdated or if they're going to be revised.

MS. BEHLING: And I agree with Ron. I would not --

CHAIR BEACH: Yeah.

MS. BEHLING: Yeah, I'm sorry. I was not aware also of the -- the nature of those reports, and as Ron said, they're very, very detailed, and so perhaps we should put -- we should wait on those.

CHAIR BEACH: Yeah, I was gonna suggest the same thing unless, Tim, do you have anything else to add? Are those going to be used as is or

will they likely be changing?

DR. TAULBEE: That's hard to say. They -- they very possibly could change as we're going through the -- right now we're working on the components of glove boxes, and so we're learning things as we're doing that, so, I guess, I would say kind of at this point they very well likely will change a little bit. So, you know, I just don't know right now from that, but as we get to the point of implementation, you know, we'll finalize all of these and, you know, then absolutely, you guys should review all of them.

CHAIR BEACH: Okay. So -- so we don't expect an answer from NIOSH other than what Tim has told us today until ICRP-116 is implemented, and I'm sure you probably can't tell me when that's going to happen. I believe that was quite a ways down the road. I think we should put these in abeyance in our temporary BRS.

UNIDENTIFIED SPEAKER: -- requested (indiscernible).

CHAIR BEACH: Is that an agreement?

MEMBER ZIEMER: I'm not even sure they're in abeyance. Are they -- are they --

CHAIR BEACH: Or open?

MEMBER ZIEMER: Let's see, we're not -- we're not taking in any action on these observations, are we?

CHAIR BEACH: No. NIOSH has indicated they're not going to answer these, they'll just keep in mind --

MEMBER ZIEMER: Right.

CHAIR BEACH: And so, but we don't want to lose track of it either, so --

MEMBER ZIEMER: No, no, no. I'm thinking they're still in process or something like -- abeyance means we really have the final thing, we're just waiting for something -- well, I'm not sure what it is. It -- I guess it could be abeyance.

CHAIR BEACH: You're probably correct, Paul. So, we can put them in process or if there's a better term, and just hold off until It's late a later date.

MEMBER ZIEMER: Yeah. I don't -- I don't think we take -- we do anything until we hear officially from NIOSH. And as Tim said, that -- there -- they're not expecting to deal with these observations right now until they finish up their evaluation of 116.

CHAIR BEACH: Correct. And I think we shouldn't also hold off on reviewing 68 and 69 at this time.

MEMBER ZIEMER: Yeah.

CHAIR BEACH: Okay. So, anything else for this topic?

MEMBER VALERIO: So, Josie this is Loretta. Just for clarification, are these going to be flagged as in progress?

CHAIR BEACH: Yeah, I think that's what we're just talking about. I believe that's correct. Is that correct, Kathy, we'll leave them --

MS. BEHLING: Yeah, that's --

CHAIR BEACH: -- in progress?

MS. BEHLING: -- right. Yes, that's what I heard, in progress.

CHAIR BEACH: Okay. So, we're ready for the next -- your handout, preparation for the August meeting.

MS. BEHLING: Yeah.

PREPARATION FOR AUGUST 2023 MEETING

CHAIR BEACH: While you're getting that up, I was kind of brainstorming a presentation about what we've been doing for the last couple of years.

(Whereupon, an unidentified speaker converses off the record on audio.)

CHAIR BEACH: I don't know how other subcommittee members feel. We've -- we've tackled quite a few of these old procedures. I don't know if it's time to do it presentation on what we've done, what we've accomplished. So far all's we've been doing is presenting documents for closure. We can continue to do that and not overburden Kathy. I -- I guess I'm looking for other thoughts from subcommittee members on -- on presenting to the Board.

MEMBER ZIEMER: This is Paul. I think we -- we certainly want to clean up all of the old ones and make sure that we're up to date on that. How -- is this list that you presented or that you distributed, Kathy, is that every -- all of the old ones? The ones that are labeled not yet presented, is that the complete list of all the old stuff?

CHAIR BEACH: The only one --

MS. BEHLING: (Indiscernible) --

CHAIR BEACH: Kathy, the only one I couldn't find was the one you presented today, the OTIB-009. I found the --

MS. BEHLING: Yeah, I --

CHAIR BEACH: -- found the OVER-002, but not -- not the one from today. Is that just me not finding it, or?

MS. BEHLING: No, the fact is that they're combined. And so --

CHAIR BEACH: Okay.

MS. BEHLING: -- we listed one document, which is the overarching document, but that actually encompasses TIB-9. In the --

CHAIR BEACH: Yeah, that --

MS. BEHLING: -- BRS --

CHAIR BEACH: Yeah. Okay. That's what I thought. Did you want to put that document up on the screen? Right now, you're still showing 87.

MS. BEHLING: Okay. I thought I was showing --

CHAIR BEACH: I don't know if anybody needs it up. I -- I have mine up.

MS. BEHLING: Yeah, I was trying to show it. I don't know why I'm still showing something else here.

CHAIR BEACH: it's nice to note on that five-page document the first two pages -- or the last three pages are complete, so we're definitely making progress. I think there's 18 left and I -- I'm sorry, but I wasn't -- didn't hear correctly if everything was on this list?

MS. BEHLING: Are you seeing that or --

CHAIR BEACH: No.

MS. BEHLING: -- not? Okay. Hold on just a second. Let me see if I can do this again.

CHAIR BEACH: Now it's up. Perfect.

MS. BEHLING: Okay. Great. All right. And you have --

MEMBER ZIEMER: And then I'm see -- I'm seeing 18 on the list, and that's really what I was asking. Is it -- are -- are those all of the, sort of,

historic ones that haven't really gone up officially to the Board, those 18?

MS. BEHLING: Yes. Yes. Yes, these 18. I was a also going to suggest that -- or you know, because I wasn't sure how -- what the outcome of the not suitable for matrix was going to be, we do have several here -- let's see, I have them marked -- that I'm showing here, like PROC-31, report 5, PER-47, PER-5, and PER-49 -- no, that was presented. That was presented, I'm sorry. But those first four that I listed, perhaps we could add those to the one that I presented for you today unless, like you said, Josie, you want to go in a different direction and show progress that the subcommittee has been making?

CHAIR BEACH: No, I think I'm with Paul. We can do that at a later time, maybe when we're complete -- I think it's more important to continue on through these and not overburden you with the extra reporting, and that's my thought now.

MS. BEHLING: Okay.

CHAIR BEACH: So, you're talking about doing 52, 55, the one today. I don't think I had them listed correctly. You're talking about the first four?

MS. BEHLING: Actually I -- can you see my screen?

CHAIR BEACH: Oh, yeah. Okay.

MS. BEHLING: Okay. I'm --

CHAIR BEACH: -- looking on my own --

MS. BEHLING: -- these initially I did not identify as not suitable for matrix, so I thought perhaps we could finish those out before we delve into the not suitable for matrix. We'll do the one -- I was just doing the one that I present to you today, which will be pared down quite a bit, and then

adding to that PROC-31, report 5, PER-47, and PER-5 that I'm --

CHAIR BEACH: Okay. And not --

MS. BEHLING: -- showing on --

CHAIR BEACH: And not --

MS. BEHLING: -- my screen?

CHAIR BEACH: Did you -- no, not 49, okay. I would be okay with that with the preamble of the difference between the two so that the Board gets an idea of the difference between them. Other subcommittee members?

MEMBER ZIEMER: What -- what was the -- so, I'm looking at the early ones particularly, but I -- when I look in the first page of your report, I see a couple from 2006. Actually, on the second page there's some from two hundred -- 2005 and 2007. Why wouldn't we do all of those early ones first?

MS. BEHLING: The --

CHAIR BEACH: Well, if you look to the -- to the right, some of them aren't suitable for matrix, and I think Kathy wanted to --

MEMBER ZIEMER: Oh, I -- oh, I got -- I got you. I see what you're saying. Yeah.

CHAIR BEACH: -- is the easier one.

MEMBER ZIEMER: Okay. Yeah, yeah. Okay. Yeah, I -- I'm with you. Okay.

CHAIR BEACH: Yeah.

MEMBER ZIEMER: Yeah, get those out of the way, yeah. And then you'll have a chance --

CHAIR BEACH: Yeah.

MEMBER ZIEMER: -- to go back on those not suitable ones, okay,

gotcha.

CHAIR BEACH: Yeah. And then --

MEMBER ZIEMER: Okay. I'm fine.

CHAIR BEACH: -- the Board -- yeah, since Kathy's already done the work on the not suitable ones, kind of give an explanation of that, and then moving forward at the next meeting, --

MEMBER ZIEMER: Yeah, yeah.

CHAIR BEACH: -- the December meeting, maybe adding a few of those.

MEMBER ZIEMER: Right. Okay. I'm good on that. Uh-huh.

MEMBER VALERIO: So, this is Loretta. Kathy, what is the list of the items to be discussed in August?

MS. BEHLING: Okay. The -- the one -- the overarching issue, that I -- 002 that I discussed today, which will be reduced in length. Also PROC-31 -- this is on the second page of my listing halfway down -- PROC-31, report 5, PER-47, and PER-5. And, again, as I always do, if I find that it looks as if we could add something else or this is going to be too much, I will convey that to you, and we can make a decision to either reduce the number or add some more so that we fill up our hour or 90 minutes.

CHAIR BEACH: Okay.

MS. BEHLING: If that's okay.

CHAIR BEACH: And if you are going to -- if we do determine, Kathy, that we're going to add more, we have to keep in mind -- I think you talked to Lori about helping with those documents, so probably need to figure that out earlier than later --

MS. BEHLING: Yes, --

CHAIR BEACH: -- so that you have the information available that you might need on those not suitables.

MS. BEHLING: Okay. Yes, agreed.

CHAIR BEACH: Okay. And we don't want to -- we don't want to go over 90 minutes, I think, with only a one-day meeting, so.

MS. BEHLING: Yes, agreed.

CHAIR BEACH: All right, any other comments? Okay. With that, I think we can move on to our last item, the newly issued guidance and supplemental topics.

NEWLY ISSUED GUIDANCE AND SUPPLEMENTAL TOPICS

CHAIR BEACH: I don't think we got anything on that, correct?

MS. BEHLING: No, (indiscernible) --

MEMBER CASSANO: No, I don't have that.

MS. BEHLING: Right. I'm going to see if I can share my screen here. Okay. This -- the reason I didn't issue a new one for this -- for this subcommittee meeting is because there's still some outstanding issues on the previous handout. And on this one, you have already tasked SC&A with the first two template reviews, which we are working on. I don't know if you want to add one or two to that. They're, you know, a little more complex than we have -- we can add to the DR templates a list of reviews. And I just want to make mention here at the end, we -- I had this list of -- let me get my -- for the last meeting we weren't tasked from this list with reviewing PER-40, PER-51, PER-67, and PER-83. But there are still four additional -- three PERs and one report that we did not -- we were not tasked to review.

Those are PER-68, Electro Metallurgical Company, PER-70, which is Nuclear Metals, and PER-72, Seymour Specialty Wiring, and then lastly, report 60, which is neutron dose from highly-enriched uranium. So, those had not been tasked at the last meeting.

CHAIR BEACH: Okay. Comments?

MEMBER ZIEMER: I'm not sure how we quite decide that those are the ones -- Kathy, you've pointed out several here, but are those ones that SC&A's determined are more urgent or --

MS. BEHLING: No, I -- I --

MEMBER ZIEMER: -- mean, it's a pretty extensive list. How -- how are we deciding what to do, which -- which ones to look at?

MS. BEHLING: Well, I -- I -- I simply go down through the list seeing what hasn't been -- been tasked yet, and these came up. It -- it -- no, I don't categorize them with regard to how urgent they are. I did list in the document summary what changes were made in these through these PERs. But they're just ones that we hadn't been tasked to review, and it seems like for the PERS, at least, we've been reviewing all of them.

MEMBER ZIEMER: Yeah. Right.

CHAIR BEACH: And I -- we did -- we did task some of the templates also, correct? That's not -- that's not on this list from the last --

MS. BEHLING: Yes. That's in the beginning here. You tasked us --

CHAIR BEACH: Okay.

MS. BEHLING: -- with Amchitka Island and the Albuquerque Operations Office.

CHAIR BEACH: Okay.

MS. BEHLING: The -- the -- one of the things that I was thinking before you tasked more of these, I was hoping that we could make a presentation on how we approach these -- these reviews, since they're -- they're a little bit different. We have -- reviewing the template and the guidelines, and two or one or two cases associated with these. So, that report's going to look a little bit different.

CHAIR BEACH: Right.

MS. BEHLING: -- similar to our, like, PER task -- subtasks 4. But perhaps we could present those first and then you can determine if our approach for presenting or for reviewing those documents is appropriate before you task with additional --

CHAIR BEACH: Yeah. Yeah. I didn't -- I wasn't necessarily wanting to task. I was just -- just a reminder.

MS. BEHLING: Yeah, that is on the --

CHAIR BEACH: Yeah, yeah. I'm fine with tasking, however, I don't want to get too far behind either. We have several reports, I think, upcoming that we haven't been presented yet, correct?

MS. BEHLING: Yes.

CHAIR BEACH: What we tasked the last time?

MS. BEHLING: Yes, and they will likely be presented at the next meeting.

CHAIR BEACH: Other subcommittee members, tasking, any thoughts? I feel like we can task (indiscernible) SC&A is capable of doing -- doing the work, or?

MEMBER ZIEMER: Well, on PERs, since we task all of those eventually,

it's advantageous just to do them in order by their -- by their date and just take a number then? I don't know how many you would want to task at a time, but, you know, I -- but Kathy, you had suggested several of those.

MS. BEHLING: Yes, yes --

MEMBER ZIEMER: Are you listing them in order by date on your --

MS. BEHLING: Yes.

MEMBER ZIEMER: I see the two '16s. Yeah. Certainly, the next group of those, we could task. I don't know how many at a time we've been doing in the past. Do you recall?

CHAIR BEACH: I think four.

MEMBER ZIEMER: Four?

CHAIR BEACH: Yeah, well, --

MS. BEHLING: (Indiscernible) --

CHAIR BEACH: -- we tasked four.

MEMBER ZIEMER: Well, how about the next four, and then on the other documents, how many more reasonable to look at now?

MS. BEHLING: As -- and I'll just interject here. We were tasked with four PERs during -- in the February meeting, and there are three PERs that are still listed here that could be tasked today. The last one is a report. If we wanted to hold off on that until you look at and see some of the other reports that we were reviewing, that's -- you know, that's something to consider. But there are three PERs listed here that you may want to task.

MEMBER ZIEMER: Is that 067, 68, and 70? Are those the three you're talking about?

CHAIR BEACH: 72.

MS. BEHLING: Yeah. It's -- yeah, 68, 70, and 72. The first three on that list, we were tasked with during the last time. And we were --

MEMBER ZIEMER: Oh, okay.

MS. BEHLING: -- PER-83, because it was two Weldon Springs, and we wanted to keep them together.

MEMBER ZIEMER: Yeah, gotcha. Yeah.

CHAIR BEACH: And then 60 is the report, correct?

MS. BEHLING: Correct.

CHAIR BEACH: Okay. Oh, there it is. I see it. Can you move that up just a little bit, Kathy?

MS. BEHLING: Can you see it now?

CHAIR BEACH: Yeah. I'm fine with tasking all four, Paul. If you'd rather just stick with PERs, that's fine also.

MEMBER ZIEMER: No, no, no. I wasn't trying to stick with just PERs. I just wanted to say we're gonna do those eventually, how many do we do at a time, then add to that what we can handle here.

CHAIR BEACH: I'm thinking Kathy, you're not going to suggest more than SC&A can handle; is that correct?

MS. BEHLING: That's correct. Yeah.

CHAIR BEACH: Okay. Rashaun, any problems with that, assigning those four that we've been discussing?

DR. ROBERTS: No, none at all.

CHAIR BEACH: I would say we go ahead and task 68, 70, 72, and report 60 at this time then.

MS. BEHLING: Okay.

CHAIR BEACH: The only other thing I'm going to add, in prepping for this meeting, sometimes more information is better. So, if there's emails, if you send them to one person, if you could send them to the whole subcommittee, and Kathy, this one probably would have been fine to refresh us with -- with this. Even if it wasn't updated, just so that we have it in our folder of -- of items for this meeting.

MS. BEHLING: Yes, I agree. I apologize for missing this one -- not including it.

CHAIR BEACH: No, that's okay. I -- just for the future, just better to have it all together, at least for me, I know. Any other items before we talk about the next meeting? Okay. Let's talk about the scheduling our next meeting. And, please, interject what your thoughts are. Three months? four months? What we're -- what you're thinking for prep?

MEMBER ZIEMER: When was the --

MEMBER CASSANO: So, Josie, --

MEMBER ZIEMER: -- last meeting? We --

MEMBER VALERIO: Josie, this is Loretta.

MEMBER ZIEMER: -- February --

CHAIR BEACH: Yeah.

MEMBER ZIEMER: -- about four months is about right, isn't it?

CHAIR BEACH: I -- I would say so. Loretta, did you have a comment?

MEMBER VALERIO: Yeah, I was gonna say probably about four months apart. Four, yeah. Four, because we have the full-Board meeting in August, so four months would put us right about the right time frame for the next meeting for the subcommittee.

CHAIR BEACH: Yeah, that's puts us into October, and I'm going to be gone the whole month of October, so that would go -- we would have to go into November. So, everybody, check your calendars for November. I guess, Rashaun, I can turn this over to you.

MEMBER CASSANO: Sure.

CHAIR BEACH: And I'm thinking the first or second week of -- probably the second week of November so I have time -- because I'm going to be out of the country for the whole month of October.

DR. ROBERTS: Okay. And are we still wanting to keep to a Wednesday or Thursday, because that would be the eighth? or ninth?

CHAIR BEACH: That -- Wednesday, so any time's good with me. So, whatever's good for everybody else. Wednesday and Thursday is fine.

MEMBER CASSANO: Yeah, Wednesday or Thursday are -- Tuesday isn't bad either, but that week election day is Tuesday, so that's all -- out. Yeah, Wednesday or Thursdays are best for me.

DR. TAULBEE: Could I put a plug in for Thursdays over Wednesdays? This is Tim.

CHAIR BEACH: Sure.

DR. TAULBEE: It's not critical, but it certainly helps us a little.

CHAIR BEACH: Sure. Yeah. And the ninth or the 16th, any preference there?

DR. ROBERTS: Actual -- yeah, go ahead.

MEMBER CASSANO: Not really.

MEMBER ZIEMER: I'm good for either one, Josie.

CHAIR BEACH: Okay, I'm good for either, too.

MEMBER VALERIO: I'm good for either, too.

DR. ROBERTS: So, November 16th, at 11:00 a.m., Eastern.

CHAIR BEACH: Okay.

DR. ROBERTS: Okay. I think we have that set then, so Thursday, November 16th, starting at 11:00 a.m.

CHAIR BEACH: Okay. So, I think that wraps up this meeting. Thank you everyone for the hard work.

(Whereupon, the meeting was adjourned at 2:58 p.m. EDT).