CENTERS FOR DISEASE CONTROL AND PREVENTION

NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH

ADVISORY BOARD ON RADIATION AND WORKER HEALTH

SUBCOMMITTEE FOR PROCEDURE REVIEWS MEETING

WEDNESDAY, MARCH 14, 2024

The meeting convened at 11:00 a.m. EDT

via teleconference,

Josie Beach, Chair, presiding.

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Members Present:

Beach, Josie, Chair

Valerio, Loretta, Member

Ziemer, Paul, Member

Registered and/or Public Comment Participants:

Roberts, Rashaun, DFO

Barton, Bob, SC&A

Behling, Kathy, SC&A

Buchanan, Ron, SC&A

Cardarelli, John, DCAS

DeGarmo, Denis, M.D., Worker Representative

Farver, Doug, SC&A

Gogliotti, Rose, SC&A

Griffiths, Richard, SC&A

Holsberger, Maria, HHS

Kranbuhl, Alek, DCAS

Lobaugh, Megan, NIOSH

Mangel, Amy, SC&A

Marion-Moss, Lori, NIOSH

Ostrow, Steve, SC&A

Rafky, Michael, HHS

Rutherford, LaVon, DCAS

Siebert, Scott, ORAU

Taulbee, Tim, DCAS

Todd, Michael, DCAS

Davis, Scott, RAU

Ulsh, Brant, NIOSH

TABLE OF CONTENTS

PROCEEDINGS

(11:00 a.m.)

WELCOME AND ROLL CALL

DR. ROBERTS: This is a working meeting of the subcommittee on procedures review, and I'm Rashaun Roberts. I'm DFO for the Board. The agenda today can be found on the NIOSH website under scheduled meetings for March 2024 for this program. Since the subcommittee will be discussing a number of different documents, some of which may 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 the conflict applies. So, as we move through the roll call, subcommittee members and others, please state where you have a conflict.

So, let's start with Beach.

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

DR. ROBERTS: Valerio?

MEMBER VALERIO: Can you hear me?

DR. ROBERTS: Yes, I can hear you now.

MEMBER VALERIO: I am here. I am conflicted at all sites in New Mexico and, I believe, the only site on this list was the Albuquerque Operations Office.

DR. ROBERTS: Okay. And Ziemer?

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

DR. ROBERTS: Okay. Great. So, let's move on to roll call for

NIOSH/DCAS/ORAU.

DR. TAULBEE: This is Tim Taulbee. I'm conflicted at Mound.

MR. RUTHERFORD: This is LaVon Rutherford. I'm conflicted at Fernald.

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

MR. KRANBUHL: This is -- this is Alek Kranbuhl, and I am not --

UNIDENTIFIED SPEAKER: Go ahead, Alek.

MR. KRANBUHL: Sorry. Alek Kranbuhl, and I'm not conflicted. No conflict.

MR. SIEBERT: And this is Scott Siebert with the ORAU team, and I have -- I'm conflicted at Mound, NTS, Brookhaven, Witt (ph), and West Valley.

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

MR. BARTON: Bob Barton, no conflicts.

MS. BEHLING: Kathy Behling, no conflicts.

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

MR. FARVER: Doug Farver. I'm conflicted at Savannah River and at Oak Ridge X-10, Y-12, and K-25.

MS. GOGLIOTTI: Rose Gogliotti, no conflicts.

DR. ROBERTS: Okay. Anyone else for --

MS. MANGEL: Amy Mangel, I'm conflicted at Pacific Northwest National Lab.

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

MR. RAFKY: Michael Rafky, HHS. No conflicts.

MS. HOLSBERGER: Maria Holsberger, HHS. No conflicts.

DR. ROBERTS: Thank you. Anyone else with HHS, or are there any contractors? How about the departments, DOL, DOE, other departments? Okay. Hearing none, are there any members of the public who want to register their attendance?

DR. DEGARMO: Denise DeGarmo, authorized physician representative for Pinellas Plant.

DR. ROBERTS: Okay, thank you. Anyone else in the public who'd like to register attendance? Okay. Well, thank you, and welcome to you all, again. I just need to go over a couple of things before I hand the floor over to Josie Beach, who's the subcommittee chair. So, to keep things running smoothly, I just ask that everybody -- everybody put -- make sure that you're on mute unless you're speaking. If you don't have a mute button, press star six to mute. If you need to take yourself off, press star six again. And, also, because we can't see each other, please identify yourself by name before any questions or comments.

Again, the agenda and presentations and background documents that are relevant to today's meeting can be found -- excuse me -- on the -- on the NIOSH website under the tab for April (sic) 2024. All of these materials were sent to Board members and staff prior to this meeting. So, with that, I will go ahead and turn it over to you, Josie.

CHAIR BEACH: Okay. Thank you. First of all, Steve, your background wins the best background today.

DR. OSTROW: Oh, thank you. I'm here for you. For some reason my

computer sound is not coming out of the computer. I had to dial in to the --

CHAIR BEACH: Yeah, we're all dialed in. We're all dialed in. Yeah, that's the way this meeting is set up. So, you're good there.

I wanted to welcome --

DR. OSTROW: Okay.

CHAIR BEACH: -- welcome everybody. Today we have a very full agenda, as you can see by the -- I was on the agenda. One of the changes I don't -- I did need to note, I mistakenly thought we were going to talk about Peek Street, but it was really 97 I was thinking about, so you can just X that off. I don't believe we have anything to discuss there, Tim -- as Tim pointed out. And then are there any other schedule changes for today?

MS. BEHLING: Yes. Yeah, Josie. Thank you. Let's see here. We are going to have Report 84, and Dr. Naeem is -- is going to be doing that and he's not going to be able to join us until about three o'clock. So, if we could push that a little bit further down on the agenda, that would be appreciated.

CHAIR BEACH: Of course, yes. We can definitely make that note. And then just looking at the agenda, I -- I'd like to go through 1, as much of 2 as we can, but if we see that we might be running out of time, I want to make sure that we get to Items 3, 4, and 5, so we'll have to keep a watch on the -- the time for those.

I -- we won't have an actual lunch break. I think we should go about halfway through our time frame and then take a 15-, 20-minute break, whatever people need, and then move on, if that's okay with everybody?

UNIDENTIFIED MALE SPEAKER: Yep.

CARRY-OVER ITEMS FROM THE NOVEMBER 16, 2023, SPR MEETING

DCAS-PER-040 Mallinckrodt TBD Revisions

CHAIR BEACH: Okay. And then we can start with Mallinckrodt, the first carryover item. I don't think that we had much except for there's a couple of questions about that, but I'll -- I'll go ahead and turn it over.

MR. RUTHERFORD: This is LaVon --

MS. BEHLING: Yeah, I can speak to that.

CHAIR BEACH: Okay. Go --

MS. BEHLING: Okay.

CHAIR BEACH: -- Kathy.

MS. BEHLING: Okay. Yeah. There were two items, I believe, that we had this as a carryover, and we still had an observation two that talked about the gap in monitoring for beta dose at the SLAPS facility. And also, Loretta had asked a question about the fact that there was residual -- residual stored at the SLAPS facility starting in 1946; however, the covered period is listed as 1947, and so she was curious as to whether workers at that facility would be covered in the '46 time frame. And I don't know if NIOSH has any response to that.

MR. RUTHERFORD: Yeah, Kathy. This is Lavon Rutherford. Yeah. We actually -- first of all, we are working on the observation, responding to that. We don't have a response at this time. But the question is 1946 is, actually, kind of interesting. Back in 2009, we actually went through a petition evaluation for the SLAPS facility, the St Louis area airport storage site. And at that time, we had questions concerning the covered periods because we'd

identified that the -- that own -- the government took ownership of that facility in -- at the beginning of 1947.

So, questions were sent to the Department of Labor, Department of Energy, and, ultimately -- ultimately, Department of Labor came back and indicated at the time that the facility was taken ownership by the US government, that would be a -- considered a DOE site. And so, they, at that time, made the determination to -- that the DOE-covered period would be from nineteen oh -- January 3, I think, of 1947 on.

And, but in that letter, they had actually turned over to Department of Energy that they needed to make the determination of whether 1946 should be an AWE period. Well, it appears somehow or -- I had -- and I have -- I had, actually, finally remembered part of this. And I contacted DOE to ask them if they had, actually, made a determination on that. So, right now we're working with the DOE to see if a determination has been made on that 1946 period, and they will issue a formal response.

MS. BEHLING: Okay, great.

CHAIR BEACH: Yeah, that is great. So, we'll keep track of that. Okay. And any idea of --

MS. BEHLING: Okay.

CHAIR BEACH: Any idea when we'll expect the response on observation two? Possibly the next meeting?

MR. RUTHERFORD: Possibly the next meeting. I should have a better time frame that I can -- I can make the subcommittee aware of in the next week or two.

CHAIR BEACH: Okay. Great, thank you, LaVon.

Anything more on Mallinckrodt? Any questions from Board members? Hearing none, I think we can move on to 93, DCAS PER-093, Texas City Chemical, and NIOSH has a -- NIOSH will start and then, I believe, Rose will take after?

UNKNOWN MALE SPEAKER: That sounds good. Alek Kranbuhl is going to, kind of, walk through our response with the findings that was sent to you in memo form. Go ahead, Alek.

DCAS-PER-093 Texas City Chemicals - NIOSH Response

MR. KRANBUHL: Okay. Good morning, everyone. I'm Alex Kranbuhl. I'm the NIOSH site lead for Texas City Chemicals. I have a redacted version of the response memo that I can share with the group, if that's okay?

CHAIR BEACH: Yeah, no that would be --

UNKNOWN MALE SPEAKER: Yes.

CHAIR BEACH: -- send that to us also?

MR. KRANBUHL: The -- sorry, the redacted version?

CHAIR BEACH: Yeah.

MR. KRANBUHL: Yes, I can. I will -- would you like me to forward that now, or?

MEMBER BEACH: Just after. I've already read it, but it's -- it's --

MR. KRANBUHL: Okay.

CHAIR BEACH: -- in my email, so that -- just for tracking. Thanks.

MR. KRANBUHL: Certainly, yeah. I will certainly do that, yeah. Okay.

So, we issued this memo back in January. It's a response to some findings and -- four findings and one observation from SC&A's review of

PER-93. So, there -- this -- that document was issued back last January 2023. So, in the review, like I said before, there are four findings and one observation, all pertaining to the dose reconstructions that they looked at for PER-93.

So, the first finding that they had -- and I'll just attempt to summarize this -- there's, basically, a discrepancy between dates for the operational period, the end of the operational period and the start of residual period. So, the -- between revisions -- between the issuance of revision 0, so the original revision, and the original, I believe, it was just a dose reconstruction methodology -- methodology document, the residual period start date and operational period end date changed from April 1, 1955, to October 1, 1955. So, there's a six month difference there, and this is an issue because of the dose assignment during these periods. So, during the operational period, the technical basis document prescribes assigning a dose of .6 millirem per day during operations and .16 millirem. So, that's about a factor of five difference in dose between those two numbers.

So, over the course of six months - I'm going to scroll down a little bit because I explained this in a little while -- but in -- in that 183-day period, that resulted in a total dose of about 80 and a half millirem. And so, the -- the question is did we do enough in PER-93 to make sure that we didn't miss this in any claims previously.

So, what we did at NIOSH, we had a search query in NOCTS. We pulled all the claims that met the criteria of having employment between this -- these periods where we may have misdosed. In total there were 10 claims that met the criteria. About half were, actually, pulled -- were pulled

for inclusion in the SEC. And that left us with about, you know, a quarter of those claims. Again, this was less than 10 in total -- were -- basically, had -- were not affected by the employment dates. The -- their employment didn't fall, specifically -- they had no employment within that shift from April to October as -- which left us with just a few claims.

Only one had a POC greater than 45 percent, and the second one was less than 25 percent. We went ahead and reworked both claims. The claim that had a POC over 45 percent, actually, was compensated through the SEC. So, the rework that we did was really just illustrative, just an opportunity to train new health physicists and -- and just to make sure that we weren't missing anything.

So, that was -- and I'm going to go through in more detail towards the end. There's a little discussion session where we -- section where we cover each of these in a -- in more detail.

So, the second finding was that ingestion intakes were not assigned for -- between -- for one of the claims between April 1, 1954, and September 30, 1955 -- excuse me -- intakes were assigned; however, there was a -- a -- an issue of the -- the numbers were flipped. So, the intake assigned should have been 39.4 picocuries per day for uranium, thorium, and radium. It -- all those nucleotides are listed here. The dose reconstructor mistakenly assigned 34.9, so the four and the nine switched places. And this results in -- in a smaller dose than what should have been assigned. And we agree that, you know, the assigned dose was incorrect, and we'll discuss this a little later.

Finding three, this is the finding where ingestion intakes were not

assigned mistakenly, and we agree. We evaluated the dose that would have -- that should have been assigned. They were both less than one millirem. So, the assigned dose to the lung would have been 7.8 microrem and 10.7 microrem to the prostate. So, pretty small doses.

And finding four, again, missing ingestion intakes between the periods listed here, so, October 1, 1955, through December 31, 1955. And again, so -- 4.1 microrem to the lung, 5.5 microrem to the prostate, which should have been assigned but was not. And finally, the -- the lone observation had to do with the CAD program. And CAD doesn't -- the CAD doesn't have default intakes for Texas City Chemicals, which I can confirm makes doing the internal dose reconstruction fairly tedious. And as I say in the response, you know, we're aware of this condition. We concur that it -- this can lead to potential errors in internal dose reconstructions; however, due to competing priorities, we plan on assessing this in the future as we take care of some other obligations and additional resources become available.

So, before we get into the discussion, I just want to see if there are any questions. Otherwise, I will briefly go through what we did when we reworked this claim that had the errors. Is there any questions before we dive into this? Hopefully this will answer any.

CHAIR BEACH: None here. Thanks, Alek.

MR. KRANBUHL: Okay.

MEMBER ZIEMER: I have none. I --

MR. KRANBUHL: So, --

MEMBER ZIEMER: -- (indiscernible). This is Paul.

MR. KRANBUHL: Okay. So, like I said, we're -- we reworked the --

the claim that was -- had a POC greater than 45 percent. This claim was compensated through the SEC, so, again, this was really just illustrative. So, what we did was go back. We assigned the missing ingestion intakes, and we corrected the inhalation intakes. And you can kind of see down in table one the effect that this had.

So, a slight increase in the internal dose to the lung, and there's a pretty significant decrease in internal dose to the prostate. And that is due to when we reworked the claim, it went from below 45 percent POC to above, and that triggered some best-estimate methods. So, that would be assigning consistent intakes instead of maximizing intakes. So, when you assign consistent intakes, solid -- solubility classes between the lung and prostate, the higher solubility classes give you a higher dose to the prostate but reduce the dose to the lung and -- and vice versa. The less soluble classes give you more dose for the lung and reduce the dose of the prostate. So, when we reworked the claim, we use the more -- the less soluble classes, which gives you a larger dose to the lung and slightly reduced -- and reduces the dose to the prostate. But you can see that -- so, the total effect here, when you do -- when we did the 30 IREP runs with 10,000 iterations, we got a POC of 46 point -- excuse me -- 43.86 percent to the lung and 2.86 percent for the prostate. The combined POC is still less than 50 percent.

So, with that, I guess, I will open up to any questions that this may have triggered. Hopefully this was fairly straightforward. Like I said, again, it was really just illustrative.

MS. GOGLIOTTI: Can we talk about the internal dose there for the lung?

MR. KRANBUHL: Yes.

MS. GOGLIOTTI: Did you change some uncertainty or is this all statistical? It's about a rem --

MR. KRANBUHL: Yes.

MS. GOGLIOTTI: -- in dose and the POC went down.

MR. KRANBUHL: Correct. Yes. So, the reason for that is when you change -- when IREP goes from 2000 iterations to 10,000 iterations, the increased number of iterations reduced -- from what I could see when I was doing the runs, it reduced the uncertainty a bit, and that pulled the POC -- it reduced the POC slightly.

MS. GOGLIOTTI: Okay. So, that's all statistical in nature, in your opinion?

MR. KRANBUHL: Yes. I don't know if -- yeah, if anyone else wants to weigh in. That -- that was --

DR. TAULBEE: Sure.

MR. KRANBUHL: -- from doing the run, what I could see.

DR. TAULBEE: This is Tim Taulbee. We -- we see this going both ways at different times whenever we make that switch from 2000 iterations to the 30 runs with 10,000 iterations. And when I spoke to the Board, I believe it was last --

UNKNOWN SPEAKER: (Indiscernible.)

DR. TAULBEE: -- I don't remember -- know when it was that I gave that presentation --

CHAIR BEACH: December, Tim, I believe.

DR. TAULBEE: Okay. In December. What we're doing is shrinking that

confidence interval about that 99th percentile. So, when we make that transition, it can do something like this, and it looks this way. The more accurate number, of course, is that 30 runs at 10,000 iteration.

MS. GOGLIOTTI: I just wanted to confirm that when you did your CAD modeling, you didn't change the uncertainty when you were entering it. So, the IREP only changed the dose that was done, correct?

MR. KRANBUHL: Correct, yes. The -- there was nothing in CAD that -- that was changed, as far as the -- the distributions that were assigned for the -- for the doses. They were all assigned as constants in accordance with the Texas City Chemical TBD.

MS. GOGLIOTTI: Okay. Yeah. That's what I'm getting at. Thank you.

UNKNOWN SPEAKER: Let me --

MS. BEHLING: This is Kathy Behling. Sorry.

UNKNOWN SPEAKER: That's okay. Go ahead, --

MS. BEHLING: No, you go ahead.

UNKNOWN SPEAKER: -- Kathy.

MS. BEHLING: Okay. Just a -- thanks. Just a question with regard to solubility types. For the best-estimate cases, do you ever use the most claimant favorable for, like, the lungs Type S and then with the prostate use the Type M? Do you -- or do you always consistently use this same solubility? I assume you --

MR. KRANBUHL: For best estimates, the procedure does say to use the same solubility class.

MS. BEHLING: Okay. That's -- yeah, just curious.

MS. GOGLIOTTI: That came up in dose reconstruction a few years ago,

Kathy, and we talked about it a lot.

MS. BEHLING: Okay.

MS. GOGLIOTTI: I can dig --

MS. BEHLING: Thank you.

MS. GOGLIOTTI: -- for you if you want.

MS. BEHLING: All right.

MS. GOGLIOTTI: But with respect to the findings and observations, NIOSH seems to be in complete agreement with all of SC&A's findings and observations, and everything seems to be an order. I don't know that we even need to formally respond unless the Board would like to -- us to.

CHAIR BEACH: I don't believe you need to. Paul, Loretta, or anybody else?

MEMBER ZIEMER: No, I think the responses are appropriate to -- to what the concerns were.

CHAIR BEACH: I think that we --

MS. GOGLIOTTI: Okay. Great. So, we can close them out?

CHAIR BEACH: Well, is there one that you -- the first finding, wasn't there one that we might need to track?

MR. KRANBUHL: Finding one, let's -- we can go back and discuss that further if we'd like to. Basically, our findings when we went through NOCTS, there should not be any claims that were missed. We went back, verified that -- but -- so the -- the claims that would have been affected have all been evaluated and would not result in any -- it would not change the POC of any claims that were -- that were evaluated.

CHAIR BEACH: Right.

MR. KRANBUHL: Like I said, it's a small group. It was less than 10 claims, and half of those claims were actually compensated through the SEC already. So, that -- that further -- less than five claims in total would have been affected at all.

CHAIR BEACH: Okay. So, SC&A, your recommendation is to close out all of these?

MS. GOGLIOTTI: That is my recommendation. The first one, it was just kind of a funky situation where the guidance changed, but it was an earlier revision where it changed so the PER didn't capture that six-month time frame. I've never seen that happen before, and this case was unique in that it -- something changed that we weren't expecting to see changed in the PER, and that's what caught my attention.

CHAIR BEACH: Okay. All in agreement, subcommittee, with closing four findings and the observation?

MEMBER ZIEMER: Yes. I'm in agreement.

CHAIR BEACH: Okay.

MEMBER ZIEMER: Loretta, okay?

CHAIR BEACH: Yeah. Did we lose you, Loretta?

MEMBER VALERIO: No, I -- can you hear me now?

CHAIR BEACH: Yes.

MEMBER VALERIO: I agree.

CHAIR BEACH: Okay. So, we are in agreement. And Kathy, of course, you'll do your magic with the tracking?

MS. BEHLING: Yes.

ANL-W TBD Revision Application of ORAUT-RPRT-0097

CHAIR BEACH: Okay. So, if everybody's in agreement, we'll move on to ORAUT-0097. That one, I think, we just needed to clarify a few things. The first thing, Tim, you had told us that you would send a paragraph to Kathy with the close-out language that we discussed at our last meeting. Did you ever get a chance to do that?

DR. TAULBEE: No. I had -- that, actually, dropped off my radar. I apologize here.

CHAIR BEACH: Yeah.

DR. TAULBEE: Okay. So, I need to send --

CHAIR BEACH: -- know for this description or what.

DR. TAULBEE: Okay. I'm sorry, I -- that completely dropped off my radar. We were discussing this the other day of -- you know, about it being on the agenda and all, and I completely missed that it was for me to send a paragraph summarizing --

CHAIR BEACH: Yes.

DR. TAULBEE: Can -- can you --

CHAIR BEACH: (Indiscernible) --

DR. TAULBEE: -- refresh my memory?

CHAIR BEACH: Well, you had briefly just told us what -- what the close out would be, and then we asked just -- you know, for -- so it was correct, if you could send that in writing to Kathy, and I thought maybe you were waiting for the transcript, but.

MS. BEHLING: Yeah, you mentioned -- yeah. I think he -- you

mentioned that you wanted to wait for the transcript.

DR. TAULBEE: Okay. All right. I will review the transcript on that.

CHAIR BEACH: And it --

MS. BEHLING: And, actually, when the tran -- this is Kathy. When the transcripts coming out, I can go through and summarize it, also, and send it over to you and be sure that I'm capturing what you said during that or summarizing it.

DR. TAULBEE: Sure, --

MS. BEHLING: And, Josie, --

DR. TAULBEE: -- to do that, that would be great.

MS. BEHLING: Okay. I -- I will take that on.

CHAIR BEACH: Okay. So, --

MS. BEHLING: And, Josie, did we -- and I apologize for interrupting here, but --

CHAIR BEACH: Oh, no, that's okay.

MS. BEHLING: -- did we skip the Peek Street review? I don't think -- I think that was an item that we're waiting for NIOSH's response on it, and I'm not sure. Did we skip that?

CHAIR BEACH: Well, I had mentioned at the beginning that it should probably have been taken off. I was confusing Peek Street with what we needed for 97. So, yeah, we're -- we're waiting for NIOSH, and that'll be on the next -- for the next meeting. So, yeah, we --

MS. BEHLING: Okay. All right.

CHAIR BEACH: -- (indiscernible). There's nothing new for it today.

MS. BEHLING: Okay.

CHAIR BEACH: So, sorry, --

MS. BEHLING: And then -- Okay. And then also, with the ANL-West TBD revision and the Report-97, I think what we decided that needs to be done is that we are going to do something of a focused review of Report-89, because that's where Report-97 has been applied. And I don't -- as we -- yeah, it was various emails that went back and forth. I don't think there should be a conflict with this being reviewed under another work group, but we're just, perhaps, going to look at a focused review of Report-89?

CHAIR BEACH: Correct.

DR. TAULBEE: (Indiscernible) --

CHAIR BEACH: Is that out? I wasn't sure if it was out.

MS. BEHLING: Yes.

CHAIR BEACH: Okay.

DR. TAULBEE: This is Tim.

MS. BEHLING: Yes, that is.

DR. TAULBEE: This is Tim. I mean, this is a report that -- Report-89 is -- is really written for the INL work group because they have an active SEC that's out there that is evaluating this from that standpoint. I mean, I don't have any problem with -- SC&A's going to review it either way. It just seems like that could be duplicative effort of that work group would be wanting to look at this in light of that SEC, and you-all want to look and see how we're applying Report-97. It seems like, you know, jointly together, you know, you could work on that from that standpoint. But it seems odd that you would do a focused review here, and then that work group is going to do a full review. That's just what I'm throwing out there. Seems like that

since it's an active SEC, that that should take, kind of -- I don't want to say priority, but it seems a slightly higher hierarchy -- hierarchy here.

CHAIR BEACH: Yeah, it's -- it's a -- it's a confusing one. Because what we need for -- for the subcommittee is slightly different, I think. But it's -- it could be -- it could be duplicated. I don't want to lose it for the subcommittee in -- in waiting for INL either.

MEMBER ZIEMER: It would seem to me that the full review will cover whatever a focused review would cover, though, right?

CHAIR BEACH: Yes.

MEMBER ZIEMER: So, there's --

CHAIR BEACH: I just don't know what that -- I'm wondering what the time line will be for INL. We haven't met for a while. I mean, I could -- we could do it either way.

MR. BARTON: Well, this is -- this is Bob Barton. I think -- I think Dr. Ziemer is correct that when we do our review, we'll be coming at it from potentially all angles. So, the sub --

CHAIR BEACH: Yeah.

MR. BARTON: -- what the subcommittee needs, I think, we can certainly discuss and then, also, what the INL work group needs, will, obviously, be the full breadth of the issues. I'm not sure it needs to be split one or the other. I think we can handle it in both arenas.

CHAIR BEACH: Okay. Well, that makes sense then. And we'll just -- we'll just make a note of it so we can track it and -- when INL meets again for that. Thanks for weighing in, --

MS. BEHLING: Okay.

CHAIR BEACH: -- Paul and Bob. So, anything else for that, Kathy --

MS. BEHLING: I think --

CHAIR BEACH: -- or subcommittee members?

MS. BEHLING: -- that's all I have.

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

CHAIR BEACH: Hi, Lori.

MS. MARION-MOSS: Hi. I want to ask Kathy, if you could, when you summarize from the transcript for this report, could you -- and send it to Tim, could you, please, cc me on that, please?

MS. BEHLING: Of course, yes. I will do that. Okay. Let me see. I was going to try and share my screen here. See if we can do this.

CHAIR BEACH: All right. So, we are ready to move on to 0071, and is that you reporting, Kathy, on the external dose coworker method -- methodology?

MS. BEHLING: This is going to be Dr. Griffiths is --

CHAIR BEACH: Okay.

MS. BEHLING: Has he joined us?

DR. GRIFFITHS: Can you hear me now, Kathy?

CHAIR BEACH: Yes, --

MS. BEHLING: Yeah, we can --

CHAIR BEACH: -- we can.

MS. BEHLING: -- hear you now.

DR. GRIFFITHS: Okay. Sorry about that. So, I got -- I got audio on my phone, and I got the -- the laptop on video. So, sorry about the complication here.

MS. BEHLING: No problem.

DR. GRIFFITHS: Okay. And I --

MS. BEHLING: Okay. And I -- and is everyone able to view -- yeah. Is everyone able to view my screen that we have the slides showing?

CHAIR BEACH: Yep, --

DR. GRIFFITHS: Yeah.

MS. BEHLING: Okay. Very good.

DR. GRIFFITHS: Okay, thank you, Kathy.

NEWLY ISSUED SC&A REVIEWS

ORAUT-RPRT-0071 "External Dose Coworker Methodology"

DR. GRIFFITHS: This is Richard Griffiths, and I am going to provide an overview of the review that SC&A did on Report-0071, which is titled "External Dose Coworker Methodology," also known, at least to me, as the multiple imputation report.

So, Kathy, we can go to the next slide.

Okay. So, I'm going to start with an overview of the methodology described in -- in 71. And then I'll -- I'll give a brief overview of our review of 71 and go into some observations and some -- some comments. All right.

So, let me start with the overview of Report-0071. This report describes the multiple imputation method for filling in censored readings, or censored dosimeter readings that are censored in the sense that they're less than the limit of detection. And so, let me kind of set the stage here by giving you an example of -- of what the methodology deals with. We have a

date -- a dataset of a number of individuals who have dosimeter readings. And in Report-071, we have -- we have dosimeter readings -- multiple readings for individuals -- individual workers for a given year.

And if on that dataset we have some -- some readings that are, in a sense, unusable statistically, in the sense that, perhaps, they don't have scalar number values associated with them. For instance, the case handled in 71 is that some readings are less than the limit of detection or .05 millirems. In that case, they get reported as a range of values, 0 to .05 or at less than .05. Other -- other situations in which this multiple imputation method could work, too, and not so much covered in Report 71 are if some of the readings are missing or even if some of the readings are unreliable. In any of those cases, a method for filling in that data to complete the dataset using an imputation method could be used. Okay.

So as statisticians, I mean -- when we have readings like this that are unusable, at least statistically, I mean, we have a number of options. One option would be just to drop those readings, not use them in statistical analysis because they can't be used in calculations, they're not scalars, they're not numbers. That kind of option, though, would -- you know, it would reduce the size of the dataset, reduce the power available to the analyst to make inferences, and most likely bias the inferences.

Two, in the case covered in 71, I mean, one thing you could do is, for those where the censored readings are less than .05, you could use a value that you know is in that range, say one half of .05, so .025, and fill that value in for the missing -- missing information. And that is, actually, the message that juxtaposed in Report 71 with the multiple imputation method.

Or another way of dealing with this is to populate some kind of statistical model based on the information you have in the dataset and use that statistical model to generate imputation. Okay. So -- so, let's -- let's assume that we have a few observations or a few individuals for whom we have censored data in this dataset. And we do use a statistical model to impute for those or to fill in those missing values or unusable values.

And in this case, we know -- we do have information on these cases, right. We know the -- the values are less than the limit of detection, so, .05. So, our model might, you know -- might estimate for these unknown values, and it might fill in things like .01 or .03 or .04. Okay. And so, what would happen in a situation like that is, we'd use the statistical model to impute.

Let's say we have three values to impute for, and we fill in those -- those three -- three value -- values by -- given by the model estimator or guessed by the model at point .01, .03, .04. We would then take the dataset, the complete dataset, okay, with the imputed values. Okay. So, for -- for everybody except those three individuals in my example, the -- the values are above the limit of detection, so they're usable values and they -- that dataset then with the imputed values and the good values can be passed downstream to, you know, whatever analysis is going to be done. So, in the case handled in Report 71, it's passed down to a coworker model, okay.

Multiple imputation is different from that scenario only in the sense that in that scenario, I only filled in one value for the -- the missing values. So, I had three missing values, three missing individual -- missing values,

and I only filled in one value for each of those individuals. In multiple imputation, you start off with a statistical model as shown in Report 71, and you go through the process of filling in the values. So, just like we did with the -- with that first example, we fill in values for those three individuals and then we have a dataset. All right. But multiple imputation goes further than that. It has a statistical model, and that model has a random component to it. And so, you could actually generate another set of imputations for those three individuals. And so, for multiple imputation, that's what we do. So, we can generate another set. So, where we had .01, .03, and .04 in the first imputation, we get a -- might get a second imputation with a .02, .02, and a .01, okay. And then we can put those into a second dataset, okay.

So, the second dataset is the same as the first dataset. All of the observations that were good observations are -- are carried over into the new dataset. But for those three individuals where we have missing values and we've imputed for; we now have another set of imputed values. So, we actually have multiple imputations and multiple datasets with these multiple replicates used in the -- in the MI method.

Okay. And so, you can -- you can do that with a statistical model as many times as you like. You can create five replicates. You can create 10 replicates. You could do 10,000 replicates. Okay. And then you would have -- after all those replicates, you would have a dataset for each replicate -- a complete dataset for each record. And we'll discuss a little bit about why you'd want to do that, right. The -- you know, if you have -- sent 10,000 datasets downstream to a coworker model, I mean, it's going to take longer to run, it's a little more complicated, the analysis, and then -- than it

would be with a single imputation.

But we'll talk -- and Report-071 talks about why you would do that, and we'll talk a little bit about it, too in the review. In general, once you have these replicated datasets, you use some kind of averaging in -- in the final analysis are the downstream analyses with these.

What Report-071 shows is that each of the datasets that's passed downstream is run individually through the coworker model. Okay. So, let's say we have 10 replicates in our multiple imputation methodology. We then get 10 datasets, and we then run the coworker model 10 times, once for each of those datasets. And then once we get the parameter estimates, the geometric means, the geometric standard deviations from each of those 10 replicates, we average across the 10 -- the 10 runs of the coworker model, and we use those, you know, further downstream as the average geometric mean and the average geometric standard deviation in any further analyses. But in general, that's pretty typical of multiple imputation. What it does is it takes the replicates and averages over them somehow and uses them in, you know, the further analyses.

Okay. So, that's -- that's a little bit of an overview of the multiple imputation methodology and what's discussed in Report 71. One thing I do want to mention about this and the report is that the procedure itself has two components. And I think this is important for understanding the comments on the 71 and really on understanding what's going on with multiple imputation. So, there's -- one is the method, the imputation method itself. It's multiple imputation. It could be something else. You could -- you know, clearly you could impute different ways. And then

there's a probability model the underlying -- that underlies the imputation. Okay. And the two can kind of be switched out. I mean, you could use a single imputation method with a probability model, you could use a multiple imputation method with the same probability model, or you could -- you know, you could change the probability model and still use a multiple imputation method. Okay. So, in some sense, those two things, I think, have to be understood separately, and we have to think about them separately. Okay.

Kathy, we can go on to the next slide.

All right. So, let me give a little overview of what I'm going to talk about in our review. In general, I think we find that multiple imputation is a good method. It's a justifiable method, and it likely improves on the LOD over two method, which I mentioned at the outset of the other slide. I think, you know, statistically, multiple imputation can be regarded as state of the art. It's a method that can, in certain forms, reduce bias or over and under statement in your final inferences, and it allows for the measurement of estimator uncertainty. Okay. And so, I want to pause there a little bit and -- but one of the things that's key to understanding our comments on the review is that when you impute data for missing data or for data that's unusable, censored data, you know, what you're -- what you're doing is you're using a probability model to estimate the actual value. Okay. And so, there's uncertainty involved in -- in doing that. And typically, when we pass the datasets downstream and imputed values, we don't account for that uncertainty in the imputations. But multiple imputation -- and this is really key to multiple imputation -- it allows you to, you know, account for

the uncertainty in that, and in the uncertainty propagated downstream in the models afterward.

Okay. Another -- another thought we have on this, 0071 focuses on the lognormal probability model, and it does acknowledge that there are going to be, you know, at other times, models that could be used as the probability structure for informing multiple imputations, but -- and it acknowledges that, you know, the assumption should be validated on a case-by-case basis, but I think some of the comments later on will point out that there's -- there's an important section, I think, in Report-0-71 that really focuses on the lognormal model. I think it's sort of the place where, you know, perhaps we need to -- to consider the possibility of other models. But I'll get to that later on.

And so, overall, in general, SC&A views multiple imputation positively, but believes there are several topics that could be explored further and considered further. This is going to lead into the first of our four observations, for high-level observations.

We can go on to the next slide, Kathy. Can we flip over to the observation one -- slide? It's frozen on my screen. That's the previous slide.

CHAIR BEACH: Yeah, did we lose you, Kathy? Hmmm.

DR. GRIFFITHS: Hmm, all right.

CHAIR BEACH: Yeah.

DR. GRIFFITHS: That won't destroy -- destroy my presentation, but it might make it hard for everybody to follow. All right. But I -- I will -- in the -- given the -- to make sure we have progressed with time here, let me go

on. But what -- we'll see here. Okay.

So, four high-level observations. All right. The first high-level observation that we have, observation one, is -- really focuses on this issue of uncertainty. Multiple imputation, the key benefit is being able to accurately account for error of the imputations. Okay. And we feel that Report-0071 doesn't capitalize on this benefit. I think that if it did, it could help to under -- it could help the analyst to understand the uncertainty, the downstream, not only in the imputations, but the uncertainty in propagated downstream in further models like a coworker model and even further downstream in the in a POC calculation. And so, I understand from reading 0071 that the measures of uncertainty are not currently used in the coworker models downstream. It does acknowledge that there are methods available for estimating that uncertainty; however, in our view, there's, you know, not much -- it's -- it's most -- to us the biggest benefit is this estimation of uncertainty in the models downstream. And so, it seems like there may not be much of a point in using multiple imputation as opposed to single imputation, which is less complicated if we're not going to take advantage of the -- you know, the ability of the multiple imputation to allow estimation of uncertainty.

All right. So, that's -- that's our first high-level observation. Our second high-level observation --

MEMBER ZIEMER: Richard, could I interrupt you? This is Paul Ziemer. Could I interrupt quickly?

DR. GRIFFITHS: Sure.

MEMBER ZIEMER: I think all of us, also, have a -- have copies of your

presentation individually that were distributed, so if -- if Kathy is unable to get this slide --

MS. BEHLING: Yeah, I'm --

MEMBER ZIEMER: -- slide on --

CHAIR BEACH: It's back on.

MS. BEHLING: Yeah, I think --

MEMBER ZIEMER: Oh, oh, okay. Well, I --

MS. BEHLING: And it -- yeah.

MEMBER ZIEMER: -- switched my --

MS. BEHLING: -- forgive me.

MEMBER ZIEMER: -- screen over. Okay. Sorry. I actually --

MS. BEHLING: Okay. And forgive me --

MEMBER ZIEMER: -- (indiscernible) --

MS. BEHLING: Yeah. Forgive me. I lost audio. Forgive me I lost audio. Can you hear me?

MEMBER ZIEMER: Yeah.

CHAIR BEACH: Yeah, we can.

MS. BEHLING: Okay. My apologies, but Rose, if you want to continue, that's fine. Thank you.

MS. GOGLIOTTI: Yeah, sorry, Kathy. I stole it.

MS. BEHLING: No problem. Thank you.

MEMBER ZIEMER: (Indiscernible) --

MS. BEHLING: I appreciate it. I just -- yeah, I lost audio. Sorry.

CHAIR BEACH: That's okay.

DR. GRIFFITHS: It's not just me loosing audio, huh? All right. Thank

you, Rose, for picking it up.

All right. So, observation two then. Explore mixture models. There's a lot of -- some of what goes into Report-0071 deals with the -- some negative observations, which come from, essentially, statistical measurement errors. So, essentially, taking the readings and tracking out background noise, radiation noise, and sometimes the -- the actual readings come back as negative. And so, this comes from, what we would call as statisticians, statistical measurement error. Our -- our comments on this is that, that subtraction of the background noise, which can be positive or negative, is actually applicable to all measurements, not just the ones that come back negative. So, and I'll talk -- I'll talk about this a little bit later on too, but the issue here is that, you know, the model that gets set up for imputing, basically, is set up in one sense to -- to not allow a negative observation. And our feeling on it is that there is this background noise, it is positive and negative, and it applies. It actually -- it actually applies to all observation.

Okay. And so, we're thinking improvements are another consideration that could be, you know, added, I think, to Report-0071 is that something, you know, that accounts for -- a statistical way of accounting for this measurement error. And that would be one way to do that is through mixture models, which have been explored in -- in other reports that this-- this group has seen, in particular here, Report-0096. So, we feel like observation two is that these mixture models can be combined with multiple imputation to develop better inferences.

Okay. All right. Next slide --

MEMBER ZIEMER: Richard, can I interrupt again?

DR. GRIFFITHS: Sure.

MEMBER ZIEMER: Richard, before you leave that slide -- when you say statistical measurement error, what does that mean? Because people do get negative values on -- on low detection levels where -- where you're subtracting background. I don't believe that's an error in -- in the usual sense. You can get a negative number.

DR. GRIFFITHS: Yeah. Yeah. No, that's true. And that report --

MEMBER ZIEMER: I mean, it's a real -- it's a real -- it's the real value that's obtained because of the nature of the -- of where you are in -- in terms of the background and the actual measurement. So, when you call it a measurement error, is that just statistically speaking? It's not a -- it's really not a measurement error by the person who's doing the work.

DR. GRIFFITHS: Yeah, no, that's correct. Yeah. So, sometimes I find that statistical terminology can be misleading. And I -- I've always thought that the use of the term error is -- is one of those terms, and it's unfortunate. But it pops up in a lot of places in statistical terminology. But that --

MEMBER ZIEMER: So, that --

DR. GRIFFITHS: Yeah.

MEMBER ZIEMER: It has a statistical meaning, not -- yeah, okay.

DR. GRIFFITHS: Yeah.

MEMBER ZIEMER: I just want to make sure what the terminology referred to in this case. Because negative values or real values for --

DR. GRIFFITHS: Right.

MEMBER ZIEMER: -- work --

DR. GRIFFITHS: Yeah.

MEMBER ZIEMER: -- that in this. Yeah. Okay. Thanks.

DR. GRIFFITHS: Right. Right. And so, yeah. So, I thank you for pointing it out. I am going to talk about a little bit more -- in more detail later on, but yeah, so you're right. The negative readings, the negative values can be real. Right. And -- and the way that I'll talk about it later on is that what you actually get in a reading is sort of a true value, a true dosage, which can't be negative, right. It's got to be zero or greater. So, that true dosage. But that's not what initially gets reported, right. Because like you say, there's this, you know -- it depends upon the background and -- and -- and a negative reading can be an actual reading, right. But it doesn't reflect what is called the true dosage. So, what you get is like a true dosage plus, in statistical parlance, a measurement error, okay, or a negative, you know, subtracted -- a positive subtracted out from a zero or something like that. So -- so, yeah. I'll talk about it a little bit more. The terminology is unfortunate from a statistical point of view. And yeah, so those are real readings, but, you know -- well, we'll talk about it later on, but it's kind of like we're trying to get at a true dosage, which -- which would be, you know, a nonnegative. Okay. That -- is that good enough, Paul?

Okay. Let's -- can you go on --

MEMBER ZIEMER: Yeah, I have a --

DR. GRIFFITHS: -- to the next slide?

MEMBER ZIEMER: I was back on mute. Yeah. Thanks, that's helpful.

DR. GRIFFITHS: Okay. Good. Okay. Rose, we can move on to observation three.

All right. Our third high-arching observation is that the probability model that supports the multiple imputation should be determined individually for each case, each dataset. And Report 71 notes that, knows lognormal is not optimal in all situation -- into all situations, but it does focus on -- only on the lognormal. And in general, we know that, you know, if we misspecify the underlying model, that could very well undermine the implications, but the analysts do need to be aware of other possibilities. And so, we kind of feel like that because 71 is -- is -- is positioned as a reference document, that maybe it would be helpful to include some guidelines for evaluating each situation. So, you know, what we -- should -- what should the analysts be looking for to suggest that the model is lognormal or not. And if -- if it's not, you know, what should we be looking for and how should they think about what type of statistical distribution could be used.

Okay. Observation four, next.

Next slide is, again, an overarching sort of observation here, and one that we'll come back to later on. But this is -- one (indiscernible) account for the relationship with doses to covariates. When I say covariate data, I'm thinking about information that's available that's on the dataset and it's, you know, available for all the individuals. For instance, in some cases, you know, occupation might be available. And in truth, that might be an important factor in -- in thinking about an imputation. I mean, you know, when imputations -- when we want to fill in a value for a missing value or for a value under -- do a limit of detection, we want to use all the available

information we have to get the best estimate possible to reduce the amount of uncertainty we have in that estimate and -- and downstream analyses. And so, in some cases, you know, occupation might be available. There might be other -- other information that's available that could be related to the actual dosage. Okay. And so, and I know this is -- again, this is -- this is -- I've seen reports where things like stratification by occupation stratification by a covariate variable has been used, and that could help improve imputation models and downstream analyses, even -- even to the point where -- and being a statistician, I -- I think of covariate information, not so much as a stratifier to do separate analyses by, but as inclusion actually in the model itself. And so, you know, you could have a lognormal probability model and still even -- even other -- other types of distributions, even nonnormal or nonalgarithm. You could use a regression model that includes the covariate data, you know. There's all kinds of generalized linear models that could incorporate the -- you know, the covariate information, information that's important for understanding the differences among individual (indiscernible) of dosages.

Okay. So -- all right. So, those are my four overarching observations. We can go on to the next slide. And I get into more specific comments here, and then I'll come back to some of these overarching observations and some comments related to those overarching observations. Okay.

So, I'm going to go, kind of, in -- in order of the report here. So, in section one of Report 71, the introduction, dose reconstruction doses are given in Table 1-1, which is sort of the illustrative example that used to drive the discussion and Report 71 about multiple imputation. And in dose -- I

mean, I'm sorry, in Table 1-1, it says the doses were reconstructed to eliminating-- to eliminate the censoring. It doesn't explain how the doses were reconstructed. And so, I -- trying -- as a statistician, trying to understand the data, that -- that was a little disconcerting to me. So, my fifth observation is that the authors don't provide adequate information how doses were reconstructed, and I think that would be beneficial. All right.

The negative -- and this is -- this is on a separate topic. On same slide, but a separate topic. But the negative dose measurements we've talked about a little bit. We think that's important to think about. Okay. We think it's important to think about, again, that term against physical measurement error or, you know, the information, actually, in those negative dose readings. And in reality, sort of, that background noise that -- in all of the reported dose readings. And so, again, I'm going to discuss the fiscal measurement error a little more fully later on, but we think that's an important topic that was -- that was in section one of the introduction of Report 71.

We'll go on to the next slide. Still in the introduction. There is an -- and on Table 1-1 still, here, the report is a really nice summary of -- you know, a really nice illustration I think of different types of imputations and how you might think about imputing and things that are good about them and things are bad about them. There's one column in -- in Table 1-1 though that I kind of want to point out here. And not that there was anything wrong with the column, but I just -- I just want to caution on something here with an observation is that there was a -- it says -- there's a quote from this introduction section. It says these linearly imputed doses

are given in the impute C column of Table 1-1. And if you're -- you know, if you're really interested, you can read through these -- my description here of what that impute C column actually is. But what I want to say is, I -- I -- this method, the impute C column, the linearly imputed doses for methodology, I think it was meant to illustrate one of the imputations, and what I'm worried about -- what we're worried about in looking at that is that it -- it might come off as a legitimate model, and it's, I don't think, really intended to be a legitimate model. You know, it -- essentially, it says that we can impute annually, you know, several doses for an individual annually by linearly increasing the dose over time. And I think that's just meant to illustrate how one of the other methods -- how it's similar to that. But our observation here is -- observation six is that we think it would benefit -- the report would benefit from a disclaimer about the linear imputation model, that it's just meant for illustrative purposes.

Okay. Go on to the next slide, Rose. All right.

Moving on to Section 3.0 of the report. Imputation models in multiple imputation. The authors fit a lognormal distribution to the data there's 3,736 observations or -- or dosages reported, and they come from 732 workers. The reason for that is there's more than one measurement for a year, and we're talking about annual doses in the example in the report. And so, what happens here is it averages out to about five observations per worker. And -- and I'm going to bring in some more statistical terminology here. In statistical parlance, this means the observation's a cluster. Okay. So, we have on average five observations per worker, and -- and the thing is when you -- when you fit statistical models, when you think about the

specifics of it, quite often observations for an individual worker or for just an individual are -- are more closely related to each other than they are if you looked at observations or measurements for other individuals. And so, that -- that has an effect on the fitting of statistical models. And so, you know, if the -- if that sort of intracluster correlation -- if, you know, the measurements for an individual worker are more similar for that worker than they are to other workers and that intracluster correlation is not small, there's -- you kind of need to adjust the fitting of the probability model for that. And so, observation seven, I don't -- I don't -- I guess, I don't know for sure that it wasn't done, but I didn't see anything saying that it was done. So, observation seven is that acknowledge the impact of clustering on -- on the -- on the distributional fitting.

Okay. On to the next slide. All right. So, those -- those previous three observations were -- were in a sense one-offs. They weren't totally related to the high-level observations that I had early -- earlier, but this next comment is, and it goes back to some of the -- it goes back to the focus on the lognormal distribution. And this one focuses on Figure 3-1 of Section 3.0, which was -- I'm sure you guys don't all have this in front of you -- but essentially, that was just a -- a graph of the 3,736 doses in the dataset laid out in order. Okay. So, in other words from smallest to high as an XY graph, basically, against the quantiles. So, essentially, what you get in a graph like that is -- is a line and it's plotted against the log. This -- a log scale. But essentially, what you get is a line from -- going up from the bottom left to the upper right, which shows the valleys of the observation. Okay. And what happens in this graph is that, because there are a lot of

really small observations not just the observations below the limit of detection plotted in here, it's really hard to see what's going on in the bottom part of the graph. And you can't really tell how well -- to me at least, I can't really tell how well the lognormal distribution fits in.

And so -- and so, what I did is I had a dataset, I pulled out those observations, those small observations, and I graphed them.

And Rose, we can skip to the next slide and then we'll come back.

So, I graphed them, and the graph I got the lower end of that distribution. And -- and the thing I want to point out about out about the graph, so, this is a histogram. It, basically, says that for the small observations, most of those small observations are, sort of, concentrated in the middle. So, ostensibly between zero and .05 or whatever level I graphed here. I'm not too sure. I can't read it. This actually does include the negative values here, I believe. But anyway, the -- it's the -- the shape of the graph is sort of symmetric. Okay. And so, these -- these are the observations that would actually be imputed for. So -- so, basically, this is saying this is the bottom tail of distribution of the observations. It looks symmetric. It looks more like a bell-shaped curve, which is more of a normal distribution than a lognormal distribution. In fairness, what Report 71 does is it fits the lognormal distribution to all the observations. So, what I've done here is I've chopped off the right tail. And so, if I had, actually, added the right tail in, it does look like a lognormal distribution I'm pretty sure, but I -- I just kind of want to use this as an illustration of why we shouldn't always, you know -- the lognormal is not the only distribution, right.

And so, if you think about this graph, and this is really the observations that we want to impute for, then the data that we actually want to impute for is more normal than it is lognormal. Okay. Not to say what was done in the -- you know, in Report 71 is wrong using lognormal, but, I think, you know, it illustrates that there are going to be cases where a lognormal is -- is not the appropriate distribution to use.

So, Rose, we can go back up to the previous slide. Okay. So -- so, yeah. So, like I said, so observation eight, we think because Report 71 is meant as a reference document, that some advice could be provided for how to deal with data that's not lognormal. All right.

We can go down to slides now. Thank you, Rose.

All right. Another comment on section 3.0, and this -- this goes back to my discussion -- one of the overarching observations is covariate data. On page -- on page 8 of Report 71, there's examples given other ways to generate multiple imputation. So, you remember we talked back in the beginning slides of this that there certainly are other ways to do imputations, and there's other ways to do multiple imputation, but the use of the covariate data is not mentioned, okay. And sometimes like I -- I -- you know, like I mentioned in the earlier slide about the overarching observation, is that sometimes dosages do vary by population of worker. I mean, you know, it can be something, like I said -- like occupation. And, in fact, data to help us distinguish important characteristics of workers that could be useful and imputing might be -- it might be there on the dataset. And so, I think as a reference document, it should be pointed out that -- that, you know, we should strive to do the best in terms of imputation, make

the imputations as -- as close to certain as possible. And one way to do it would be to use the information to stratify a model or you could use the information, the covariate information, as an independent variable in a -- in some kind of model. So, observation nine is that as a reference document, we feel like the discussion of population subsets should be expanded a little bit more.

All right. Next slide.

All right. So, I think the way this presentation goes is I got two slides here with, sort of, information that leads me into the conclusion of this -- this presentation. All right. Things that I'm going to -- that I want to mention a little bit more about later on. But in Section 3.0, there's -- I think -- I think -- I'm not sure it was titled multiple imputation variations. I think that's my own title.

And I just want to talk about the varieties of multiple imputation now. So, as -- as -- as mentioned, I mean, we, you know, Report-0071 says there are other ways to, you know, frame a multiple imputation methodology traditionally, at least, statistically. And the way it was originally developed -- multiple imputation was developed within a Bayesian frame work. And so, acknowledging that that can be difficult to apply in practice and -- and not saying that Report 71 should apply a Bayesian frame work to it, just noting that, you know, the Bayesian framework is -- is going to be more complex. Okay. And what 071 uses as imputation method is not a Bayesian implementation. And so, there's, you know, it's just another variety of imputation. And there's many varieties of imputation. And this -- this does set the stage a little bit for what I'm going to talk about

later on. But the -- you know, the Bayesian version is probably -- might be unnecessarily complicated for the application here. Nothing wrong with the diversion use; however, when we're discussing the statistical properties of the multiple imputation, things in particular like the statistical bias or the propensity to over or under state, you know, we shouldn't assume that all the benefits of the full or the traditional multiple imputation method applied to the version used in Report-071.

Okay. Next slide.

All right. And then a comments on Section 4.0, coworker models here. Here's a quote here's a quote from page 9 of the report. (Reading): The statistician performing the analysis will make the judgment as to whether or not a given dataset is large enough to provide usable parameter estimate. A statistician is, you know, not just how large the dataset or how well the model fits, you should add a statistician or an analyst quantify the uncertainty in the model parameter estimates. Okay. So, now I'm back to the uncertainty issue here.

So -- so, it's not just -- you know, you have a dataset. It's not just the case of saying, you know, how large is the dataset. If it's more than 30 or more than 100 or more than 10,000, you know, is that enough. And really, it's not so much about the number in that dataset, okay, the size -- emphasizing the dataset. Shouldn't say it's not so much about -- sample size is very important, right. But different datasets can have -- can propagate different levels of uncertainty downstream to not only the imputations, but to the, you know, the models used later on, for instance, the coworker models and the parameter estimates for those. And so -- so,

from my perspective, it's something we should be looking very carefully at, is the uncertainty in these estimates in the imputations in the downstream parameter estimates.

And multiple imputation allows us to quantify that uncertainty. Okay. It's, you know, imputation adds uncertainty and -- but most methods of imputation don't allow us to quantify that uncertainty downstream. And so -- so, we just -- we feel like it's sort of a missed opportunity here if we don't quantify the uncertainty when we have a method to quantify the uncertainty. And, you know, we feel like the report -- this report -- this reference report is -- is the place to explore that. Understood, again, that currently, the downstream models don't really accept, you know, the uncertainty estimates from the imputation method, but it just -- it seems like there's not much return on adding the complication of multiple imputation to a dataset and to an analysis if we're not going to -- you know, we're not going to quantify the uncertainty. It seems like, you know, a simpler method, a single-imputation method, you know, would be easier and more practical.

All right. Next slide.

All right. I am going to close this out with a couple of thoughts on future considerations or future research, and these thoughts are going to harken back to my overarching -- overarching observations. All right. So, and this -- this one, actually, I just said a lot of this one. But the -- the multiple imputation method could be implemented with a single imputation. So, okay. And report is used to denote the number of replicates or a number of multiples we have. So, a single imputation would have to stay

equal to one, and that wouldn't alter the statistical bias properties of the model that's being used in -- in the paper.

What -- what using k greater than one or using multiple imputation does do is -- it does two things. Okay. And I hadn't -- I, maybe, haven't been totally fair about this, because I don't think I've mentioned this part yet. But one thing it does do it does reduce the uncertainty. Okay. So, the thing I've been harping on about measuring, if you have multiple imputations, okay, that does reduce the amount of uncertainty over a single-imputation model. I mean, you're -- in your final estimates but -- but to me, very importantly, it also provides a method for assessing the level of uncertainty. And with a single imputation, you don't get that. So, again, we feel like Report 71 should highlight that and should discussed the benefit more. And -- and -- and we feel like just thinking about this downstream in the -- the coworker coexposure models, using multiple imputation could allow us to properly account for the extra uncertainty in the model parameters propagated from the imputation method and it -- ultimately it could allow us to estimate resultant standard errors, which I -- which I think are important for understanding, you know, the parameter estimates coming out of the coworker model and even thinking about distributions and downstream and probability of causation models.

Okay. So -- okay. Next slide. All right.

Again, measurement error, back to this term. And this is where I'm going to say more about it. Okay. So, again, unfortunate terminology, yes. Saying error -- measurement error. It is there. It's present -- it's present in all -- measurements is -- it's not really an error, but this is from a statistical

point of view, the way this looks is you've got a measured dose, you've got what's reported that is a true dose, which is not known. Right. We know that, you know, non -- nonnegative. Okay. And then the measurement error, which is part of the measurement. Okay.

And so, in some cases, you get a negative measured dose from that, but the simple approach to modeling usually (indiscernible) as the true dose. Right. So, there's this, kind of, like -- Okay. So, there's this random -- random measurements -- random background noise that happens around a measurement, but -- but Report-71 -- and I'll explain this a little bit more in a bit -- it, kind of -- it focuses -- and the model it -- and the model that it develops really, kind of, works to negate those negative measurements. Okay. And -- and what -- you know, Report-71 notes the measurement errors that play in the negative doses and it attempts to count for that via imputation. So, since the true dose value has to be, you know, zero more than none -- nondose -- nonpositive doses negatively, or the negative doses that, you know, necessarily have a negative measurement error -- okay.

But the model postulated in Report-071's a lognormal model, you know, tries to get rid of the negative measurement error in the smaller doses. Right. It says doses have to be greater than zero, so the lognormal model will not allow you to impute something smaller than zero. Okay. And that -- intuitively that makes total sense. Okay. But what it's doing there is really, like I said, the simple approach using model' true value. It's trying to model the true value there. It's not trying to model the -- you know, that -- that background noise that goes into these measurements. Okay.

And the reason I point this out is because this is -- this is not an

unusual thing to do. Okay. But the reason I point this out is because the -- the -- the model -- using a lognormal model, what it does is at the lower end, okay, down near zero, okay, the lognormal model is modeling the true doses. Right. The things that are above zero. All right. But then as the lognormal model -- the values for the lognormal model increase, it starts fitting more the measured doses because nothing is being done about the measurement error in these -- in these dose readings. Right. You've got true value plus measurement error, and so really, there's a random scatter about the true dosage for each individual, but the lognormal model is modeling that. It's modeling the true value for -- plus measurement error at the top end, but at the lower end it's trying to fit a model that won't allow for negative measurements.

So, anyway, that's -- that's sort of setting the stage for the next slide. So, we go to the next slide. And again, back to the mixture models. I just -- I -- I feel like since the mixture models have been examined before, you know, and in conjunction with this project, in particular, Report-0096 looked at mixture models, instead of putting together just a lognormal model that has, you know, the issues that I just mentioned, what I think could be done is you could do something like a lognormal in conjunction with a mixture model. Okay. So, the lognormal model would be more about measuring the true dose all the way through the spectrum, and then a mixture model could be brought in or -- or a measurement-error model could be brought in and mixed with the lognormal model to take a look at this random fluctuation, this background noise. So, we think Report-071 has a bit of a contradiction because this -- because of this. It considers negative measurement errors,

but generally ignores the -- the positive ones. So, observation 10 is that Report-071 does not acknowledge positive measurement error. And that's -- that's -- that's for the reasons that -- that I just mentioned.

Okay. All right. Next slide. Oh, all right. Let me just finish this up then.

Our view multiple imputation -- SC&A's view on multiple imputation is that it's a state-of-the-art approach, that it is incredible approach, and, you know, as a statistician, I think it's the right way to go. Okay. The measurements it targets, and we've talked some, about this are the smallest ones. So, for the same reasons that, perhaps, my criticism of the lognormal model may not make much difference in the long run, because it's really the -- the issues are with the lower end of that lognormal model for the -- for the same reason, you know, the measurements that this multiple imputation model are targeting are the smallest ones, you know, it may not make much difference in -- in the end and downstream -- the downstream analysis. I think in the -- in the paper in the report, I think -- I think there's a case made for the fact that multiple imputation does make an important difference, but I'm not so sure that would be true in all cases because of the -- because we're really in this case, you'd be multiply imputing for small doses. Nonetheless we think, you know, multiple imputation is a good method, but if it's to be pursued further, we'd like to see or we believe further exploration of some of the issues that we've talked about here would benefit the dose reconstruction process.

And I think I have one more slide. Okay. Just the references. Very good. So, these are the -- these are the references that were in the

presentation, and I thank you for your time and probably listening into a subject that only a statistician could love. Thank you.

CHAIR BEACH: Okay. Yeah, good -- good reporting, Richard. Thank you very much. Any questions before I turn it over to NIOSH from subcommittee members? Paul? Loretta?

MEMBER ZIEMER: I -- I have a question, which may be a practical and -- very -- very good presentation, Richard. I learned a lot by it.

CHAIR BEACH: Yeah.

MEMBER ZIEMER: We're -- we're typically interested in doses that are high enough to provide compensation for a worker and my sort of general question is regardless of how we treat that lower end, how much does it affect the doses that we're assigning to the distribution up at the upper end? I -- I understand it reduces the uncertainty a little bit. As a practical matter, we come up with a number that's assigned for probability of causation, and it's not given as a number of plus or minus anything. In fact, as my colleagues know, I always object to the reported accuracy of the number, which is given out to two decimal places. But in any event, as a practical matter, is it -- is there any clear indication that doing the imputate -- is it imputation method, I.M., would affect the decisions on compensation and whether it did or didn't, you know, I -- I could understand, including some discussion in the document, if it doesn't affect it, to, at least, point out that one has considered whether it would have an effect or not. But and maybe it's too early to even answer that question. But I don't know, Richard, if you have any comments on that or maybe NIOSH does.

DR. GRIFFITHS: Yeah, I do have a couple of thoughts on that. So,

one thought is I -- you know, used as it is, just as a multiple imputation method versus, say, something like a single imputation, I -- I don't think it would have a -- you know, a material effect on -- on downstream, you know, analyses. But what -- one thing I am trying to point out here is that when we do imputation, those imputations are not, you know, the truth. Right. They're actually estimates. They're statistical estimates. And if we accounted for the uncertainty in those statistical estimates then that might, you know, change some of the -- the downstream modeling that's done.

DR. TAULBEE: Hey, Paul, this is Tim Taulbee. To try and to weigh in a little bit here, I think I understand what it is that you're asking there. And the way we're using multiple imputation is for the low-end doses as Dr. Griffiths pointed out there. And by the way, that was a very nice presentation. It's just that it doesn't -- you're right it doesn't have a large practical impact on the doses at the high end. It does help us a lot with a way of modeling the doses that are the censored values, and so this is why we've implemented it. It's better than what we were doing in the past, and so this is kind of why we implemented this methodology.

You know, to look at -- Rose, if you could flip up a slide to the conclusions there. The -- you know, we can go through and respond to all of these 10 observations. It's going to take us some time, as you can see, this is really complicated from that standpoint. But we -- I guess, I'm questioning how much effort do you want us to put towards this from the subcommittee here because it's not going to really, I don't think, change anything and how we're doing our current dose reconstructions and how we're developing our coexposure model. We're still going to be applying the

same methodology. We're going to have more documentation that we, you know, considered and addressed these topics, for sure, but I don't see any major changes here. And I certainly didn't hear any of that coming from this presentation that, you know, we're on the wrong path here and that, you know, this method shouldn't be use. I think we got confirmation that this is a good method and we should use it, I do see where there's requests for further exploit -- exploration of the issues, but how much should we expend resources to do that, to address these observation versus accepting this methodology?

CHAIR BEACH: That's a great question, Tim. And you're right, they're all observations. Comments from any other subcommittee members? It's -- it's hard to just let it go when we've done the work.

MR. BARTON: Well, this -- this is Bob Barton. Just to sort of piggyback on what Tim was saying there. I think the real takeaway is that this is a much better method. It's more scientifically accurate than what we were doing before, which was the LOD over two. I think the observations are about documenting why -- why this is better and offering a few avenues to tweak it slightly. But I think Dr. Ziemer's question is also relevant, that we're dealing with really low dose values.

So, to the first part of Dr. Ziemer's question, if I heard it correctly, was, you know, how does this affect the high end of distribution, and the answer is that it really doesn't. But I think the point here and the takeaway really is on this slide, it's -- it's state of the art and it's credible, in our view. So, to the extent we want to prioritize essentially, you know, modifying this report so that it's a little clearer and maybe explore a few tweaks, I -- I

wouldn't consider it extremely important. Think it should be responded to eventually though. But again, the take away that it's -- it's a vast improvement over the previous method, and we find it a credible way to approach coexposure model.

CHAIR BEACH: Okay. That -- those are -- those are good comments, Bob. Thank you. Is it something that can go on the back burner, Tim, for any future rewrites or updates?

DR. TAULBEE: Sure, in fact, that's kind of where it's at right now. Our statisticians are busier on other really pressing issues that we have. And so, they -- I mean, we haven't started this response yet. But, you know, it was more -- like I said, prioritizing our work because we do have limited resources too, this was going to be, you know, addressed as soon as we could get to it. But, like I said, we get some other issues like the GSD of three for internal doses that we're working on right now.

CHAIR BEACH: Right. Okay. So, if everybody's in agreement and we all conclude that this is not a priority and it can possibly stay on the back burner as something moves -- to move forward with when you do some rewrites or updates. And other subcommittee members and SC&A agree with that? I think Bob stated he did.

DR. GRIFFITHS: Yeah, this is Richard. I agree with that.

CHAIR BEACH: Oh, sorry, go ahead, Richard.

MEMBER ZIEMER: Yeah, --

CHAIR BEACH: Oh, Paul, go ahead.

MEMBER ZIEMER: Yeah, well, no. That's -- I think that's fine. I think we -- we did -- do need some sort of response from -- from NIOSH. I -- I --

I don't know whether it needs to be point by point. Maybe it's -- maybe at some point an overall statement of why NIOSH would -- how would NIOSH use this and the -- the extent to, which they would not implement any of this would be, again, just (audio break) really great stuff. We also have to be practical about (audio break) we interact between science (audio break) and if it's not going to change the outcomes, then we have to say it's great, but it's not going to make a difference, if that's the case, but yeah.

CHAIR BEACH: Okay.

MEMBER ZIEMER: But we --

CHAIR BEACH: Well, this --

MEMBER ZIEMER: We do need a response from NIOSH at some point. So, that's -- if it's back-burnered, we have to do it that way. Yeah, thanks.

CHAIR BEACH: Okay. Thanks, Paul. And Richard, did you have a comment?

DR. GRIFFITHS: No, it was just to agree with Bob.

CHAIR BEACH: Oh, okay. Thank you. Tim, and is that something you can give us a response for documentation on -- on this?

DR. TAULBEE: Yes. The -- you know, as I mentioned, it will be a while for that, but, yes. This can go on to the back burner, and we can do that.

CHAIR BEACH: Okay. Well, even the response to start with could be a paragraph that it's not a priority. It's on the back burner. I mean, we -- something simple, at least, to put into the notes at this time. And I don't know if that -- if -- Paul, if you would be in agreement with that, and Lorett, just to state where we are --

MEMBER ZIEMER: Well, I think --

CHAIR BEACH: -- and that --

MEMBER ZIEMER: -- we'd -- I think we have the response verbally, that -- that much of it, and it'll be in the record. So, I don't know that we need something written at this point, I don't --

CHAIR BEACH: Okay. Well, that --

MEMBER ZIEMER: -- from what --

CHAIR BEACH: -- makes sense.

MEMBER ZIEMER: -- Tim said, --

CHAIR BEACH: Yeah.

MEMBER ZIEMER: -- I'm okay -- I'm okay with that. We've -- we, basically -- we agreed that that this continues to be in process or --

CHAIR BEACH: Okay.

MEMBER ZIEMER: -- what -- what terminology we need there. It's --

CHAIR BEACH: I believe it's in progress and then --

MEMBER ZIEMER: Yeah, yeah, right. Yeah.

CHAIR BEACH: So, that makes sense. And then, Kathy, if you'll do your normal tracking.

MS. BEHLING: Yes.

CHAIR BEACH: Okay. Thank you. Is everybody okay to go on with Ron's DCAS PER-047, and then we'll look at a break?

MS. BEHLING: Yes.

DCAS-PER-047 ST4 "GJOO"

CHAIR BEACH: Okay. So, we'll -- unless there's nothing else on that, Ron, we'll look forward to hearing from you on the Grand Junction --

MS. BEHLING: Okay. And --

CHAIR BEACH: -- case.

DR. BUCHANAN: Okay. Yes, I'm here. This is Ron Buchanan with SC&A. I'll be --

CHAIR BEACH: Ron? Ron, you're breaking up really bad. I don't know if the court reporter's going to be able to get you. If you can, get something clearer.

DR. BUCHANAN: Okay. Can you hear me okay now?

CHAIR BEACH: No.

DR. BUCHANAN: Okay. Let me -- let me go to a (audio break). Can you hear me now?

CHAIR BEACH: Oh, that's much better, thank you.

DR. BUCHANAN: Okay. Okay. This is Ron Buchanan with --

MEMBER ZIEMER: That's better.

DR. BUCHANAN: -- SC&A, and I'll be presenting our review of PER-47, subtask 4. Now, this was a Grand Junction facility. Subtask 4 is a review of two cases that were selected by the Board for reevaluation after PER-47 was issued.

Next slide.

By way of introduction, in case some of you might not be familiar with the Grand Junction facility. It's located in Grand Junction, Colorado. The covered period is 1943 to 2006. It was formerly known as the Grand Junction Operation Office, so you'll see "GJOO" in some of these slides. The site was under contract with AEC to support uranium processing, assaying, and milling remediation and had some limited thorium exposures. Now, in

1986 it started as a remediation project. In 2006, it was completed and released. And there's an SEC for 1943 to 1985 due to the lack of dose -- internal dose reconstructability.

Now, the Grand Junction was a relatively small facility compared to National Labs in South Dakota. It didn't get a TBD right away, and so they developed the technical dose reconstruction methodology and templates in place of TBD for the smaller facilities and that was the here, particularly for the facilities to do dose reconstruction. And during in NIOSH's evaluation of SEC petition, they came across a substantial body of new information and had an impact -- could have an impact on dose reconstruction, so they revised the methodology in 2012 and issued PER-47 in 2014 to look at the previous dose reconstructions to see if it would change the outcome.

Next slide. Next slide, please.

So now, we're going to get forward a little bit now. We find out that the facility does have a TBD issued in 2018. TBD-0060 and we reviewed that TBD in 2021, so it kind of out of step with -- with doing this, but we needed to complete the Subtask 4 for the older PER-47.

Next slide, please.

Okay. Now a review of some of the other documentation for this facility, we see that NIOSH did an addendum to their SEC petition evaluation in 2015. We reviewed that and issued a report in 2016. And so, NIOSH issued PER-90 in 2019 to address DR methods modified by the TBD, replacing the previous dose reconstruction document for the facility. And as of yet, we've not been tasked to review PER-90 or the new TBD.

Next slide.

And so, now NIOSH -- SC&A did perform Subtask 1, 2, 3 for PER-47 and issued a report in 2015. And in that report, as you know, whenever we do a PER, we have subtasks one through three, which is a review of the PER, and then at the end, we suggest some cases -- some parameter for the cases for us to review to rework the cases. And in that review, we suggested a post 1960 case, a post 1975 case, and a post 1989 cases, which would cover some of the major phases of operations there. And in April of 2023 NIOSH provided SC&A with two cases, and we'll call it case A and B.

Okay. So, these two cases -- case A was an energy employee at work for a short period during early operations period, which was criterion one. And case B was a for worker who worked an extended time, beginning in 1978, which satisfied criteria two and three. And now, as always, SC&A just reviewed the limited methods that were implemented by PER-47 and not the rest of the dose reconstruction, but just the things that would be caused the issue of the PER.

Next slide.

Okay. So, we're going into little detail on case -- the first case. You know, what I'll do is, I'll go a little bit over the original 2004 dose reconstruction of the external and internal dose, and then we'll jump to the more recent one, 2013 or 2014 and go over that and then see if we have any issues with those if they're (indiscernible) correctly.

So, if you look at case A, you see that the worker worked throughout the site, was not monitored for external exposure. There was one uranium bioassay and the initial DR's performed in 2004 with a POC less than 50 percent. Now, NIOSH reworked the case in 2013 per PER-47.

Now, we'll go into external dose with the original DR for case A. And NIOSH assigned an overestimate of external dose by using a dose limit of 3.000 rem per quarter and also assigned an overestimate of medical X-rays using OTIB-6. Now, the internal dose, NIOSH assigned an overestimate of internal intake, hypothetical 28 radionuclides per OTIB-2, which is, of course, now canceled, but it was in effect back in '04. And NIOSH's thought -- NIOSH felt that the EE's positive bioassay did not indicate an internal dose greater than that derived by the hypothetical intakes, and so used that instead and arrived at a POC less than 50 percent.

Next slide. Okay.

We reviewed the original DR in 2004 (indiscernible). We found that it provides sufficient overestimate, and we did not find any errors for an overestimating method.

Okay. So, then we move on to the 2013 external dose assignment and rework. NIOSH assigned external dose for the doses listed in the then-current methodology document. They assigned a full year of dose of 1.5 rem times the appropriate dose conversion factor, which was an overestimate because the worker didn't work a full year. And they used overestimating methods to assign neutron dose. And they also used OTIB-6 to assign the X-ray dose.

Next slide.

Internal dose, the urine analysis showed activity greater at detection level, so they did use the different solubility types of Uranium-234 and assigned the intake and associated fractions associated with tailings, and these are mine tailings at the facility, and that was used in a maximizing

approach. It was a worst-case scenario. And the additional -- they assigned it for the full year instead of the partial year of work. So, the 2013 rework used the actual urinalysis measurement to divide -- developed a chronic uranium intake, revised the methodology for assigning radium and thorium, and both the 2004 and 2013 were overestimate assumptions used.

Next one.

Okay. So, we evaluated the case A for the 2013 DR, and we evaluated the external and found it was assigned correctly (indiscernible) overestimating method. Same way as the internal. Reran the IREP POCs and got the same approximate numbers NIOSH got. And although, it was -- you didn't -- you would expect that the increase because PER's issuances could be an increase in dose, but it wasn't in this case. It decreased slightly because the rework used an overestimate, but the 2004 used a significant overestimate, and so the POC came out a little less. And we found out that did it correctly for an overestimate and had no observation or finding for the rework of (indiscernible).

Okay. So, that's (indiscernible). The second case, B. And the -- this EE had primarily administrative duties and visited Colorado radium sites. The EE was not monitored for external exposure in the first and later part of employment, was during the middle part of employment, and was not monitored for internal exposure. And the initial 2004 DR resulted in a POC of less than 50 percent. Then NIOSH reworked the case in 2014 for PER-47.

Now, the external dose in the original 2004 DR used the recorded dose to assign monitored proton dose using an overestimating dose conversion factor of 2.0, which is a fairly large overestimate. Assigned missed photon

dose using an overestimated 12 dosimeter exchanges per year, did not assign the unmonitored dose. Assessed the maximum ambient dose for all years of employment and assigned overestimate of occupational medical from OTIB-6. The internal dose, again, used a hypothetical intake with OTIB-2, and the result from this large overestimate was still less than 50 percent for the original DR.

So, we reviewed it and we found that it was a significant overestimate for the external and internal doses, but we found no error in their dose reconstruction.

Now, there's a little glitch comes in then. From 2004 to 2014, the modeling in OTIB-5 for this particular organ changed. And so, this revision required both rotational and isotropic exposure geometries be reconsidered, so that's what they did in 2014 DR external dose assignment.

So, external doses, NIOSH assigned measured missed photon dose for the monitored period and assigned unmonitored proton dose during the unmonitored period, according to the methodology document. Did not assign occupational medical X-ray because it was taken off site.

UNKNOWN SPEAKER: (Indiscernible) this time.

DR. BUCHANAN: Correct. Next slide.

Now, they assigned external neutron dose as the worker wasn't monitored for it. They assigned it using some overestimating methods and assigned it for the period the worker was not monitored.

Next slide.

Now, internal dose, didn't have any internal monitoring records so NIOSH used inhalation ingestion according to the category listed in Table 6

of the methodology document. Based on the worker's duties, assigned the highest possible annual intakes in the Table 6 and using selected values in a chronic annual dose tool, CAD tool, to derive the internal doses.

Now, we evaluated the 2014 external measured missed dose, and as we see there, we -- we agreed with the measured proton, neutron, and missed photon and neutron dose and had no issues with those.

Now, we come and we look at the unmonitored proton dose or reviewed the record and found that the EE was not monitored during some of the periods of employment. We were -- derived -- derived a total unmonitored dose that was greater than NIOSH assigned, so that brings us finding one. Unmonitored photon dose for two years appeared to be incorrect, and there were two aspects. During one year, the worker wasn't monitored for less than half of a year, and it appeared from the spreadsheet that NIOSH had used a factor of around .6 fraction, and so this would have been an overassignment dose. And then we found that for another year that the worker wasn't monitored for three quarters and that the worker -- the worker was only assigned one quarter of unmonitored photon dose. And so, that was our finding one.

Now, looking at the neutron dose, same scenario. We had no issues except for finding two, which was a mirror for the photon dose and found that there's an incorrect fraction resulting in an overestimate and not assigning for two quarters, and so that was an underestimate. So, same issue as with the photon dose.

So now, internal dose. We found the EE was not monitored, that's true, and used the recommendations according to the methodology

document. We derived the same annual internal doses for the employment period for most of the years. We found that EE did work part of a year and another full year for which NIOSH did not appear to have assigned internal intakes, so that brought us to finding three, unmonitored internal dose for two years not assigned resulting in several rems of internal dose but a small fraction of the total dose was omitted, and since the -- NIOSH performed the DR using overestimating approach and the POC was less than 50 percent, we calculated it out and found this would not affect the outcome of the case.

Okay. Now, and another issue was that radon was included in the revised methodology document, and it recommends 5.7 picocuries per liter was assigned to most all workers. And in this DR NIOSH did not assign the radon dose. Now, considering the organ, which I won't mention, but the radon dose may not have been assigned because of the target organ. I would feel that the reason for not assigning should have been stated, so we did have finding four. Radon dose not assigned, according to the documents, it should have. It would not affect the outcome of the case overestimate with less than 50 percent POC.

So, in summary, our evaluation cases A and B we evaluated and verified external or internal dose assigned in the reworked case, ran the IREPs, derived the POCs, receipt -- derived approximate same value as NIOSH had. We had no observation, had four findings concerning proton and neutron did not appear to be correct for two years, and the internal dose not assigned for two years, and radon dose not assigned.

Next slide.

The conclusion is that for each of the two cases for your review

provided an overview and brief comparison of the doses of the original and rework. We find these cases focus strictly on external and internal exposure that were affected by the issuance of PER-47. We found that the doses for case A and B, except for the four findings mentioned, were reevaluated according to PER-47, which is change -- addressed the changes in the methodology document. And we found that the -- the findings we had would not change the POC.

Okay. Any questions?

CHAIR BEACH: Thanks, Ron. Good job on that reporting. Subcommittee, any questions?

MEMBER VALERIO: Josie, this is Loretta. I do have a question.

CHAIR BEACH: Okay. Go for it, Loretta.

MEMBER VALERIO: So, finding three and four would not affect the outcome, is that correct, but findings one and two may affect it?

DR. BUCHANAN: No. No, not --

MEMBER VALERIO: Am I understanding that correctly?

DR. BUCHANAN: No. It would change the POC, but it wouldn't change it significantly to change the outcome of the case. All these findings, one through four, were things that should have been corrected, but it wasn't enough dose to affect the POC significantly to be over 50 percent.

MEMBER VALERIO: Okay. And that's all four findings?

DR. BUCHANAN: Yes, uh-huh.

MEMBER VALERIO: Okay. And then my next question is PER-90 has not been reviewed by SC&A; is that correct?

DR. BUCHANAN: That's correct.

DR. BUCHANAN: And so, my question to Josie is does that needs to be tasked to SC&A?

CHAIR BEACH: Loretta, that was going to be one of my questions or the recommendation, if Kathy had that on her radar or not.

MEMBER ZIEMER: (Indiscernible) --

MS. BEHLING: Yeah, this is Kathy.

CHAIR BEACH: Yeah, no, go ahead. I thought Paul was trying to talk, but.

MEMBER ZIEMER: I will when you're done with this. I have a comment.

CHAIR BEACH: Okay. Thanks. Go ahead, Kathy.

MS. BEHLING: Okay. Yes, I -- I'm aware that PER-90 has not been reviewed, but I didn't put it on the list of PERs for this particular meeting just because I'm a little -- we have -- we get the opportunity to go through the PERs that were classified as not needing a review and we do -- do decide that in some cases we want to review some PERs, that I -- I thought that would be -- take precedent over this because we have reviewed a lot of G -- the -- the Grand Junction cases and Grand Junction TBDs so far. The other thing is, we may want to include some additional DR templates for review, and so it would -- it would -- we would be really stretching our resources to include too many additional PERs. But this is on my radar, and it will be something we could discuss in the future, I hope.

CHAIR BEACH: Okay. That -- that sounds reasonable. So, we'll just keep it on the list low priority or back burner at this point. So, thank you, Kathy.

And then, Paul, comments?

MEMBER ZIEMER: Yes. Well, one -- one thing on reviewing these PERs, one is always looking for something that was systematically done incorrectly that might affect not just the reviewed cases, but other ones that were reviewed. This -- these findings are very specific to this one case, would not have any effect on any other PERs from that group, so even though they are certainly findings, I don't think we need to do anything in terms of making any corrections. I would just say that we should just close this.

CHAIR BEACH: Well, and Paul, I have to ask Ron, we only looked at two cases, and are we sure that this only affected this?

DR. BUCHANAN: Well, the -- the errors I seen were apparently dose reconstruction error. I didn't see anything that the method or procedure that would affect this. This seem to be simply calculating the right fraction or determining the number of quarters missed or the years missed for internal intake. I didn't say anything that was a systematic or procedure problem.

CHAIR BEACH: Okay. Paul --

MEMBER ZIEMER: Yeah, that --

DR. TAULBEE: That --

MEMBER ZIEMER: It's this particular person's work time that --

CHAIR BEACH: Yeah.

MEMBER ZIEMER: -- came into question here. That -- that's why I said it's very specific to this -- this one case.

MEMBER BEACH: Yeah. Okay. I see that. But why was his work time missed, I guess, and did --

MEMBER ZIEMER: Well, I guess you could -- you could ask -- yeah. I

suppose that -- you could say well, how systematic is that or is that just one dose reconstructor that missed something. I -- I -- I sort of had a related question, though.

I -- I thought most of -- I thought we were going to focus on selecting cases that were closer to 50 percent to start with. These are both big overestimate cases, which suggests that they were not near the 50 percent mark to start with.

DR. BUCHANAN: This is Ron. Grand Junction is a small facility, and it was hard to find a couple of cases, I think, --

MEMBER ZIEMER: I gotcha, yeah. Yeah.

DR. BUCHANAN: -- because it just --

MEMBER ZIEMER: Yeah, there just weren't --

DR. BUCHANAN: -- to select --

MEMBER ZIEMER: -- that many cases to select from.

DR. BUCHANAN: Correct.

MEMBER ZIEMER: Gotcha. Thanks.

CHAIR BEACH: And then the criteria that we're looking for, it makes it even harder when you're --

MEMBER ZIEMER: Yeah.

CHAIR BEACH: -- collecting. Okay. And then I think --

MEMBER ZIEMER: Right.

CHAIR BEACH: -- NIOSH --

MR. DAVIS: This is Scott Davis. But I just wanted to -- from the ORAU team. I just want to go back to the -- the question about systematic error, which was a great question, mostly because I already looked into it,

and I have an answer that makes it easier.

UNIDENTIFIED SPEAKER: Okay.

MR. DAVIS: I did look at this specific claim, and it does -- we -- the first two findings do have to do with the prorating of the dose for partial years. And I looked at it, and it appears to be specifically the error was made in this case. We've already talked about PER-90. This case was also done under PER-90. I looked at it, and the -- the fractions were done correctly in that version of it. And also, for the rest of the PERs that were done under PER-47, I looked at the other ones done by this specific dose reconstructor, and this is the only one where I saw that prorating issue. So, I just wanted to point that out.

CHAIR BEACH: Okay. Thanks, Scott.

MR. DAVIS: Sure.

CHAIR BEACH: So, Loretta, Paul suggested that we close these out. If there's no objections, or if you have any objections, state those.

MEMBER VALERIO: This is Loretta. I have no objections.

CHAIR BEACH: Okay. And I agree also. SC&A, are you in agreement with closing out the four findings?

MS. BEHLING: This is Kathy, I -- I am, but I would like to hear Ron's opinion.

CHAIR BEACH: Yeah.

DR. BUCHANAN: That's okay with me.

CHAIR BEACH: Okay.

DR. BUCHANAN: Yes, it's okay.

CHAIR BEACH: Okay, thank you. Good reporting, and we will consider

findings 1, 2, 3, and 4 closed for subtask four. All right.

Before we move on to the next one, which would be Doug on Amchitka Island templates, is everybody okay to go for another report, or are we needing a break? Paul?

MEMBER VALERIO: This is Loretta. I'm okay moving forward, you know, going with Amchitka.

MEMBER ZIEMER: Yeah, we -- we can do one more, but I'm going to need to grab a snack here, but we can do Amchitka first.

CHAIR BEACH: Okay. Well, let's do that, and then we'll -- we'll talk about a break. So, Doug, if you're ready -- and, I think, Kathy, are you running the slides again, or?

MS. BEHLING: Yes, I'm going to try to here. Hold on Just a second.

CHAIR BEACH: Okay.

MS. BEHLING: Sorry about this. Hold on. I have to move this away here. Okay. Here we go. Okay. Are you seeing that?

CHAIR BEACH: Yes, I am.

MR. FARVER: Okay. Are we ready?

MS. BEHLING: Yes.

"Amchitka Island Template"

MR. FARVER: Okay. This is Doug Farver. I'm with SC&A, and I got to review the DR methodology and template and case review for Amchitka Island Nuclear Explosion site.

Next.

MS. BEHLING: Whoops, I'm sorry. There you go.

MR. FARVER: Last February SC&A was tasked to review the dose reconstruction template for Amchitka and also review two adjudicated cases to determine if the template's consistent with the DR methodology document.

Next, please.

Okay. So, the first thing I do when I get a case like this is I request all the references for the documents. So, I got all the references for the methodology document and all the references for the template document, and that's what I use as a basis to go back and look and try to verify different -- like in this case -- time periods.

So, we had three observations about the facility description. I was unable to verify the time periods in the DR methodology. It just states these dates, and it really doesn't even provide a reference, so I was unable to verify that. Unable to verify the date of remediation, the beginning of the drilling, and mobile -- the mobilization of the drilling. So, those are three dates I could not verify. And then third observation is the facility information in the DR methodology is less complete than information in the DR template. The template contains about a little extra paragraph that talks about radiological emission information and provides a reference for it. This was not contained in the DR methodology documents.

Now, I should point out that the DR methodology document was written up, I believe, it was in 2013. And the DR template was modified later. Gosh, I think it was after 2020. Anyway, so there's a little bit of difference between what's in the methodology and what's in the template.

Next slide, please.

There is an SEC that was established by the -- the original Act back -- for employees before January 1st of 1974. I reviewed the Act and verified that the establishment is in there of the SEC.

Next.

External dose. So, I looked at the dosimeter type they used, the photon energy, electron energy, neutron doses, ambient doses, and then the occupational medical dose, and there were two findings identified. One of them was associated with the electron dose and one associated with the occupational medical dose.

Next.

Proton doses. The DR methodology states the penetrating doses should be 30 to 250 keV photon. So, I looked in the Nevada Test Site technical basis document and also OTIB-88, and they both support using the photon energy distribution of 100 percent 30 to 250 keV photons for recorded and missed dose, so no issues with the photon dose.

Next.

Electron dose, and this is our first finding. Electron energy of less than 15 keV in the methodology document is not consistent with the energy in the DR template or the current NIOSH guidance. So, basically, in the methodology document, they specify less than 15 keV electrons, and the template and NTS TBD state it should be greater than 15 keV. This is probably just a typo error, but the problem is when these are the only two documents you have to go by, we would like them to be consistent.

Next, please.

Neutron dose. So, the methodology and the template contains similar

wording. The neutron dose is assigned only to those workers associated with activities involving neutron sources. This section is reserved at this time. If an energy employee had neutron dosimetry and had a potential for neutron exposure, then contact the Amchitka (sic) site lead or principal dosimetrist for further guidance. So, I looked at this and that's considered reasonable. I mean, it's a reasonable assumption since all the detonations were contained in a detonation-formed cavities, and the guidance specifies that those reconstructionist should contact a site lead for neutron dosimetry and potential neutron exposure.

Next.

Onsite ambient dose. Environmental monitoring after the shots indicate that these levels were comparable to background. It did not have survey data, so they assume the maximum average NTS onsite ambient doses, and I believe this is a reasonable approach.

Next.

Occupational medical dose, which leads us to our second finding. Methodology document contains information that conflicts with the template. So, this is similar to the electron. You have two different -- it's not consistent between the two documents. The -- the methodology says there was no medical facilities, and the template states that due to evidence there was a medical facility, you will assign chest X-rays for each partial year worked at the facility. I'll just leave it at that. It's just not consistent. Next, please.

Internal dose. So, I looked at the internal dose, the bioassay monitoring, the doses from tritium, and also environmental sources and

came up with two observations; one related to bioassay data and one related to the tritium. Observations four: Clarity is needed regarding whether there were positive bioassay results. It's not real clear from looking at the methodology or the template if there were positive bioassay results. In -- in -- the template states a little bit more information in that second paragraph, but it just isn't clear if there were positive bioassay results.

Next, please.

Environmental dose. So, the methodology document and the template, they list environmental inhalation and intake -- and ingestion intake rates, and I found those same intake rate, Table 4-7 for the ingestion intake rate and Table 4-11 -- yeah -- inhalation and intake rate. Inhalation in 4-7 and ingestion in 4-11, and no concerns or issues with the environmental doses.

Next.

Tritium dose. Tritium dose information in the methodology differs from the template. The methodology states to -- to add 2 millirem per year, and a template says no we're not going to do that. And a lot of this stems from the fact that that -- that the technical basis document for NTS was revised, and it never got changed in the methodology. So, the template gets revised but not the methodology. And the concern here is you had two -- you have two documents, and they say different things, and it's just not consistent. And it'd be very easy to do. I mean, the methodology document's only two pages long. It wouldn't take -- wouldn't take but a few minutes to go back and look at that every time you revise the template to make sure that your methodology is consistent.

Next, please.

Case one. So, we looked at two cases. This is case one, and it was completed in 2019. The employee worked for at -- for short time at Amchitka, had a qualifying cancer after employment termination, and was monitored for photons and was not bioassayed.

Next.

The employee's recorded dosimetry results were zero, so NIOSH assigned a missed proton dose based on 4 zero-dosimeter cycles. SC&A verified the missed photon doses were calculated correctly and has no concerns related to the missed dose.

Next.

Ambient dose. The employee was not monitored for most of the employment period. NIOSH assigned the maximum ambient dose of 207 millirem per year and adjusted for proportional years of employment, and that was all done correctly and there were no issues with the ambient dose.

Medical dose. NIOSH made a claimant-favorable assumption that the employee received the part -- annual chest X-ray for each partial year. So, this was done in 2019, which would have been after the template had been revised to include adding for the chest X-rays. And after OTIB-79 was revised -- where it says Table 3-2 lists Amchitka as a covered facility for X-rays off -- onsite. There were no concerns with the medical doses.

Internal dose. It was not bioassayed. NIOSH assigned the environment internal environmental doses based on what's in the environmental TBD. They assigned environmental dose from tritium to account for potential exposure from venting and emissions following the

test. NIOSH's approach is consistent with the guidance in TBD-4, Rev. 3. Now, this is the one where you would have the 2 millirem per year of tritium dose, I believe, which was in effect at the time that DR was completed.

Case two. It was completed later in 2022. Employee worked for a brief period and was diagnosed with a cancer after employment termination, was monitored for photons and was not bioassayed.

External dose. Finding three. Justification for neutron exposure is not consistent with the DR methodology document and DR template. DR report states, "To maximize the probability of causation" -- and it gives a photon energy distribution and the neutron -- neut -- based on reported deep-dose measurements have been applied. So, they went and applied neutron dose based on the photon measurement. No indication that the employee worked with a neutron source, and the notation in the particulate calculation workbook reads, "Neutrons added for drill back operation." Well, based on the guidance in the DR methodology document and the DR template and the NTS TBD, SC&A does not believe the employee had potential for exposure to neutrons from drilled back operation, so I'm not sure why they added neutrons.

Next, please.

The employee's recorded dosimetry results were all zero. NIOSH assigned missed photon and neutron dose based on four 0-dosimeter cycles. Finding four. NIOSH underestimated employee's missed proton and neutron doses. Well, the employee had five dosimeter issued. So, there were five zero readings rather than four used by NIOSH, which means they underestimated the dose slightly.

Next.

Because the employee was monitored, NIOSH did not assess onsite ambient doses. Okay. Well, that's consistent with both with the guidance in PROC-60 and the NTNS -- NTS TBD, so no real issues with them not assigning ambient dose.

Next.

NIOSH made the claimant-favorable assumption that they had a chest X-ray for each partial year, and like the last one that's consistent with OTIB-79, and SC&A has no concerns with the occupational medical dose.

Internal dose. Employee was not bioassayed at Amchitka. NIOSH assigned the internal environmental doses in the TBD, both for inhalation and tritium. Oh, they did not assign the environmental doses for tritium, because this occurred after the TBD was revised. I believe, it was revised in 2020, and this case was done in 2022. And that's where they took out assigning the 2 millirem a year for -- for tritium. So, no issues with the internal doses.

So, summarizing our -- our findings and observations, and with the methodology, we had an issue with the electron energy that was in the methodology document, but it was different than the template. Finding two, the medical information in the methodology is different than what's in the template. And then observation one, unable to verify some of the time periods in the DR methodology and unable to verify the dates of remediation and drilling and demobilization of drilling. Observation three, the information in the DR methodology document is less complete than the template. Observation four, clarity is needed whether there were positive

bioassay results at all. And observation five, there's different tritium dose information in the methodology document than what's in the DR template. So, a lot of these observations are methodology and the template are not consistent with what they say.

Next, please.

The concerns with DR cases, finding three, justification for the neutron exposure is not consistent with the DR methodology document and the DR template. And finding four, NIOSH underestimated the employee's missed photon and neutron doses.

Any questions?

CHAIR BEACH: Thanks, Doug. Good job on that reporting. The -- the question I had, just -- it's for NIOSH, and it goes back to the methodology and the template. We've had this come up in a couple of the templates that it's been noted that the two are different. Is -- is your -- what's your methodology on when you change the template, because I know they change quite often? Is it common practice to look at the methodology or -- or what's happening there?

DR. TAULBEE: This is Tim. If you recall, back when we first started discussing DR methodologies and templates and reviewing these documents, I gave a presentation, and I mentioned at that time that it's the dose reconstruction is really the final document, okay. Things can change within the template, within the methodology.

If you were to think of a hierarchy of stuff, I guess, the template, the most current template, is our most current guidance that we would be doing from this. So, I guess, I'm a little concerned with -- that we've got findings

here of the difference between the documents when we told you that there could be differences between the documents. So, that's where I'm concerned that we're going to end up with -- as you go through the DR methodologies, you're going to see this over and over, you know, as we're doing it. The final document is the dose reconstruction itself. Neither one of these are what I would consider final peer reviewed, you know, that we put out on our web like we do with our technical basis documents, our site profiles, our -- our input -- our TIBs, technical information bulletins. So, that -- that's one of my major concerns with these findings from that standpoint.

I don't disagree with them. I mean, yes, I would love for him to be consistent. I mean, they are -- I mean, Doug is absolutely right. I mean, you would want these to be consistent. I wish all of them were. They're not at this time, but the final document is really the DR, not these documents, --

MEMBER ZIEMER: Tim, this is Paul.

DR. TAULBEE: -- if that makes sense.

MEMBER ZIEMER: Yeah, I under -- I understand that. Tim, could I ask this question? Do you consider the -- the date of the -- well, the most -- the most recent one that you're using to be the -- let's say, if you have a template that is now in use, does that, in essence, replace the methodology document? Is the methodology document, basically, no longer used once there's a template? That's what I'm asking.

DR. TAULBEE: Not necessarily. And -- and the reason I say that, not necessarily, is that if the template -- you go through, you've got a case and you're doing the -- you're following the template, but something doesn't

match for this particular claimant. They talk about something in their CATI, there's something you're seeing in the record, you may go back to the methodology and look and see hey, is there any information in there that helps me answer this. And so, you may be pulling from both, but the DR template is generally the most recent, but not necessarily. It's really the final document is that dose reconstruction.

MEMBER ZIEMER: So, if they -- if the two disagree in the -- in cases such as Doug has pointed out, does that cause a problem for the dose reconstructor?

DR. TAULBEE: I don't believe that it does, no. And if they have questions, then they -- they bump it up and -- and -- and get the answers. But it -- you know, in these particular cases here -- well, the first one, you know, take the finding one with the electron energy, that one's -- yeah, I believe it was a typo from that standpoint, and I would -- I would venture if you go through all of the dose reconstructions, you're going to find that they're using the greater than 15 keV for the external dose from that standpoint when we have to do that for skin cancers. So yes, they're inconsistent. You know, I wish they were the same because we wouldn't have this finding, but I don't think it's impacted a single dose reconstruction.

MS. BEHLING: And this is Kathy. When we started doing -- reviewing these dose reconstruction templates, yes, we did have this discussion, but one of the things that we decided to do is to make a comparison between the two. And this is unique in regard to the way you do other dose reconstructions because, obviously, site profiles and OTIBs dictate how you're going to go about calculating doses for dose reconstruction. You also

have templates for the other -- other dose reconstructions that you do that are outside of these small cases. And for those cases, we always look at the guidance document as our -- the top document to look at. And so, it is a little bit different. Oh, it's different definitely from what you're telling us in these. I recognize that.

I don't think it hurts for us to make an observation, maybe. I don't know that they should be necessarily findings, but, I believe, it doesn't hurt to make an observation to indicate there is discrepancies between the two. It could, from our perspective, which maybe is a little bit more naive because you dose reconstructors do this all the time, but it does appear to us, then, that there could be -- when there's discrepancy in guidance, that could lead to dose reconstructor to be inconsistent with their approach in doing the reconstruction.

DR. TAULBEE: Kathy, this is Tim. I agree with you there. I don't have a problem with pointing out that they are different and as an observation, that's okay. You know, like I said, I would love for them all to be consistent, but as an observation, I think that's fine. But you do need to keep in mind that the final document really is that -- that dose reconstruction, and that's what I want the subcommittee to, I guess -- I'm hoping I'm communicating properly or to where you can understand that what these documents are used to make that final dose reconstruction, and that's what the answer is going out our door that these templates and -- and the methodology are just tools to try and help, and they are -- they are much less formal than the technical basis documents and other documents that we have.

MS. BEHLING: And I -- this is Kathy again. And I think in moving

forward when we do look at these DR templates, as we have termed the documents, we are going to be, hopefully, looking at more than just one or two cases. We're going to -- because we're going to be working in conjunction with the DR review methods work group, and we were likely look at, maybe, four or five cases. And so, I'm hearing that we could actually see a difference in the final case that's put out, and there may be a difference between the template and that final case and the template and that DR methodology. And you're saying that case (indiscernible) -- is the controlling document, is the most current. Like I said, it's just inconsistent with what we do in other areas of dose reconstruction, but perhaps this will, at least, point out a few things when we look at more cases.

I guess, and again, I know we've had this conversation, and I know that you all are very busy and -- and -- but these -- it just seems to me that these templates and these -- this DR methodology document, since they're not so formal, they're easy to change, and then you don't have the concern with inconsistency and perhaps a dose reconstructor not electing the appropriate methodology.

MR. BARTON: This is Bob Barton. I'm trying to figure out what the real issue is here. Is it that -- the issue using the word "finding"? Because it --

DR. TAULBEE: Well, it seems to elevate the concern more and -- and that's where I'm -- yes, that's where I'm concerned, I guess.

MR. BARTON: Okay. I mean, we can certainly --

DR. TAULBEE: It's implying we did something wrong here, and I don't believe that we have.

MS. BEHLING: And I -- this is Kathy again. I will say I'm going to be

presenting the Albuquerque Operations Office, and in most cases when we found a discrepancy, it became an observation rather than a finding. I will tell you, we will try to be more consistent with that to be sure that they are only observations if that's going to help this process. I do think, though, that it's still worthwhile pointing that out. Now, if --

DR. TAULBEE: I agree --

MS. BEHLING: -- the subcommittee -- okay. Okay.

DR. TAULBEE: Can we change finding one and two observations here, downgrade them?

MS. BEHLING: I'm going to let Doug speak to that because --

CHAIR BEACH: Yeah.

MS. BEHLING: -- I think that -- I sense that finding one may be a finding. Doug, can you compare?

MEMBER ZIEMER: Before you make a final decision on that, can I ask a question here? Do we -- have we in the past ever reviewed methodology that documents, per se?

MR. FARVER: Yes. We looked at the history -- or I know that I did.

DR. TAULBEE: Right. Peek Street is the only one.

MS. BEHLING: Peek Street, yeah, exactly.

CHAIR BEACH: Yeah. That was our --

MS. BEHLING: That --

CHAIR BEACH: -- first one.

MS. BEHLING: Right. And this is the new avenue that we -- the subcommittee is moving into now, is looking at -- because NIOSH has provided me with a full list, and Tim did make a presentation on these

templates, but that is what the subcommittee is going to start doing. It's a new listing of documents that -- you know, DR methodology documents that haven't been reviewed by the -- by the Board.

CHAIR BEACH: And then --

MEMBER ZIEMER: Well, I -- I can understand the concern, particularly pointing out where the -- the tools don't match each other. In other words, you have a template that doesn't match the methodology document. The -- the -- it -- it sounds like tools can change easily. They're not at the level of the site profiles and so on. So, maybe -- maybe tracking them should be done in a separate -- a different way to -- a finding shows a level of concern. I think Tim is suggesting the level of concern gets raised a little higher than the document warrants, as I understand it. And the -- these documents are tools that maybe don't require the same level of concern as site profile might. It -- it -- am I understanding this right, Tim?

DR. TAULBEE: That is correct. Yes, sir.

MS. BEHLING: And I agree, going forward we will ensure that if there's a discrepancy between the methodology document and the template and if we find a case that doesn't follow the template or when -- we will point that out, but it will become just an observation.

MEMBER ZIEMER: And when we review methodology documents by themselves, how are we going to handle that?

MS. BEHLING: Our approach to looking at these -- at this particular classification of DR methodology is to look at three things: the DR methodology document, the DR template, which is used by the -- typically the dose reconstructor to fill in the blanks, and then finally, we're going to

have case reviews to say these four cases that were actually adjudicated using these two tools, if you may. And so, it's going to be -- our approach is going to be to look at all three. We're not going to -- I didn't have plans on looking at just the DR methodology independently. They're going to be combined. And I thought that was the appropriate approach just because of the way NIOSH uses these documents.

CHAIR BEACH: And that seems like a good approach to take also, and so they won't be separate. So, I'm okay with keeping that as an observation, and I don't believe Doug had a chance to weigh in on that.

MR. FARVER: Well, you probably won't like my opinion, but I would keep them as findings, and the main reason is those are the only two guidance documents available, so that's what you have to go by. And --

MEMBER ZIEMER: Well, for this particular site, you mean?

MR. FARVER: For this site. And if you look at the methodology document, it's two pages. If you revise the template, at least go back and read through your methodology and make sure that the changes you made to the template are consistent with what's in the methodology or the methodology is consistent with the changes you made to the template.

Now, if you look the observations one and two, that just means I couldn't verify times because the documents I looked at had a lot of time periods in them, a lot of dates, and maybe I didn't see the correct date that NIOSH saw. I don't know. But this was very black and white, the findings one and two. It's just not correct, so if someone did read through the methodology document and maybe didn't catch that typo, well, that's just the way it goes. You know, if you go through a TBD document and you

make a typo and I'm doing a dose reconstruction review and I find it, that's going to be a finding, because that number is different than the number in the dose reconstruction. Same thing with this. If you -- if your technical document contains an error, then I'm going to point it out. So, in my opinion, I would not change findings one and two.

CHAIR BEACH: Okay. So, my suggestion -- this is Josie -- is to leave it as is and maybe SC&A, if you guys want to have the internal conversation, because I -- I see both sides of that for leaving it and -- and/or changing it to an observation. But Doug makes a good point. Would it benefit this to have a -- you guys have internal discussions on this and come forward at the next meeting?

MS. BEHLING: Yes. We can do that, Josie. And, I guess, what Bob Barton is trying to point out is -- is NIOSH -- I mean, is this -- is this NIOSH is concerned that there's going to be, too, many findings associated with these discrepancies between these two documents, and it appears that that is a concern of theirs.

CHAIR BEACH: Well, and that's the reason we're --

MR. BARTON: Yes, it is.

CHAIR BEACH: -- reviewing these as well, so we're --

MS. BEHLING: Yes.

CHAIR BEACH: -- into the second one and, of course, we're going to hear one more today. So, Tim, if you don't mind, can we let this hold and -- and move it to discussion at the next meeting?

DR. TAULBEE: Sure.

CHAIR BEACH: Okay. Because it does meet the criteria and that -- that

is one of the reasons why we're actually looking at these. Paul, Loretta, are you okay with that?

MEMBER ZIEMER: Yeah. And let me get some clarity, again, on -- from SC&A. When -- when you're doing what you described, Kathy, are you looking at just comparing the documents, or are you looking at the methodology itself and saying is this the correct methodology?

MS. BEHLING: All of the above. We look at --

MEMBER ZIEMER: Oh, okay.

MS. BEHLING: -- is this -- yeah. Is this the correct methodology, you know, that --

MEMBER ZIEMER: Now, -- now, -- now, Doug -- Doug's thing, in this particular case, there's nothing else to compare it with. Most of the sites will have other documents like site profiles and so on, right, so you can see that --

MS. BEHLING: Yes.

MEMBER ZIEMER: -- is this consistent with a site profile, for example. And we don't have --

MS. BEHLING: You could --

MEMBER ZIEMER: We don't have --

MS. BEHLING: Right. And what was gonna --

MEMBER ZIEMER: -- there's no other documents besides what you referenced?

MS. BEHLING: That's correct, yes. It -- it -- that's -- for these smaller sites, they never went through the process of having a formal technical basis or even exposure matrix compiled or -- or developed. So, they sat down

and, like Doug -- Doug said, it's, maybe, a two-page -- two/three-page here's the methodology we're gonna try to follow for the some of the smaller sites. They developed a dose reconstruction report that has a lot of color coding in it and a lot of information to the dose reconstructor as you fill in this, in this particular case, and so we look at both of those documents, compare them. But initially, we look at the dose reconstruction methodology just as if we were looking at a technical basis document. And we look for correctness in that methodology. And then we determine if the methodology document and the template are consistent. And then we look at some -- some cases and say where -- was the dose reconstruction performed as specified in these two documents. But that is --

(Whereupon, Member Ziemer and an unknown speaker speak simultaneously.)

MEMBER ZIEMER: And that -- in that case, it would seem to me that you could -- you can have findings on the first case where you review the methodology. You could have observations on comparing the doc -- the template with that and -- no, you're going to discuss what, maybe, what you would do going forward. It sounds like Amchitka was a special situation.

MS. BEHLING: Yeah.

DR. TAULBEE: Well, that last step there that Kathy mentioned that's causing me some pause here, because it -- you know, it's the dose reconstruction doesn't necessarily match the methodology or the template that, that then becomes a finding. The dose reconstruction is what we consider that final document, and it could be right. It could have the details that are necessary and have details that are not in the methodology that are

not in --

MEMBER ZIEMER: Right.

DR. TAULBEE: -- the template --

MEMBER ZIEMER: Exactly.

DR. TAULBEE: -- got added.

MEMBER ZIEMER: Exactly.

DR. TAULBEE: And I'm concerned --

MEMBER ZIEMER: Yeah.

DR. TAULBEE: -- that you're going to be calling all of those findings when they're not. That's my concern.

CHAIR BEACH: Okay. So, Kathy, and are you looking at the final document as well, correct?

MS. BEHLING: We -- what Tim is saying is we need to look at actual cases that have been used to -- adjudicated cases for these facilities, and we are doing that. But we're comparing -- okay. If -- if that final dose reconstruction is the most correct information, we're saying it -- shouldn't that be reflected in the DR methodology or in the DR template. How does the dose reconstructor come to conclude that this -- okay, I'm going to make a decision that this dose reconstruction is going to follow this set of rules when it's not documented in either a DR methodology report or in the template. And so, --

DR. TAULBEE: Right. It -- it would --

MS. BEHLING: I'm not sure --

DR. TAULBEE: -- should be documented in the dose reconstruction itself, and as we see the commonalities, those are the things that get added to the

template. And, you know, if there's, you know, a whole group of claims that are all following a certain way, then it will appear in the template as well as the methodology. So, it's -- you got to -- I fully understand how you're reviewing, and I agree to review the methodology the template and the DRs, but more weight should be put on the DRs themselves and less on the templates and even less on the methodology, in my mind.

MS. BEHLING: Okay. And -- and we can certainly do that, but I still go back to the fact that I think it's important to point out where we find -- and maybe, as you said, we will find a dose reconstruction that has more accurate information and -- but shouldn't that be pointed out so that all dose reconstructors do it consistently? If it's not in the template and it's not in a methodology document, how is it being implemented consistently?

DR. TAULBEE: I agree. I don't have a problem with you pointing it out as observations, from that standpoint. I don't have a problem with you doing that.

MS. BEHLING: Okay.

CHAIR BEACH: Okay.

MS. BEHLING: We -- we --

CHAIR BEACH: I guess --

MS. BEHLING: We -- we will --

CHAIR BEACH: Yeah, go ahead, Kathy.

MS. BEHLING: I was just -- yeah, we're -- we're happy to make them observations, but I do think that it is necessary to point them out. That's -- and finding will be something that is just wrong in the -- in the way to dose reconstruction was -- was performed.

DR. TAULBEE: Correct, I --

MS. BEHLING: So, I -- I --

DR. TAULBEE: I believe finding three where we -- I think that's the one where we -- or was the finding four where we miscounted the number of dosimeters, that to me --

MS. BEHLING: Correct.

DR. TAULBEE: -- is finding, yes.

CHAIR BEACH: Okay. So, and -- and Kathy, before you make that decision, I want SC&A to have an internal -- and then we'll talk about it that the next meeting, because I still feel like you and Doug and Bob need to come to agreement.

MS. BEHLING: Okay. Yes, we will do that. I agree.

CHAIR BEACH: Okay. Okay.

MS. BEHLING: (Indiscernible) item.

CHAIR BEACH: There you go. Okay. Thank you. And this --

MS. MARION-MOSS: Quick question.

CHAIR BEACH: Oh, hi, Lori. Yep.

MS. MARION-MOSS: Kathy, did you ever formalize in writing the process that SC&A will be following when they're looking at the DR methodology and DR template?

MS. BEHLING: I had proposed doing that to the sub -- with the subcommittee. They felt that just the overall approach that I was using -- I did during the last Board meeting, when we talked about the subcommittee's accomplishments, I did give a -- little pictures thing as to what we're looking at and the details associated with what we're looking at. I can -- I can send

that over to you if -- if you're interested, and no one seems to have any issues with that approach.

MS. MARION-MOSS: Sounds good. Yes, if you could, send that to me, please.

MS. BEHLING: Will do. Thank you, Lori.

MEMBER ZIEMER: Yeah, but one -- one additional comment. That -- that only describes what you're looking at. This issue of how you're -- how you would handle observations versus findings might be something that is over and above what you previously discussed.

MS. BEHLING: That's correct. We will --

CHAIR BEACH: Yeah, and --

MS. BEHLING: We resolve that internally.

CHAIR BEACH: Well, and for -- we're following what we've always done on findings and observations, so if that's going to change -- that's why I didn't want to do it on the fly.

MS. BEHLING: Okay.

CHAIR BEACH: Thank you, everyone. So, are we in agreement to a break?

MS. MARION-MOSS: Real quick, Josie. So, if the approach changes, would that be reflected in the approach that we're using for these types of documents?

CHAIR BEACH: If the approach on findings or observation changes, is that what you're asking, Lori?

MS. MARION-MOSS: Yes.

CHAIR BEACH: If -- if they determine that it will be different, then I

think we should have a brief -- of what -- that's why I'm asking for the internal -- with SC&A and that -- and a paragraph or a comment on why and what the change is. I don't think it'll change anything else, just, perhaps, the templates; is that correct, Bob and Kathy?

MS. BEHLING: Well, I'm all -- I'm not trying to dictate what NIOSH may do with our observations or findings. If -- if it's -- if their current approach is working and all the dose reconstructors are doing things consistently, I just don't know how that's happening if you -- if you don't have a guidance document that points them all in -- going down the same path. And so, we should be able to determine that in the future when we look at these types of -- of template reviews. Because as I said, it's going to be looking at the DR methodology, it's going to be looking at the DR template, and then looking at several cases. I just -- I can't understand how a -- the final dose reconstruction would be different than any of the other documents, and how it -- does that philosophy or whatever, that -- that approach, filter down to other cases. How does -- it's got to be documented somewhere.

MR. BARTON: Yeah, this is --

MS. MARION-MOSS: And I think we need -- go ahead.

MR. BARTON: I think what we're -- what we're trying to strive for is, you know, obviously, clarity and transparency and consistency in these dose reconstructions that don't have a TBD to -- to back it up. And so, what I'm hearing you say, Tim, is that you might have a dose reconstruction for an individual that might not match either the template or, essentially, what is the informal TBD for the smaller sites, and so how -- it's tough for me to see how we could assure consistency among different claimants if neither one of

these guidance documents could apply to -- to a given case. That -- that's what I find a little concerning.

MS. BEHLING: And this --

MR. BARTON: And you --

MS. BEHLING: This is Kathy.

MR. BARTON: -- review (indiscernible) cases, so I mean, even if we look at a few, if the potential exists that neither one of these guidance documents is applicable to a given case, I mean, how can we assure, again, traceability, transparency, and consistency?

MS. MARION-MOSS: What, I think, Tim is -- has said is that, it -- it should be stipulated in the final dose reconstruction what approach --

MR. BARTON: Yes.

MS. MARION-MOSS: -- took.

DR. TAULBEE: That's correct, yes. And I -- I don't want to lengthen this discussion here anymore than necessary, but if you think of some of AWE sites where we have -- where we've analyzed data and we've got operators -- the dose for operations and then a dose laborers and a, you know, a dose for a clerical-type person, we've got it documented in structure. Think about these DRs could be done that way without that documentation. Okay. And -- but it should be a standalone dose reconstruction is how we kind of refer to these DR methodologies. They're -- the dose reconstruction itself should stand alone, all of the assumptions, everything that went into it should be in that DR, which is why I keep referring to that as the final document. Does this make sense? So, it -- for consistency, I fully understand what it is, and it's going to be very

tough for you all to go through that -- through this and ensure that we are doing that, it's certainly not going to be easy, but on the -- on the other side many of these DR templates, you -- we don't have -- or DR methodologies, you don't have a lot of claims to look at. So, I mean, that's -- that's where I'm trying to get the point across is that the dose reconstruction itself is the final document. That's -- should contain, self-contained, everything that's needed.

MEMBER ZIEMER: And Time, this is Paul, again. I'll just ask a related question. If you had a case even, even for Amchitka, where, for some reason, the dose reconstructor said, you know, even though the template suggests this, the following circumstances are -- are tell me that I should do the following instead, that would be documented in the dose reconstruction material that the dose reconstructor decided to do something other than what the template or, let's say, the methodology document called for, and would have to justify that, and that would have subsequently been reviewed multiple times for correctness; is that -- my understanding correct?

DR. TAULBEE: That is correct. You're absolutely correct in -- in everything you just said.

MEMBER ZIEMER: So, you know, sort of in theory, you can have some case, any situation, where, for some reason, you would have to -- you would do something other than what the template called for, but you would have to document, specifically, that you were not using the template for some reason; is that correct?

DR. TAULBEE: That is correct. Yes. That is correct. I don't think you would specify in the -- in the DR that you were deviating from the template.

I think you would just state what it is you did and why.

MEMBER ZIEMER: Gotcha.

MS. BEHLING: But there's still a basis document, and you're saying that should be the DR template. Because I know, like, in the past, even -- there was always some type of documentation no matter how informal it was, because we used to find these DR guidelines that would help the dose reconstructor at specific sites get through that dose reconstruction. And, in fact, years past, they were not included in dose reconstruction files, but in -- that is being included now.

But I just keep going back to there's some documentation, some -- you have to have some basis document to start with, and so, -- and certainly understand there could be circumstances that would allow that dose reconstructor to deviate from that, but they still have to have some basis document to start with. And we're looking at the consistency between the dose reconstruction methodology and that DR template. And then we're going to be looking at cases, so hopefully some of these things will be fleshed out, but there is, like I said, somewhat of a concern of consistency. So, I guess, as we move forward, if we look at enough cases and we -- we make these comparisons and we point out these things, perhaps we'll get a better understanding as to whether these dose reconstructions are being done on a consistent -- consistent basis.

That -- that's part of what we're doing looking at professional judgment issues in behalf of the work group, the DRRM work group. So, I think we're heading in the right direction. I -- I just think, perhaps, we have to be more cautious As to making things findings as opposed to

observations, if that is becoming a concern to NIOSH.

DR. TAULBEE: And one thing to -- that I would elaborate a little bit on there, Kathy, is that I would recommend you look at more of the dose reconstruction instead of, you know, just two or something like that. I would look at more of them before you make your consistency type of concerns or -- or raise an issue from that type of standpoint. Because in some cases, they very well, may not be consistent because they're two different -- two different types of work that were being done, and they didn't need to be from that standpoint. So, I would --

MS. BEHLING: I think --

DR. TAULBEE: -- really encourage you to look at more cases.

MS. BEHLING: Absolutely, agree. And that's what's being proposed, especially after the dose reconstruction review methods work group meeting. So, yes. That's what we -- that's what we have proposed, and -- and the subcommittee has agreed to that. And we discussed it at the Board, and I think they agreed to it, too. and I do agree with you on that -- on that recommendation.

CHAIR BEACH: Okay. Is that something we can do with Amchitka, go -- go look at a couple more, or do you want to just hold off on that for now? I'm not opposed to that.

MS. BEHLING: That is something we could do.

CHAIR BEACH: Do you know --

MS. BEHLING: And the other thing I was going to -- I'm sorry.

CHAIR BEACH: I was gonna say we're --

MS. BEHLING: Uh-huh?

CHAIR BEACH: -- you could say you could discuss. Okay. Go ahead.

MS. BEHLING: It seems to me that Amchitka, at least based on the information that Tim had presented, there's quite a few claims and these -- I think we had looked at, like, 177 claims, so I would think we could select more cases to review under this particular DR template, if that's something the subcommittee would like us to do.

CHAIR BEACH: Well, it sounds like a good suggestion, and maybe it will help answer these questions for us --

MS. BEHLING: I agree.

CHAIR BEACH: -- on the findings and to Tim's note. And we're going to have some growing pains. We're just starting this, so I appreciate all the discussion. And other subcommittee members, what's your thoughts on --

MEMBER ZIEMER: I -- I -- well, --

CHAIR BEACH: -- more cases?

MEMBER ZIEMER: -- I think I'd like to hear just the general approach first, the discussions that you are going to have internally at S -- SC&A and -- and then from that, maybe expand it to more cases.

CHAIR BEACH: Okay. That can be part of --

MEMBER ZIEMER: I don't know, I'm -- I'm -- I'm just thinking we -- you know, I think SC&A has plenty right now to do anyway, but.

CHAIR BEACH: Yeah. And I think it's important that we get this right for our standpoint and NIOSH and SC&A and these templates. So, I'm -- I'm in agreement to --

MEMBER ZIEMER: Yeah, I mean, --

CHAIR BEACH: -- for that to be part of --

MEMBER ZIEMER: -- would -- would --

CHAIR BEACH: -- the discussion.

MEMBER ZIEMER: -- Amchitka alone be enough to answer the question? This seems to be more of a small-site issue, but are there other sites that we should take a look at? You know, so may -- maybe we can start to consider that generally as a question. It sounds like you're going to do more anyway, right, Kathy, for -- in most cases?

MS. BEHLING: Yes. Yes. That's what I'm proposing, although -- and -- and hopefully we'll get to that at the end of this meeting. I'm proposing that we -- and, in fact, the work group has already asked, like, what kind of a time frame can we expect to have some -- some results on professional judgment issues. So, I was hoping that we would -- the subcommittee would tasked us to do other sites, but I do, quite honestly, like the idea. We've already looked at the DR methodology for Amchitka, and we've looked at two cases, and I think we could build on that by looking at additional cases.

In fact, -- and one of the things I will -- I was going to ask, and I hate to belabor this any longer, but Lori had provided me with a list of all of the sites that have the -- that uses DR templates. Now, Tim, in his presentation, he gave a list, and he gave on how many claims they're aware of and -- and that goes back (audio break) just because of this cybersecurity issue. But it would be nice for us to get an understanding of how many claims are affected by all of the sites that were listed in that table. And I was going to request that. I don't know how it ease -- how easy that's going to be for NIOSH right now, but it would help us to focus and also give us an

idea of how many cases are involved. And, like I said, with Amchitka, it looks like there's at least 177 claims and probably more now. So, I do like the suggestion of adding to that particular template -- looking at more cases there.

CHAIR BEACH: It makes sense.

MS. BEHLING: And I -- later on in the meeting, I hope to also make some suggestions as to other template cases that we -- you may want to task us to review. And -- And those reviews will include more cases, more than one or two cases, that we've done (audio break) --

CHAIR BEACH: Okay.

MS. BEHLING: -- what I would suggest.

CHAIR BEACH: That makes sense. So, maybe, think about how many more cases you're thinking with Amchitka, and Tim might be able to answer that. And, maybe, we can take a break, come back, and finish this out, just in terms of how many more cases, and then that will be part of our next meeting before we move on. Everybody in agreement with that?

MEMBER ZIEMER: Sounds good to me.

CHAIR BEACH: Okay. let's go ahead and break until 2:30. That gives us a little over 20 minutes. Is that agreeable?

MEMBER ZIEMER: I'm good with that.

CHAIR BEACH: Okay. And then, maybe, Kathy, if you'll be thinking about how much time we need for 3, 4, and 5 and where we need to cut off with the new issued -- SC -- SC&A reviews that we'll hold over to the next meeting. So, we'll hit that right when we get back.

MS. BEHLING: Okay. Thank you.

CHAIR BEACH: We're on break. Thank you.

MEMBER VALERIO: Until 2:30?

CHAIR BEACH: 2:30, yes.

MEMBER VALERIO: Okay. Thank you.

CHAIR BEACH: Yep.

(Whereupon, a break was taken from 2:07 p.m. EDT until 2:30 p.m. EDT.)

DR. ROBERTS: I'll do a quick roll call. So, Beach, are you back?

CHAIR BEACH: I'm back. Thank you.

DR. ROBERTS: Okay. Valerio?

MEMBER VALERIO: I'm back.

DR. ROBERTS: Okay. And Ziemer? Paul are you on yet? Okay. We'll give him a minute or so.

MEMBER ZIEMER: I am -- I am back.

DR. ROBERTS: Okay. Great, thanks Paul.

And just a quick reminder to so -- to make sure that you're on mute unless you're speaking, and, please, identify yourself before you talk. Thanks.

And over to you, Josie.

CHAIR BEACH: Okay. Thanks, Rashaun.

So, I did ask Kathy to give us some time frame, and I -- I was thinking about it. I think we should go through Albuquerque and then go back up to 0084, and then see where we're at before we move -- maybe change to section 3, 4, and 5. Does that seem reasonable, Kathy, time wise?

MS. BEHLING: Yes. Yeah. Can you hear me?

CHAIR BEACH: Yes. Yes. (Indiscernible) --

MS. BEHLING: Okay. All right. Good. I --

MEMBER VALERIO: (Indiscernible) -- Hold up, hold up, hold up. Josie, this is Loretta. Do you need me to, actually, get off the call while you discuss Albuquerque?

CHAIR BEACH: I would say yeah, but that's Rashaun. I don't think you need to get off -- no comment; is that correct, Rashaun?

DR. ROBERTS: Let's see, usually on these, on an electronic call, you do disconnect. Do you have a -- a -- about a -- an estimate for how long the discussion would be?

CHAIR BEACH: We're --

MS. BEHLING: I --

CHAIR BEACH: -- thirty (indiscernible) slides, so what do you think, Kathy, 30 to 40 minutes, depending on the comments and questions?

MS. BEHLING: Yeah, and Josie, your recommendation or your suggestion is exactly what I was going to suggest. And I'm hoping that I can get through this in 30 minutes, because, as I said, we want to maybe start report 84 at 3:00 -- somewhere around three o'clock, a little after 3:00. We -- so -- and so, that should work exactly and then determine where we are. So, I would say about 30 minutes.

CHAIR BEACH: And --

DR. ROBERTS: Okay.

CHAIR BEACH: -- Loretta, I can -- if you look at your phone, Loretta, I can text you and let you know when can come back --

MEMBER VALERIO: Okay.

CHAIR BEACH: -- if that's okay?

MEMBER VALERIO: Yeah, --

CHAIR BEACH: So, let's hold off on the discussion on Amchitka and the templates, and we'll do that at the end. Let's just go ahead and try to move through these two reports. (Indiscernible) --

MEMBER VALERIO: All right. I'll go ahead and -- I'll log off right now. Thanks.

CHAIR BEACH: Okay, thanks. All right, --

MS. BEHLING: Okay.

CHAIR BEACH: -- Kathy, --

UNIDENTIFIED MALE: Go ahead.

MS. BEHLING: Can you see my screen?

CHAIR BEACH: Yes.

Albuquerque Operations Office Template

MS. BEHLING: Okay. Very good. All right. We'll try to move through this, and since we're talking about these DR templates, this will give us -- give us a perspective -- a perspective from a different smaller site. And we may come -- did come -- yeah. We may come away with some different conclusions, at least for this particular site. First of all, I'm giving this presentation, but Ron did the assessment of the DR methodology document, and Amy looked at the case review.

So, this first slide I'm just giving you a background. We, obviously, know, just like with Amchit -- Amchitka, there's a dose -- dose reconstruction methodology document, and there's a DR template. We --

SC&A was tasked to do this review in February of 2023, and we submitted our review in October.

So, a little about the Albuquerque Operations Office, the "AOO." It's a defense program field organization under the DOE, and it originated during World War II and was initially named a Los Alamos "Z" division. In 1946, when the Atomic Energy Commission was established, it was called the Santa Fe Operations Office. And in 1951, it moves to Albuquerque and became known as the AOO, or Albuquerque Operations Office, in 1956. The AOO still oversees and maintains the nation's nuclear weapons stockpile, and the operation period is considered from 1942 to present.

The first piece of information that we looked at in this document, this guidance document, is the -- the facility description. And there -- there was no reference provided for this description. Therefore, SC&A did a search of the site research database and NIOSH website. We looked at the Sandia National Lab and Los Alamos National Lab's TBDs, and I'll explain why. You'll see that later in this presentation. But we couldn't find any facility description. We did do a search of the internet, and -- and we found the exact description on the Energy Employee Claimant Assistance Project website. And although the information about the history and location of AOO is sparse, we didn't find any contradictory Information, and therefore, we didn't have any findings about the description.

For dose reconstruction guide -- guidance, there are two time periods assessed because the AOO was located on two different sites. Between 1942 and 1951, the office was located at the LANL site, and between '52 to present, the office was relocated to the Kirtland Air Force Base in

Albuquerque, New Mexico.

No one received occupational external or internal doses at AOO, so dosimetry records that exist are for exposures to energy employees that worked at other sites. And doses are calculated using the TBDs associated with those sites where -- where the EE was exposed. So, therefore, the AOO DR methodology -- methodology document only addresses potential environmental exposures, radon exposures, and X-ray doses.

So, SC&A's review of this guidance found that -- we found it appropriate to assign internal and external doses from the site where the EE was exposed. And we found it reasonable to assign environmental, radon, and occupational medical dose using LANL data from '42 to '51 and the SNL data from '52 to present.

SC&A's re -- review on guidance for estimating external and internal doses using LANL's data for the '42 to '51 -- and we also compared the information in the DR template to that in the guidance document and the LANL TBD. This resulted in SC&A identifying two findings and one observation.

Okay. Finding one, the DR template incorrectly states that onsite ambient dose should be assigned for 1944 through 1951, rather than 1942 through 1951. This contradicts the DR methodology document, which does state '42 to '51. Also, it contradicts the DOE covered period, which lists 1942 to present. There's also some conflicting data where the AOO DR methodology document states to use LANL environmental exposure data starting in 1942, but LANL wasn't established until 1943. So, we're not sure how that 1940 -- dose -- '2 dose gets assigned.

And finding two, the AOO template recommends using a maximum environmental intakes from Table 4B-1 of the LANL environmental TBD for calculating internal dose for uranium and plutonium; however, the Table 4B-1 is only included in Rev. 1 of the TBD. The current version Rev. 01 does not contain Table 4B-1 or any table with these values. So, our concern is that this could cause outdated and incorrect intake values to be used.

And observation one, the DR methodology document states to use sitewide ambient data to calculate environmental dose, but the LANL TBD lists both a maximum sitewide and a geometric mean sitewise -- sitewide data. The DR template, which I understand now, is probably the more accurate, does specify that the maximum value should be used, so -- but it does appear. And here again, now, we made this an observation, but there does appear to be some inconsistency between the DR methodology document and the DR template. The Dr template is more specific and does state that the maximum value should be used.

So, SC&A also reviewed environmental external and internal dose guidance for 1952 to present using the Sandia National Lab data. The DR methodology document states that no external or internal ambient exposure from SNL could result in any significant doses to workers at the AOO due to the distance between the two sites. To verify that, using -- SC&A used the maximum SNL ambient dose rate of 10 millirem per a year and could -- considering doses would fall off as a function of one over the distance squared, SC&A determined that a dose rate would be less than one millirem per year. So, SC&A also ran a long-term 28-year exposure scenario for -- and we used the CAD-W program, and we calculated doses for eight

different organs with a 10-year latency period, and we found that doses were less than 1 millirem for most organs. And therefore, we have no findings or observations with the environmental doses aside from SNL.

For 1952 to present, the present period, the DR methodology document recommends assigning an annual PA X-ray exam using doses in OTIB-6. This prompted a second observation, which is observation two. The method -- methodology document uses generic occupational medical guidance rather than the Sandia National Lab-specific guidance. And this appears inconsistent with the pre-1952 guidance where the LANL occupational medical doses are -- are used prior to 1952, but a generic approach is used after 1952.

Okay. SC&A also compared the DR methodology document to the AOO template and identified an observation regarding references to the LANL TBD, which is discussed in observation three. And we also have an observation four that was prompted just as an overview of the environmental data guidance in LANL and SNL.

So, observation three, the DR template reference -- references using the current, which is Rev. 01 revision of the LANL occupational medical TBD; however, it appears that the DR methodology document has not been updated and still references Rev. 00 of that document. And, again, this is just an observation to point out those -- that in -- inconsistency.

And observation four, this is more of a curiosity question. But I'm sort of thinking about this -- since -- what we're say -- asking is since AOO is -- it's a unique situation where the environmental data comes from LANL and SNL, would AOO employees qualify for inclusion in an SEC if established at

either LANL or SNL? I did -- it -- after we -- we submitted this, I -- I did go back and look at some of the terminology, I guess, also in the -- the SECs, and I think often it states that the worker has to be onsite, but, I guess, that can be specific to -- to the -- to the site. So, I can have, maybe, NIOSH further elaborate on that. But, again, just an observation-curiosity thing.

Okay. So, in this case, for our case review, we only looked at one case, and we evaluated that, you know, using the AOO template. The DR was completed in April of 2014, and the EE held a variety of job titles at LANL and -- he worked at both LANL and Albuquerque Operations Office. Total employment was more than three decades, and the EE was diagnosed with a qualifying cancer after the termination of employment.

This case involved an EE who is monitored for external and internal exposure at LANL. And as previously stated, there was no external or internal exposure associated with AOO. And there were medical X-rays in the DOE files for this worker.

So, although our focus for these cases was to assess the AOO templates, we did include a summary of the external and internal doses assigned for LANL since that is part of the -- the -- yeah, DR methodology's recommendation and just for the completeness of this review.

For recorded photon dose, SC&A reviewed the dosimetry records and verified that NIOSH used the correct dosimeter -- dosimeter results and that they applied the appropriate DCFs and that doses were correctly entered into -- in IREP as 30 to 250 keV photons.

For electrons, we did the same verifications, and we found that NIOSH accurately calculated doses and assigned the doses as greater than 15 keV

electrons, and that's in accordance with the LANL TBD.

And again, the recorded neutron dose, we found no concerns with NIOSH's calculation and their IREP input.

For missed photon dose, SC&A confirmed that NIOSH assigned dose for all zero or less than one half the LOD dosimeter values, and those doses were calculated in accordance with OTIB-17, and they were correctly input into IREP.

For missed neutron dose, NIOSH appropriately used the 95th percentile neutron-to-photon ratio. And for the remaining years of employment, -- yeah -- they used for the late -- later years of employment -- this was used for the earlier years, and for the later years of employment, they used number of zero exchanges and one-half the LOD for calculating the dose. And again, that's specified in the LANL TBD, and all doses were correctly entered into IREP as 0.1 to 2 MeV neutron.

Okay. For unmonitored periods of employment, environmental dose was calculated using maximum ambient dose from LANL, and SC&A was able to confirm that NIOSH correctly calculated these doses. And for onsite ambient dose at AOO, it was determined that the SNL environmental dose would be less than 1 millirem, so no dose was assigned.

It was also noted that radon levels at SNL are less than background, so therefore, no radon intakes are assigned for SNL or Albuquerque Operation Office employees. So, SC&A confirmed that the information in the dose reconstruction report is consistent with the template and with the DR methodology document.

Okay. At LANL, the EE was assigned annual PA X-rays and a lat. X-ray

also, a -- a lateral X-ray. SC&A verified that appropriate doses were assigned based on the LANL TBD guidance.

So, for occupational medical doses at AOO, the EE was assigned an annual PA X-ray, And that was based on OTIB-6, as stated in the AOO guidance, which we are challenging, as we identified in observation two above. But SC&A did confirm that the annual doses were calculated correctly and were entered into IREP correctly. We were also able to confirm that the DR template text and dose reconstruction language and the DR methodology documents were consistent. So, SC&A concluded that the AOO template and the DR methodology document are mostly consistent, except for the previous-identified observations. And we found that NIOSH appropriately applied this guidance for calculating external doses.

For assessing internal dose, NIOSH assigned missed plutonium dose. All the EE's urine bioassays were below the MDA. NIOSH calculated doses using one-half the LOD values, or MDA values, and also assumed mixture of radionuclides based on weapons-grade plutonium. And SC&A was able to confirm that all those results -- that all the EE's results were less than MDA and that NIOSH correctly modeled these intakes.

So, in -- internal environmental dose was assigned for the years when the EE was not monitored at LANL using the LANL TBD guidance. For employment at AOO, he -- there was no on site ambient dose assigned since it was determined that the modest onsite ambient dose at SNL would not impact AOO. SC&A compared the text, again, in the template to dose reconstruction report and to the DR methodology document, and we found that to be consistent.

So, in conclusion, SC&A found that NIOSH appropriately calculated and assigned internal doses and, except for the previous findings and observations, the template and methodology documents were consistent.

So, I went through that pretty quick, but one of the things I do want to point out is, for this particular DR methodology or DR template, obviously, since the AOO -- there's no internal or external exposures, and we're using other sites to calculate those doses, this is not one of those sites that I would recommend us looking at a lot of cases. I think this pointed out there is consistency, and it is mostly associated with environmental dose, with radon exposures, medical exposures. We just -- like I said, our -- our observations Findings speak for themselves, but we were just curious about the inconsistent -- inconsistency in the -- using OTIB-6 as opposed to using the SNL medical dose and the other findings. So, any questions, any comments that I can answer?

MEMBER ZIEMER: This is Paul. I have -- had one comment. I think on the SECs at LANL, they all specify, as I recall, that the claimant has to have worked -- be working in a technical area. In fact, I think most of those that SECs actually specified what technical areas that worker has to be in. So, I doubt if -- I doubt if -- these folks would be in nontechnical areas, I believe, and I doubt if they're covered by the -- by the SEC. But, maybe, NIOSH may want to weigh in on that.

CHAIR BEACH: Yeah.

MS. BEHLING: Yeah, I --

MR. RUTHERFORD: Let me --

MS. BEHLING: -- that conclusion.

MR. RUTHERFORD: Yeah, let me --

MS. BEHLING: Go ahead. I'm sorry.

MR. RUTHERFORD: Yeah, that's all right.

MS. BEHLING: Go ahead.

MR. RUTHERFORD: This is LaVon Rutherford. Actually, originally, they were defined as technical areas; however, after the Department of Labor had difficulties in identifying and being able to establish everyone in technical areas, we ultimately changed that. And not only that, but we changed it because of the access control to these areas. So, it's all employees instead of identified as technical areas.

CHAIR BEACH: Yeah, that's what I thought, too. And LaVon, --

MEMBER ZIEMER: -- and so that -- that was changed then, later?

MR. RUTHERFORD: Yes, that --

MEMBER ZIEMER: In the later SEC?

MR. RUTHERFORD: Yeah.

MEMBER ZIEMER: Oh, gotcha. Yeah.

CHAIR BEACH: And can you --

MEMBER ZIEMER: Well, --

CHAIR BEACH: -- you -- you comment, Kathy, on observation four, her question there? Can you cover that also?

MR. RUTHERFORD: I'm sorry, I just got back on, so I don't know what was the question.

CHAIR BEACH: Sure, long lunch. Go ahead and just give it to him briefly, Kathy. I think LaVon can answer that pretty quickly, if you don't mind.

MS. BEHLING: Okay. Yeah. Yeah. I don't mind. Under observation four, we just said that, you know, AOO is -- is unique because they use LANL and SNL environmental data, and the question arose would an -- is -- if it -- an SEC was established at -- at either of these sites, would an AOO employee qualify for that SEC status?

MR. RUTHERFORD: That's, you know -- I'm not sure on that, except -- because, honestly, the determination would have to be made by the Department of Labor on that. But let me dig into this a little bit, and I can get back to you.

CHAIR BEACH: Okay.

MS. BEHLING: Okay. And one of the things, -- I'm sorry.

CHAIR BEACH: Go ahead. No, go ahead.

MS. BEHLING: Yeah. This is Kathy, again. One of the things, I -- I went back and read through some of the SECs and said to myself, usually they're pretty specific that it has to be a worker onsite or in --

MR. RUTHERFORD: That's correct.

MS. BEHLING: -- specific areas, whatever, so I -- yeah, so I didn't know. This is just something we wanted to -- to question and pursue, just curiosity.

MR. RUTHERFORD: Well, yeah. Again, I -- I -- you know, just hopped back in, so I missed the whole discussion on the AOO, yeah. But we did -- and Josie will remember, we, actually, did look at some of the groups that were technically not on the site, and there are people that are not covered under the SE -- were not covered, period, because they weren't actually onsite. So, yeah, I would have to look at this one little closer.

MS. BEHLING: Okay.

CHAIR BEACH: Thanks, LaVon. This is Josie. Sorry to put you on the spot there.

MR. RUTHERFORD: Well, I was -- I had to jump off for another meeting, and I jumped back on, and all of a sudden, I (indiscernible).

MS. BEHLING: Yeah.

CHAIR BEACH: Yeah.

MS. BEHLING: And if I -- I -- I'm sorry, Josie.

CHAIR BEACH: No, that's okay. I was --

MS. BEHLING: I was just --

CHAIR BEACH: Sorry, go ahead.

MS. BEHLING: Okay. No, this Kathy, again. I guess, based on our observations and findings in this particular template, is this more in keeping with what NIOSH was expecting? And, I -- like I said, I -- I think we do have to have an internal meeting to discuss our path forward, but I'd just be curious as to Tim's thoughts on this review.

DR. TAULBEE: Yes. The one -- one thing that I would caution on is your finding two, and that is something that I would look a little closer into, because I don't know the specifics here. But if when we did the dose reconstruction that -- that used Table 4B-1, if that was -- if they were done during the time period that technical basis document 10-4, Revision 0 was in effect, then it's not a finding from that standpoint. If we did something different when -- in the latter time period in the dose reconstruction when Rev. -- when revision 1 is there and we're not using Table 4B-1, then, again, I would not find it -- see that as a finding from that standpoint.

This is a scenario where the dose reconstruction itself is the final, kind

of, guidance document. So, you got to pay attention to what was in effect at the time that dose reconstruction was done. So, in this case, I don't know whether it would be or wouldn't. I'd have to go back and -- and look at those claims from that standpoint.

MS. BEHLING: Okay.

DR. TAULBEE: Does that make sense?

MS. BEHLING: It does. It does, but, like I said, we were -- we just want to point out the inconsistencies. And In this particular case, as you can see, our concern is that someone's going to use outdated data. And then, again, we're raising this inconsistency issue, so.

DR. TAULBEE: Right. And if we did it --

MS. BEHLING: (Indiscernible) --

DR. TAULBEE: -- in a dose reconstruction, then I would agree, absolutely, it's the finding. But if we didn't in a dose reconstruction, then I don't feel that it's a finding. I do --

MS. BEHLING: Okay. Well, --

DR. TAULBEE: -- the findings to be more based upon the dose reconstruction.

CHAIR BEACH: Kathy, this is --

MS. BEHLING: Okay. That's something to --

CHAIR BEACH: Did you --

MS. BEHLING: Go ahead.

CHAIR BEACH: -- do any cases associated with this?

MS. BEHLING: Yes. Yes. We did one. One case.

CHAIR BEACH: Just one?

MS. BEHLING: Yes. And I have to go back and look to see how that was calculated. Amy did that case. I don't want to put her on the spot, but I -- I don't know if she would even be able to answer that question as to the time frame and -- and what -- what version of the technical basis document was in -- in effect.

CHAIR BEACH: Okay. So now that we've done two of these and Peek Street would make it three, I think that we do need to go back and look at making sure that they're both being done the same, and so I think a -- a meeting amongst yourselves and then report back to the subcommittee of how -- of how we're going to go forward with these to make them consistent in how we're reviewing also. I think that's --

MS. BEHLING: Okay.

CHAIR BEACH: -- important. Any -- Paul? I was going to ask Paul if he agreed with that?

MEMBER ZIEMER: Yeah, no, no. I'm fine with that, sure.

CHAIR BEACH: And then, maybe, this one, again, would need a couple more cases and maybe have them on the agenda for the next meeting, and maybe not go forward with any more templates until we, you know, get this so it's -- so we can move forward easily and consistently.

MS. BEHLING: Okay. Very good. All right. I -- if you're ready to move on, Josie, --

CHAIR BEACH: Yes.

MS. BEHLING: -- with Report 84. Okay.

CHAIR BEACH: -- do.

MS. BEHLING: Okay. Can I verify that -- Okay. Is --

DR. ROBERTS: Just to break in here, did -- so, we're moving on from the last one. Can Loretta rejoin?

CHAIR BEACH: I just texted her, yes, thank you. I was just going to say --

DR. ROBERTS: Okay, great.

CHAIR BEACH: -- that.

DR. ROBERTS: Thanks. Okay.

ORAUT-RPRT-0084 "Two-Count Filter Method for Measurement of Thoron Progeny in Air"

MS. BEHLING: Okay. Let's see if I can -- and is Dr. Naeem -- has he -- has he joined us?

DR. NAEEM: Hi, Kathy. I am here. Can you hear me?

MS. BEHLING: Very good. We can hear you, yes. I'm going to pull the slides up. And then, I think, Josie, would appreciate your presentation. Can you see my screen?

DR. NAEEM: I can see --

CHAIR BEACH: And Rashaun?

DR. ROBERTS: Yes.

CHAIR BEACH: This is Josie. Sorry to interrupt. Loretta said she is logging back in, so if we could, just give her a moment so she doesn't miss the presentation. I don't see her yet, but I have asked her to let us know when she's back in.

MEMBER VALERIO: Josie, it's Loretta. I'm back in.

CHAIR BEACH: Thank you so much. Okay. I think we can begin.

DR. NAEEM: All righty, sounds good. So, yeah. So, thanks for the invitation to attend. So, that's the first time I'm doing this presentation for SC&A. So, it's about review of RPRT-0084, and that's two-count filter method for measurement of thoron progeny in air.

Next slide -- slide, please.

Right. So, the purpose is to evaluate a method to calculate internal dose to the lungs from inhalation of thoron. And thoron is really Radon-220 and is progeny using Bismuth-212 and Lead-212. So, know that thoron is a member of Thorium-232 decay chain, and Bismuth-212 and Lead-212 are members of the thoron decay chain.

So, here Bismuth-212 and the 212 part of primary radionuclides of interest when calculating the internal dose from inhalation of thoron and its progeny due to their relatively long half-lives when compared thoron reaching equilibrium.

So, RPRT-0084 provides a process for deriving an equation to calculate the concentration of long-term thoron progeny using our two-count filter method, and that's what we'll be talking about today. The goal is of the two-count method is to calculate the Lead-212 concentration in the ambient air. And secondary step process -- so step one is pull air through a filter for six hours and measure the total alpha activity on the filter after the pump stops. And the second is pull to the same filter for an additional 18 hours and measure the total alpha activity on the filter after the pump stops. So, all in all, we're going to have a total of 24-hour accumulation.

Next slide, please.

So, this two-fold approach was used to calculate the concentration of

Lead-212 in air to indirectly calculate internal dose from inhalation of thoron and its progeny. So, you can see that here's a decay chain of Radon-232, which thoron and can see that starting with Radon-220, it decays all the way down to the last (indiscernible), Thallium-208. So, the half-lives of polonium, I can see that they're dedicating Polonium-216 and Polonium-212. They're our far meters, but they have very short half-lives and do -- they do not contribute to the working-level calculation. So, these are amateurs and represent an insignificant dose due to a -- due to only a small number of atoms in here.

So, and I already mentioned that here this material (indiscernible) than the two-thirds by the primary radionuclide of interest because of their half-life that can be used to calculate internal doses.

Next slide, please.

So, the approach is to derive an equation for the two-count filter method. So, they are patented two approaches. They're naming it forward problem approach and reverse problem approach. So, the forward problem approach is calculate total alpha activity expected on the filter paper when it is counted at six and 24 hours after the air sampler pump is turned off. So, let me call that the air sampler is turned off at 24 hours. So, you calculate -- you estimate the alpha activity at six and 24 hours after the pump is turned off. So, when the pump is turned off, I -- you had to input the known concentrations of Lead-212 and Bismuth-212 and a long list of perimeter in the air. So, that's the forward problem approach.

In the reverse problem approach, their emphasizing on deriving an equation to calculate the concentration of Lead-212 in ambient air using the

total of activity determined in the forward problem approach. So, the forward problem approach, you're going to know the total alpha activity, and then use it as an input parameter in the reverse problem approach to calculate the Lead-212 activity -- concentration. Sorry.

Next slide, please.

So, the concentration of source term is presumed to be a concentrated stream in the forward problem approach. And this concentrated stream is composed of Lead-212 and Bismuth-212 released into the air sampler.

And already talked about the forward problem approach calculates the total alpha activity on the filter at six and 24 hours after the sampler is turned off. So, NIOSH assumed Lead-212 in air going to the sampler to even picocuries per liter. The flow rate of the sampler was 15 liter per minute, which is 900 liter per hour.

Next slide, please.

So, Okay. The (audio break) total activity built on the on the filter paper as a function of time. So, you can see that on the horizontal axis, there's a time, and on the vertical axis, there's an activity -- Lead-212 activity over a period of 24 hours. So, that's a time when the pump was on, so it was accumulating all activities, Lead-212 and Bismuth-212. And once the pump is turned off, then we see the exponential decay. So, Lead-212 activity

occurs exponentially from the time the air pump is turned on to the time it is turned -- turned off at 24 hours and then decays.

Next slide, please.

So, again, in the forward problem approach, so the next step is to

access -- assess Lead-212 and Bismuth-212 activities. So, from initial deposition of Lead-212 on the filter paper when the pump was turned off, the decayed Lead-212 filter paper activities were calculated for six hours and 24 hours after the pump stopped. So, if you refer back to the -- the graph we saw. So, this refers to 30 hours and 48 hours on the exponential decay.

Similarly, for Bismuth-212, activities were assumed to be in transient equilibrium with Lead-212 after the pump is stopped. So, activities of bismuth, once again, were calculated at six and 24 hours on the filter paper. But to calculate the activity of Bismuth-212 is you had to know the ratio. So, you need to know the ratio of Bismuth-212 to Lead-212 activity ratio and then multiply it by that 212 activity and then this will give the transient Bismuth-212 activities.

Next slide, please.

So, Bismuth-212 to Lead-212 activity ratio is equal to the Bismuth-212 decay constant divided by the difference of Bismuth-212 then Lead-212 decay constants. The goal of knowing Bismuth-12 -- 212 is because Bismuth-212 it emits alpha particles. So, therefore, Bismuth-212 activities at six and 24 hours after the pump is stopped were used to determine total alpha activities on the filter paper at six and 24 hours.

So, alpha activities determined at six and 24 hours were used as input parameters in an equation. So, this equation will be derived in the reverse problem approach. So, once we know the alpha activities, you can use those as input parameters into the equation (indiscernible) in the reverse problem approach. And then it will give you the concentration of Lead-212 linear. Next slide, please.

So, here's the equation. It was derived in the reverse problem approach. So, Cb Cbp, that the -- the Lead-212 concentration. So, we know the decay constants, bismuth and lead decay constant, so A24 and A6, they are the alpha activities that were determined in the forward problem approach. F is the flow rate of the pump. So, after inputting those parameters, you can calculate Lead-212 concentration.

Right. Next slide, please.

So, already covered that, the first bullet. Starting from the second bullet. Once you input those parameters, I can get the concentration, level of concentration to be 1 picocurie per liter. So, this confirmed that the derived equation in the reverse problem approach is appropriate for calculating the Lead-212 concentration in the sampled air.

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So, SC&A review of RPRT-0084 -- so, SC&A did not identify any issues with a general NIOSH approach to evaluate the two-county filter method for measurement of thoron progeny in air. SC&A evaluated two-count filter method employed by NIOSH to analytically estimate the Lead-212 concentration in the ambient air. SC&A evaluated both forward and reverse problem approaches to estimate the Lead-212 concentration. SC&A additionally verify NIOSH's statement that the total alpha activity is not a parameter of interest when calculating Lead-212 concentration in the ambient air.

So, what does this mean that the total alpha activity is an independent variable when calculating Lead-212 concentration in the ambient air.

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So, the summary of this presentation, SC&A found the approach used to don a sampling plan to be reasonable and technically correct. SC&A found the analytical methods used in the forward and the response approaches to be acceptable. SC&A provided some expanded discussion concerning the effect that changes in variable parameters could have on the results, and SC&A did not identify any documentation issues that would affect readability or application of the two-count filter method.

Next slide, please.

So, questions?

CHAIR BEACH: Okay. Thank you. Any comments questions, Paul or Loretta? I have none.

MEMBER ZIEMER: I have a --

MEMBER VALERIO: Just a --

MEMBER ZIEMER: -- general question, and this may go to either SC&A or to NIOSH. The -- the -- these calculations always assume, kind of, an instantaneous value at the -- at -- you know, six and 24 hours, but there's also -- always counting time involved. And sometimes the -- the concentrations of the -- of the -- in the air are fairly low, which means you use long counting times, which means you're -- you're not having the instantaneous value at six and 24. What's typically used as the count time? Like, is it a minute, which is fine, as opposed to an hour?

DR. NAEEM: I would say that it --

MEMBER ZIEMER: Do we -- or do we know? Do we know?

DR. NAEEM: Yeah, we don't know, really. I mean, you know -- I mean, and I think the reason there are things like this long time is probably

due to statistics because we don't know what will occur, like what would happen in one minute. So, but ideally, I think it would be better if they take multiple samples in different time intervals instead of continuous intake.

MEMBER ZIEMER: Uh-huh. So, yeah.

DR. TAULBEE: This is Tim. I mean, typically Dr. Ziemer, this is the results that we're seeing on a survey or -- or some record that's out there. So, typically what we'll see is the count as six hours or we're seeing it then at 24 hours from the same filter. And so, we're not really seeing, you know, what -- what you're kind of talking about from -- we don't get that data as to how long they did those measurements. We're just seeing it --

MEMBER ZIEMER: I -- yeah, --

DR. TAULBEE: -- reported in this manner.

MEMBER ZIEMER: Yeah. I suspect in most of those cases, there -- the concentrations are high enough so that they -- in fact, if they have a continuous monitor, they have a value for a pretty short period of time, which is what you want.

DR. TAULBEE: That is --

MEMBER ZIEMER: You know, you --

DR. TAULBEE: -- correct.

MEMBER ZIEMER: -- want to know what it was six hours and 24 hours. I was -- I was more curious. I mean, the method -- the methodology is exactly fine. It's similar to what you use on Radon-220, as well.

DR. NAEEM: And, I think, these days it's possible, right. I mean, because in old times, air sampler can -- like it operated it for a longer period of time, but these days you can use digitizers and then collect some data on

this --

MEMBER ZIEMER: Right.

DR. NAEEM: -- as well.

MEMBER ZIEMER: Right. Very good. Thank you.

CHAIR BEACH: Loretta, did you have something?

MEMBER VALERIO: No, I didn't have any questions.

CHAIR BEACH: Okay. Thanks. All right. So, it looks like SC&A is in agreement with NIOSH. And, I believe, we can move forward to close this, correct?

MEMBER ZIEMER: Yes, I agree with that.

CHAIR BEACH: Okay. Loretta, you're in agreement as well?

MEMBER VALERIO: Did you get that, Josie? I'm in agreement.

CHAIR BEACH: Yeah. Okay. I did now, thank you. Okay. So, thank you. Good reporting. And nice to have agreement.

So, Kathy, I think we should go ahead and move on to the program evaluation report, and then the last four items, we can carry over to the next meeting. If we end up getting done earlier, we can always jump in and do another one of these 68, 70, 72, or 60, but at this point, I think we'll carry them over.

MS. BEHLING: Okay. I'm -- I'm fine with that. Now, I will tell you this -- the PERs not needing a review, there are 14 PERs. I was thinking, if you agree, that the best approach, when we talk about those, is to pause after each one and have a discussion as to whether you agree that the -- that this did not need to be reviewed or if you do think that tasking -- that SC&A should the tasked. It may take -- I would say it's going to take, at least, a

half an hour, if -- if that's okay.

CHAIR BEACH: (Indiscernible) --

MS. BEHLING: And to be -- okay. And the only other things I -- I was hoping we could discuss, like you said, is the preparation for the Board meeting, which I have selected some -- some reports that I am going -- that I am -- I've already begun preparing a presentation for the full Board meeting. And we, also, maybe wanted to talk about unreviewed documents --

CHAIR BEACH: Yes.

MS. BEHLING: -- and whether there should be any tasking from there.

CHAIR BEACH: Yes.

MS. BEHLING: So, are you comfortable with us starting with the PERs not needing review?

CHAIR BEACH: Yes. We have about an hour left, and is everybody -- the schedule goes until 4:30. I think we can get that all done. The only other thing we left hanging was the templates, but I think we are in agreement that we need more cases, and we can do that -- you guys can decide that when you're discussing it internally, and we can do that over email. I -- I don't think it requires additional tasking. Is that correct, Rashaun? We can jump back to that during tasking. Okay. All right.

DR. ROBERTS: Sorry.

MS. BEHLING: Yeah, I think we're okay.

DR. ROBERTS: Sorry, no.

CHAIR BEACH: Well, --

MEMBER ZIEMER: And Josie, --

CHAIR BEACH: -- we'll --

MEMBER ZIEMER: Okay.

CHAIR BEACH: Okay. Go ahead, Paul.

MEMBER ZIEMER: This is Paul. Just before you start, I'm going to -- I will be switching out of video to complete phone in about five minutes, and I will be -- I'll still be on the phone, but I'm going to be driving. I have to get across town by four o'clock, and I have to bail out at 4:00.

CHAIR BEACH: Okay.

MEMBER ZIEMER: So, I'll still be on the call. I won't be on the video.

CHAIR BEACH: Okay. Thank you for that.

MEMBER ZIEMER: So, -- so far. Yeah. Uh-huh. Okay.

CHAIR BEACH: Thanks.

MS. BEHLING: So, considering that, Josie, you're still good with us starting with a PERs not needing a review?

CHAIR BEACH: Yeah, I think so --

MS. BEHLING: Okay.

CHAIR BEACH: -- because I think we all need --

MS. BEHLING: Okay.

CHAIR BEACH: -- to talk about that. Okay.

PERS PREVIOUSLY IDENTIFIED AS NOT NEEDING REVIEW

MS. BEHLING: Yes. Okay. All right. If you can see my screen?

CHAIR BEACH: Yes, I can.

MS. BEHLING: Okay. As we said, these -- it -- these are the PERs that were previously deemed not necessary -- not warranting a review. We'll --

I'll just give you brief background information. During our discussions of the -- the subcommittee's accomplishments, the subcommittee became aware that the former procedures and subcommittee chairperson determined that 14 PERs did not require review. So, Josie recommended that we revisit these unreviewed PERs, and that's what we're going to talk about now.

And just as a reminder, I know you -- we go through this so many times, but I just wanted to elaborate one more time. SC&A's protocol for reviewing PERs consists of -- of four subtasks. Subtask one is to assess NIOSH's evaluation and characterization of the issues addressed in the PER and potential impacts on dose reconstruction. So, basically, why was the PER issued and in what areas are adjudicated cases impacted.

Under subtask two, we assess methods for corrective action. Now, it's under subtask two that SC&A has an opportunity to review any technical basis documents associated with a PER that, perhaps, were not reviewed by SC&A previously. That -- that can include updated TBDs, OTIBs, white papers, that type of thing. We -- we do -- do a -- if not a full review, at least a focused review associated with what the PER was addressing. If that has already been done, the technical basis documents have been looked at, then SC&A just provide a summary and conclusion of our review in this subtask two.

Then subtasks three, we evaluate NIOSH's -- how NIOSH determined the universe of potentially affected cases that require rework. And additionally, we assess the timeliness of -- of the issuance of the PER.

And then subtask four, we provide selection criteria for assessing a

sample of reworked cases. And these cases reviews are -- I -- usually -- or once we -- so, that the -- yeah, the cases are selected. We issue a separate subtask score report with our findings and review of those cases.

Okay. With that said, the first PER we'll talk about is PER-24, and this is General Steel's in -- Industries TBD approval. This PER was issued in September of 2007, and it was issued because the Battelle-TBD-6000, Appendix BB, was approved in June of 2007. Previously, some external doses for a GSI radiographers were assessed using OTIB-4, which OTIB-4 is estimating maximum plausible dose to workers at AWE facilities. OTIB-4 has since been cancelled.

The newly issued TBD includes doses to radiographies. They're actually greater than what OTIB-4 guidance suggested. So, there were four cases reworked by NIOSH. That represented all the cases that were available that were less than 20 -- or less than 50 percent. And since PER-twenty -- since PER-24, the GSI TBD has revise -- been revised three times, and it resulted in issuing two additional PERs. And that's PER-57 and PER-80. Those were in 2015 and 2017, respectively. And I thought it was important to just point out whether SC&A looked at those PERs or the revised TBD in assessing whether you want to continue or -- or want to make the task OTIB -- or PER-24.

SC&A has reviewed PER-047 and 080 and -- and the revised TBD. So, with that, I -- should I turn it back over to you, Josie, and you want to have a discussion as to whether you agree that this TBD -- or PER needs to be reviewed or not?

CHAIR BEACH: So, you're saying that the two later ones, the 57 and

have been reviewed, but back to PER-024 that was issued in 2007, that one is still not reviewed; --

MS. BEHLING: Correct.

CHAIR BEACH: -- is that correct?

MS. BEHLING: That's correct.

CHAIR BEACH: Did I get that right?

MS. BEHLING: Yes.

CHAIR BEACH: Yes. Yeah, when I read it, I was a little --

MS. BEHLING: And I will --

CHAIR BEACH: -- so, thank you for --

MS. BEHLING: Okay.

CHAIR BEACH: -- clarifying.

MS. BEHLING: And I apologize. Yeah, I apologize if I confused things. One of the things I'll point out now, each PER is -- is issued for different reasons. We need to keep that in mind. But we also have to look at what is -- what are the key issues that we're looking at. And so, in a PER we want to be sure that all the cases that should have been captured and reworked were. In this particular case, there were only four cases that were reworked by NIOSH, because those were the only four that were -- had been previously adjudicated with -- that were less than 50 percent. We have looked at the TBD, and we have looked at other PERs associated with this particular site, GSI. In fact, there's been quite a bit of activity at GSI.

CHAIR BEACH: So, is it a recommendation from SC&A that we do review this or that it's not necessary? I guess that's where I'm at. And if --

MS. BEHLING: Okay. Yeah. Yeah, I -- I would --

CHAIR BEACH: All right.

MS. BEHLING: -- suggest that we -- yeah, I -- I would suggest that we do not need to look at this PER, just because it was four cases. They were all reworked. We have looked at the TBD. That would be my suggestion. And I know that the issue of radiographers was discussed at length at a lot of the GSI meetings, so my suggestion would be we don't need to redo this.

CHAIR BEACH: That's -- and that's where I came to, too. If there's only four cases and other things have been looked at, it just didn't seem like something we needed to. So, okay. Thank you for that.

Paul, Loretta agree?

MEMBER ZIEMER: Well, I have a question. So, the four cases represented --

CHAIR BEACH: Go ahead.

MEMBER ZIEMER: -- the original, or did they represent cases that were looked at under these new PERs?

MS. BEHLING: Those were from the original, and I -- and maybe NIOSH should jump in here, but initially before the GSI TBD, if -- you know, you have Appendix B was approved, they were looked at under OTIB-4, and they -- and now there was increased dose, external doses, after the -- the TBD was -- was issued, and so I'm -- if the cases were not -- were not revised -- or I mean, I'm sorry -- were not compensated after looking at those four cases, when the new PERs came out, they would have been looked at again.

MEMBER ZIEMER: Oh, that's -- that's what I'm asking. So, you -- you don't know whether the new PERs affected those cases or not.

MR. SIEBERT: Well, it's -- this is -- this is Scott Siebert. I can help you

with that. This one, specifically, because it does refer to PER-57 being a follow-up PER. And I'm looking at PER-57 right now, and it specifically states: Therefore, all previously completed claims were reevaluated under this PER. So, anything that was considered under the first PER would have been considered under PER-57 as well.

CHAIR BEACH: Okay. Good. So, that answers your question, Paul?

MEMBER ZIEMER: Yeah, uh-huh. Thanks.

CHAIR BEACH: Okay. I'm in agreement with that, --

MEMBER ZIEMER: Yeah, so --

CHAIR BEACH: -- that we don't --

MEMBER ZIEMER: -- looks like we don't have to do -- yeah. Okay. I'm good.

CHAIR BEACH: Yeah. We do not. Okay. Any disagreements, speak up. Otherwise, Kathy, you can go ahead and move on to 026.

MS. BEHLING: Okay. PER-26 is Pantex TBD revision, which is over ORAUT-TKBS-13. The PER was issued back in October of 2007. Revision 2 of the Pantex occupational medical dose TB do -- TBD increased doses for three categories that I have listed there, the thyroid, testes, and uterus doses; for chest exams between '67 and 1971. It also increased doses for ovaries, urinary bladder, and colon -- for colon cancers; for chest exams between '67 and '71 and 2004; and for lateral lumbar spine exams prior to January 1, 1982; and skin doses for the AP lumbar spine exams prior to January of '82 also increased. There were 50 cases that were evaluated by NIOSH that met their criteria of their -- the employment date for the EE and the target organ as specified above.

In July of 2008 SC&A did review the Pantex TBD-3, the occupational medical those TBD Rev. 1. We did identify some concerns with the occupational medical dose, but those concerns seem to be addressed in Rev. 2 of -- of that TBD.

So, I will turn it over to you.

CHAIR BEACH: We --

MS. BEHLING: There were no -- I'm sorry.

CHAIR BEACH: Go -- go ahead.

MS. BEHLING: No, I was just going to say there were no follow-up PERs issued in behalf of Pantex. When it comes to selection of cases for this particular PER, it seems fairly straightforward to me. The -- the EE either had to work during a specific time frame or they had -- and they had to have the target organ that was identified above. So, I don't think that's a lot of guesswork there as to the number of claims that needed to be looked at.

CHAIR BEACH: Yeah, and the fact that --

MS. BEHLING: And we --

CHAIR BEACH: -- you did the TBD review Rev. 1, and you found that things were fixed and Re. 2. I think this is something we don't need to review also. Paul, Loretta?

MEMBER ZIEMER: Yeah, I'm okay.

MEMBER VALERIO: I agree.

MS. BEHLING: Okay. So, --

CHAIR BEACH: Okay. Thank you.

MS. BEHLING: So -- and so, can I move on to the PER-27?

CHAIR BEACH: Yes. Go for it.

MS. BEHLING: Okay. All right. This is Clarksville and Medina site profile, which is TKBS-0039. The PER was issued in October of 2007. The Clarksville-Medina site profile was initially issued in November of 2006; however, cases were being adjudicated using guidance in the development of this TBD. However, what happened, that guidance changed during the NIOSH comment resolution process and because -- and so, they needed to go back and look at those adjudicated cases that were actually reworked prior to the issuance of this site profile. Because I -- NIOSH was not able to determine which cases were affected, they looked at all the cases, which was 65 -- 65 cases that were less than 50 percent. The site -- site profile has been reviewed -- revised three times, and this did result in the issuance of the PER-87. SC&A has reviewed the technical basis document and PER-87. So, I would think these -- these cases would have been, I would think, also included in PER-87 if -- you know, if they weren't compensated during this PER.

CHAIR BEACH: Yeah, I agree with --

MS. BEHLING: And because --

CHAIR BEACH: Oh, go ahead. Sorry.

MS. BEHLING: No, and, again, I'm just trying to point out that all of the cases that had the -- that were less than 50 percent, they were all evaluated. They were all looked at.

CHAIR BEACH: Okay. I feel like this is one we don't need to review as well. Paul, Loretta?

MEMBER ZIEMER: Agreed.

MS. BEHLING: Okay.

MEMBER VALERIO: Agreed.

CHAIR BEACH: So, on to 28.

MS. BEHLING: Okay. 28. Pinellas TBD revision. This was issued, again, back in 2007. And external dose TBD -- TBD-6 was revised in August of 2006 to provide direction on assigning missed dose. And then a few months later, it was revised again because they realized that they had to clarify the language in the TBD because it led dose reconstructors to perhaps conclude that missed dose should -- should be excluded. So, again, in this particular case, NIOSH did evaluate all cases that were less than 50 percent, and that represented 24 cases. The TBD -- TBD-6 has been revised two additional times, and it has resulted in PER-79.

SC&A has reviewed the TBD Rev. 0 and Rev. 1. We actually did a focused review on Rev. 1 to ensure that our concerns in Rev. 0 were answered, but we have not reviewed PER-79.

CHAIR BEACH: Okay. And were all -- all the findings resolved in Rev. 1?

MS. BEHLING: The findings --

CHAIR BEACH: Do you remember?

MS. BEHLING: Yes, I -- yes. The findings had been resolved in Rev. 1. And I still think, perhaps, we could go back -- that should become one -- the PER-79 should become something about -- on our list that we want to review in the future, I would suggest.

CHAIR BEACH: Yeah, I was going to suggest that. And also, I know the Pinellas work group is active. Is that something they would review it within that work group? Anybody know?

MS. BEHLING: In that -- this is Kathy. Not in -- but in the past,

typically, all of the PERs are typically reviewed under the subcommittee, and then maybe --

CHAIR BEACH: That's what I thought.

MS. BEHLING: -- that information is shared with the work group.

MEMBER ZIEMER: That's correct. That's correct.

CHAIR BEACH: Okay. Well, I think that one --

DR. TAULBEE: This is Tim.

CHAIR BEACH: Oh, go ahead, Tim.

DR. TAULBEE: This is Tim. That is my understanding as well, is that PERs are addressed by the subcommittee of procedures review and not the individual workers that are active typically under an SEC or a TBD revision.

CHAIR BEACH: Okay. Thank you. Let's go ahead and, I would suggest, adding that to the list.

MS. BEHLING: I agree. Okay.

DR. TAULBEE: If -- if I --

MEMBER ZIEMER: This is Paul --

DR. TAULBEE: -- make a suggestion here. That would be to add the PER-79 as you just indicated, but I don't know that there's a need to review the PER-28 from that standpoint.

CHAIR BEACH: No, I agree.

MS. BEHLING: Correct.

CHAIR BEACH: -- with 79.

MS. BEHLING: Yes. Yes.

CHAIR BEACH: Yeah. Okay. So, that is correct, Tim, --

MS. BEHLING: Yeah, that's correct.

CHAIR BEACH: -- thank you. And Loretta, Paul, are you in agreement with reviewing --

MEMBER ZIEMER: Yes. Yeah, --

CHAIR BEACH: -- PER --

MEMBER ZIEMER: -- exactly.

MEMBER VALERIO: Yes, but I -- I just need to clarify -- Jose, this is Loretta. I just need a clarification. So, PER-79 is being tasked for review by SC&A?

CHAIR BEACH: No. We would task it, yes.

MEMBER VALERIO: Okay.

CHAIR BEACH: That's one that hasn't been reviewed.

MEMBER VALERIO: Okay. But that will be done at a later time, not right now?

CHAIR BEACH: It will just be added to the list. And then as we -- as we assign these or task these, then it will be -- it'll fall on the list, depending on priority. Yes.

MEMBER VALERIO: Okay. Thank you.

CHAIR BEACH: Along with 90 --

MEMBER VALERIO: Yeah.

CHAIR BEACH: -- that we talked about earlier. Yeah.

MS. BEHLING: Okay. And I am looking back -- Kathy, again. I am looking back at PER-79. I just wanted to verify that this does have to do with PE -- with the external dose TBD, and it does, so --

CHAIR BEACH: Okay.

MS. BEHLING: -- we're talking about the same, yeah, T -- TBD.

CHAIR BEACH: Okay. (Indiscernible) --

MS. BEHLING: Okay. Can I -- can I move on?

CHAIR BEACH: Yes.

MS. BEHLING: All right. PER -- PER-32, Nevada Test Site TBD revision. Again, issued way back in 2007. It was -- the external dose TBD was revised to, first of all, increase the limit of detection of dosimeters that were issued after 1986, and it corrected recorded photon dose from film dosimeters, which contained a lead filter and that were used during the time period of July 1960 to the end of 1965. There were 481 cases with POCs less than 50 percent that were adjudicated before July 30, 2007. That's when Rev. 1 of the TBD was issued.

The TBD has been revised two times to add an SEC and to eliminate neutron dosimeter correction factors, and SC&A has -- is -- has reviewed the NTS TBD. And that's a very active work group.

CHAIR BEACH: Okay. So, not needed for review. Paul --

MS. BEHLING: That's what I would suggest.

CHAIR BEACH: Yeah. Paul, Loretta, okay with that?

MEMBER ZIEMER: I'm okay with that.

MEMBER VALERIO: Yes.

MS. BEHLING: Okay.

CHAIR BEACH: Let's go ahead --

MS. BEHLING: Okay. Now, we -- we will move on to PER 34, which is Harshaw Chemical Company TBD revision. This PER was issued in 2011, and Rev. 1 increased the intake rates for Type S uranium between December of 1949 through December of 1953. Using the NIOSH-specified criteria, NIOSH

evaluated five cases. They -- they had specific criteria. They didn't look at all of the cases. I will just make mention there is no Harshal work group that I could find, and SC&A has not reviewed the exposure matrix. So, if you want my suggestion, this would be one PER that I do we would bene -- that you'd benefit from having a review. Because as I said, under subtask 2, we do get an opportunity then to look at the guidance document associated with this. Can you hear me?

MEMBER ZIEMER: Yeah. I was waiting -- waiting for --

MS. BEHLING: Okay.

MEMBER ZIEMER: -- to say something. Yeah, if -- you haven't reviewed anything on Harshaw yet; is that correct?

MS. BEHLING: That's correct.

MEMBER ZIEMER: So, it's not --

MS. BEHLING: We looked at cases, --

MEMBER ZIEMER: -- (indiscernible) --

MS. BEHLING: -- but we haven't --

MEMBER ZIEMER: -- review related documents, then what -- what do you have -- what is -- what is there Harshaw? There's no site profile, right?

MS. BEHLING: There is a TBD, yes. There is a site profile.

MEMBER ZIEMER: Oh, there is, okay.

MS. BEHLING: Yeah, an exposure matrix, I believe.

MEMBER ZIEMER: but you've not reviewed that?

MS. BEHLING: No, we have not. Okay. Did we lose, Josie?

CHAIR BEACH: Sorry, I'm muted. Yes. No, I was talking into my muted phone. I apologize. So, yes, I had added this to my list early on, so I'm in

agreement with reviewing. And we can move forward.

MS. BEHLING: Okay. So, we will move on to PER-36. That's the Blockson TBD revision. This was issued in April of 2012, and Rev. 3 of the Blockson TBD increased radon exposures from sixty -- 1963 to the end of the residual period and also increased particulate intakes during the residual period after 1977.

NIOSH evaluated 36 cases after identifying two populations of potentially impacted claims. So, this doesn't represent everything that might be out there. They -- they had a criteria to use to come up with these 36 cases. We did review PER-20. And that was -- SC&A evaluated changes between the Rev. 1 and -- I mean, I'm sorry -- Rev. 0 and Rev. 1 of the TBD; however, SC&A has not reviewed Rev. 3. To me this is a PER you may want to consider having us review.

CHAIR BEACH: Okay. And to be clear, that would be PER-20, Rev. 3?

MS. BEHLING: No. Per-36.

CHAIR BEACH: So, --

MS. BEHLING: We -- we already -- yeah, we reviewed PER-20, and I know there were some findings there. It had to do with workbooks and things like that, but I know they have been resolved. But it -- this may be one that I would consider that we could look at.

CHAIR BEACH: Okay. Paul, Loretta, you in agreement with that recommendation?

MEMBER ZIEMER: Yeah, that would be okay.

MEMBER VALERIO: Yes.

CHAIR BEACH: Okay. We can --

MEMBER ZIEMER: When was (indiscernible) -- what was the date on this revision?

MS. BEHLING: 2012 was the PER, so the TBD was sometime before that.

MEMBER ZIEMER: Well, okay. It goes to the back a ways then.

MS. BEHLING: Yeah. It's just that we don't always look at a lot of Blockson.

MR. SIEBERT: This is --

MEMBER ZIEMER: The one that you reviewed --

MR. SIEBERT: -- (indiscernible) --

MEMBER ZIEMER: -- what year was that? What was the date on the one that was reviewed?

MS. BEHLING: March 2009.

MEMBER ZIEMER: 2009, okay.

MR. SIEBERT: And you --

MEMBER ZIEMER: Probably was looking at --

MS. BEHLING: I don't know. Is someone else trying to say something?

MR. SIEBERT: Yeah, I was. This is Scott. I was just going to say, I was trying to wait until you are done with Blockson, because I wanted to go back to Harshaw real quick. I'm sorry. So, if -- if you're done with Blockson.

CHAIR BEACH: I think we are. Go ahead, --

MR. SIEBERT: Okay.

CHAIR BEACH: -- Scott.

MR. SIEBERT: Sorry about -- sorry to interrupt. I was frantically typing and searching as we were going through that. Just going back to the Harshaw, the last one, I just did want to point out, it may be helpful to SC&A

to know that in the eighth set during the dose reconstruction subcommittee, one of the claims was actually a Harshaw claim. And during that, SC&A did do a review of the Harshaw technical basis document. It's dated May of 2008. UNIDENTIFIED SPEAKER: (Indiscernible.)

MEMBER VALERIO: That goes back a ways.

MEMBER ZIEMER: Was -- was that a full (indiscernible).

MS. BEHLING: I lost you. I'm not hearing.

MR. SIEBERT: Hello? Can you hear me?

MEMBER ZIEMER: Yeah.

CHAIR BEACH: Yes.

MR. SIEBERT: Yeah. It's a -- it's an attachment to the eighth set of dose reconstruction reports, and it's entitled review of the Harshaw Chemical Company technical basis document. So, I mean, I'm not -- it may not change anything, but I'm just -- just want to point that out for SC&A, so they have, at least, a starting point that they -- something already exists for them.

CHAIR BEACH: Right, --

MEMBER ZIEMER: So, now --

CHAIR BEACH: -- thank you.

MEMBER ZIEMER: -- so, yeah. Makes -- that's already done. That simplifies the process.

MR. SIEBERT: Yes. Definitely.

MS. BEHLING: And (indiscernible) -- and I -- I can look at that. In some cases, when we did that, those attachments -- because I think we did it for Bridgeport Brass some of the others -- often we focused on just those

issues -- some things in the dose reconstruction report. So, I don't know if all of the pathways and all of those dose reconstruction (audio break) would be assessed there.

CHAIR BEACH: Yeah.

MS. BEHLING: but if you'd like, I could go back and look at that. And if you don't think this is worthwhile, I could report back to you on that.

MEMBER ZIEMER: So, you're saying it may not --

UNIDENTIFIED SPEAKER: (Indiscernible) --

MEMBER ZIEMER: -- Kathy?

MS. BEHLING: I'm sorry, Paul, I didn't hear that.

MS. BEHLING: I just -- you're thinking it might not have been the full review is what you're saying, I think; is that --

MS. BEHLING: Yes, that's what --

MEMBER ZIEMER: -- right?

MS. BEHLING: -- I'm -- yes. That's what I'm thinking. Because even with some of the DR templates that are on our list, I see in some cases we looked at some of those -- some -- some of the method -- yeah, DR methodology; however, we only focused on internal dose because that was the discussion in the PER. We did go outside of that. Now, it may be different because this was associated with the eighth set of DRs, but often we -- it's -- it's more of a focused review. That's the only thing I'll point out.

CHAIR BEACH: So, Kathy, I think you should go ahead and just have -- know that that's there as a starting point, as Scott suggested. I --

MS. BEHLING: Okay. Great.

MEMBER ZIEMER: Yeah, that's (audio break). Right. Very good.

CHAIR BEACH: Great.

MS. BEHLING: Okay. Are we are ready to move on?

CHAIR BEACH: Yes.

MS. BEHLING: Okay. PER-39, Baker Perkins TBD revision. Now, this was issued in January. The PER was issued in January of 2013. The PER assesses both changes introduced in Rev. 0 and Rev. 1, which included modifying both internal and external dose models. There were eight cases that were previously adjudicated that were less than 50 percent, and all eight cases were reevaluated by NIOSH. SC&A has reviewed Rev. 0, but not Rev. 1. And it just seemed to me that since both the internal and external dose models were modified, it may be worth looking -- looking at that and reviewing PER-39.

CHAIR BEACH: Do you know offhand if there was any findings or observations for that first review?

MS. BEHLING: I do not know.

CHAIR BEACH: Okay.

MS. BEHLING: I apologize. I can go back and look.

CHAIR BEACH: No, that's --

MS. BEHLING: I'm sorry.

CHAIR BEACH: -- okay. I'm okay with adding that. Paul, Loretta?

MEMBER ZIEMER: Probably. I guess we don't have any feel for the extent of the revisions, whether they were substantial or not?

CHAIR BEACH: Uh-uh.

MS. BEHLING: Let me see here. I could -- could go in and look. Let me see if I can pull that up quick.

MEMBER ZIEMER: Well, they were enough to cause -- to require a PER, so that's -- that's --

MS. BEHLING: Yeah.

MEMBER ZIEMER: -- that's itself --

MS. BEHLING: Yeah, that's --

MEMBER ZIEMER: -- so, I guess, --

MS. BEHLING: -- and it did --

MEMBER ZIEMER: -- answers its own --

MS. BEHLING: Yeah.

MEMBER ZIEMER: -- themselves. Probably worth taking a look at it then.

MS. BEHLING: Yeah. It -- it -- in summary, just as it revises the internal dose model and provides more details regarding the client -- quantities of uranium and time line events, that type of thing. So, it -- it has to do with the internal dose model, so it seems to me that that's worth looking at.

CHAIR BEACH: Paul, you got about three minutes left.

MEMBER ZIEMER: Yeah. Right. Well, you still --

CHAIR BEACH: (Indiscernible) --

MEMBER ZIEMER: -- you still have to two votes on everything there, so I'm fine with that. You guys can handle it.

CHAIR BEACH: Okay. I was going to ask Rashaun, but if you're fine with it, then we can go ahead and move through the rest of these.

MEMBER ZIEMER: Yeah. Yeah.

CHAIR BEACH: Okay.

MEMBER ZIEMER: (Indiscernible) -- then I'm good.

CHAIR BEACH: Okay. Thanks, Paul. And thanks for your participation today.

MEMBER ZIEMER: (Indiscernible) in touch.

CHAIR BEACH: Okay. And --

MEMBER ZIEMER: Bye-bye.

CHAIR BEACH: Bye-bye.

You can go ahead, Kathy, on 41, I believe, we are.

MS. BEHLING: Yes. 41, which is OTIB-6 revision and OTIB-6 is your occupational medical X-ray for dose recon -- yeah, procedure document. Rev. 4 increased estimated dose from lateral projections of lumbar spine X-rays for the stomach, bone surface, liver, gallbladder, spleen, and remainder organs. And it also increased estimated doses to ovaries from pelvic X-rays through the end of 1970.

This -- this required NIOSH to do a pretty complex selection criteria process, and they ended up reworking 22 cases by implementing this -- this selection process. There were many sites involved, and it actually -- to -- to get to the number of potential claims, they had to do a text search of -- of those sites and the dose reconstructions associated with those sites. The TBD has been revised two additional times, and SCA -- SC&A has reviewed Rev. 3 and Rev. 5.

My thinking of this is the only reason I would think to have to go in and look at this is because of the number of cases and the complexity of the selection criteria; however, SC&A does not have the ability to perform these text searches. So, I -- I -- we have to assume that the criteria was

appropriate and that, you know, that the searches were done, because I -- I don't see a need to do -- to -- for us to go in and do this, because we can't -- we can't do -- we can't duplicate their results for identifying the number of cases.

CHAIR BEACH: Then I would be fine with not doing this one based on that explanation.

MS. BEHLING: Okay.

CHAIR BEACH: Loretta, you fine with that or different opinion? Are you still with us, Loretta? If you're talking, Loretta, we're not hearing.

MEMBER VALERIO: Can you hear me now?

CHAIR BEACH: Yes.

MEMBER VALERIO: Okay. So, I'm fine with that. I agree with you completely. I just had one quick question, and maybe I missed it somewhere. The last bullet says that SC&A reviewed Revision 3 and Revision 5. How long has it been since those were reviewed?

MS. BEHLING: Okay. Since the Rev. 5 was reviewed --

MEMBER VALERIO: Yes.

MS. BEHLING: Is that what you're asking?

MEMBER VALERIO: Yes.

MS. BEHLING: Actually, I don't think that was too long ago. Ron, are you still on the line, because I think you reviewed that. I don't know if Ron Buchanan is still on the line or not.

CHAIR BEACH: Yeah, I expect he dropped.

MS. BEHLING: Yeah, I recall that Rev. 5 was reviewed rather recently. And -- and I -- I'm almost sure of it.

MEMBER VALERIO: So, Rev. -- just for clarification, Rev. 4 has not been reviewed?

MS. BEHLING: No.

MEMBER VALERIO: Okay.

MS. BEHLING: But we did review Rev. 5. Yes.

MEMBER VALERIO: Okay.

CHAIR BEACH: So, if you were to review Rev. 4, is -- and you're saying it's not possible to pull those cases. You don't have the ability to, or?

MS. BEHLING: No. We -- we cannot -- we don't, at this point, have the ability to look at the NOCTS database, and I'm not -- and that -- I don't even I don't even know if that would help us, because they would have to have IT people, I believe -- and NIOSH can correct me here -- go in and do a search. I mean, we would have to look at all of the potential cases and do a text search associated with the changes that were made here for all of the cases to narrow it down to those 22 cases that were evaluating and to ensure that none were missed.

CHAIR BEACH: Okay. I feel like if we need to put that on the back burner somewhere, that'd be fine, but at this time, I don't think we should move forward on it.

MS. BEHLING: Okay.

MS. MARION-MOSS: This is Lori. Just to clarify, Kathy, the review of Rev. 5 for OTIB-6 was done in 2019.

MS. BEHLING: 2019, okay. Great. Thank you. Thank you, Lori. And Loretta, did you hear that?

MEMBER VALERIO: Yes, I did. Thank you.

MS. BEHLING: Okay. Can I move on?

CHAIR BEACH: Yes.

MS. BEHLING: All right. Okay. Next PER is 44, Metallurgical Laboratory. This was -- DR was issued in May of 2013, and here we go again with the DR templates. There's no TBD for this site. And this template guidance changed. It changed the dates of the operational and residual periods. There was also an SEC established for internal and external doses. Some -- some cases that used OTIB-70 -- OTIB-70 is dose reconstruction for residual -- radioactive -- radioactivity periods at AWE facilities. And that OTIB changed by lowering the contamination reduction rate, which increases your dose.

There was only one case that was less than 50 percent, and NIOSH reevaluated that. SC&A did review the SEC evaluation report in June of 2009. And SC&A has -- but we have not reviewed the template. That is on -- on our list of templates out there. Now, I believe -- and yes. No. Let me just be sure. I am not sure. Okay.

What I would suggest is that rather than reviewing PER-44, it is more important to review the template. And so, that would just be my suggestion.

CHAIR BEACH: Okay. That was going to be my comment that it's -- Kathy, that it's already on the list. And so, let's bypass it here, and it -- it's on our list. We're going to review it with the templates.

MS. BEHLING: Okay.

CHAIR BEACH: Okay with that, --

MS. BEHLING: Loretta?

CHAIR BEACH: -- Loretta?

MEMBER VALERIO: It takes a minute for my mute to kick off. Yeah, I'm fine with that. I was actually just making a note of that.

CHAIR BEACH: Okay. I think the next one is going to be the same situation, but go ahead, Kathy, 48.

MS. BEHLING: Yeah. It is the same situation, but I have a little bit different recommendation here. This is what -- Wah Chang, and it PER-48. It was issued in 2013, and again, the -- it's a DR template. And a lot of the same changes happened at this facility. SEC was established, the OTIB-70 changes. There were 114 cases that were less than 50 percent that were looked at.

Now, SC&A has not reviewed this DR methodology template, and NIOSH has stated that they are developing a TBD for this site. The only thing I was thinking is that PER-48, in looking at this, may give us an opportunity to look at the DR guidance now -- that exists now -- prior to the TBD being issued. And also, we don't know what the timing of that TBD is going to be. Now, obviously, if there's a lot of changes, there's going to be another PER issued for this site.

I just thought it might give us an opportunity to -- to just look a little bit at their DR methodology. I don't know. I can go both ways on this one. It's just -- I guess, it depends on, from my way of thinking, when the TBD will actually be issued. And I don't even know if NIOSH can provide an answer to that.

CHAIR BEACH: Well, that was going to be my question because I hate to do one and then turn around and do it again. So, NIOSH, any --

MR. RUTHERFORD: Well, yes. This is LaVon Rutherford. I don't know exactly when the TBD would be issued. It is on our schedule, and I don't have the schedule in front of me, but, you know, we already have a ton of work into -- and to have to address two different PERs for the same thing, I really I -- I -- I would, you know, like to not do that.

MS. BEHLING: Yeah, I'm sure.

CHAIR BEACH: Yeah. And I'm kind of in agreement with that, also, Kathy, because we do -- we had noted that as one that was going to be developed. And it may change completely. So, I'd say let's not -- let's not do that --

MS. BEHLING: Okay.

CHAIR BEACH: -- and create more --

MS. BEHLING: Okay.

CHAIR BEACH: -- and -- Loretta, are you --

MS. BEHLING: I agree.

CHAIR BEACH: -- okay with that? Okay. Kathy, thanks.

MEMBER VALERIO: Yeah, I do agree with that. I was just going back through my whole notes to see what I can find on -- on this site. But I do agree that, you know, we hold off a little bit on this and -- since we don't know what the time frame for that TBD is.

CHAIR BEACH: It came up during our template discussions the last couple of meetings, and the -- the four top sites were going to be -- NIOSH was going to create site profiles for, so -- and that was one of them.

MS. BEHLING: Right. I agree.

CHAIR BEACH: Okay. So, --

MS. BEHLING: And like I said, they will issue a PER after the TBD is out if there are any significant changes from this template. So, I agree.

CHAIR BEACH: Okay.

MR. RUTHERFORD: Thank you.

CHAIR BEACH: Yeah, of course. And then on to 56.

MS. BEHLING: Okay. 56 is BWXT Virginia. Same deal here. This is a DR template. You can see what changed, the same type of thing. There were 78 cases that were evaluated after NIOSH eliminated some for not being employed during the residual period. And again, this is one of those templates that ultimately is going to become -- there's going to be a TBD issued for this site, so I assume we'll -- we will not look at this, considering --

CHAIR BEACH: Yeah.

MS. BEHLING: -- forthcoming TBD.

CHAIR BEACH: Yeah. I think so.

MS. BEHLING: Can I --

CHAIR BEACH: Yeah, you can move on.

MS. BEHLING: Okay. PER-58, Dow Chemical, the Madison site, issued in 2014. The change to the TBD-6000 Appendix C, it changed the deposition time used to calculate external dose from contamination so from seven days to 30 days, which resulted in an increase in the photon dose and, again, the OTIB-70 revision was incorporated in this, which also increases dose.

There were 96 total potential cases, and 80 were reevaluated by NIOSH because 16 of them were eliminated for various reasons. They were redone with this version or something else. So, and SC&A has reviewed

Rev. 0 and Rev. 1 of the Do TBD, so I'm not sure that it's necessary to review PER-58.

CHAIR BEACH: Okay. I agree with that.

MS. BEHLING: Okay. And now --

CHAIR BEACH: Loretta, I'm assuming you -- I'm assuming, --

MS. BEHLING: Oh. Sorry.

CHAIR BEACH: -- Loretta, if you don't like that, you'll speak up, right?

MEMBER VALERIO: Right, right.

CHAIR BEACH: Okay. Last --

MS. BEHLING: Lastly --

CHAIR BEACH: -- one.

MS. BEHLING: All right. PER-74, this was an upgrade to the NIOSH IREP 5.8 version, and it was issued in 2016. And NIOSH uses an underlying computational platform called Analytica Decision Engine. And that was upgraded from version three to version 4.1.6.

And the -- it -- what it does is it uses a different random number generator, and I think the modification was from like a 32-bit server to a 64 bit, and it's faster, and it changes its random number generator. And it resulted in slight differences in POC results. And it was incorporated then into the IREP version 5.8.

Now, the -- the analysis of the effects of using this version was performed by the original developer -- developers, which is Oak Ridge Center for Risk Analysis. NIOSH also did their independent -- own independent analysis, and they reran cases with POCs between 48 and 50 percent and looked at 117 cases. And a -- the difference in POC was

between minus .77 percent to .56 percent. I don't think there's a need to look at this. It seems to me that NIOSH captured everything that could have been impacted, and so, that's my suggestion.

CHAIR BEACH: Thank you. I agree with that suggestion.

MS. BEHLING: Okay.

CHAIR BEACH: All right. So, it looks like --

MS. BEHLING: There's that --

CHAIR BEACH: -- we have four or five. One, two -- we actually have four that we've added to the list then.

MS. BEHLING: Okay. So, we are now -- so you are tasking us to do the four that we talked about that need to be reevaluated?

CHAIR BEACH: Correct. So, we've got OCAS-PER-079, DCAS-PER-034, DCAS-PER-036, DCAS-PER-039, Rev. 1. Is that the same as what you have?

MS. BEHLING: I -- actually, I -- I was circling things are going along here, so I didn't make my list.

CHAIR BEACH: I -- I -- I think -- I think we're good. And if that changes, --

MS. BEHLING: Okay. --

CHAIR BEACH: -- you can let us know.

MS. BEHLING: Okay. All right.

PREPARATION FOR APRIL 2024 FULL ABRWH MEETING: REVIEW OF TECHNICAL GUIDANCE DOCUMENTS

CHAIR BEACH: So, prep for the full Board meeting.

MS. BEHLING: Okay. As I -- I briefly mentioned earlier, I have gone

through and I -- I need to update you on several things. I have gone through the list of subcommittee-approved documents. I have selected four or five. I selected five.

CHAIR BEACH: Five --

MS. BEHLING: I've already started -- yeah, put together the presentation. The five I've selected are PER-42, which is Linde Ceramic Plant TBD revision, PER-55, which is the TBD-6000 revision. Let's see here. OTIB-11, which is --

CHAIR BEACH: Yeah.

MS. BEHLING: -- TIB for tritium calculated missed dose estimates, OTIB-19, which is coworker coexposure bioassay data for internal dose assessment generic, and then the big one, which is OTIB-54, which is fission and activation product assignment for internal dose related to gross data and gross gamma analysis. And --

CHAIR BEACH: Yeah.

MS. BEHLING: -- there's 36 findings there, so --

CHAIR BEACH: Yeah, I saw --

MS. BEHLING: -- to incorporate that in.

CHAIR BEACH: Yeah, yeah, I --

MS. BEHLING: -- (indiscernible) --

CHAIR BEACH: -- saw that when I was prepping and I thought, you know, we're probably good with these five being that that one is going to be long.

MS. BEHLING: Yeah.

CHAIR BEACH: We have --

MS. BEHLING: And (indiscernible) --

CHAIR BEACH: We have 90 minutes.

MS. BEHLING: Yes. The other thing that happens with the PERs is -- and -- and Linde, there's only three findings, but we talk about the subtask one through three and then we also have case reviews, so those discussions get a little bit lengthy at times, but I'll see where I'm at, but I am definitely going to try to incorporate those 36 findings into this presentation. And I will certainly share that with you. I'm -- I'm moving along with that presentation.

I also want to mention and I -- I'm going to apologize up front for this, but when I started compiling these SPR-approved documents reviews, I guess, what I was looking at is I -- I went back to when Wanda would give the presentations, and I started moving from there to the current time. And when I put together the subcommittee's accomplishments presentation, I said, hmm, I don't think I have enough documents on this approved document review list that I've identified while I was preparing for that presentation.

So, I have added quite a few of new -- I don't even know if I have in front of me right now -- of new documents to this list. And under the comments period -- or the comments, I did identify these were added for this April -- this April 14th meeting. I just did that so that you know that there are newer ones that -- or not the newer ones -- what had actually happened, I had gone back to some of these first sets of data -- of -- of procedures that we used to review. And Steve Marshkey (ph) used to work with Wanda on -- on putting together these presentations and that type of

thing, so. But I did now go back -- I went back to -- we had three sets of many, man, many reviews. I mean, there were at least 30 procedures we reviewed in each of these sets. And I combed through them. Those that were -- have been canceled, even though we reviewed them, I don't see a reason for us to present those to the full Board unless you feel there's some reason for that, and I've added those older reviews to this list now.

And I just wanted to make you aware of that. And I apologize that I didn't include that earlier.

CHAIR BEACH: Nope, that's okay. I saw it on Page 6, all the new add-ons, and I'm fine with that. And I see no reason to -- to bring before the Board the ones that are no longer in use. I think that's what you said.

MS. BEHLING: Yes. Yeah, they've been canceled since then.

CHAIR BEACH: Canceled --

MS. BEHLING: We've reviewed quite a few of these procedures. I don't --

CHAIR BEACH: No, I think -- I -- we have the 90 minutes, and I think with the five that you have chosen, I think we're good with those.

MS. BEHLING: Okay.

MS. BEHLING: And then if you feel like that's going to be short and we want to add another one, I'll leave that up to your judgment. And we definitely don't want to go over 90 minutes, that's for sure.

MS. BEHLING: Okay. Okay.

CHAIR BEACH: So, then the --

MS. BEHLING: (Indiscernible) --

CHAIR BEACH: -- other thing we have is newly-issued guidance and

topics, but before we get to that, I want to go back to the templates and adding the cases, because I think that we'll want to report on those at the next meeting, if you think that's enough time. So, just something to keep in mind there.

MS. BEHLING: Okay.

MEMBER VALERIO: Josie?

MS. BEHLING: I -- I --

CHAIR BEACH: Yep, go ahead.

MEMBER VALERIO: I -- I'm sorry, Kathy.

MS. BEHLING: No, it's okay.

MEMBER VALERIO: For the -- for the meeting next month, I didn't catch the second PER. The first one was 42, correct?

CHAIR BEACH: Yeah, and the second one is 055.

MEMBER VALERIO: Okay. And then --

CHAIR BEACH: And then --

MEMBER VALERIO: -- OTIB-11, OTIB-19, and OTIB-54?

CHAIR BEACH: Correct.

MEMBER VALERIO: Okay, thank you.

CHAIR BEACH: Yep.

MS. BEHLING: Okay.

CHAIR BEACH: Okay. And then --

MS. BEHLING: Okay. And Josie, let me be sure I -- I'm -- I'm understanding. You are suggesting that we add the cases to the Amchick -- Amchitka Island template?

CHAIR BEACH: Yes. And --

MS. BEHLING: Which I think there's --

CHAIR BEACH: -- Albuquerque, yeah.

MS. BEHLING: Okay. I'm not quite as concerned about Albuquerque, but it's certainly worth -- worth looking at it. It's just because the internal and external doses is usually done by other sites. One of the other things I was wondering is would we benefit from also adding some cases to Peek Street? Add --

CHAIR BEACH: Based on Tim's thought, we're kind of farther in the process there, though, so any -- any comments on that? I think we didn't really have --

DR. TAULBEE: Yes.

CHAIR BEACH: -- type of discussion when we got to Peek Street. Who said yes?

DR. TAULBEE: This is Tim. I would --

CHAIR BEACH: Oh, Tim. Go ahead.

DR. TAULBEE: -- not add any cases at this time, because we're still trying to figure out how we're going to respond to the one -- or to the one case that you reviewed already. And we don't know if we're going to be revising the DR methodology, templates, or issuing just the response paper. We really don't know where we're at from that standpoint along with that one.

CHAIR BEACH: Okay. That's fair enough. And Kathy, I think just in view of the comments and conversation today, especially on Amchitka, seeing if we can come to a consensus on that findings versus observations. And as Tim suggested, maybe adding more cases, you get to that bottom

line and -- and anyway, that's the only thing I was thinking on that.

MS. BEHLING: Okay. And what would your suggestion be with how many additional cases would you like us to look at? And I --

CHAIR BEACH: Oh, I don't know.

MS. BEHLING: -- you -- yeah, can Lori help us with that? And I was --

CHAIR BEACH: Yeah.

MS. BEHLING: -- going to also ask -- I mentioned this earlier, the document that I sent out that's the unreviewed DR methodology templates and reports, that's -- that's really on this last topic, Lori had provided me with a list first of -- of all of the DR template sites, and she even listed, you know, revision -- you know, versions when they were changed, and that type of thing. Now, looking back at this, I'm wondering, can we get an estimate of how many cases are involved with this. And I know, as I mentioned, that this may be a difficult thing to determine right now, because of the cybersecurity. But it may help us going forward to determine how many cases we actually want to look at. Is that something that NIOSH is -- is able to do?

MS. MARION-MOSS: Kathy?

MS. BEHLING: Or willing to do?

MS. MARION-MOSS: -- Lori, we can certainly look into that and solicit help or assistance from ORAU, so we can --

MS. BEHLING: Okay.

MS. MARION-MOSS: -- work on that.

MS. BEHLING: Okay. Very good. Thank you, Lori.

CHAIR BEACH: Well, and some of this goes back to just your

conversations within SC&A and really fine tuning how we're going to do these templates going forward.

MS. BEHLING: Okay.

CHAIR BEACH: And, you know, the findings versus the observations and, you know, that's going to make a difference also. Do you need anything more from -- like, from NIOSH on that, or just what Lori suggested? Is that enough at this point?

MS. BEHLING: Yeah. Now, with Amchitka, at least, based on Tim's presentation, I mentioned this, though, there's 177 claims, and that was back some time ago. So, we -- are we going to look at additional 5, 10? And Albuquerque Operations Office there's 119, so I'm just trying to get a ballpark as to how many additional cases you want us to look at.

CHAIR BEACH: That's a good question. I -- I'm not sure. Tim, do you have a recommendation on that since it was your recommendation to add cases? Yeah, sorry.

DR. TAULBEE: Yeah, so that's all right. This is Tim. It seems to me, since we have that many for those two particular claims, that you probably -- you definitely want to look at, at least five, possibly 10. I mean, that's giving you a 5 to 10 percent sampling of the population to look for consistencies or -- or how we're doing those dose reconstructions. And -- and it seems to me that that would be an appropriate number, somewhere in there.

CHAIR BEACH: Okay. That sounds reasonable. And I had 5-10 in my head, too, so that's agree -- agreeable.

MS. BEHLING: And so --

EMBER VALERIO: This is Loretta, I have a --

MS. BEHLING: -- Lori. Okay. I'm sorry.

MEMBER VALERIO: That's fine.

CHAIR BEACH: No, that's okay, Kathy. Go ahead, Loretta.

MEMBER VALERIO: So, the -- the five to 10 cases, does that include both site or from each site?

CHAIR BEACH: No, just from that -- we're just talking on Amchitka right now.

MEMBER VALERIO: Oh, okay. Just Amchitka. Okay. And then I have one more question, and that's all I have. Looking back at PER-70, Subtask 4, and I have a note that SC&A recommended the Board select at least one case from the remaining cases, is that another one that can be -- be reviewed, or do we not need that at this point in time?

CHAIR BEACH: (Indiscernible) be for Subtasks 4, correct? And we -- we --

MEMBER VALERIO: Correct.

CHAIR BEACH: We didn't get to 70, so those -- so, 68, 70, 72, and 60 will be on the carryover for next -- the next meeting.

MEMBER VALERIO: Okay.

CHAIR BEACH: So, we're -- we won't select those today.

MEMBER VALERIO: Okay.

CHAIR BEACH: Okay. And --

MS. BEHLING: There are a couple things --

CHAIR BEACH: Before (indiscernible) --

MS. BEHLING: Can I ask one more question before, Josie?

CHAIR BEACH: Go for it.

MS. BEHLING: I'm sorry. Okay. And, I guess, maybe I'm a little confused here. We're so we're only talking about doing five to 10 cases for the Amchitka, not the Albuquerque Operations Office? As I said, one has 177 claims, the other one has 119. I didn't know if you wanted to select additional claims for both those sites or just --

CHAIR BEACH: Yeah, you know what, --

MS. BEHLING: -- Amchitka.

CHAIR BEACH: -- I feel like we probably should, but I was going back to what you had said that you didn't think we needed to worry about Alburquerque. But I'm okay with doing both if it gives us a better picture of how we're going to do the templates and getting the information we need moving forward.

MS. BEHLING: Okay. All right. Yeah, I -- I would agree that we could go ahead and do both. And, perhaps, if you agree, I could just work with Lori on -- on picking cases for those two?

CHAIR BEACH: Yes, I agree with that. And then --

MS. BEHLING: Okay. Then, so --

CHAIR BEACH: -- (indiscernible) --

MS. MARION-MOSS: I'm sorry? I didn't hear that. This is Lori.

MS. BEHLING: Yeah. I just -- are you okay with the two of us working together to pick out cases for those --

MS. MARION-MOSS: That would --

MS. BEHLING: -- number of cases, so.

MS. MARION-MOSS: -- be fine.

MS. BEHLING: Okay, thank you.

CHAIR BEACH: Okay. So, two other things. I want to pick a -- a date for the next meeting, and do we need to assign any other documents at this time, or is there --

MS. BEHLING: Okay.

CHAIR BEACH: -- plentiful enough?

MS. BEHLING: Yeah. Let me think about this. Okay. We have PERs we're gonna -- we have four PERs, we are going to do additional cases here. I do have on the last page -- Page 5 of the unassigned reports --

CHAIR BEACH: Yep.

MS. BEHLING: -- I have a couple -- yeah, I have a couple of things here. Now, obviously, we talked about the fact that we are not going to review Report-89 under this subcommittee, so that last one, I guess, can come off --

CHAIR BEACH: Comes off.

MS. BEHLING: -- of this. The only -- yeah. The only thing I -- I will mention is when it is reviewed -- when it's reviewed under an SEC or in a different light, I don't know if it answers the questions that we had in this subcommittee, and that is how was that applied and how does that get applied, but I'm going to let that go and hopefully those of -- on this subcommittee --

CHAIR BEACH: I -- I'm on --

(Whereupon, Ms. Behling and Chair Beach speak simultaneously.)

CHAIR BEACH: I'm on the --

MS. BEHLING: Okay. You'll make sure it happens.

CHAIR BEACH: -- on that. I'm gonna try to --

MS. BEHLING: Okay. You'll do that.

CHAIR BEACH: -- make sure it happens. So, yeah, I'll keep --

MS. BEHLING: Okay.

CHAIR BEACH: I'll keep a note of that.

MS. BEHLING: Okay. All right. Okay. Then I did have PER-88, which is Pacific Proving Grounds, that's a Revision 3. We had looked at some of the -- the older TBDs. I -- maybe we should just focus on the OTIBs, the PERs on some of the -- like OTIB-67, that's reconstruction of intakes for thorium resulting from nuclear weapons programs. That was put out --

CHAIR BEACH: That --

MS. BEHLING: -- put out in 2014.

CHAIR BEACH: That's actually 0076.

MS. BEHLING: Yeah.

CHAIR BEACH: You just --

MS. BEHLING: I'm sorry.

CHAIR BEACH: -- backwards. Okay. So, you're --

MS. BEHLING: Okay. Sorry.

CHAIR BEACH: -- you could handle those three OTIBs at this point, 076, 0, and 84, or are you -- is that what you're suggesting, or just for one?

MS. BEHLING: Perhaps we could handle the three. We have a six-month time frame on those, but I will admit, we're going to probably try to focus on during the dose reconstructions for these templates so that we can, perhaps, have something to you by the next meeting, depending on what -- when that meeting is.

CHAIR BEACH: Yeah, I don't --

MS. BEHLING: I'm hoping to have it (indiscernible).

CHAIR BEACH: Yeah. I'm hoping to have it in July, so that was the next step. Is this something you -- you wanted tasked today, or can we hold these over until the next meeting? I'm okay, but I don't want to overburden you either.

MS. BEHLING: Okay. let's hold off then. Let's hold off --

CHAIR BEACH: Okay.

MS. BEHLING: -- work on what we have here. We still have --

CHAIR BEACH: Yeah, okay.

MS. BEHLING: -- dose reconstruction set working on.

CHAIR BEACH: Okay. That sounds good. And Rashaun, if you're -- we're -- I think we're ready to try to book another meeting, if people would look at their July calendars. I kind of would rather go in July, if we can. August, we have the Board meeting the first week.

DR. ROBERTS: Okay. What -- what week -- can -- can you hear me?

CHAIR BEACH: Yeah. Yeah. So, (audio break) mid-July or based on people's calendars.

DR. ROBERTS: Mid July, yeah, the first -- the third or fourth week. We have five weeks in July.

DR. ROBERTS: Right. Would you want to look at the -- the 18th, the 16th, 18th?

CHAIR BEACH: Yeah, you -- that week would be fine, any of those days for me. Others?

DR. ROBERTS: And we'll, of course, have to see if Paul can make it.

CHAIR BEACH: Yes, of course, yeah. Sometimes it's easier just to put down a date.

DR. ROBERTS: Yeah, --

CHAIR BEACH: (Indiscernible.)

MEMBER VALERIO: So, any of those --

DR. TAULBEE: The week before that is the Health Physics Society meeting, --

CHAIR BEACH: Okay.

DR. TAULBEE: -- and so, I don't know if Paul will be traveling a lot or not. We will be back, but it just means we've got to get everything done before that meeting, so.

CHAIR BEACH: Maybe we should go to the 24th or 25th. I think -- do people prefer Thursday?

DR. TAULBEE: I prefer Thursday or a Wednesday.

CHAIR BEACH: Okay. So, the --

(Whereupon, multiple people speak simultaneously.)

DR. ROBERTS: No, that's the week of the lead team. So, let's see.

DR. TAULBEE: Sorry.

DR. ROBERTS: What about the following, the -- the very end of that month? We would have the --

CHAIR BEACH: That's the --

DR. ROBERTS: -- the 30th, 31st, the 29th.

DR. TAULBEE: We could do the 18th, if you back it up to there. I just was thinking if Paul was traveling, he -- he may not be back, but so, you'd want to check with him.

DR. ROBERTS: Yeah.

CHAIR BEACH: So, let's -- let's take --

DR. ROBERTS: Okay.

CHAIR BEACH: -- two days. So, 18th and an alternate, say the 31st -- 30th or 31st.

DR. ROBERTS: I would say the 30th.

DR. ROBERTS: Okay. All right.

CHAIR BEACH: -- check --

DR. ROBERTS: -- I'll put this out -- yeah, I'll put it out in an email and see if there -- if he can make it.

CHAIR BEACH: Is Tory still on the subcommittee?

DR. ROBERTS: No, she -- she left the Board some time ago.

CHAIR BEACH: Okay. I was thinking it was Nicole. Okay. I have the two of them mixed up. Okay. Thanks.

DR. ROBERTS: All right.

CHAIR BEACH: That sounds great. And any other business that we need to talk about before we sign off? Hearing none, I think we can --

MS. BEHLING: I have --

CHAIR BEACH: -- adjourn. Oh, go ahead, Kathy.

MS. BEHLING: No. I was going to say, I -- I don't have anything else, if you were asking me.

CHAIR BEACH: Oh, no, I was asking everybody. Okay. Thank you. Good meeting. Lots of work done. And we have a half of an agenda for next time. Thank you.

DR. ROBERTS: Thank you.

(Whereupon, the meeting was adjourned at 4:35 p.m. EDT).