CENTERS FOR DISEASE CONTROL AND PREVENTION

NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH (NIOSH)

ADVISORY BOARD ON RADIATION AND WORKER HEALTH (ABRWH)

SUBCOMMITTEE FOR PROCEDURE REVIEWS (SPR)

WEDNESDAY, JANUARY 28, 2026

The meeting convened at 11:00 A.M. Eastern Standard Time (EST)

Josie Beach, Chair, presiding.

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Members Present:

Beach, Josie, Chair

Frank, Arthur, Member

Valerio, Loretta, Member

Registered Participants:

Roberts, Rashaun, Designated Federal Official (DFO)

Barton, Bob, SC&A

Behling, Kathy, SC&A

Buchanan, Ron, SC&A

Cardarelli, John, NIOSH

Chalmers, Nancy, NIOSH

Cook, Madeline, NIOSH

Holzberger, Malia, Department of Health and Human Service (HHS)

Mangel, Amy, SC&A

Marion-Moss, Lori, NIOSH

Murry, Maisha, NIOSH

Ostrow, Steve, SC&A

Rutherford, LaVon, NIOSH

Siebert, Scott, NIOSH

Ulsh, Brant, NIOSH

Registered Members of the Public:

DeGarmo, Denise

Silver, Ken

Schmoldt, Mike

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PROCEEDINGS

(11:10 a.m.)

WELCOME AND ROLL CALL

DR. ROBERTS: Let me start from the beginning, because it seems that everyone was (indiscernible). Is the court reporter still there?

THE COURT REPORTER: I am.

DR. ROBERTS: Okay, great. The music keeps coming on. Apologies, we're having some technical difficulty. I'll give it a second just to make sure that the music stays off. Okay.

So, I will start at the beginning. Sorry for the delay. So, good morning, again, everybody, and welcome to the Advisory Board on Radiation and Worker Health. This is a meeting of the Subcommittee on Procedures Review. I'm Rashaun Roberts, and I'm the designated federal officer for the Board. There's an agenda for today. It's on the NIOSH website for this program under scheduled meetings under calendar year 2026. Go to the tab for -- for January.

Since the subcommittee will be discussing a number of different documents today, some of which may involve specific sites, we do need to go over 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 roll call, subcommittee members and others, please state where you had a conflict of interest. So, we'll start with the Subcommittee Chair Beach.

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

DR. ROBERTS: Frank?

MEMBER FRANK: Frank is here and I'm conflicted at Pantex.

DR. ROBERTS: Valerio? Is Valerio on the line?

MEMBER VALERIO: Can you hear me now?

DR. ROBERTS: Yes, I can.

MEMBER VALERIO: Okay. I'm here, and I'm conflicted all sites in New Mexico.

DR. ROBERTS: And is Ziemer with us?

DR. ROBERTS: Okay. I don't see or hear Dr. Ziemer, nonetheless, we do have a quorum, so the meeting can proceed. And so, I will continue through the roll call, and hopefully he will join us a little bit later. So, roll call for NIOSH/DCAS and ORAUT.

MS. MARION-MOSS: Rashaun, this is Lori. Can you hear me?

DR. ROBERTS: Yes.

MS. MARION-MOSS: Lori Marion-Moss, NIOSH, and I'm conflicted with Mound (indiscernible).

DR. ROBERTS: Okay.

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

DR. ULSH: And this is Brant Ulsh, NIOSH. I am conflicted with Fernald and Argonne East.

DR. ROBERTS: Okay.

MS. COOK: This is Maddie Cook. No conflicts.

DR. ROBERTS: Anyone else for DCAS or ORAUT?

(Whereupon, multiple people speak simultaneously.)

DR. ROBERTS: (Indiscernible.) I'm sorry, where did you say the conflict was?

UNIDENTIFIED SPEAKER: -- WIPP.

MS. MURRY: Maisha Murry, no conflicts.

MR. SIEBERT: Scott Siebert, conflict Mound, WHIP, and West Valley Demonstration Project. Oh, and NTS.

DR. ROBERTS: Okay. Anyone else for DCAS/ORAUT? Okay. Hearing none, let's go to SC&A.

MR. BARTON: Bob Barton, SC&A, no conflicts.

MS. BEHLING: Kathy Behling, SC&A no conflicts.

DR. BUCHANAN: Ron Buchanan, SC&A, conflicted at Los Alamos.

MS. MANGEL: Amy Mangel, SC&A, conflicted at Pacific Northwest National Lab.

DR. OSTROW: Steve Ostrow, no conflicts.

DR. ROBERTS: Anyone else for SC&A? Okay. Then let's --

DR. CARDARELLI: Rashaun, this is -- sorry. This is John Cardarelli, I'm with NIOSH, conflicted at Fernald. I hit my mute button backwards. Sorry about that.

DR. ROBERTS: Okay. It's quite all right. Thank you. Anyone else for NIOSH/DCAS or SC&A? Let's move on to HHS and contractors.

MS. HOLZBERGER: Malia Holzberger, HHS, OGC .

DR. ROBERTS: Any other folks with HHS and contractors? Are there any folks with us from the departments, like, DOE, D -- DOL? Hearing none,

I will move on and ask if there are any members of the public who would like to register their attendance today.

DR. DEGARMO: Dr. Denise DeGarmo authorized petition representative for Pinellas and for United Nuclear Hematite.

DR. ROBERTS: Welcome. Any other members of the public who'd like to register attendance now?

MR. SILVER: This is Ken Silver in the onboarding pipeline to join the Board, and I'm going to go back to a previously scheduled meeting with a very capable person at CDC as part of the onboarding process, but I'll be listening later. Thank you.

DR. ROBERTS: Thank you. Okay.

UNIDENTIFIED SPEAKER: Mike Schmoldt, also in the onboarding process.

DR. ROBERTS: Well, welcome to everybody. I do need to go over a couple of items before I give the floor over to the chair.

(Whereupon, music began playing over the audio.)

DR. ROBERTS: Okay. Thank you. I do need to go over a couple of additional items before I get the floor to Josie Beach, the Chair of this committee. Since we are receiving audio through the telephone only, there -- we ask that everybody helps keep everything move -- running smoothly, so that everyone speaking can be clearly understood. So, if you're not speaking, please mute your phone and check it periodically to make sure that it is on mute. If you don't have a mute button, press star six to mute. If you need to take yourself off mute, press star six again. Because we can't see each other, please identify yourself by name before questions and

comments.

The agenda, the presentations, and background documents that are relevant to -- to today's meeting can again be found on the NIOSH and DCAS website, and --

(Whereupon, music began playing over the audio.)

DR. ROBERTS: -- all of the materials were sent to the Board -- okay. Zaida, are you on? Nancy, are you on? I -- okay. We're going to have to take another pause and make sure that the music isn't going to interfere for the rest of the agenda. So, we're going to take a break and see if we can fix this. Perhaps we can, if it's okay with you, Josie, maybe give it about 10 -- give it about 10 minutes.

CHAIR BEACH: That's great.

(Whereupon, a break was taken from 11:20 a.m. EST until 11:30 a.m. EST.)

DR. ROBERTS: Okay. It has been about 10 minutes. And what we can conclude is that perhaps the music is being triggered by someone who may be putting the call on hold versus putting the call on mute. So, you know, when you mute yourself, please make sure you're going on mute and not on hold because we believe that may be triggering the issue. And I haven't heard the music for some time, so hopefully, we're in the clear.

So, Josie, if you're back, are you ready for me to turn the meeting over to you?

CHAIR BEACH: Yes, Rashaun, I'm here and I'm ready.

DR. ROBERTS: Okay. Your floor.

CHAIR BEACH: Okay. Thank you. And thanks for working through all

the technical issues this morning.

Frank, thank you for joining our subcommittee. I think this is your first meeting, if I'm correct.

MEMBER FRANK: It is, indeed, Josie. Thank you for having me.

ADMINISTRATIVE ITEMS

CHAIR BEACH: We're happy to have you. The agenda is very full, if anybody's looked at it. I doubt that we're going to get through the full agenda today. I do want to say that at the end of the day, our -- our end time is 4:30, but I want to give us at least a half hour, 45 minutes to go over last-minute details in planning for the next meeting, so I want everybody to keep that in mind.

The other item I would like to hold off on, if we get to Pinellas, I'd like to hold off on that until the next meeting as long as, Rashaun, you're okay with that, because we do have a Pinellas meeting on -- tomorrow, actually.

DR. ROBERTS: Yeah. I -- I'm sorry, Josie, that's sounds fine. I do want to say that we do need to stop at 4:30, so -- so, it's great that you're trying to determine, you know, pieces that we may not be able to go over today.

CHAIR BEACH: Okay. Good. So, anything that we don't go over in our agenda today, it's all -- it's all ready. It will just simply be put onto the next agenda. So, we -- we'll go as far as we can go.

And I believe -- I've talked to Kathy, a half hour is probably enough time to -- for the end of our -- our day. And if you're ready, Kathy, I'm going to turn it over to you to get us started with the administrative items.

SPR APPROVED DOCUMENTS FOR NEXT BOARD MEETING

MS. BEHLING: Okay. Can you hear me?

CHAIR BEACH: I sure can.

MS. BEHLING: Okay. Great. Actually, this first item on the agenda is the approved documents -- the SPR approved documents for the next Board meeting. I assume that the subcommittee will be making a presentation at that full board meeting.

CHAIR BEACH: Yes. I think we'll have time for that. Correct, Rashaun?

DR. ROBERTS: Okay. Yes.

UNIDENTIFIED SPEAKER: (Indiscernible) and go ahead and --

DR. ROBERTS: -- mute. We have a -- we have a Board teleconference to discuss that. Yeah.

MS. BEHLING: Okay. All right. In -- in anticipation of us -- of the subcommittee presenting something at the next Board meeting, I did go and select or at least suggest five documents that the subcommittee has already reviewed that we could present. And then lastly, I thought -- I'm going to throw this out for NIOSH. NIOSH also -- and it's part of our agenda today under Item 3 -- they have some responses to OTIB-52, and I'll get into more details, and that's really for the full Board. But if you'd like, I can go through the documents that I'm suggesting.

Would you like me to do that, Josie?

CHAIR BEACH: Yes, I think we should go ahead and do that. That'll take --

MS. BEHLING: Okay.

CHAIR BEACH: -- away some of our last-minute stuff.

MS. BEHLING: Yeah. And this was all submitted to you in a handout, and these -- these documents that I'm talking about, are all listed in that approved document hand -- SPR-approved document handout, and they're on -- they're listed on Pages 2, 7, and 8, if you want to follow there. But I'm suggesting OTIB-19, which is analysis of co-exposure bioassay data for internal dose assignment. There was one finding there. And these are -- the first couple that I selected are older ones. I thought we could clear the Board of those.

PROC-95, that's generating summary statistics for coworker bioassay data. There were three findings there. PROC-65 -- and these are back in -- we did these reviews back in 2007 -- internal findings and corrective actions to prevent re-occurrence, there were two findings there. PROC-94 is the verification and validation process for tools development. We had one finding and PER-47, which is the Grand Junction facility, we had two observations under our Subtask 1 through 3, and we had four findings under the case reviews under Subtask 4.

And then lastly, I would assume that NIOSH once -- since they have their responses ready for OTIB-52, those -- what happened there was back in 2013, I made a presentation to the Board on -- on OTIB-52, and during that presentation, the Board had eight questions. And NIOSH has now -- has responded to those Board meetings -- or to those Board questions. And I thought that we could do it a number of different ways, but perhaps I can add that to the end of the presentation, or NIOSH can provide me

something, or I can give you a background or a history, and then NIOSH can add to it so that we could work together for this presentation. I don't know how NIOSH feels about that. Lori?

MS. MARION-MOSS: This is Lori. I guess I'm trying to understand, Kathy. You mean at the full Board meeting or today?

MS. BEHLING: No, no, the full -- yeah, I'm sorry if I'm not being clear. I'm talking about putting together a presentation for the April full Board meeting. We typically (indiscernible) reviewed, and I thought perhaps NIOSH would want to include at the end of the SPR Approved Documents the responses to the OTIB-52, which you now have -- have published.

MS. MARION-MOSS: Yes, we can do that.

UNIDENTIFIED SPEAKER: Yeah.

MS. MARION-MOSS: We can do that, Kathy.

MS. BEHLING: Okay. And should I just put something into the agenda at the end and -- and then we can work together thereafter?

MS. MARION-MOSS: Yeah.

CHAIR BEACH: Sounds good.

MS. BEHLING: Okay.

CHAIR BEACH: And Kathy, -- this is Josie. I think that sounds good, because the questions did come up through NIOSH, so -- and it's NIOSH's response, so I think definitely work together would be a good plan.

MS. BEHLING: Okay. That's --

CHAIR BEACH: That's the outcome --

MS. BEHLING: -- (indiscernible) -- now, so I guess I just have to determine if you're in agreement with the selected job --

CHAIR BEACH: Right. Yeah. That's what I was just going to ask the subcommittee. Subcommittee, are you in agreement with those documents? I think we kept it a little lighter this time, also, getting back in -- getting these full (indiscernible).

MS. BEHLING: Yeah, --

CHAIR BEACH: -- And Frank, I didn't know if you had --

MEMBER FRANK: I have no -- I have no objection, but I have no knowledge to base it on, either.

CHAIR BEACH: I was just going to ask you. So what we do is, when we have closed out everything within the subcommittee and the subcommittee's voted, then it has to be given to the full Board, and then the full Board will either approve or, like in the case of 52, asked questions, which we are now ready to respond to those questions, and then hopefully that will lead to closure of those documents. So, if you look at that handout, you'll see that Kathy has noted what's been presented, what needs to be presented.

Really, we're just trying to (indiscernible) all these features that -- I mean, they go back quite, quite a number of years. So, we're just trying to do...

MEMBER FRANK: Housekeeping?

CHAIR BEACH: -- housekeeping and make sure (audio drop) questions for the full Board.

DR. ROBERTS: Josie, I'm sorry to interrupt, but your audio was going in and out for me. I'm not sure if that was true for others.

DR. ULSH: Yes, same for me, this is Brant.

CHAIR BEACH: I'm on my house phone, so I will do my best. And if it continues, I'll switch over to my cell phone, if that's helpful.

MEMBER FRANK: Well, you -- I think you just have to hold it in front of you. You moved it, and that's when we lost you.

CHAIR BEACH: Okay. Great. So, I will do a better job of that. I don't know what you missed, so I think if there's no objections, I haven't heard from Loretta.

MEMBER VALERIO: There's no --

MEMBER FRANK: Sounds great.

MEMBER VALERIO: -- objection from me, Josie.

CHAIR BEACH: I think we're okay with that moving forward, Kathy.

MS. BEHLING: Okay. Thank you.

DISCUSSION OF PROFESSIONAL JUDGMENT ASSESSMENT OF SIX PER-17 CASE REVIEWS

CHAIR BEACH: Okay. So, you want to take us into the next item? B is a discussion - just a quick update on the profession -- professional judgment assessment that we had talked about. I think Kathy is just going to lead us through and kind of just update us.

MS. BEHLING: Yes. When -- at the December 2024 Board meeting, I presented a PER-17. And under that review, SC&A audited six cases, and at the end, I suggested to the Board that perhaps we could delve into those six cases a little bit further and look at professional judgment issues. I'm always trying to look for what -- how we could look at these professional judgment issues on behalf of the dose reconstruction review methods work

group. And the Board seemed to be in agreement with that. And then so the -- we would just ask if we could include that into the agenda for today.

And so, I'm just asking if that's something that you think we could do, we should be tasked with looking at those six cases a little bit further for the professional judgment issues. And the -- I will mention the -- I did take notice of this, the transcript for The December 5, 2024, meeting, it was on page 78 and 79 if anybody needs to go back to that.

CHAIR BEACH: Okay. Thank you, Kathy. That is something we discussed quite a bit, and we had -- it's an ongoing discussion. Does any have -- anybody have any objections to tasking that look at those cases where professional judgment is concerned?

MEMBER FRANK: No objection from me. Frank.

CHAIR BEACH: Thanks, Frank.

MEMBER VALERIO: No objection from me, Josie.

CHAIR BEACH: Okay. And I'm pretty sure Paul agreed with that also. So, if -- Rashaun, if you're okay with that, we would consider that tasked and move forward on that -- on that?

DR. ROBERTS: Yes. Yes, that's fine.

CHAIR BEACH: Okay. Thank you.

List of Documents Awaiting NIOSH Responses

CHAIR BEACH: Okay. Kathy, do you want to take us through your next handout, the list of documents awaiting NIOSH responses?

MS. BEHLING: Okay. This -- I -- I -- this one I cannot pull up. This has not been PA cleared. But the third item under the administrative is, you

had requested that we put together a list of documents. I put together a table of documents that were still awaiting some response from NIOSH.

I did revise that, and that was due to, I won't -- say, questions from Brant Ulsh and NIOSH, which helped to clarify things a little bit better, and I appreciate those comments and I did revise that document so that we're able to determine how many outstanding findings and how many outstanding observations are still there. I -- I have to pull up that document just a second. I didn't have that one ready for -- for myself yet. I apologize. Just one second.

CHAIR BEACH: That's okay, Kathy. Really we wanted that just so we could kind of have a living document of -- of where we are to try to keep -- keep tabs on it. So, it'll be a -- you know, we'll add and take away as we go.

MS. BEHLING: Right. Oh, here we go. Yes, I tried to -- when I first started putting this document together, I used the report format that we used to get off of the BRS, but I realized that, because we hadn't separated out those findings and observations, it -- it was more -- more helpful to go ahead and do that, and so I did be on that last column, which is the subcommittee's findings closed and observations closed.

And then -- so, what we're looking at is that there are currently about 58 documents that are involved that we still have outstanding findings or observations. There were a total of 145 findings. There were a total of about 107 observations. And then I broke those findings and observations down into 23 are -- had a status of open, 145 had an in-progress status, 79 are in abeyance, and five were transferred. So, hopefully this, like you said,

will be -- will be something I'll update as we go along and as we end these meetings, and as NIOSH does respond to -- to some of these findings and observations.

CHAIR BEACH: Okay. Thank you.

Any questions on that document? Did anybody get a chance to review it? I know NIOSH went through it and had some comments which asked -- we changed -- which Kathy changed the way this document is. Any other comments or questions on it?

MS. MARION-MOSS: Hi, Josie. This is Lori. I have one -- maybe, a question for Kathy. Kathy, some of the documents that -- and reviews that take had taken place after we lost the application, has SC&A had an opportunity to update the Board review system with any findings and observations from those reviews?

MS. BEHLING: I assume that you're talking about -- I have been keeping the -- a temporary BRS, and I have --

MS. MARION-MOSS: (Indiscernible.)

MS. BEHLING: -- Yes. I had hoped that by -- by this meeting, I would have everything updated. I've gotten about a quarter of those updated at this point, but I am in the process of doing that. So, hopefully within --

MS. MARION-MOSS: Okay. Sounds good.

MS. BEHLING: Yes. Hopefully within the next week or two, I will have everything updated in the BRS. Thank you for --

MS. MARION-MOSS: Is there a way to let -- is there a way to let NIOSH know when you have done that, and if we have responses, we can immediately turn around and update the BRS with our responses and then

notify the Chair of the subcommittee?

MS. BEHLING: Yes, absolutely. And if you could update me too when you have responses, that would be helpful. But yeah, I will certainly send out an email when I have updated everything.

MS. MARION-MOSS: Thank you. I appreciate it.

CHAIR BEACH: All right. Thanks for that question, Lori. That was on my agenda to ask next, so -- so that's good to know that the BRS is going to be updated and -- and I -- and I like -- if you can definitely let the subcommittee know back and forth, that's helpful. So, --

MS. BEHLING: Will do.

CHAIR BEACH: -- thank you for that. Any -- anything else on that list?

MS. BEHLING: I don't have anything else, no.

CARRY-OVER ITEMS FROM MARCH 14, 2024, SPR MEETING

CHAIR BEACH: And doesn't sound like subcommittee members have questions, so we can move on to -- I think our next item is documents -- no, I'm sorry, the S -- procedures priorities? I believe that takes us into the carry-over items.

ORAUT-OTIB-0036, Rev. 00 "Internal Dosimetry Coworker Data for Portsmouth Gaseous Diffusion Plant"

MS. BEHLING: Yes. And the first carry-over item is OTIB-36. And I will make mention, OTIB-36 is also mentioned under our agenda item 3 c because this is a document where NIOSH does have responses to our

findings or observation, so perhaps at the end of Ron's presentation, you -- we would -- I think it makes more -- it's logical for NIOSH to present their responses, which would be Item 3 c, if that's --

CHAIR BEACH: I agree --

MS. BEHLING: -- okay with you.

CHAIR BEACH: -- with that. Yeah.

MS. BEHLING: Okay.

CHAIR BEACH: Yeah.

MS. BEHLING: Of course. All right. I am going to attempt to share my screen here. Let's see here. Okay. This is -- are you seeing my screen?

CHAIR BEACH: Yes.

DR. BUCHANAN: Yes, I can see it.

MS. BEHLING: Okay. Great.

CHAIR BEACH: Morning, Ron.

DR. BUCHANAN: Morning.

MS. BEHLING: Well, a -- okay. Let's do slideshow. Okay. There we go. We're good?

CHAIR BEACH: Perfect. Thank you.

MS. BEHLING: Okay. Ron.

DR. BUCHANAN: Okay. Thank you, Kathy.

This is Ron Buchanan with SC&A, and today I'll be presenting our review of OTIB-36, which is an internal coworker bioassay data for Portsmouth Gaseous Diffusion Plant. Now, this was delayed a year or two, and so I had to go back over and -- and refamiliarize myself for everything I said on the slides. So, we'll start out here with the purpose of the review.

We know that NIOSH issued OTIB-36 in 2005. It provides the information for assigning internal dose to the Portsmouth Gaseous Diffusion Plant, and we'll just call it "PORTS," for workers who had no or limited monitoring data. Now, this was based on the people that were monitored, on coworker data. Now current nomenclature'd be co-exposure, so both terms used in OTIB-36 and OTIB-40, which I'll present next.

We see that SC&A was tasked by this subcommittee in November of 2023 to review this, and we issued our review in May of 2024. Now, the source of data NIOSH used to develop this document was the year -- urinalysis table in the PORTS site database called R -- HR prior to 1993

and the internal data within that database was contained in tables within a field called RES alpha.

So, the reported data corresponds to individual growth data bioassay results in two different units; integration -- disintegrations per minute, per 100 ml and total uranium in units of milligrams per liter of urine. Now, the database began -- well, actually PORTS started their enrichment operations in September of '54, but there wasn't any gross alpha bioassay results recorded before the 1955 database, and the intake modeling there was based on '55 and later, however, when DRs are performed, the uranium intake should be considered possible as early as September 1, 1954, which is stated in the document.

Now, we reviewed NIOSH's source of data. We reviewed the database and reviewed the table containing the alpha information, and we found that NIOSH did use the gross alpha measurements. Had approximately 30 percent nonzero value, whereas the total uranium results had approximately

only 4 percent nonzero value. And so, NIOSH used the gross alpha because it would indicate more robust data set. Now, their analysis of this data, they set -- they set the effective bioassay data equal to the midpoint of that analysis period. That's standard procedure used to allow normal distribution. And from this year's analysis, they determine the 50th and 84th percentile for each quarter of the year, except for 1955, which didn't contain near as much data, so they used the whole year data for 1955. And they used the math as described in OTIB-19, which is the analysis coworker bioassays for internal doses.

Now, in the document itself, in OTIB-36, we see that Table A-1 one in attachment, a just the result of the statistical analysis of the gross alpha bioassay results. So, you can look at that if you have the document handy or want to investigate it further and see that they have divided -- they have each year in there, each quarter for each year of all the bioassay data from the alpha -- gross alpha counting. And then they'll divide that up into areas that -- that are similar. And we'll go into that in more detail next.

So, the IMBA program we use to analyze this bioassay data. In other words, you put in the bioassay data, and you project the intake of how much it's actually taken in using different parameters. And so, then once you divide the projected intake, you can use that as co-exposure model. And so, the results are gross alphas always used and assumed Uranium-234, because this is claimant favorable to use the calculation. And we see that the uranium at that facility could be solubility type F, M, or S lung clearance, so all three types have to be evaluated.

Okay. So, now they examined this data for patterns, potential intakes,

and divided them to periods into the integrals that had similar intake results. And so, this would indicate that if you plot this out, you would see a level, and then it decreased, and then another level, and then it decreased or increased. So, they could divide it up into, generally, from 1955-to-1988 period, they had data for the four chronic intake periods. This is '55 to '56, '57 to '58,'59 to '61, and then '61 to '88. I noticed these intervals aren't equal times, because probably at the beginning of operations, there was -- a lot of changes were made, and we'll see if you plot this -- that out, the bioassay results decrease with time, and so as they got the process more perfected, you see the last one was like 27 years, for the other and sometimes for just for a year. So, we see a progression in the data that gives longer periods of time with more stable results.

So, the results were used to fit potential intake for type F and M Uranium-234 in IMBA for each time period, considering all the vital data from '55 to '88. In other words, when they projected the intake from Type F and M, they considered all the data and then divided that into four periods of potential intake. Now, as you know, type S uranium has a very long radiological half-life and a pretty long biological half-life. So, to avoid underestimating intakes for workers that work for a relatively short period of time, NIOSH fitted before chronic intake periods. Used the same four chronic intake periods for Type S, but independently, didn't consider all the data in each quarter when they did a quarter. And so, they did all four quarters, but the independent of the other quarters. So, this will allow for if any error was to occur in the intake because of long life of uranium, it would actually allow for an overestimate, Type S intake.

Now, with using these four time periods, you derive the 50th and 85th percentile, uranium intakes for Type F, M, and S, use dpm/day, derive the geometric standard deviation, and results for this is in Table 5-1 for F, 5-2 for M, and 5-3 for S of the OTIB-36. Now, also at PORTS, they had the possibility of recycled uranium contaminants, and they included plutonium, neptunium, and technetium. And so, they used the TBD for the site, 15, Page 5, to derive the RU constituent intake values in relationship to the coworker uranium intake. So, that particular side profile lists the RU contaminants. If you know the uranium, you can determine the concentration of the RU.

So, once they did this, they used dose reconstruction recommendations. They said to use 50 percentile intake rate to determine the internal organ dose and derive annual doses for F, M, and S solubility, and of course, use the highest dose to that particular organ to determine the POC for that case. And also, factor in the RU contaminants to determine the most claimant-favorable solubility type, and use the lognormal distribution and IREP program, and apply the annual dose in parameter one and a GSD in parameter two. Those that are familiar with the IREP that's actually the program that's used to calculate the POC. And you have three columns in there, and they recommend using this distribution, which is standard.

Now, the Attachment A Table, Type F and M IMBA fit. So, a little detail on this, I -- like I said previously, Table A-1 summarizes the bioassay data used to derive the potential intake. And now, Figure A-1 through A-4 contains the 50th and 84th percentile using IMBA fitting analysis for '58-'88, bioassay data for F and M.

Now, what the IMBA does, it looks at the -- you put in the -- your urinalysis results, and then it will calculate what it thinks the worker actually took in. And so, they're able to do this to list what is useful in dose reconstruction and for the individual cases.

Okay. Then Type S, we see that Figures 5 through 8 contains 50th percentile for Type S uranium, and uses the four individual periods, '55-'88, without interactions between the periods. And just to show that this was claimant favorable, they show Figure 8 and 9 which shows A-8 and 9, which shows -- excuse me, A-9 and 10, which shows the projected -- if you did use this information, what would you project the excretion rate to be, and we find that the excretion rate is -- the projected excretion rate matches fairly well the measured excretion rate.

So, we reviewed -- our review of OTIB-36 -- that was the rundown of what it contained and now we'll look at our overview. We reviewed the original, I say, data and NIOSH's -- I mean calculation analysis sheet, along this -- it was a lot of analysis sheets. We checked those, reviewed those, evaluated those, and we evaluated their end data and the recommendations and their use of this data in constructing the tables, you know, in OTIB-36.

Now, our analysis concluded that we concur with the use of the gross alpha count measurements for developing coworker model. Both sets contain about the same number of bioassay results, 150,000 bioassay results. And now, this was done a few years ago, five, which did a good job with what they had to work there. Today, they would probably, in coworker modeling, would compare both data sets, the gross alpha and uranium gram measurement, and see which produced the best, most stable results. Now,

we concur with grouping bioassay data by quarter, because there was a lot of data points for those years. And of course, there was fewer in '55, so that year was used in its entirety, and we had no issues with the increase in Table A-1 of the OTIB.

Now, we looked at their modeling, and we concur with their modeling methods, using quarterly intake and the four distinct chronic intake periods look reasonably divided correctly. And assuming that the U-235 was claimant favorable because the other isotopes to Uranium don't -- as great an effective dose coefficient as U-234. And we concur with the use of the four periods, with use of the bioactive data for Type F and M, and then the four individual periods for the Type S uranium.

Okay. Now, the methods; we analyzed the database spreadsheet used to derive the values in the tables and the appendix, and we concur with their method and derived values and had no findings or observations. We went back and did some calculations and didn't find any errors.

Okay. Now, for the RU contaminants, we agree that the site TBD-5 used to determine the RU contaminants and the solubility of the material that resulted in the biggest dose should be used, and we agree with their recommendations there and had no issues.

Okay. The recommendation in the DR process, we concur with a 50 percentile to derive the internal dose (indiscernible) was appropriate. And we agree with using the largest POC for the organ concerning the solubility type and that -- or you should be -- contaminants should be included.

Now, we did go back and review the numerous IMBA fitting plots and a select number of the IMBA -- IMBA runs. We -- we did duplicate it, and we

didn't identify any issues, and found the fitting plots helpful in following the all -- overall analysis of the data.

Okay. And then for using the tables in OTIB-36, we found them useful, and we, again, reviewed them, did some of the calculations and didn't find any findings. We did have the following observation.

Observation one, we questioned why NIOSH did not use the '89 to '91 bioassay data that was present in the PORTS database when they used it for '55 to '88 and requested clarify why they didn't use that later data '89, '90, and '91. And since then, they've responded they're willing to do that, and that will be presented later.

So, in conclusion, we reviewed and evaluated the original data, NIOSH's analysis and recommendations, their use in constructing the tables in the OTIB, and as we noted, the coworker modeling has changed since 00 -- 0036 was issued, which was about 20 years ago, but it was current at that time. We had no findings. We had one observation, the question on developing the coworker model using the last three years of data.

Okay. That concludes my presentation. Open to questions.

(Whereupon, Chair Beach's telephone creates audio interference.)

CHAIR BEACH: Hi, Ron, sorry about that. My phone was dying already. Can you hear me okay?

DR. BUCHANAN: Yes.

CHAIR BEACH: I thought I hung up. Okay. Thank you. Excellent presentation. Very thorough, as usual.

Any questions from subcommittee members, Loretta or Frank?

MEMBER FRANK: No. If it's all right, if everybody else gets their --

their -- this is Frank. If you use everybody else's first name, why don't you call me Arthur?

CHAIR BEACH: Arthur, okay. Okay. Sorry about that. Sure.

MEMBER FRANK: That's okay. Frank is the last name.

CHAIR BEACH: Of course. Sorry. Okay, Arthur. So, no questions for you and --

MEMBER FRANK: No, I'm fine.

CHAIR BEACH: -- Loretta? Okay. Thanks for correcting me.

All right. I actually have no questions either. I thought it was a good presentation.

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CHAIR BEACH: And I know that NIOSH has a response prepared. It was -- it was delivered to us -- it was March 6, 2025, and Tim actually sent that out.

Who -- Lori, do you -- are you going to present that?

MS. MARION-MOSS: No, we have Maddie -- This is -- this is Lori. We have Maddie Cook who will be responding to that observation.

CHAIR BEACH: Okay. Terrific.

Hi, Maddie.

MS. COOK: Hi, yeah, I can go ahead and provide the NIOSH response to that one observation and clarify that the 1989 to 1991 data wasn't also incorporated, because at the time of developing this co-exposure, data sets

had been obtained for other co-exposures for other DOE sites, which ended in 1988, so this just became the default cut off for all sites for consistency, and we will be updating that data in our next revision. So, I think -- yeah, the response is in the BRS, and I believe we could change that status of the observation to in abeyance until we complete that revision.

CHAIR BEACH: Okay. Does anybody have any questions on that, Arthur or Loretta on -- I mean, I read the background and agree with -- with that proposal myself.

MEMBER FRANK: I'm fine. Arthur.

MEMBER VALERIO: I'm fine, Josie.

CHAIR BEACH: Okay. And I'm assuming, Ron, that you're okay with that.

DR. BUCHANAN: Yes, sounds -- sounds good.

CHAIR BEACH: So, that does answer the observation. Okay. Great. So, all in favor of closing OTIB-0036 for Portsmouth?

MEMBER FRANK: In favor. Frank.

MEMBER VALERIO: In agreement. Loretta.

CHAIR BEACH: Thank you.

ORAUT-OTIB-0040, Rev. 00 PC-1 "External Coworker Dosimetry Data for Portsmouth Gaseous Diffusion Plant"

CHAIR BEACH: Let's move on to OTIB-40, and that again is Ron. Are you okay to continue, Ron?

DR. BUCHANAN: Yes.

CHAIR BEACH: Okay. Thank you. I know you've been ready for

these for quite a while.

DR. BUCHANAN: Yeah, couple years.

CHAIR BEACH: Exactly. Okay. And we are seeing your share. Thank you for that.

DR. BUCHANAN: Okay. Again, this is Ron Buchanan with SC&A, and I'll be discussing OTIB- 40, which is similar to what I just talked about in 36, but this is external coworker dosimetry data for the Portsmouth Gaseous Diffusion Plant.

Next slide.

MS. BEHLING: Okay, I'm sorry. That's not the way I wanted to... Are you seeing that, Ron?

DR. BUCHANAN: I'm seeing it, but it's on Slide 5. We need Slide 2.

MS. BEHLING: Okay. And I don't know why I pulled this up. There we go. I -- I apologize.

DR. BUCHANAN: That's fine.

Okay. So, overview of this OTIB-40; it was issued in 2006. It provides information for assigning external dose to Portsmouth. Now, in that picture -- OTIB, they call it PGDP instead of Portsmouth like they did on 36, so I'll probably use PORTS. It's easier to say -- for workers who had no or limited monitoring data -- now, this is based, of course, on the site's co-exposure of dosimetry data for those workers did have information, and the subcommittee tasked us with -- in November 2023 with reviewing it. We issued our review in May of 2024.

Now, the source of data was similar to before. They used the HR prior 1993 database for PORTS, and they -- you know, within that, there's a table

that has sectional data called "Doseext_dat," and that had external data from 1992. Now, all the data correspond to individual badge readings. Now, just refamiliarize yourself with the concept here, they measured the deep dose, which would be the penetrating gamma rays that the -- reach to the organs. They also measure the shallow dose, which by nomenclature really is confusing sometimes, because shallow dose actually is measured penetrating plus nonpenetrating. And so, we use "NP" for nonpenetrating.

We really want -- especially in skin cancers, we want a co-exposure model that lists the nonpenetrating. And so, we will see that we subtract out the deep dose from the shallow dose, and that gets us to nonpenetrating. So, that's the nomenclature used in this OTIB.

Now, NIOSH analyzed the individual badge results, to develop the co-exposure dose data. And to do this, you had to make some adjustments. You had to adjust for wear-time -- prorate for wear time. You need to include missed dose when the worker didn't have any dosimetry to add it to make it a complete year, and you had to derive -- if -- if 95th percentile for both the penetrating and the shallow dose, and then you derive the NP dose from that also. And you -- and then at the end, you had to adjust this information for trade workers by multiplying it by factor 1.4.

Now we'll go into a little detail on each one of these. It's outlined very well in OTIB-40, and we'll get into 40, and we'll touch on each area of adjustment. And the wear time, it was prorated with the annual average wear time. So, if a worker worked 11 months and recorded certain number of badge exchanges, then that total for the year was multiplied by 12 and divided by 11, which would give a factor 1.09. So, that adjustment was

made to the final recorded yearly dose. And so, that way, it represented a full year monitoring employment -- of monitored employment. And that way that could be used in calculating the co-exposure dose -- would be assigned for the workers -- claimants' employment period.

Now, when there was missed dose or zero dose, you had to account for that in the individual badge exchanges. And so, of course, that's determined by looking at the lower level of detectability. And these are illustrated at -- Table 6-1 lists the time periods and what the LOS are. Now, if you had a zero recorded for the whole year, then you would add half of this LOD for the year in the database to determine the co-exposure. However, if there was any positive result for that worker, sometimes it's just reported as an annual dose, and so you have to -- and if it's, say, 100 millirem, we know that one of those badge exchanges had to have a positive reading. And so, you extracted out one from the number of exchanges, except assign the rest of them missed dose. So, now the above method was used back then, and probably the current method, the one person, one sample method, would be used today.

So, NIOSH used this data to determine the 50th and 95th percentile external co-exposure dose and used it to derive from adjusting the recorded penetrating and shallow doses. And -- and the guidance range occurs in the 50th and 95th percentile extracted for each year. They take all the individual data reading per year, and you determine the 50th and 95th percentile.

Now, this leads us, of course, we need the NP dose so the individual records, like I said earlier, was in penetrating and nonpenetrating, then

subtract penetrating from nonpenetrating, got the NP. And, of course, since this is uranium facility, the nonpenetrating to skin, we assigned this as >15 keV electrons, with correction factors applied according to clothing attenuation or whatever other factors need to be included. Now, NIOSH recommend assigning co-exposure dose at 50th percentile used for best estimates when exposed to intermediate -- low levels of rad -- external radiation and not be used for workers that were routinely exposed.

And the 95th percentile we use for routine exposed workers, such as production line. Now, external on-site dose should be applied rather than the co-exposure dose for those unlikely to have been exposed, such as -- like most sites, if you had administrative, wasn't working in the production area, then you'd just expose on-site ambient dose instead of co-exposure.

So, Table 8-2 of OTIB-40 provides the summary of the 50th and 95th percentile of the annual penetrating and nonpenetrating co-exposure doses for '54 through '92. Now, the next thing NIOSH did was adjust construction trade workers according to OTIB-52. And Table 8-3 contains that information, which was for '54 to '92 also.

So, our review that outlined what NIOSH did in OTIB-40, and in our review of it, we analyzed NIOSH's methods and calculations, found that they correctly converted recorded dosimetry data, dose values in Table 8-2; noted that 8-2 should be labeled 8-1 since it was the first table in Section 8.

So, now validation of the data used for co-exposure development. So, you've got your -- your claim tracking system, which has the original role data in it, and then you have your -- your sites' dosimetry total database, and so that's what was used. The latter was used to develop co-exposure

model. But they wanted to see, does the individual role data match up with what's in the database. And so, they took samplings of this. They took samplings of 10 workers that had worked there for an extended time, and it covered more than 130 work years of monitoring at the facility and compared the two databases for those 10 workers. And they found, in fact, they were in agreement greater than 99 percent between the two data sets.

So, when we reviewed their data about validation process and concur that the results indicated that the -- that the data was usable for co-exposure model, and it also met the criteria set forth in a later document for -- this one was developed later in 2017 -- of Report 86, so we had no issues with that.

Now, we did analyze the adjustments made to the data, and they -- NIOSH outlines these adjustments for wear time in Item 1, Page 8 of the OTIB-40, and we reviewed that, and we agreed with that. Then the adjustment for missed dose, again, that's outlined in Item 2 of OTIB-40, and in Table 6-1 lists of penetrating and nonpenetrating maximum doses for '54 to present. And we verified the data used in Table 6-1 according to the TBDs and other information, and we had no findings about NIOSH's adjustment for missed Dose but did have one observation.

Okay. The reference that -- as I carry over, it -- in Table 6-1, footnote h, it -- it says see OTIB-17, which is for beta and shallow dose radiation, mainly in the skin, for an explanation, and instead, it should see Attachment C.

Now, evaluation of the 50th and 95th percentile, NIOSH outlines this procedure in Section 7, Item 3 of OTIB-40. Again, we reviewed

(indiscernible) their methods and had no issues. Evaluation, nonpenetrating, that's Item 4, Section 7, again, I just simply derived just extracting the penetrating from the shallow dose, and that was correct, and we concur with that.

Okay. The recommendation, when to use that for co-exposure. It outlined that in Item 5, Section 7, and recommends using the penetrating and nonpenetrating doses, as recommended in Table A-2. We reviewed this section, and we agree. We had a question concerning a reference -- the lack of a reference concerning radiation effectiveness factor. That's Observation 2.

Observation 2 was reference needed. We request that they provide a reference for the statement at the bottom of Page 8 of OTIB-40, and the radiation effectiveness factors are the same for greater than 15 keV electrons and greater than 250 keV photons and are higher for 30 to 250 keV photons. And in certain geometry, certain situations, we had -- we found an example where they wasn't, and I understand that they did provide that reference. And we looked it up and agree.

Next slide.

Okay. For construction trade workers, they outline this in Section 8 of the OTIB, and they have the recommended penetrating dose in Table 8-3. We reviewed and concur, verified the (indiscernible) doses were calculated correctly. And again, Table 8-3 should be labeled 8-2 since it's the second table in Section 8.

Now, when they -- their recommendations for assigning neutron dose, no neutron dose was recorded at this facility in the EE records, and there are

potential for neutron exposure in certain areas of the facility. And they recommended using TBD -- site TBD-6 be used for neutron dose assignment when appropriate.

So in this case, instead of developing a co-exposure model for neutrons, what is done in most places is to use a neutron-to-photon ratio, and this is what NIOSH recommend using, you know, TBD-6, which recommends a neutron-to-photon ratio of 0.2 if applied to a photon dose and to years prior to '97, if appropriate.

Now, since this was issued, Report 60 of 2019 provides additional and upgraded information for -- reports neutron doses and how to assign those to the claimant. And we have reviewed Report 60 and agree with that, and so that's the updated information for -- for assigning neutron dose, if warranted and (indiscernible).

Okay. Evaluation, when to assign ambient dose. Like I say, they recommended if it's the administration or wouldn't be exposed to the primary sources, and we can cover that recommendation.

Okay. We evaluated the penetrating and nonpenetrating values in A-2 table and concur with the methods used. We reviewed the calculations, spot checked them in the data and had no issues concerning the values in that table. Then we did the same thing, construction trade workers' values in 8-3. Concur with it. Had no issues.

So in conclusion, we reviewed the original database, we review the (indiscernible), the original data recorded database, and their analysis of data and recommendation, and the final data that the dose reconstruction will be using from Table 8-2 and 8-3 of OTIB-40 and had no findings, but

they had two minor observations, which was the incorrect reference guide in the footnote and reference needed for another factor.

Questions?

CHAIR BEACH: All right. Ron, thank you so much. Another good report, and again, two minor observations.

Arthur or Loretta, any questions --

MEMBER FRANK: Yes, I -- I --

CHAIR BEACH: -- for Ron?

MEMBER FRANK: -- do. I do. This is -- yeah. Some of this is new to me. So, there was a comment about a third of the way in about the adjustment for clothing for nonpenetrating dose. Is that done in every case, or does it depend on where the skin cancer that you're dealing with is located, because not all skin gets covered by clothing?

DR. BUCHANAN: That is correct. Yes, the dose reconstructor has to evaluate if the cancer is, say, of the elbow, we assume the person was wearing coveralls, some kind of sleeve covering, and a factor of 5 is applied. If it's to the hands, the face, or exposed skin to be present, then it did not apply a clothing attenuation factor.

MEMBER FRANK: Okay. Thank you. I was just trying to understand how that might be done. Thank you. I got no problem otherwise.

DR. BUCHANAN: Okay. Thank you.

CHAIR BEACH: Anything for you, Loretta?

MEMBER VALERIO: No, nothing for me.

CHAIR BEACH: Okay. Thank you.

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CHAIR BEACH: NIOSH, I don't see that you have a response; however, these are minor, and I'm wondering if you have a response, a verbal response, or --

MS. COOK: We do have a response. This is --

CHAIR BEACH: Okay.

MS. COOK: -- Maddie.

CHAIR BEACH: Thank you, --

MS. COOK: I think those -- sorry, go ahead.

CHAIR BEACH: Oh, no. I said I figured you would have a response. So, great. Go for it.

MS. COOK: Yeah. I think they are also in the BRS, but yeah. Observation one, NIOSH agrees. We will go ahead and revise that footnote to refer to Attachment D instead of Attachment C, so thanks for that catch. Observation two, again, we're in agreement. We will add the NIOSH IREP technical documentation as the reference for the radiation effectiveness factors. And those will both be done in the next revision. So, I believe those could also be held in abeyance in terms of status on those observations.

CHAIR BEACH: Okay. That sounds great to me. Any objections to that? And I guess if it's in abeyance, we're not actually closing them, correct, Kathy, until -- until that's complete? I can't remember how we did that --

MS. BEHLING: Yeah.

CHAIR BEACH: -- in the past.

MS. BEHLING: We do not close them. We just put them in abeyance and wait for the document to be revised.

CHAIR BEACH: Okay. Yeah, and I asked for the last one to be closed, so that was incorrect on my part. I just -- I realized that halfway through Ron's presentation. So -- so, those are both in abeyance then.

And we have one other NIOSH response for OTIB-0071, and that will --

MS. MARION-MOSS: Hi, Josie.

CHAIR BEACH: Hi.

MS. MARION-MOSS: Josie, this is -- this is Lori. I just want to make a point that those responses that Maddie just presented are in the BRS.

CHAIR BEACH: Okay. Thank you. Yeah, she mentioned that at the beginning of her conversation. So, yeah, thanks for letting -- letting us know.

ORAUT-OTIB-0071, Rev. 00

CHAIR BEACH: So, how do we want to handle OTIB-0071, the external dose coworker methodology? NIOSH would present. Has SC&A had a chance to look at that and is there any work that needs to be done with that document?

MS. BEHLING: Yes, SC&A has reviewed that. We -- I will let NIOSH go ahead and present their observation -- or their -- their responses, and this is -- was Richard Griffith's, and he's not with us today, but perhaps after

we get all of the responses from NIOSH, we could put together a memo indicating our reply to those responses. I think pretty much we're in agreement with what's being said, but we would like to hear NIOSH go -- go through those responses.

CHAIR BEACH: Okay. Yeah, --

MS. BEHLING: (Indiscernible.)

CHAIR BEACH: -- I agree. Okay. That sounds like a good path forward.

DR. CARDARELLI: Okay. This is John Cardarelli. I'll briefly go through the -- the 10 observations. There were zero findings, and this is mostly associated with the application of multiple imputation statistical method for external radiation.

We'll start with Observation 1 on Report 71, which is the external part. And the comment -- SC&A's comment was, It does not include estimates of uncertainty. They state, The authors do not capitalize on the benefits of multiple imputation related to estimating uncertainty. A benefit that should be exploited for better understanding of the estimates generated by multiple imputation method. The multiple imputation cannot only help researchers understand the uncertainty involved in making imputations but also help clarify the uncertainty of inferences and downstream methodology, such as co-exposure model and probability of causation calculation.

Our response: NIOSH agrees that one of the benefits of multiple imputation is the ability to estimate uncertainty. However, as Footnote 4 of Report 71 mentions, the project does not use the variance in the parameters for anything in the coworker model. The purpose of Report 71 was to

illustrate how multiple imputation compares the substitution of half the limit of detection in the co-exposure framework, which does not take uncertainty of the estimate into account.

SC&A Observation 2: Report 71 should expand its exploration of mixture models. SC&A would like -- this is their comment. SC&A's comment is: SC&A would like to further explore -- would like to see further exploration of issues related to nonpositive measurements, as we believe it relates to all reported measurements, not just the nonpositive ones. A later report, ORAUT Report 96, on the Revision 1, noted that nonpositive results from noise generated when samples containing approximately the same levels of uranium are subtracted from each other. That was actually associated -- this is-- side note: That was associated with Report 96 which was a focus on internal dosimetry using bioassay data.

Continuing their quote: In the process -- in practice, this is the -- this type of measurement error is not present in the nonpositive results. It is there in all the observations. In the same report, Oak Ridge Associated Universities' team details a possible solution, mixture models. SC&A may believe the development of mixture models is worth further exploration as a fundamental issue in dosage measure -- dosage measurement that could potentially be exploited to develop better inferences. NIOSH's response to this observation. NIOSH addresses the measurement error portion of this observation in the response to observation 10. The focus of Observation 2 is the desire to explore mixture models. The purpose of Report 71 was to illustrate how the multiple imputation compares to the substitution of the limit of detection divided by two in the co-exposure framework. The use of

the mixture models is beyond the scope of Report 71, but ORAUT Report 110, the discussion of variability in health physics data, explores the use of mixture models, or mixture distribution.

SC&A's Observation 3: Determine the appropriate statistical distribution to use for sensor readings -- sensored readings in each case individually. SC&A states: SC&A reiterates a point the authors make in passing. The lognormal distributed -- distribution highlighted in the report on which to base the multiple imputation method is not going to be optimal in all circumstance -- in all situations. Each situation should be evaluated individually to determine the most appropriate underlying distribution to use for sensored reading. It's important for analysts to understand that misspecification of an underlying distribution will undermine the benefits of the multiple imputation method.

The NIOSH response to Observation 3 is: NIOSH concurs. The choice of the imputation distribution is made by an ORAUT team statistician and discussed with and reviewed by at least one other ORAUT team statistician and by a health physicist. A lognormal distribution is usually appropriate, but the statistician can and will consider other distributions, if necessary.

SC&A Observation Number 4: The need to account for relationships between dose and covariate should be considered. SC&A states: The primary analysis question is sometimes broader than simply determining an underlying distribution to use in the multiple imputation procedures. In fact, there may be situations where accountings in a relationship of dose and other variables is more important than the chose -- than the choice of statistical distribution. If dosage varies by how closely an employee worked

to the source, it may be more pressing to use a regression model that makes use of the covariate data, for example, job type, than to empirically fit a site-wide statistical distribution. In such situations, the distribution model might be secondary to the need to account for existing relationships to other variables. One can still assume an underlying lognormal model, for instance, and it's the generalized linear model with covariate data under that assumption for the purposes of multiple imputations.

The NIOSH response: The data set used in Report 71 only contains dates and ambiguous worker identification numbers and doses. Typically, data sets do not contain information to enable the use of covariants. Statisticians doing the analysis can consider covariants, if they are available.

SC&A Observation 5: NIOSH does not provide adequate information on how the re -- on how Report -- excuse me -- on how Report 71 Table 1.1 doses were reconstructed. They state: How the doses in table 1.1 of Report 71 were reconstructed seems an important point in assessing the accuracy of an imputation model for these data. SC&A has -- raw data set was available for the example worker. However, further explanation regarding these reconstructed doses would be helpful. It would be appropriate for the authors to explain how the doses were reconstructed and the effect of the reconstruction on the multiple imputation model. Of particular interest would be the bias and precision of the reconstruction method and the implications for latter inferences of the co-exposure models.

NIOSH's response to Observation 5: We state, The data sets provided to the authors of Report 71 contain an actual values column where the results that are less than the limit of detection has been recalculated based

on the number of tracks, lengths of tracks in cycle-specific calibration. The raw data were not made available to the authors. The regression on order statistics used for the imputation model in Figure 3.1 does not use the recalculated values that are less than the limit of detection, so the imputation model is not effective at how these doses were recalculated.

The SC&A Observation Number 6 states: Report 71 --

CHAIR BEACH: Can I -- hold --

DR. CARDARELLI: Yep.

CHAIR BEACH: This is Josie. Can I break for a sec? We're getting a lot of inter -- interference, so I'm not sure if -- if everybody could please check their mutes that court reporter can hear John. Thank you. It went away. Okay. John, sorry for that. Go ahead.

DR. CARDARELLI: Thank you. Thank you for that. Okay.

SC&A, Observation 6: Report 71 would benefit from a disclaimer in the discussion of linear imputation. They state, quote, Putting the linear imputation method in the form of an equation makes it look like a model. In fact, the author states at the end of Report 71, section 1.0, that because of this method, quote, Introduces the idea of using a distribution model, unquote, for imputation. They will move on -- they will move on to talking about the statistically based multiple imputation model. This might be an effective visual tool for elucidation, but we worry that someone could read this development of the linear imputation model and think that it is a valid imputation method. Perhaps the author should add a disclaimer to their development of this model out of caution.

The NIOSH response to Observation Number 6: NIOSH agrees that

the linear imputation method is not an appropriate imputation model. Early in the project, it was an option for internal co-exposure modeling but has since been replaced with methods described in Report 96. It was included in Report 71 for illustrative purposes and as a logical transition from substitution of the linear -- of the limit of detection divided by two method to an imputation model. A disclaimer could be added in future revisions of Report 71, but the statisticians who perform the multiple imputation are aware that the linear imputation method is not appropriate and is no longer used on the project.

SC&A Observation Number 7: Report 71 should acknowledge the impact of clustering. They state, We would suggest that the authors acknowledge this possible limitation and add a note to their report that the statistician working on a project with cluster data should evaluate the potential impact of clustering on their analysis. If clustering effects are potentially large enough to have a material effect on model fit, the statistician should apply a model-fitting method that accounts for the clustering.

The NIOSH response to SC&A Observation 7 states: The purpose of Report 71 was to illustrate how multiple imputation compares to the substitution of the limit of detection divided by two methods in the co-exposure framework. Consideration of clustering or stratification is beyond the scope of that report. Clustering and stratification will be considered by a team of statisticians and health physicists on a case-by-case basis.

SC&A Observation Number 8: Report 71 should provide advice about fitting data that are not lognormal. SC&A states, While only based on an

example data set, Report 71, section three would benefit from more transparency as a guide for how a statistician should apply the multiple imputation method recommended in this report. It would be worthwhile to present a fuller analysis of this particular data set as a case study. It would also be useful to hear the author's advice on what to do when lognormally -- lognormality of the data cannot be assumed.

NIOSH's response to SC&A Observation Number 8 states: The purpose of Report 71 was to illustrate how the multiple imputation compares to the substitution of the limit of detection divided by two in the co-exposure framework. Many exploratory analyses could be done with this data, but that is beyond the scope of this report. If the data are not lognormal, the statistician performing the analysis can use whatever distribution is most appropriate.

Observation Number 9, SC&A states: Report 71, Section 3 should expand its discussion of population subsets. It specifically states, quote, Since Report 71 is intended to address procedures in many different situations, it should note that an important potential application is one in which populations of workers differ by level of exposure, and those populations may be distinguished by available information or covariant data. For instance, in DCAS IG-006, revision 00, the National Institute for Occupational Health discusses the use of stratification to allow for analysis of highly exposed populations separately from other populations. Such a procedure is potentially a simple and effective way to improve imputations if the covariant data are available to stratify the population. In some cases, for example, knowledge of the job type could be helpful in predicting

dosage. In fact, the note about sub setting is an example of how the use of covariant data might be helpful. Instead of sub setting the data by occupation, which reveals a smaller sample size for modeling each occupation, it would perhaps be more effective statistically to use the covariant data related to an occupational potential risk in a single or, for example, regression model that might -- that includes all the dose data to generate the multiple imputations.

The NIOSH response to SC&A's Observation 9 states: The purpose of this report was, again, to illustrate the multiple imputation as it compares to the limit of detection divided by two methods in the co-exposure framework. NIOSH agrees that there are situations where considering covariant or stratification would be helpful. As mentioned in the response to Observation 4, this data set does not contain information that would enable consideration of covariant data or stratification. Consideration of covariant data or stratification is beyond the scope of this report. In general, covariance and stratification will be considered by a team of statisticians and health physicists on a case-by-case basis.

SC&A Observation Number 10 is: Report 71 does not acknowledge positive measurement error. They state: Given that measurement error is present in all reported dosimeter readings, not just the negative one, it should be clear that some measurements reported as below the limit of detection come from doses that are actually above the limit of detection. And in parentheses it states, Negative measurement errors, close parentheses, and that some doses measured as above the limit of detection come from actual doses below the limit of detection. And then parentheses,

positive measurement errors, close parentheses. This means that the dose measurements with negative measurement errors are more likely to be imputed than those with positive measurement errors, which is a potentially biased application of imputation.

And NIOSH responds to SC&A Observation 10. NIOSH disagrees with the interpretation in Observation 10. SC&A states, quote, The fact that we see nonpositive observations in dosage measurements is due to the presence of measurement error, close quote. Measurement error does not cause so many of the measured results to be negative. Report 71 does not address measurement error. As mentioned in the response to Observation 5 background or blank subtraction was done when the less than the limit of detection doses were recalculated. A blank subtraction is causing the negative measured results. That phenomenon necessitated Report 71 footnote Number 1, which stated that, quote, The true doses are not negative. The measured doses are negative. However, this technicality has no further bearing on this discussion. Close quote.

SC&A also mentions this quote from Report 96, quote, The normal component of the mixture can be viewed as an analytical noise generated from samples containing approximately the same levels of uranium are subtracted from each other, close quote. The quote from Report 96 refers to blank subtraction as well. It's a bioassay sample that is knowing essentially no activity in it, it has a blank subtracted from it, it likely contributes to the normal component of the mixture that is being discussed in the quote. Neither of these reports attributes a negative measured result to measurement error. Measurement error exists anytime a measurement is

made.

Because of measurement error, measured doses that are below the limit of detection could have true doses above the limit of detection, and measured doses above the limit of detection could have true doses that are below the limit of detection. This is true, and it's typically not a draft. Measurement error is much less consequential than Observation 10 makes it seem. The correct understanding of what is causing the nonpositive result, and in parentheses, blank subtraction, not measurement error, close parentheses, make this observation immaterial.

So, NIOSH concludes: SC&A's previous report on Report 96 and this review of Report 71 are complementary of the multiple imputation method. The 10 observations for Report 71 deal with exploring some of the finer points of multiple imputation. Many of the observations address issues that are beyond the scope of Report 71 but are useful to consider on a case-by-case basis when multiple imputation is used by statistician.

With that, I'll open for discussion.

CHAIR BEACH: Thanks, John, thanks for getting through that. Any questions or comments?

MEMBER FRANK: Not from --

MR. BARTON: This is Bob Barton, if I might, Josie, kind of --

CHAIR BEACH: Yes. Go ahead.

MR. BARTON: -- comment. Unfortunately, we couldn't get Richard Griffiths on the line. But I think one thing to understand is, yes, there were 10 Observations here, and as John described aptly, they were to the finer points, basically, not even observations, but suggestions on what the NIOSH

ORAUT statistician should be considering, and again, on -- on the case-by-case basis, as was stated repeatedly. And I think based on our own internal discussions on these issues at SC&A, I think we're largely in agreement with NIOSH that, you know, these are somewhat important issues that should be considered. They shouldn't be cast out of hand, but they are going to be on a case-by-case, as in a site-by-site basis. I certainly welcome the opportunity for SC&A's team to sort of close the loop on a lot of these suggestions by pointing out what Report 71's intent was and how a lot of these issues, which should be considered by the statisticians when -- when creating co-exposure models would really fall under the purview of said exposure models when they're created.

So, again, each site's likely to be unique, and so a lot of these heavy statistical concepts really apply on a site -- site-by-site basis. And so, it perhaps is not worth it to try and proceduralize an overarching system, because, again, each -- each data set you look at is going to have its own ideo -- idiosyncrasies and, you know, special considerations that should be taken up by the Board at the appropriate time when a co-exposure model for a specific site is created. So, I -- I guess, in summary, I think, again, there's a lot of heavy concepts that we just went over, but I believe that from SC&A standpoint, you know, we -- we casually agree with where NIOSH is coming from and the approach going forward. But I would -- I would like to be able to put that in writing, just to officially close the loop, if it -- if it pleases the subcommittee.

CHAIR BEACH: Yeah, John -- or Bob, excuse me, this is Josie. I agree with that. And thank you for clarifying. The statistician stuff is a -- is pretty

-- a lot of overhead stuff, as I know you were saying. So, I -- I agree with that. Kathy did mention a memo is forthcoming, and we can add that to the agenda -- the next agenda, if that's ready in time. And just close the loop, like you mentioned, on all of these. And again, realize that if they're not gone, we're going to look at them as we develop the co-exposure models at each -- individual sites, so.

MS. BEHLING: And -- sorry.

CHAIR BEACH: Go ahead, --

MS. BEHLING: And Josie, (indiscernible) add something. One of --

CHAIR BEACH: Yeah.

MS. BEHLING: Yeah. One of the things that this statistician did -- did share with me, he was under the impression, and I'm not sure that this is factual, that as long as the statistician that is using Report 71 -- and I apologize, I have OTIB-71 in -- in the agenda, and I apologize for that -- but that -- the statistician is actually using Report 71, will they have access to SC&A's review of OTIB or -- of Report 71, because I think, as we're saying, and even NIOSH is saying, we make a lot of good points, in here, and it's a case-by-case basis, and perhaps that statistician could benefit from looking at the comments that we had on that report? I'm not sure that that happens. Sometimes we discuss these things in these subcommittees, and they get put onto a VR -- BRS, but to the actual people that are implementing this report, will they have access to -- to -- will this information be shared with them?

MS. CHALMERS: Hey, John, do you want me to answer that question?

DR. CARDARELLI: Yeah, I'll give it a shot, Nancy.

I would say that absolutely the ORAUT statisticians are fully aware and would have access to this information. They actually helped develop the response to this and are very familiar. And even if there were a change in the statisticians among ORAUT, this would be part of the overall record in them -- in their applying their methods.

MS. BEHLING: Okay.

DR. CARDARELLI: So, if you want to expand upon that, Nancy, you're welcome to.

MS. CHALMERS: Yeah, I'll just say one thing. This is Nancy Chalmers from the ORAU team. I am the principal scientist for statistics for the ORAUT team, and I'm aware of all this. I wrote the responses that John presented today, and so anybody from my team who would do any of this analysis will be made aware of all these things. And I -- one of my tasks is basically to -- to make sure things are done correctly and consistently across all sites. So, we will make sure that all this stuff is taken into account. We talk to the health physicists that are also part of the team, make sure what we're doing makes sense to them also. So we will -- we will make sure we take care of that.

MS. BEHLING: Great. Great. That answers my question.

CHAIR BEACH: Thanks for that. That was my --

DR. CARDARELLI: Josie, this is --

CHAIR BEACH: -- concern. Yeah, go ahead.

DR. CARDARELLI: Just real quickly, for clarification, once SC&A, I guess, does a final response, like what Bob was saying, can we then consider that -- the word closed out -- but do we consider these closed after

that response is received?

CHAIR BEACH: I think we'll put it in the agenda. That way we can look at it as a as the subcommittee, and then formally close it.

DR. CARDARELLI: Okay. Thank you.

CHAIR BEACH: Good -- yeah, good question. We'll just do the same review we normally do.

DR. CARDARELLI: Very good.

CHAIR BEACH: Sorry, I'm a -- my phone's about to go out again. I recommend that we take a break after this if there's no other questions on (audio interruption). Sorry.

The next -- the next task we have is PER-075, which is very long, 53 slides. I thought maybe we should take a comfort break.

MEMBER VALERIO: Josie, (audio break) question (audio break).

CHAIR BEACH: Go ahead, Loretta.

MEMBER VALERIO: So, Report 71 that we just went over, is that in abeyance for now?

CHAIR BEACH: No, it's --

UNIDENTIFIED SPEAKER: (Indiscernible.)

CHAIR BEACH: -- in process.

MEMBER VALERIO: It's in process, okay. All right. Just wanted to make some notes. Thank you.

CHAIR BEACH: Sure, sure. Okay. Give me one second. Okay. I've got a reliable phone back on. Okay.

Any other questions for 71? Am I on?

MEMBER FRANK: No questions from --

MS. BEHLING: I hear you, Josie.

CHAIR BEACH: Perfect. Thank you. I didn't know since I switched phones again.

So, moving forward, we're on to Section 4, the new reviews. Would everybody like to take a 10- or 15-minute comfort break before we get started on that?

MEMBER FRANK: Yes.

CHAIR BEACH: Yes. Okay. Rashaun, should we go ahead and break until, let's see, 1:25?

DR. ROBERTS: Yes, that sounds good to me.

CHAIR BEACH: Okay. So, we'll just be back at 10 -- at 1:25 Eastern, and we'll see you all then. Thank you.

(Whereupon, a break was taken from 1:05 p.m. EST until 1:25 p.m. EST.)

DR. ROBERTS: Okay. I have 1:25 on my clock. I've checked in, and the court reporter is on the line. I can do a quick roll call just to make sure that the subcommittee members are back. Josie, are you there?

CHAIR BEACH: I'm here.

DR. ROBERTS: Okay. How about Frank?

MEMBER FRANK: I'm here, thanks.

DR. ROBERTS: Valerio, are you back? Okay. And I'm going to assume that Dr. Ziemer hasn't joined, but just to check in, is Ziemer on the line? Okay. We'll give Valerio a moment to come back.

CHAIR BEACH: Loretta said she had to log out and log back in.

DR. ROBERTS: Okay.

MEMBER FRANK: Yeah, my -- my computer in the midst of all this, required a restart as well. I did it during the break. Pretty crazy.

DR. ROBERTS: Lots of technical problems today. Thanks to everybody for bearing with that. Loretta, are you back on yet?

MEMBER VALERIO: Hello?

DR. ROBERTS: Hello? Can you hear me? This is Loretta.

DR. ROBERTS: Oh, wonderful, great. Okay. Thanks, Loretta.

Josie, you can proceed.

CHAIR BEACH: Okay. Thank you.

ORAUT-OTIB-0052, Rev. 00

CHAIR BEACH: And I just realized I brushed right over OTIB-52. Did we want to -- I know we had talked about it earlier, but did we want to go through the -- NIOSH's paper or just wait and just present that at the full Board meeting?

DR. ULSH: Josie, this is Brant. I had planned for -- when this was still on the agenda for today, to basically just pull the paper up and share the screen and walk through and ask if anyone had any questions. You know, I don't have a slide presentation for it. So, --

CHAIR BEACH: Yeah, no, I agree with --

DR. ULSH: -- whatever you --

CHAIR BEACH: Yeah, no, I agree with that. I just had totally over bypassed it. So, if you want to go ahead and do that, Brant. I know that that paper was sent out a couple weeks -- or a while ago, so let's -- let's go ahead and do that.

DR. ULSH: All right. You took me by surprise, so give me a minute to try to --

CHAIR BEACH: Sorry about that.

DR. ULSH: That's all right. Let me try to pull up Teams so I can share my screen. Okay. Share. Da-da-da. Let's see, I think it's this one, so --

CHAIR BEACH: Yep, --

DR. ULSH: -- let me know --

CHAIR BEACH: -- we see it.

DR. ULSH: -- when you can see the paper.

CHAIR BEACH: It is there.

DR. ULSH: Okay.

UNIDENTIFIED SPEAKER: You're -- you're (indiscernible).

DR. ULSH: Okay, thank you. So, I'll make this as brief as I possibly can. This is an old chestnut of an issue. You can see here in the background section that the purpose of this memo was to respond to some questions that were raised in March of 2013 at a Board meeting. And Josie mentioned the process earlier. This happened when I was not here at NIOSH. I think -- and Josie, please correct me if I've got this wrong -- you guys considered -- this Subcommittee considered OTIB-52 and then took it to the full Board, and I think it --

CHAIR BEACH: That is correct.

DR. ULSH: Go ahead. Thank you. So, the ADS, Tim Taulbee, wanted to close the loop on this before he retired this past year, so he prepared this memo in March, and it was sent to Josie, and through her, to the Subcommittee.

OTIB-52 deals with the application of these ratios for coworker model, and it specifically looks at construction and trade workers and -- compared to all monitored workers. And so, some questions came up when this was presented to the Board. How were these CTWs' -- that's construction trade workers -- ratios established? And the answer is, basically, we looked at the five major DOE sites where we had data to do this, and we looked at the -- the doses that were received by a subset of the workers that fit into the construction trade worker category compared to all of the monitored workers. And usually what we saw -- well, I guess that's a separate question, so I'll get into that. But that was how these ratios were constructed, by looking at actual data from the big five DOE sites. I think Savannah River, the three Oak Ridge sites, X, 10, Y-12, K-25, Rocky and Idaho, and then you can throw in Hanford as well. So, that's where the data came from.

Is there validity in establishing such a ratio; yes. Next question. That was supposed to be a joke. We do believe that there is significant validity in doing this. We just want to make sure that we're not short-changing construction and trade workers.

What kind of an evaluation qualitatively needs to be done when applying this at a particular site? Basically, this is done at the level of the health physicist doing the dose reconstruction as guided by DCAS-IG-6. And this -- this methodology is really only applied until we have more site-specific data that would supersede it. So, it's kind of the default until we get that site specific data. So, who made the decision that we were going to do this? That would be the management way back around 2004, this idea was

raised, and we put it out through worker outreach meetings, and we consulted organized labor. You can see the couple of unions that we reached out to, and their comments were incorporated.

So, why are we using coworker data for unmonitored workers when it appears the people should just be put into an SEC? Well, the answer is, because the law, 42 CFR 82.17 says that we should use, or we can use, coworker data to do dose reconstruction.

What's the science? So, the ratio is 1.4. In other words, we apply a multiplication factor of 1.4 to the construction and trade workers over their -- you know, the all monitored workers, that ratio is about 1.4. And what we normally find is that the all monitored workers doses were actually higher than the construction and trade workers when you look on an annual basis. And so, what that means is, if you have CTW divided by AMW, that ratio is less than one because the denominator is higher.

But there were a few years where that was not the case, where the construction and trade workers is actually higher. And in those very limited set of cases, the ratio was generally less than 1.4, not -- not always, but -- but very, very often. And so, to come up with a reasonably claimant-favorable approach, NIOSH decided that the 1.4 ratio was a good way to go to come up with a claimant-favorable, but not crazy, claimant-favorable approach.

Do you apply correction factors to every job title in the construction industry? The answer here is no. And this is a professional judgment call by the health physicist doing the dose reconstruction. The sources of data that he will use or she will use are the -- the records sent over by the

Department of Energy about what the worker was doing, the computer-assisted telephone interview that the claimants provide that describes their duties, and information on which construction type -- CTW job title is included in the intro to OTIB-52, and a list of keywords that we used during the PER, the program evaluation report on construction and trades workers is also provided.

All right. How is OTIB-52 being used and where is it being applied? As I mentioned, OTIB-52 is applicable to all sites where there are co-exposure or unmonitored values are given, except for the Pacific Proving Grounds, and that's because at PPG, we are using the 95th percentile dose for all workers. That is the last of the questions that were posed and responded to, so now I guess I could respond to any questions from the subcommittee.

CHAIR BEACH: Thank you. I just want to remind (audio break) subcommittee that we are tracking for (audio break). I know that came up in one of the responses, and that's -- that is something that the subcommittee is doing in conjunction with the dose reconstruction committee. So, those -- those are being looked at.

And did I hear somebody? Arthur, were you --

MEMBER FRANK: Yeah. I was going to say I didn't -- I didn't have any questions and understood that.

CHAIR BEACH: Okay. Thank you.

MEMBER FRANK: Thanks.

CHAIR BEACH: Loretta, anything here?

MEMBER VALERIO: No, no questions here.

CHAIR BEACH: Okay. Yeah, and just as a reminder, we did -- this did -- we -- the subcommittee was closing this, the full Board came up with these questions. And I appreciate you jumping in, Brant and presenting this, since I forgot to go through it.

And we will move this forward as we -- we discussed earlier at the end of our presentation to the full Board, it will be closed out, and we'll let the full Board take it from there, if they agree.

DR. ULSH: Okay.

CHAIR BEACH: And any other -- go ahead.

DR. ULSH: Well, just to make sure I understand the -- the -- the path forward here, I will reach out to Kathy as I understand it, Kathy, you're going to be presenting OTIB -- your review of OTIB-52 to the Board, and I'll just work with you to work -- these questions, then. And is that kind of what we're thinking?

MS. BEHLING: Yes, that's what I thought. At the end of the presentation, I -- they -- we'll include this. Yeah, we can work together.

DR. ULSH: Okay. All right. I'll reach out to you. Thank you.

MS. BEHLING: Thank you.

CHAIR BEACH: Okay. Thank you.

SC&A ISSUED REVIEWS

DCAS-PER-075, Rev. 0 "Battelle Memorial Institute TBD Revision"

CHAIR BEACH: And I think Amy is up for the next DCAS-PER-075 report.

MS. BEHLING: Can you see --

MS. MANGEL: Can you --

MS. BEHLING: -- my screen?

MS. MANGEL: -- hear me?

CHAIR BEACH: No, I'm -- not yet. I can.

MS. BEHLING: Oh, boy.

CHAIR BEACH: Always a challenge.

MS. BEHLING: Yeah. Now?

CHAIR BEACH: No.

MS. BEHLING: Okay. No, I don't want to do it that way. Oh. Let me try --

CHAIR BEACH: Is that --

MS. BEHLING: -- something else.

(Whereupon, Ms. Behling and Dr. Ulsh speak simultaneously.)

DR. ULSH: Yeah. This is Brant. I can see it now.

MS. BEHLING: Okay. We'll go that route. I -- I don't know. Okay.

CHAIR BEACH: That's --

MS. BEHLING: That's fine, if that's okay with you. That's -- that's great.

MS. MANGEL: Okay. Yeah, it --

MS. BEHLING: Okay.

MS. MANGEL: -- looks fine.

MS. BEHLING: Great.

CHAIR BEACH: Thank you.

MS. MANGEL: Okay. Can everyone hear me?

CHAIR BEACH: Yes.

MS. MANGEL: Okay.

MEMBER FRANK: Yes.

MS. MANGEL: My name is Amy Mangel with SC&A. I'll be presenting our review of PER-75 for Battelle Memorial Institute, TBD revision. The purpose of the PER was to address impacts of Rev. 1 of the TBD for Battelle Memorial Institute on previously completed cases. Rev. 1 was issued as a result of SEC reviews.

There's two locations associated with Battelle; King Avenue in Columbus, Ohio, where they processed and machined enriched natural and depleted uranium and thorium, fabricated fuel elements, analyzed radiochemicals, and studied power metallurgy, the West Jefferson site, also in Columbus, a large hot cell facility was operated and research reactor -- the reactor was defueled and partially dismantled in 1975.

Two classes of workers were added to the SEC: one from April 16, 1943, through June 30, 1956. It was determined it was not feasible to reconstruct internal doses for uranium, thorium, and progeny, and it was not feasible to reconstruct external doses through February 13, 1951. And the second class was July 1, 1956, through December 31, 1970. Determined that insufficient information to reconstruct internal doses to thorium and progeny.

The timeline for the King Avenue location, the covered period for AWE was 1943 through 1986, for DOE, it was -- was '86 through 2000, with a residual period from 2001 through March 1, 2011. For West Jefferson, the covered period for AWE was 1956 through 1975. DOE, 1986 to present day,

and the AWE residual period was 1976 through 1985.

Subtask one, the changes that necessitated a PER: As a result of the SEC reviews, Revision 1 was issued in June 2016. And as a result of this revision, increased dose was possible due to the inclusion of environmental doses, recycled uranium components, and other modifications to the internal and external dose assessments.

For Subtask 2, the corrective action methods, we had not previously reviewed the TBD for the site, so therefore, our Subtask 2f review for PER-75 is evaluate the documents, guidance, dose reconstruction.

For the occupational internal dose estimate, in vitro and in vivo bioassay monitoring was required at the site. This included urinalysis, fecal analysis, nose swabs, lapel sampling and whole-body counting. There's information for interpreting bioassay results for plutonium and fission products.

For urinalyses, the earliest record was in 1956. The frequency was determined by the workers' exposure potential. Urinalysis tables were also collected after incidents. Table 4-3 of the TBD has the MDAs over time for urinalysis.

Some samples from 1976 through 1982 were marked Ru for radiometric uranium. The gross activity was measured rather than the mass of uranium. This may have been used to quantify exposures from enriched uranium.

If the uranium enrichment was unknown, the TBD says to assume natural uranium. After 1952 recycled uranium is assumed to be present at the site. And the TBD includes fraction -- contaminant activity fractions to

used.

For fecal analysis, records exist from May 1974 through March 1982. Analyzed for Potassium-40, uranium, plutonium, americium, and fission products. And these were collected as needed after incidents. No swabs were collected after incidents as well, or when exiting dusty cleanup work in JN-4. Lapel samplers were used in JN-4, beginning in 1975. Results from the nose swabs and lapel samplers aren't used to quantify the intakes, but to verify if a worker had a positive intake after an incident.

The earliest record for whole-body counting was August 1970. For records prior to 1995, the TBD lists max MDAs, if the MDA is not listed on the record. And after 1995, MDAs were reported with the results.

In regards to plutonium, the TBD includes the plutonium isotopic composition that should be assumed and the absorption types that are applicable for the site. For fission products, the TBD recommends using OTIB 54 to reconstruct doses for workers whose bioassay results are reported only as gross beta or gamma. NIOSH determined that workers that weren't likely exposed to radioiodine, as the areas where fission products were handled had adequate ventilation. The TBD also provides spent fuel cooling times that that you -- that can be used with OTIB-54.

Our comments on internal dose for urinalyses, SC&A agreed with the assumption that recycled uranium was potentially processed at the site. The contaminant activity fractions in the TBD match those in TBD-6000. We did have two observations regarding urinalysis.

The first, SC&A is unable to verify detection limits that were listed in TBD Table 4-3. We were -- we were able to verify the detection limits for

mixed fission product after 1993, and for isotopic uranium and plutonium, after 1992. We looked at several site records and just weren't able to verify the remaining detection limits that were listed in that table, so we just request clarification on how those values were selected or -- or determined.

And the second observation, it's unclear how radiometric uranium analysis results should be interpreted in dose reconstructions. The TBD says that some urinalysis results designated as radiometric uranium and that the detection limits for this analysis are unknown, but the TBD doesn't provide any guidance on how to assess these results. So, we just request additional information, then, how these types of urinalysis results should be used in DRs if the detection limits are unknown.

Comment on other internal dose for fecal samples, nose swabs, and lapel sampling, we agree with NIOSH's approach that results from these bioassay methods are used to verify a potential positive intake. For fission products, we agree with NIOSH assumption that radio -- radioiodine does not need to be considered. The areas with fission products that exhaust above the reactor, individual exhaust in the hot cells, building exhaust for the hot cell facility, and glove boxes and hoods with exhaust and HEPA filters.

Another observation -- information needed for X-ray diffraction sample prep methodology. We reviewed attachments B, C, and D of the TBD and their (audio drop) indicate X-ray diffraction was performed on samples using powder samples, and that small amounts of the sample material should be assumed to have been ground into a powder. Table B-1, indicates that the grinding may have taken place in Building 5, the machine shop of the King

Avenue location. We just request additional information about how these samples were ground into the powder and what sort of monitoring may have been conducted of the workers that were involved with the grinding.

For occupational external dose, the TBD contains information about the external dosimetry practices at the site, per SEC petition 208, it's not feasible to reconstruct external doses before February 13, 1951. For some individuals, dose records may be missing for short periods of time, and this could be due to actual missing records, or the worker had little exposure potential and was not monitored during that time.

For a beta dose from 1956 through 1961, beta exposures may have been reported as other or arbitrary units. Doses converted using factors based on the assumed beta energy, and the site records might include notes about the assumed beta energy and the multiplication factor to apply, or both of these things. The TBD lists multiplication factors to use for old fission products, new fission products, and uranium. If records do not indicate an assumed beta energy or multiplication factor, then a factor of 5.3 is used as a claimant-favorable assumption.

For photon dose, the TBD lists energy parameters for natural depleted uranium, enriched uranium, natural thorium, fixed fission products, and plutonium. If it's unknown, what specific materials a worker was exposed to, then assume 100 percent 30 to 250 keV photon. For neutron dose, neutron exposures were monitored via NTA film dosimeters at the West Jefferson location. To account for NTA film under response, a neutron-to-photon ratio was calculated using workplace measurements from the site survey records. Prior to 1970, neutron surveys were reported in terms of

thermal and fast neutron flux. So, NIOSH used an equation from NCRP Report 38 to calculate dose rates from reported neutron flux.

For environmental dose, measurements of on-site external dose for West Jefferson -- for the West Jefferson site were collected from 1978 through 2005 with no report found for the year 1999. Environmental monitoring was performed at the King Avenue site from 1993 through 1998. The King Avenue measurements were lower than those at the West Jefferson location, so therefore NIOSH applied the West Jefferson measurements for both sites. It was assumed that the workers were exposed for 2000 hours per year, and for the years prior to 1978, the highest annual dose from 1978 through 2005 should be applied.

For SC&A comments on external dose, we reviewed a sample of film badge dosimetry records from 1956 through 2008 to confirm the various dosimetry and processing services that were listed in TBD Table 5-1, and we were able to verify most of the MDLs that were listed in Table 5-2, except for the periods that are listed in Observation 4 that I'll get to soon. SC&A agrees with NIOSH's determination of the neutron dosimeter MDL for 1961 through 1996.

So, for Observation 4, we were unable to verify several of the MDLs that were listed in TBD Table 5-2, specifically the -- the photon MDL of 50 millirem for the period of March 1951 through March 1956. We reviewed some -- some monitoring records from 1951 and 1952 that reported 30 millirem. So, we just want a little further explanation for the -- the photon MDL for this time period. We reviewed some site film badge results from 1959 through 1964, and we were -- we weren't able to verify the photon,

beta, and neutron MDLs listed in the TBD, so we also request additional information about how those were determined.

Observation 5, clarification needed for the workplace radiation fields. NIOSH cited the external dose TBDs for Y-12, Lawrence Livermore National Lab, Idaho National Lab, and Los Alamos National Lab for the workplace radiation fields photon energy ranges that are included in Table 5-4. We reviewed these cited TBDs and found some inconsistencies in the assumed photon energy range percentages for the different materials at the site. So, we just request additional information about how specifically the energy range percentages were determined for -- for Battelle, and just additional guidance about which cited TBD was used for which energy range.

For beta dose, we reviewed the references that NIOSH cited for the multiplication factors, and we were able to confirm the factors that were listed in the TDB. We find that NIOSH has guidance to use a factor of 5.3 when the given dose record does not include a multiplication factor or beta energy is claimant favorable and reasonable. We did have one observation about interpreting these records. It's unclear if doses reported as arbitrary units would be reported on various dose records.

So, we reviewed dose records from September of 1956 that were reported on two different dosimetry forms. One form had a column labeled "other," but the second form did not have this column. So, the inconsistency between these forms, it -- it's not exactly clear how beta dose would be interpreted. It's also unclear if any notes about the assumed beta energy or multiplication factor would appear on the forms lacking the columns labeled "other."

We reviewed Attachment F of the TBD, which contains NIOSH's analysis for the NP ratios. We also reviewed NCRP Report 38 and the equation that NIOSH used to convert neutron flux to dose. NIOSH provided us with the -- the spreadsheets containing the data and calculations, and we have one observation.

We would -- we would like more information on specifically what records were selected for determining the NP ratios. So, NIOSH stated that for the JN-1 and JN-4 NP ratios, only a sampling of available records were used in the calculations. For the JN-1 calculation, there were 49 measurements used. For the JN-4 calculation, 41 measurements were used. We just would like additional information as to how -- how -- how those records were selected to be used in the analysis.

It's also unclear why the data was limited for these calculations when the calculation for the JN-3 ratio used over 2000 (indiscernible). So, just a little more information about that would be appreciated.

The TBD lacks guidance about glovebox workers in JN-1 and 3. The last paragraph of TBD section 5.5 states that guidance in OTIB-10 applies to glovebox workers handling plutonium in JN-2 and JN-4. It just wasn't clear if this guidance would also apply to workers in other areas, such as JN-1 and JN-3. So, just seeking clarification on that.

For external ambient dose, we reviewed NIOSH's methodology using the yearly site environmental reports. We believe that assigning the higher doses from perimeter measurements for 1985 through 2004 rather than the lower doses from the recreation area and property boundary is reasonable and claimant favorable. We also agree that applying the higher doses from

the West Jefferson site to the King Avenue site is reasonable and claimant favorable, but we did have two additional observations.

We request additional information about the applicability of the post operational environmental monitoring data for pre-1978. So, the TBD states that for the years prior to 1978, the highest annual dose from 1978 through 2005 should be applied. The available environmental data are from the residual period and remediation period. So, we would just like additional information on how it was determined that these data were representative of environment -- environmental data for the pre 1978 timeframe.

Also, the ambient external dose does not account for potential overtime. The calculation assumed workers were exposed for 2000 hours per year. We reviewed an employee interview from a past dose reconstruction at the site audit that we had reviewed, and in that interview, it was stated that they worked up to 16 hours of overtime a week. So, we suggest that if -- if it's somewhat routine that workers worked overtime, it would be appropriate to adjust the assumed worker occupancy accordingly. And this also applies to environmental internal dose.

Internal dose from on-site atmospheric radionuclides, stack sampling at King Avenue took place from 1973 through June 1975 and at West Jefferson, it took place from 1973 through 2005.

NIOSH used NCRP Report 123 methodology to estimate the atmospheric dispersion factor to calculate the onsite atmospheric concentrations. The inhalation intakes were calculated using this. The standard breathing rate and exposure of 2,000 hours per year for the West Jefferson location.

For the years prior to 1973, you're to assign the highest intakes for alpha emitters from 1993. For years prior to 1975, assign the highest reported mixed fission product intakes from 1977. For King Avenue, the doses came out to be less than 1 millirem per year. If a worker may have traveled between locations, then the West Jefferson intake should be applied.

We reviewed Attachment G of the TBD, and we were able to closely match the atmospheric dispersion factor and intakes that NIOSH calculated. As mentioned in Observation 10, intakes may need to be adjusted to account for potential overtime. And we did have two observations about this.

Inconsistency in the application of external and internal environmental dose. For external environmental dose, NIOSH states that dose estimated from West Jefferson data may also be applied to the King Avenue site. However, for internal environmental dose, NIOSH states that the West Jefferson data should be applied to the King Avenue workers -- only those that may have traveled between sites, rather than just applying it to all workers, as was done for the external dose.

And clarification needed on the years with the highest alpha emitter and mixed fission product and activation product environmental intake. (Indiscernible) is saying that NIOSH chose the years 1993 to 1977 based on the highest sum of radionuclides for a given year, as shown in Figure 6-1 and 6-2 of the TBD. And if the ratio of the activity of the radionuclides remains fairly constant, then this would be a claimant-favorable assumption, but it doesn't appear to be the case.

Table G-1 for 1993 shows that Uranium-238 appears to be the driver, but Plutonium-239 and Americium-241 decreased from 1992 to 1993. And Table G-2 shows that Cobalt-60 is a driver, but many other radionuclides varied by year. Which radionuclide dominates depends upon the target organ, so we believe that this might warrant additional analysis to demonstrate that the recommended approach is claimant favorable.

For the residual period, NIOSH states that workers at both sites were monitored for internal and external exposure during residual periods. No additional assessment is needed in order for DRs to be completed for these periods. We confirmed that the site has the capability to conduct external monitoring for photons, betas, and neutrons for both residual periods, but we had one observation.

It's unclear what internal exposure monitoring capabilities existed at the site after 1998. It wasn't clear when we reviewed the TBD what was available for that timeframe. Tables 4-1 and 4-3 indicate urinalysis ended in 1998 and for Section 4.2, states that the latest in vivo analysis record was also from 1998.

For occupational medical dose, before 1957, X-rays were performed off site and therefore aren't eligible for inclusion in DRs. Between 1957 and 1968, X-rays may have been performed on site or off site. NIOSH instructs dose reconstructors to assume on site X-rays began in 1957 unless there's specific records indicating it was done off site.

A machine that was described as radiographic and fluoroscopic was installed in 1968 NIOSH states had no evidence of chest fluoroscopy and to assume only radio -- only radiographic mode was used. Starting in 1957,

assume a pre-employment, annual and termination checks -- chest X-ray were administered. Records indicate collateral checks -- chest X-ray was performed annually between 1975 through 1980.

Occupational medical doses not reconstructed for residual periods, and the TBD also directs the use of OTIB-6 for assigning organ doses. We concur that the off-site X-rays are not eligible for inclusion in a DR, and we also agree that NIOSH has assumed X-ray frequency and the use of OTIB- 6 for assigning organ doses is reasonable.

We have one observation. Evidence of photofluorographic examinations at the site -- as part of the 29th set of DR reviews that SC&A completed, Tab 589 involved an employee of the site, and in that DR NIOSH assigned dose from PFG examinations in 1960 and 1961, so we just request additional information on the potential use of these at the site.

And we have another observation just for overarching DR guidance, inadequate dose reconstruction guidance for workers with potentially missing dose records. As stated earlier, the TBD acknowledges that external monitor -- monitoring records may be missing in a worker's files. SC&A assumes that all types of dosimetry records, including internal monitoring, might be similar -- similarly incomplete in some cases, and the TBD doesn't address the potential for missing internal monitoring records. For potential gaps and external records, NIOSH recommends interpolating if the gap is small. If the gap is more significant, alternate -- alternative methods should be used. But there's no further guidance given regarding these alternative methods.

For Subtask 3, the PER selection criteria -- so, first look -- looks for all completed case -- claims with verified employment at the site, and this

brought about 91 claims. Twenty-seven claims had a POC greater than 50 percent and were removed from further evaluation, leaving 64 claims. Of these, 20 already used Rev. 1 of the TBD, were awaiting a dose reconstruction, or were pulled from dose reconstruction and were removed from further evaluation, which left 44 claims.

NIOSH also searched the DR reports for the word "Battelle," and this identified 3,126 claims. Seventy-two of those had already been identified in the previous search, 3,050 had no connection to the site, and the remaining four claims were added to the initial search. Twelve claims were members of an SEC and were removed from further evaluation, and ultimately this left 36 claims for evaluation.

Thirty-one of the 36 claims were unaffected by changes in Rev. 1 of the TBD, so five claims were re-evaluated. Four claims had a POC less than 45 percent. One claim had a POC between 45 and 50 percent, so IREP was run 30 times at 10,000 iterations, and the POC was still below 50 percent.

We agree with NIOSH's selection criteria and that they're broad enough to capture all potentially affected claims. We believe that the PER was conducted in a timely manner. Rev. 1 of the TBD was issued in June 2016. The PER was issued in December 2017.

We did have two observations. We request additional information on how four claims from the second search were not identified in the first search. It's unclear from the description of the selection criteria how the four claims from the second search weren't found during the initial search of claims with employment at the site. If these claims only involve visits to the site, we ask if other PERs include a step of searching all DR reports for

mentions of a given site name.

And we request additional information regarding NIOSH's determination that 31 claims were unaffected by the changes in Rev 1. It just seems that the changes that were made in Rev. 1, we would think, would affect more than just five other than 36 claims. Uranium was processed at the site. Urinalyses were analyzed for uranium between 1957 and 1998, so it seems like the potential for workers to have been exposed to uranium, and therefore recycled uranium, could have affected more than five out of 36 claims, so we just would like additional information about that (indiscernible).

Subtask 4, SC&A recommends that the Board select the appropriate number of cases necessary to assess all the changes that were introduced in Rev. 1 of the TBD. This includes environmental, internal, and external dose, recycled uranium components, thorium and beta dose with records that had the arbitrary units.

CHAIR BEACH: Thank --

MS. MANGEL: And --

CHAIR BEACH: Yeah, this is Josie. Thank you so much. That was a thorough, good report.

Any questions from the committee members?

MEMBER FRANK: None from --

MEMBER VALERIO: Josie?

MEMBER FRANK: -- Arthur.

MEMBER VALERIO: Josie, this is Loretta. Can I -- can we go back to slide 39 real -- just real quick.

MS. BEHLING: Give me just one second.

MEMBER VALERIO: I guess, my question is, does NIOSH have a good indication of how many of the workers travel between the site and how often?

DR. ULSH: If that is a question for NIOSH, this is Brant Ulsh. Okay. Well, the answer --

CHAIR BEACH: It was.

DR. ULSH: Okay. Well, the answer is I don't have that information today, but it may be available. I have to follow up.

CHAIR BEACH: And Loretta, in -- let me make sure I'm understanding your question. Because the external dose was applied to all workers, but the internal was -- or the environmental was not; is that correct? Oh, no, the internal, excuse me, was not applied --

MEMBER VALERIO: Yeah.

CHAIR BEACH: -- workers because of travel.

MEMBER VALERIO: Right.

CHAIR BEACH: Yeah, I guess -- okay.

MEMBER VALERIO: That's the way I'm reading it.

CHAIR BEACH: Yeah. So, why was it applied for the external, but not the internal? Okay. And Brant's got that.

DR. ULSH: Yeah, I've --

MEMBER VALERIO: And that was --

DR. ULSH: -- got it.

MEMBER VALERIO: I'm sorry. That was one question. And I think I might have another question if we can go back to slide 13, I believe. I --

no, that's not the one I was looking at. I might have the wrong slide. Oh, yes, that is.

The absorption -- the absorption types applicable for the site, by absorption types, is that just inhalation and ingestion, I'm assuming?

DR. ULSH: I'm not sure. Yeah, not sure I understand your question, but yes, I think so. It's --

MS. MANGEL: And also, for -- it's like -- it's listing -- if you're to assume type M or S for -- for the plutonium when doing the dose reconstructions.

MEMBER VALERIO: Okay. Okay. My mistake. I apologize.

CHAIR BEACH: Okay. And then my question is, back on Subtask 4, normally, you'll suggest how many cases you would like, but you're going to leave it up to (audio interference) to determine the cases that have all five of this -- these criteria met; is that correct?

And Lori, is that how you understand it?

MS. MANGEL: Yeah, I think ideally, we're just looking for enough -- as -- as many cases as it takes to be able to cover the areas that had changes from Rev. 0 to Rev. 1 of the TBD, just to make sure that we are able to review all of these items in however many --

CHAIR BEACH: Okay.

MS. MANGEL: -- cases that tends to be. If one case is all of them, that's great. If we need more, then (sic).

CHAIR BEACH: Okay. Great. And Lori, that's something that you'll work with Amy or with SC&A on, is that correct, in getting the cases over to them for review? I don't know if Lori is still on, but I think that's --

MS. MARION-MOSS: Hey, Josie, --

CHAIR BEACH: -- how -- oh. All right. Yeah.

MS. MARION-MOSS: Hi. This is Lori. I'm sorry, I pressed the wrong mute --

CHAIR BEACH: Don't worry.

MS. MARION-MOSS: -- hung us up. I did hear your question before I was disconnected, was did I understand that we're supposed to pick the number of claims that met the criteria --

CHAIR BEACH: Correct.

MS. MARION-MOSS: -- that's in the report; is that correct?

MS. MANGEL: Yes, that's how I interpret it.

CHAIR BEACH: Yeah. Is that something, Lori, that you're still doing, or has somebody else been assigned to start doing that for you?

MS. MARION-MOSS: Right now I'm still doing it, but pretty soon, someone else will -- will work along with Kathy and/or SC&A to select claims.

CHAIR BEACH: Okay. That's normally something the subcommittee just knows that you work with SC&A to provide those cases. We don't generally hear when that's done, so I'm assuming that will continue the way it has, unless something needs to change, is that correct, between you and Kathy, and (sic)?

MS. MARION-MOSS: Yes, at this -- at this time, yes, that is correct, Josie.

CHAIR BEACH: Okay. All right. So then -- and Kathy for you, I'm assuming you will add all these observations to the BRS moving forward?

MS. BEHLING: Yes, yes, --

CHAIR BEACH: Okay.

MS. BEHLING: -- I'm working on that.

CHAIR BEACH: Yep. Yep, that's what you said towards the week or next week. Okay. Great.

And if there's no other comments, questions, I think we can move on. I think you're -- Kathy, you or Ron is gonna -- are the Mallinckrodt TBD revisions, PER-O40?

MS. BEHLING: Yes. Let me see here.

CHAIR BEACH: (Indiscernible) this.

MS. BEHLING: Let me see if this is gonna pull it up.

MR. BARTON: If I might, this is Bob Barton. While Kathy's working on the next presentation. I wanted to --

CHAIR BEACH: Yeah, go ahead, --

MR. BARTON: -- comment to Valerio's comment, I would just add that, you know, the issue of workers moving among sites, especially sites that are located near each other, is certainly not new. And I know that in the past, NIOSH has worked with Department of Labor, which ultimately decides where covered employment exists. For example, the DeSoto and Santa Susana sites in California, or even just moving among this -- the large sites such as Savannah River. So, that that process does go on, so it's not lost in the dose reconstruction process, and it's often undergone great scrutiny. So, I just wanted to add that for the benefit of the subcommittee.

CHAIR BEACH: Oh, thank you, Bob. Appreciate that.

DCAS-PER-040, Rev. 0 "Mallinckrodt TBD Revisions"

MS. BEHLING: Okay. I'm working on pulling up this file. I know I have one pulled up, but I want to go to a different file.

CHAIR BEACH: Okay. yeah, DCAS-PER-40 is the Subtask 4 Report.

MS. BEHLING: Yes, it is.

CHAIR BEACH: Yep.

MS. BEHLING: Okay. And can you see my screen?

CHAIR BEACH: Yes.

MS. BEHLING: Okay. All right. This is PER-40, it is Subtask 4, review of four cases, was actually done by Ron Buchanan. I may have worked with him on the Subtask, 1 through 3, but he has so many presentations to give that I've offered to take this one on for him. So, hopefully, Ron, I'll do as good a job as I know you to do. So, just -- and you can correct me if I say anything wrong here.

Okay. Again, PER-40 Subtask 4, the review of four cases. Okay. Let's see if I can -- and we'll start out. You know, PER-40 was issued to evaluate revisions to the Mallinckrodt TBD, and we'll start by just giving you an overview of the facility and operations.

The Mallinckrodt Chemical Company, also known as Mallinckrodt Chemical Works, is -- the downtown site is in St Louis, Missouri. The site began research on uranium refining and processing operations in April of 1942. And by July of 1942, Mallinckrodt was producing nearly one ton of uranium dioxide per day. They -- they also produced uranium trioxide, uranium tetrafluoride, and produced uranium derby metal and did vacuum

recasting of ingot metal. They recover -- recovered scrap uranium metal and processed pitchblende residues to recover uranium.

The residues from the Mallinckrodt operations between 1946 and 1958 were sent to the St Louis airport storage site known as SLAPS. And after the operational period, the site, SLAPS site, was used for residual storage and disposal until 1967.

The Mallinckrodt site profile was initially issued in October of 2003, and it was revised four times. PER-15 was issued in July of 2007 to address changes introduced in Rev. 2. And under PER-15, NIOSH evaluated all of the previously adjudicated claims with POCs of less than 50 percent. PER-40 was issued in September of 2013, and that was to evaluate changes introduced into Rev. 3 of the TBD, and NIOSH reassessed all claims completed between -- or using Rev. 02 and 02 page change 1.

Okay. According to the Department of Labor, the Mallinckrodt covered periods were from 1942 through 1962 and again in 1995, and SLAPS covered period were from January 3, 1947, till the end of December of 1973 and 1984 through 1998. So, because there were a variety of uranium refining operations at the site, the resulting search -- the source terms changed. Most of the ore that was processed at Mallinckrodt was pitchblende ores from the Belgian Congo.

The uranium dioxide feed material of pitchblende, ores contained up to 65 to 70 percent of triuranium oct -- octoxide by weight. And this pitchblende ore contains high levels of Radium-226, and daughter products which contributed to the external dose. Thorium-234 and Protactinium-234 produced most of the extremity doses. And radon in radioactive dust

resulted in internal doses due to inhalation.

Now Table A-4 of Rev. 3 of the TBD lists the types and quantities of materials produced from the uranium refining and related operations. So, PER-40 was issued due to changes in Rev. 3 of the TBD, as I said, and those changes included -- Rev. 2 stated that due to SEC-12, no internal or external doses could be reconstructed from 1942 through 1948; however, Rev. 3 clarified that if there were -- if the EE had records dose -- for external dose, the external dose could be reconstructed.

Rev. 2 PC-1 added guidance after Table A-40 to include isotopic ratios for internal doses between 1959 and 1962, which could increase dose for some organs. And Rev. 3 increased external doses at SLAPS for most years between 1947 and 1973, and again, 1984 through 1998. Also, Rev. 3 also added radon exposure estimates for SLAPS.

Okay. So, S -- let me see here. Okay. SC&A issued its Subtask 1 through 3 reports for PER-40 in September of 2023, and it's linked to this slide. SC&A had no findings but did identify two observations. Observation 1 was that Table A-4 did not include the intake values for 1995, and Observation 2, SC&A question why NIOSH did not recommend assigning beta doses between November of '71 and December of '73. And both those observations were discussed and closed at the November 2024 SPR meeting.

So, Subtask (audio interference) SC&A audit representative (audio interference) -- I don't know if others are hearing background noise, but. Okay. So, we (audio interference).

DR. ROBERTS: If folks can, check their phones and go on mute, please.

MS. BEHLING: Okay. Thank you.

For PER-40, NIOSH provided SC&A with four cases, and our Subtask 4 report was submitted to the Subcommittee on Procedure Reviews in September of 2024. The selection criteria that we had suggested were to look for cases that had employment during 1942 to 1948 where external dose was assigned, also internal dose was assigned between '59 and 1962 and/or in 1995, external penetrating and/or nonpenetrating doses as SLAPS for years 1947 through 1973 and/or 1984 through 1998, and radon exposures assigned for SLAPS between 1971 and 1973 and/or between 1984 and 1998, and also internal dose assigned for SLAPS within the timeframe of 1984 through 1998.

So, the cases provided by NIOSH did satisfy our requested criteria, and for each of the reviewed cases, SC&A provided an overview of the case and a comparison of applicable doses assigned in the previous dose reconstruction and the re-evaluated dose reconstruction. Now, this review was limited to only changes addressed in PER-40.

So, for Case A, the EE was an operator during early years of operation. The EE was monitored for internal and external exposure. The original dose reconstruction was performed in 2009, and the revised associated with this PER was performed in 2012. And both PERs resulted in a POC of less than 50 percent.

So, for both the original and the rework, NIOSH assigned doses as 30 to 250, keV photons, and applied the appropriate DCFs, dose correction factors. A neutron DCF of one was applied, and a geometry correction factor of 2.1, for the lower toe -- torso was applied. The difference between the

two DRs was in their assignment of neutron dose. The original DR assigned a 50th -- 50th percentile neutron-to-photon ratio while the reworked used the 95th percentile, and both DRs applied the ICRP 60 conversion factor of 1.91 to determine the neutron dose.

So, SC&A -- SC&A reviewed the EE's dosimetry data and was able to reproduce the 1970 -- 1947 and 1948 photon dose, but we did have an observation. And the observation is that it was some confusion as to the use of this geometry correction factor and the neutron-to-photon ratios during -- during and prior to 1949. NIOSH did not apply a GCS of 2.1 to the 1947 and 1948 measured photon dose, and they did not assign missed or measured photon dose or a missed neutron dose using the neutron-to-photon ratio for 1947 and 1948. However, both the 2009 and 2012 DRs did a sign measured in this photon and neutron-to-photon ratio, plus missed neutron dose for 1949.

So, neither Rev. 3 of the TBD nor OCAS-TIB-13, which is the selected geometric exposure scenario considered -- considerations for external dose reconstruction at uranium facilities provide clear guidance on these issues and how to handle this prior to nineteen forty -- '49. So, the external dose in the reworked DR increased because it included the dosimetry data from '47 and '48 and because it used the 95th percentile neutron-to-photon ratio for calculating neutron dose.

Okay. For the internal dose, both DRs assigned internal dose using the EE's uranium urinalysis data, both those doses were relatively small. Radon exposure was not considered for this -- for this EE, because the cancer location was not the lung and therefore, the total internal dose

stayed the same between the two DRs.

So, SC&A concurs that the internal dose should remain unchanged since the TBD revision did not apply to this EE. In summary, SC&A did not have any findings, but did have one observation concerning the reworked D -- DR for case A.

Okay. For case B, the worker -- the EE worked in a production area of the plant. The only year that applied to this EE was 1995. The EE was not monitored for internal or external exposure, and the original dose reconstruction was done in 2008 with the rework being done in 2012. Again, this is a focused review which assesses only the external pathways discussed in this PER.

So, in the original dose reconstruction, internal doses were assigned using hypothetical intake of uranium and radon that's listed in Table A-40 of Rev. -- Rev. 2 of the TBD. The original mistakenly assigned the uranium dose using intake values per day, rather than per year, as provided in Table A-40. The radon intake of 2.62E-2 working-level months per year for Plant 7 was assigned for the full year -- for a full year rather than prorated for a partial year of employment.

Okay. In the reworked DR, NIOSH assigned internal doses for uranium and radon using Table A-40 of TBD 3, and they used uranium, thorium, and actinium intake values per year and a radon intake of 1.31 working-level months per year for Plant 2, which was a more claimant favorable working-level month, as opposed to the Plant 7.

They also applied that for a full year, even though the EE only worked for a part -- for a partial -- apart -- part time during the year. Result -- this

resulted in a total internal dose of less than half of the dose assigned in the original DR. And although the reworked internal did include the thorium actinium, the intake values were based on correct intakes per year instead of intakes per day.

Okay. So, to evaluate the internal doses, SC&A ran the CAD tool, the chronic annual dose tool, they used -- we used 1995 Plant 1 inhalation and ingestion intakes from Table A-40 of TBD-3 -- Rev. 3. And we determined that type S solubility for Uranium-234 provided the largest dose, and we were able to match the rework DR assigned dose. Radon exposure value was derived from Table A-40 and matched the 2012 DR assigned value.

Okay. For case B, the overall internal dose in the reworked DR decreased, and that's because of the picocurie per day versus picocurie per year issue. The addition of Thorium-230 -- 230 and Actinium-227 intakes accounted for only half of the reworked assigned internal dose. And because the reworked DR assumed that the EE -- the EE worked in Plant 2 rather than Plant 7, the radon exposure substantially increased. So, in summary, SC&A found that the assumptions used to calculate the internal dose to be reasonable, and we had no findings or observations for Case B.

So, the next case, the EE worked for an extended period at the Mallinckrodt Plant. Only the years 1959 through 1962 from PER-40 applied to this EE. The EE was not monitored, and the original dose reconstruction was done in 2009 and again the revised in 2012, and both resulted POCs of less than 50 percent. So, the original DR assigned internal doses using 50th percentile intakes of uranium and associated radionuclides from Rev. 2 of the TBD and radon exposure was not included because it did not include a

cancer to the lung. The reworked DR also assigned the 50th percentile intakes, but used Rev. 3 of the TBD and again, no radon exposure was considered.

So, SC&A's evaluation used the recommended Plant 6E inhalation and ingestion uranium and associated radionuclide intakes from Table A-40, Rev. 3 of the TBD, and applied that to the -- in the CAD W pool. We determined that type M solubility of U-234 provided the largest dose, and we were able to match NIOSH's reworked DR internal dose. And so, we concur that the radon exposure should not have been included.

So, internal dose in the reworked DR decreased slightly compared to the original DR because the original used overestimate -- over -- yeah, overestimating intake location of Plant 4 while the reworked DR used a more reasonable intake location of Plant 6E. So, in summary, SC&A found the assumptions to be reasonable, and we had no findings or observations.

Lastly, Case D, the EE worked at SLAPS. The EE was not monitored for internal or external exposure during employment. The original dose reconstruction was done in 2010 and then revised in 2012, and both resulted in POCs of less than 50 percent. And again, this was a focused review.

Both DRs applied the appropriate DCF for 30 to 250 keV photons, unmonitored external exposure was and -- and -- this -- we should have added Rev. 3 here. The unmonitored external dose was calculated using Rev. 2 for the original dose reconstruction and Rev. 3 for the 2012 reworked dose reconstruction. Full years of exposure were assigned for both the DRs, even though the EE worked only a partial year.

Okay. Now, with regards to other external doses, NIOSH did not

assign on-site ambient dose in either dose instructions, but they did assign occupational medical dose for both. And SC&A did not find any external dose monitoring records. We were able to duplicate NIOSH's unmonitored photon dose using recommend -- recommendations in Rev. 3 of the TBD. We concur with assigning occupational metals -- medical dose based on Rev. 3 guidance, and we agree that it -- that it was not necessary to assign the on-site ambient dose.

So, external dose in the rework DR increased slightly due to Rev. 3 recommending a slightly higher unmonitored dose for the latter years of expose -- of employment. Okay. Both DRs assigned unmonitored inhalation and ingestion doses and radon exposure doses using applicable rev -- rev -- revisions of the TBD. Internal doses remained the same because there were no changes in the recommended intake values over the years. So, SC&A's evaluation also noted that changes in the internal dose assessment from Rev. 2 and Rev. 3 of the TBD did not apply to the period or location of employment for this energy employee, and we concur that the internal doses should remain unchanged.

In summary, SC&A found the assumptions to be reasonable, and the doses were calculated correctly, and we did not have any findings or observations of Case D. So overall, summary of the four case reviews, we identified no findings, but one observation concerning the geometric correction factor. That observation would not impact the outcome of the case, however.

So, that sums up PER-40. Ron, do you have anything to add?

DR. BUCHANAN: No, I don't (indiscernible). Thank you for saving my

voice for the next three.

MS. BEHLING: And any --

CHAIR BEACH: Yeah, thanks for jumping in there, Kathy.

Anybody, as Kathy just asked, have questions on these -- any of these cases or how the review was done? It sounds like it was a good representation of what we were looking for, so -- you know, with just the one observation. Any comments from (indiscernible)?

NIOSH RESPONSES TO SC&A ISSUED REVIEWS

DCAS-PER-0040, Rev. 0

MR. RUTHERFORD: Yeah, Josie. This is Lavon. Since we had that one observation, we actually were able to pull together a response to that really recently. In fact, so recently, I'm going to ask Scott Siebert to go over that response. Once we get --

CHAIR BEACH: Oh.

MR. RUTHERFORD: Once we -- we'll get the -- our response put into the BRS once Kathy gets that observation loaded.

CHAIR BEACH: Okay. That's great. Appreciate you just virtually going over (audio drop).

MR. SIEBERT: Yeah, sure. This is --

CHAIR BEACH: Great.

MR. SIEBERT: -- Scott. Can you guys hear me okay?

CHAIR BEACH: Yes, we can. Thanks, Scott.

MR. SIEBERT: Okay. Good. Yeah, the observation is -- the main

portion of the observation, as Kathy mentioned, was the geometric correction factor. I've gone back and looked at that, and there is -- there's no indication, there's any reason why that would not be applicable during the SEC, just as it's applicable after the SEC, because it is a correction factor based on geometry. So, looking back at the claim, it just looks like when the claim was -- the PER was done, they just did not apply it to those two years when they should have. We've looked back at it and the impact of it, and just as SC&A says, there's -- there's very little impact on the actual POC on that.

But -- but we agreed that the glove box -- well, it's not glove box. The geometry correction factor should have been applied. To being on the safe side, I went back and I looked at the rest of the PER. There's 91 claims in the PER, and only 26 of them had employment that was in that early period where this could be a question, and it did not impact any of the other claims. This was the single one where this was done. So, it's -- it's pretty -- pretty straightforward that it's -- it's closed out. It was just a mistake in that specific assessment.

CHAIR BEACH: Okay. And thanks for anticipating our questions on how many other cases that might -- or claims that might (audio drop).

MR. SIEBERT: Sure thing, that's what I do. The other piece that's in there --

CHAIR BEACH: Yeah.

MR. SIEBERT: The other piece is in there is a discussion of 1949. It's kind of obliquely mentioned, but we'll go ahead and cover that real quick. The SEC ends in '48 and the site profile is, as Kathy was -- said, it's a little

unclear in 1949. It states that missed cannot be assigned in 1949 (audio drop) portion of the TBD. Other places it's start -- of the site profile. Other places it's talking about the SEC ending in '48.

I went back and looked at it and, yeah, 1949 should have both missed and measured doses assigned during that timeframe. It's just a -- a misstatement in the -- in the site profile. We've already added a note to our document control system to update that wording. But as -- as I said, I also look back at all the other cases, and that's the only one that it impacted as well. So, that was also not an issue. So, that should really close that stuff out.

CHAIR BEACH: Okay. Thank you. I appreciate the verbal confirmation of that. And after it's uploaded, and Kathy lets Lori know that it's uploaded, we'll look for your response, and then we can move forward with either putting that in abeyance, we're closing it out. Great. Anything else on PER-40? Thanks, Scott and Kathy.

MS. BEHLING: One more question. Josie, should we then carry this forward to the next meeting as something to discuss or once we --

CHAIR BEACH: Yeah.

MS. BEHLING: -- this information in the BR -- okay. We're going to carry forward. Okay. Thank you.

CHAIR BEACH: (Audio drop) that way we -- we -- everybody knows it's in there and -- and you're --

MS. BEHLING: Okay.

CHAIR BEACH: -- you're okay with the response that was written into the BRS, and then we can officially close it out, if --

MS. BEHLING: Okay.

CHAIR BEACH: -- if we're ready for that. So, yes.

MS. BEHLING: Okay. Great.

CHAIR BEACH: Okay. Thank you.

DCAS-PER-051, Rev. 0, ST4 "Weldon Spring Plant"

CHAIR BEACH: So, we have 2:50. I think we can go ahead and move on to at least 51 and possibly 83. I can't remember from reading how long each one of those are. Let's go ahead and get to the first Weldon Spring, PER-051.

MS. BEHLING: Okay. Are you seeing it?

CHAIR BEACH: Yes.

MS. BEHLING: Okay. Great.

CHAIR BEACH: Okay. And --

MS. BEHLING: Okay. Now it's Ron's turn.

CHAIR BEACH: All right. Ron. (Audio drop), yeah. Thank you.

DR. BUCHANAN: Okay. Can you hear me?

CHAIR BEACH: Yes.

MEMBER FRANK: Yes.

DR. BUCHANAN: Okay. This is Ron Buchanan again with PER-51, Subtask 4. In this presentation, we'll be reviewing three of the selected cases for PER-51.

Now, just to refresh your memory, it might have been a while since you heard of Weldon Springs (sic). Weldon Springs TBD was issued in 2013, Rev. 1, and the environmental dose from TBD 4 was issued in 2013 and 5

was 2013 and 6 in 2013. And so, we had all three, 3 through 6 TBDs were revised in 2013.

And so -- next slide.

So, just a little bit about Weldon Springs. It was -- it had three major components to it. Weldon Springs was a uranium processing plant located west of St. Louis, Missouri, and it had three main sections to it; the main processing plant, a query where they buried some of the stuff, and the raffinate pits where they evaporated some of the waste. And so, it's all in generally referred to as the Weldon Springs Plant, but in DR, sometimes we have separate out -- separated out where they work in that facility.

And it was operated by the AEC as a feed plant for processed uranium and thorium ore by Mallinckrodt that's located in St. Louis. And it had four periods of site operation mainly. Had the development in '54 to '57 and then operational. The main plant operated '57 to '66. And so, now it's a little confusing on who controlled what and when.

So, the post operation and after they shut down from '67 to '85 was controlled by DoD and not DOE. Now, the -- the plant part was post operational during '67 to '85, and the pits and the quarry was post operational, '67 to '74, and they were controlled by DoD. However, the remediation then was under DOE in '85 to '02.

Okay. So, that means that covers the proper plant itself during the operational period, '57 to '66, remediation period from '85 to '02, whereas the quarry and the pit were covered from '57 to '66, like the plant, but there was a -- started earlier in the post operational period, from '75 to '84. And of course, they're in their remediation period from '85 to '02.

Now, the radionuclides significance -- of course, this is a uranium processing plant, so they had natural uranium in the beginning from '57 to '62. However, in '62, the uranium is assumed to be enriched to 1 percent. They had some natural thorium. They had recycled uranium was the -- again in '61. And then the Radon-222, and Radium-228 was considered to be potentially significant for dose reconstruction.

Now, PER-51 was issued in March of 2015, and the subcommittee tasked us with reviewing it in February '23, and we committed our report in September of '23. Now, the PER-51 was issued because of changes in the TBD that increased dose and covered all operational periods and job types. This included changes in the isotope ratios for uranium, addition of a neutron-to-photon ratio, geometry correction factor, external dose, addition of thorium potential exposure, and changes in RU contaminant fractions, and an increase in radon exposure estimates.

So, we recommended for task four cases that included X-ray, especially to the skin, environmental intakes, and environmental external ambient dose, the internal intakes, exposure to the radionuclides, and external dose for an operator, material handler, or trade workers, because this was the items that were changed in the revisions. Now, so in November '23, this committee tasked SC&A a review of the representative cases. In March of '24 NIOSH posted three cases for our review, and one or more of the DRs for the cases included recommended criteria except criterion 2 concerning environmental intake of exposure to uranium, thorium and RU contaminant. There was no cases that had that criteria. And so, in September of '24, we provided our report from our audit.

So, we'll look at three cases now labeled A, B, and C and received it for the first case, the EE worked as an operator at the plant. He was monitored for external and internal exposure during employment. Initial DR was performed in '04. It was revised 10 years later in '14 per PER-51, and it involved changes in the isotope ratio, addition of neutron-to-proton ratio, addition of a geometry correction factor, and change in RU contaminants. However, both DRs result in POCs less than 50 percent.

Now, we'll start out looking at the first DR in '04. They assigned measured missed neutron -- I mean, photon dosimetry dose, used overestimating dose conversion factor 2, and did not assign neutron dose. Now, the 2014 external photon dose assigned measured and missed photon dose, assigned co-exposure photon dose, and used the appropriate 30 to 250 -- greater than 250 photon dose conversion factor rather than an overestimate using dose conversion factor of 2. And in the 2014 DR also applied the film correction factor of 1.1 to measured co-exposure photon dose and uncertainty factor of 1.4 to the measured photon dose and construction trade worker adjustment of 1.4 and a geometry correction factor of 2.1 to all photon doses because the cancer location was in the lower torso. If a person worked on an assembly line or glove box or something, the lower torso wouldn't be measured, right, (indiscernible) badge on the chest, so you apply a correction factor for geometry, if that is true. So, now we -- that's okay. Let's see. They also assignment of neutron dose -- in 2014 assigned neutron dose using a ratio of .23, the measured, missed, and co-exposure dose, and a conservative dose conversion factor of 1 and CRP Report 60 dose correction factor 2.

Okay. Now, we're comparing the 2014 versus the 20 -- to 2'04. We see that the 2014 DR used -- used pure overestimating methods. 2'04 five applied very claimant-favorable factors. So, the ambient dose -- external dose -- ambient dose was not assigned in either DRs because the EE was monitored or had co-exposure dose assigned, and we concur with that.

Now the medical X-ray dose, we see that the '04 assigned a PA exam only if '14 assigned both the PA and the lateral, and the dose assignment increased, of course, slightly from the '04 because of the two views dose assignment. We calculate medical dose based on the records and concur with NIOSH's dose assignments.

Internal dose, the '04 did not use bioassay records to assign intake resulting from the assumption of 28 radionuclides for a site with a reactor. In 2014, reworked dose used urinalysis results, used Uranium-234 and the decay products, and recycled uranium contaminants to assign internal dose. Our evaluation of internal dose assignment is that we reviewed the records and the bioassay data, calculated the intakes with various isotopes and different solubility types, and (indiscernible) like this. Found the largest dose for this organ, verified NIOSH used to the correct intake and parameters and CAD program to derive the dose, and did not identify any findings but did have the following observation.

Observation 1: In the report, the 204 Report, it was stated that the intakes are significantly larger than any intakes based on urinalysis, therefore, the application, hypothetical intakes, maximizes the assumptions to clearly claimant favorable. However, looking through the files, we couldn't find any files accompanying the DR that showed dose reconstructor

evaluated the dose using a urinalysis compared to OTIB-2 and the 2014 DR total internal dose assigned based on the urinalysis, increased the amount by 15 percent compared to the 2'04 which used OTIB-2.

And so, our comments, you know, that it should be noted that the second time SC&A has identified OTIB-2 it resulted in doses less than the bioassay data when it was used, and that OTIB-2 was important and appropriately used in the case that did not qualify for use based on the start date and the fact that the EE was monitored for uranium. Based on the second occurrence, SC&A questions if there's other cases out there that would be impacted by the improved use of OTIB-2 -- or TBD-2.

Our summary evaluation: We reworked Case A. We found assumptions to be reasonable and doses correctly calculated. We did not have any findings. We had one observation. That's the first case, and we'll move to the second case.

Case B worked as an administrative role at the plant. So in this case, you'd expect lower dose, and the person who worked with administrative role or the plant inside the production area, was intermittently monitored for external exposure and was monitored for internal exposure. Initial DR in '04 and revised 10 years later in 2014 per PER-51. Now, this met the criteria of occupational X-ray, although it wasn't a skin cancer, change in uranium or concentrations, and change in RU contaminants. However, both DRs result in POC of less than 50 percent.

Okay. The external dose in 2004 and 2014 both saying that there was no positive reported dose, they assigned missed external dose, used the photon correct -- conversion factor of 1, and assigned it as the shadow dose

as a greater than 15 keV electrons, since it was uranium, and did not assign neutron dose, since it's administrative worker, and assigned environmental doses for periods not monitored. Now, the 2014 DR did apply a film correction factor of 1.1 to the photon dose.

Now, so the two dose reconstruction -- construction total of the 2014 external dose decreased about one half the 2004 DR because the 2014 used less overestimating methods and used the limit of detection divided by 2 instead of the full LOD. Our evaluation, we found no positive dosimetry reading, calculated missed dose, and we verified NIOSH's dose assignments were correct. Okay. The ambient dose, the '04 assigned on-site ambient dose, used the Fernald Environmental Management Project due to similar operation, since there wasn't anything available at that time for Weldon Springs, assigned an overestimate of ambient dose for all years of employment, did not prorate partial years.

Now, 2014 assigned on-site ambient dose using TBD 4 annual dose rates for the Weldon Springs site. Assigned ambient dose for years he was not monitored, and but did not prorate the partial years of employment. For our evaluation of ambient dose, we calculated the onset ambient dose. Using recommendations in TBD-4, we were able to verify NIOSH reworked ambient dose assignment, and it decreased compared to '04 because the 2014 reflected the current site specific rather than a surrogate ambient dose and used less overestimating methods.

Now, occupational medical X-ray, the '04 assigned PFT annual dose, or at the 2014 assigned a PA and a lateral annual exam dose. And so, the 2014 dose assignment decreased from the 20 -- 2'04 because of the use of

the revised TBD-3. We calculate the medical X-ray dose based on the records and concur with NIOSH's dose assignment.

Now, internal dose, -- okay. Case B, 2'04 did not use bioassay records, it used the internal intake of 12 radionuclides for a site without a reactor, again, OTIB-2. And then 2014 used bioassay results, U-234 and recycled uranium, did not assign the decay products because of the work location being administrative.

Internal dose, we reviewed the records, the recorded data, calculated the U-234 and RU, different solubilities, find type S provides the largest dose, concur with NIOSH not assigning decay products, and verified that NIOSH used the correct intake and parameters in the CAD program. And SC&A noted that although bioassay records did not result in a higher dose in the hypothetical increase -- hypothetical intake, the case did not qualify for using OTIB-2.

So, the summary of the rework of Case B, we found that NIOSH used assumptions to be reasonable and doses correctly calculated and did not have any findings or observations regarding this case.

Now, the third case, Case C, again, the EE worked in an administrative role at the plant, periodically monitored for internal and external exposure. The initial DR in 2'09, reworked in 2014, under PER-51 and involved changes in isotope ratio, addition of the geometry correction factor, and changes in RU contaminant factors -- fractions, and both DRs resulted in POCs less than 50 percent. Now, the external dose in '09 was assigned measured and missed dose. 3 -- 30 to 250 keV with a dose conversion factor of 1 and an electron dose conversion factor of 1. Did not assign neutron dose, did not

assign environmental dose.

2014 assigned measured, missed, and included co-exposure dose (indiscernible) was available, used the correct organ conversion factors, and in this case, it was also an organ correction factor 3.6 for the electrons. I had a film correction factor of 1.1 for the photon dose, did not assign neutron dose or environmental dose.

So, the '14 versus the '09 DR, the total 2014 external dose increased -- increased substantially compared to the '09 because year '14 applied co-exposure and missed dose during period the EE was not monitored by both each year. 2014 applied correction factors as required.

Our evaluation is that we calculate the missed -- the measured, missed, and co-exposure photon and electron doses using appropriate correction factors. We used the same overestimating methods of applying both missed and co-exposure during periods the EE was not monitored. Just to verify NIOSH's dose assignment (indiscernible) this was a large overestimate.

Was able to verify the dose assignment except for the following finding and observations. Okay. Finding 1, it looks like the NIOSH didn't apply an uncertainty factor of 1.4 to measured photon dose. We back-calculated NIOSH's reworked measured photon dose. We found that apparently the 1 -- the uncertainty factor 1.4 was not applied to the measured photon dose as recommended in TBD-6. Resulted in the omission 44 millirem photon dose, which would be a small amount in this case. SC&A found that NIOSH did apply the uncertainty factor 1.4 to the measured (indiscernible) 250 keV and greater -- 250 keV photon dose in the rework for Case A that we just

discussed.

Okay. Then we get to the observations. We need consistency and clarification when applying this film correction factor of 1.1 to missed photon dose, because in these three cases, Case A, NIOSH did not apply a film correction factor of 1.1 to missed photon dose but did apply to measured and co-exposure photon dose. Case B, NIOSH did apply a film correction factor 1.1 to missed photon dose, and there was no positive dose. However, in Case C, NIOSH did not apply a film correction factor of 1.1 to missed photon dose. So, we need clarification. And TBD-6 does state that it's estimated 10 percent of the less than 250 keV values of the energy was lost, so that there should be a correction factor applied. However, it's not clear if this film correction factor is being applied to only measured photon dose are also missed and co-exposure or then when you assign neutron dose, it's the proton ratio. It does not appear that the film correction factor 1.1 was consistently applied in these three worked cases.

Observation three, prorating of 1966, a dose appears incorrect. It appears that NIOSH prorated a co-exposure dose for partial years of employment correctly, but did not prorate the potential missed external dose, but instead assigned a complete year of 1966 missed dose. So, first of all, usually you don't assign this and code exposure at the same time. In this case, they assigned for 1966 for a partial year, which is correct, but the missed dose was assigned for the complete year '66, which is an additional overestimate on top of an overestimate. It resulted in NIOSH overestimating external dose by a small amount.

The Observation 4, when back-calculated, it appeared that the use of

the number of monitoring exchanges per year varied between photons and labs drawn, so it was kind of difficult to figure it out. When we back-calculated, we found out it looked -- appeared that the number of monitoring badges exchanged per year were used to derive missed dose different than for photons that it did for electrons, like one would use, like -- use 26 exchanges for a year, maybe electrons use 52 exchanges for a year. Typically, either a co-exposure or a missed dose is assigned for an unmonitored year. In this case, assigned both, which would be unusual, but claimant favorable.

Okay. Ambien dose was not assigned in either case, because other doses were assigned, and we concur with that.

Okay. Occupational medical X-ray, 2'09 assigned a PA and lateral. Same way in 2014. It decreased slightly between the two DRs because the revision in TBD-3. We recalculated the medical dose, and we find that they assigned the correct medical dose.

Now internal dose, NIOSH used the highest bioassay urinalysis, excluding all others, which would be claimant favorable, used 234 and recycled uranium, did not assign the decay products because of the work location, and used the appropriate reservation of TBD-5. We evaluated the internal dose, reviewed the records, calculated the uranium and RU for different solubility types, find type S provided largest dose, concur with not assigning decay products, verified that NIOSH used the correct intake values, parameters, and the CAD program, and that the 2014 assigned dose decreased compared to 20 -- the 2'09 because of revisions in TBD-5.

Summary of our evaluation of reworked the case. We had one finding.

It appears that the uncertainty factor of 1.4 wasn't applied to measure photon dose, need the consistency when applying the film correction factor 1.1 to missed photon dose, priority of 1966 dose appears incorrect, and the apparent inconsistent use of the number of badge exchanges per year between photon and electron dose.

So, our evaluation is that Case A had one observation, that's the use of OTIB-2. In Case C, we had one finding and three observations, which we just discussed.

Okay. That's my presentation. Any questions?

CHAIR BEACH: Thanks, Ron. This is Josie. Hey. I do have a question on Observation 1, which is slide 21, and I'm wondering why this should remain an observation and not a finding. And I'm also -- the second part of that is how we know that no other cases have been -- claims have been missed.

DR. BUCHANAN: Okay. I'll turn it over to Kathy, because she has been monitoring this situation, and I'll let her give her expert opinion.

MS. BEHLING: Okay.

CHAIR BEACH: Thanks, Ron.

MS. BEHLING: Well, with it being an observation or finding, that I agree, we can change that to a finding. This case that the -- and I realize these were cases that were done as efficiency measures, but we had this occurrence back in -- when we were reviewing PER-49, and I know at that time, Ed had us delve into it a lot further. And when we did, we sort of convinced ourselves it's very unlikely that this is going to happen again. And it just -- when we saw this a second time, and especially since we're

only looking at a handful of cases here, we did question if this occurs other -- in other cases.

I am not going to say for sure what the impact of that would be, because, like I said, they use OTIB-2 as an efficiency measure and what they think is going to be a higher dose, but it's just strange that the urinalysis data (indiscernible) and perhaps this could be looked into. We -- we feel it should be looked into a little closer so we could have an explanation of that.

But the other thing is that there are -- OTIB-2 is no longer. It's canceled. It's a canceled OTIB, but there are specific criteria in OTIB-2 that state which cases should be used and which case should not be used, and this case should not have been used for OTIB-2. It was -- they -- they monitored for uranium and the timeframes were not consistent with the criteria and the guidance in OTIB-2. So, it was a mistake. So, it could become a finding, as far as I'm concerned.

CHAIR BEACH: Yeah, that's kind of what my thought was when I read -- generally read through this.

Any -- any comments from NIOSH on that -- or subcommittee members?

MEMBER FRANK: Seems reasonable to me. This is Arthur.

MR. BARTON: This is Bob. I wouldn't have specifically called out -- Bob Barton --

CHAIR BEACH: Yeah.

MR. BARTON: No, I think Kathy's right. I mean, you just need to look into this. I mean, we all agree that efficiency measures need to be

used. I mean, especially in, you know, underestimating cases or overestimating cases, not best-estimate cases. But if we have a worker's actual record, and they actually indicate a larger intake than what the generic guidance would have noted, in this case, OTIB-2, which is now not -- no longer under use. We should look into that, make sure that, you know, no other cases we -- were affected. And I -- I -- I don't foresee that being the case, but it is worth pursuing. That's -- that's my input.

CHAIR BEACH: I agree. And I feel like a finding makes it more important -- more important than an observation. So, I -- I am -- if there's no objection, I think we should move this to be changed to a finding.

MS. BEHLING: And we can certainly do that.

CHAIR BEACH: Okay. Any other comments or questions? Okay. So, we have about 30 minutes.

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CHAIR BEACH: Ron, the next one, 83, I feel like we can probably get that in before 4:00, unless there's a reason to just go into the administration part of it.

MS. BEHLING: Josie, I -- if you don't mind my comment, since this is also --

CHAIR BEACH: Yeah.

MS. BEHLING: -- a Weldon Springs Plant -- this is also a Weldon Springs Plant, PER and discussed -- we have Weldon Springs on our minds, right. So, that would --

CHAIR BEACH: Why don't you --

MS. BEHLING: -- that -- yeah, would want to go ahead --

CHAIR BEACH: -- do it.

MS. BEHLING: Okay.

CHAIR BEACH: Yeah, let's do it. It's only half as big as the last one, and I think we only had one observation. So, let's -- let's do --

MS. BEHLING: Yeah.

CHAIR BEACH: -- that section, that way we're keeping these together.

MS. BEHLING: Okay. (Indiscernible) --

CHAIR BEACH: -- you got a drink of water and ready to go.

DR. BUCHANAN: Yes, I'm ready to go.

MS. BEHLING: Okay. And give me a second here so I can find this document. Okay. Here we go. I -- I assume you're not seeing my slide -- my -- my -- my screen? Or are you? Maybe --

CHAIR BEACH: No, we're still --

MS. BEHLING: -- not. Okay.

CHAIR BEACH: We're still --

DR. BUCHANAN: We're back on the old Observation 1.

MS. BEHLING: Okay. I'm getting there, I hope. Okay. Okay. Where did it go to? Okay. I don't know why it is not showing. Hold on just one second. Let me see if I can read... Op, here we go. Okay?

CHAIR BEACH: Yes.

DR. BUCHANAN: Okay. We got it now.

MS. BEHLING: Okay. Great.

DR. BUCHANAN: Okay. This is Ron Buchanan again with PER-81, and this is, again, a Subtask 4. Review of two selected cases because of PER-83.

Okay. A little bit about the documents, again. This was revisions in TBD-4 and TBD-5 for Weldon Springs, and they were revised twice in 2017, both of them were. And so, that's the reason that PER-83 was issued in 2019.

Okay. I won't go over these facilities. We just did that. Going next slide. And the next one. And the next one, and the next one.

CHAIR BEACH: Look at you breeze through that. Good job.

DR. BUCHANAN: Yeah, right. We're about done here.

We got -- PER-83 was issued January 2019. The subcommittee in February '23 tasked us to review. And in September '23, we issued our Subtask 1-through-3 review.

And so, we see that revisions in TBD-4 and TBD-5 could increase the internal dose assignment. And the issues was that RU intakes begin in nineteen ninety -- in 1961 and the TBD -- the first TBD, it wasn't clear before or after, and so they clarified that in the revision, RU contaminate intake -- intake radionuclides- and uranium-specific activity changed slightly after 1962. It increased to 972 picocuries per milligram, which would affect some internal doses on (audio interruption) potentially.

Okay. So, we recommended -- for Task 4, we recommended that environmental intakes consisting of exposure to EU, from '63 to '66 and RU, '61 to '01, contaminants and also cases that involved internal intake system exposure to EU, '63 to '66 and RU, '61 to 2002. So, in November '23, this committee tasked SC&A to review representative cases. April '24 NIOSH posted two cases for our review, and both cases included recommended criteria, except none involved environmental intakes. There was no appropriate case for this, so that couldn't be addressed this time. So, in

September of 2024, we issued our written report of our audit.

Now, we have two cases here. We'll call them Case A and B. Case A, the worker worked as an operator at the plant, was monitored for external and internal exposure. Issued a DR in '04, revised in 2014 per PER-51, and revised in 2018 as -- per PER-83. Involved recycled uranium beginning in '61, extended list of RU contaminants, change in the uranium-specific activity, but it didn't contain any environmental impacts.

So, the 2018 DR compared that report to the original 2004 report, not the 2014 reworked under PER-51. So, we'll compare the 2004 to the 2018 in this presentation. Now, all three DRs did result in POCs less 50 percent. Now, our assessment, external dose, we reviewed the case -- the impact of changes in TBD-4 and 5 and concluded that only internal dose assignment would -- would be affected. And we noticed that the 2004 performed -- DRs performed prior to the issuance of the Weldon Springs TBD conservative DOE complex-wide data resulted significant overestimate of both external and internal dose compared to 2018.

Now, the '04 assessment of internal dose did not use bioassay records. It used the complex-wide data, assigned internal intake, resulting assumption 28 radionuclides for a site with a reactor. Used -- the 2018 used bioassay uranium urinalysis results and assigned uranium, uranium decay products and impurities, RU contaminants, and thorium intakes all prior to 1961. They assigned natural uranium and decay products and an activity of 683 picocuries per milligram. And the '61 to '62 period, same radionuclides, plus the RU contaminants at the same concentration. But then in '63 to '66, assigned enriched uranium 1 percent and decay products RU, and thorium

intakes using specific activity of 973 picocuries per milligram. That was one of the changes outlined in PER-83.

We evaluated the internal dose and reviewed the records, bioassay data, calculated the uranium DP, RU, and thorium intakes for different solubility types. Found type S provided greatest dose, verified NIOSH the correct values and parameters in the CAD program, and did not identify any findings, but they had the following observation.

Observation 1 had to do with the thorium assignment. They didn't provide, first of all, why it was assigned or not assigned in second section -- selection and work location. The 2004 and 2014 DRs did not assign thorium intake. However, the 2018 DR assigned program intake.

SC&A couldn't determine the reason why the 2018 assigned thorium intake but wasn't signed in the other two DRs. And when it was assigned in 2018, the thorium intake used a 95th percentile for the refinery 101 location for '63 and '64 but then switched to the 50 percent unknown location for '65 and '66. And according to the records, we couldn't see that the workers' job title or location changed during those periods. So, our evaluation of Case A, we did not find any findings, had one observation concerning thorium, and that was it for that case.

Second case, B, again, the worker worked as an operator at the plant, was monitored for external and internal, initial DR in 2010, and the 2018 DR was brought about because of PER-83. And in this case, involved the following: RU beginning in '61, expanded list of RU contaminants, change in uranium-specific activity, and again, it didn't consist of any environmental intakes.

Now, the Case B D -- dose -- correction doses, 2018 compared it to the original 2010 DR, but did not indicate whether the DR was reworked under PER-51. So, the 2010 and 2018 DRs resulted in POC less than 50 percent.

Now, the 2018 assignment of external dose, reviewed the Case B and aspects that would be brought about by the revisions in TBD-4 and 5. And in this case, only the internal dose assignments would be impacted. So, the assignment internal dose in 2010, the NIOSH used the bioassay records to assign one chronic intake over the entire employment period, plus two acute intakes in that period. So, two acute and one total chronic. Used type S and included doses from RU, plutonium, neptunium, technetium.

Now, the 2018 DR used bioassay results, and it did -- it had two potential chronic intakes and three acute. So, they divided up -- (audio interference) analysis -- (audio interference) -- on the 2018 DR. Type S (audio interference) U-234 was used and assigned uranium decay products and RU contaminants and thorium intake. As showing there, prior to '61, was just NU and -- and decay products used the specific activity of 683 picocuries per milligram. '61-'62 the UDP and RU, you can use the same concentrations, (audio interference), and then '63 to '66 is 1 percent and thorium intake of -- of the higher activity, 973 picocuries per milligram.

Our evaluation of the internal dose, we reviewed the records, the bioassay records, calculated uranium, DP, RU, and thorium intakes. Type S provided the greatest dose. Verified that NIOSH used correct intake values and parameters in CAD program, and that 2018 internal dose included procedural changes in TBD-5, which increased internal dose to -- compared

to 2010 that didn't include the decay product.

For summary evaluation, we found the assumptions to be reasonable and correct. Did not have any findings or observations concerning the reworked Case B.

So, our evaluation of the PER-83, we had no findings, had one observation in Case A, and that was concerning thorium exposure and selection of the work locations. So, that's the presentation.

CHAIR BEACH: Okay. Thanks, Ron, and glad we were able to get through both of the Weldon Springs.

Any questions from subcommittee members?

MEMBER FRANK: None from Arthur.

(Whereupon, the was audio interference as well as several members and attendees speaking simultaneously.)

DCAS-PER-034 Rev. 0 "Harshaw Chemical Company TBD Revision)

DR. BUCHANAN: -- PER-34 is fairly short, if you want to try to go through it.

CHAIR BEACH: Yeah, I think we're prepared for it. If there's no other questions or comments, I would agree with that.

MS. BEHLING: Okay. Give me a second here and try to pull that up.

CHAIR BEACH: So, Kathy, for --

UNIDENTIFIED SPEAKER: (Indiscernible).

MS. BEHLING: Here we go.

CHAIR BEACH: Yeah, no findings, no observations. Okay. Great. Thanks, Ron.

DR. BUCHANAN: Yeah.

CHAIR BEACH: And then if -- if -- I should remind everybody to please mute your phones, we're getting a lot of interference on that last section. It makes it difficult to -- for the court reporter, so please remember to mute your phone.

All right. It look -- we see it, Kathy. And Ron, you're up.

DR. BUCHANAN: Okay. Thank you. Kathy.

This is Ron Buchanan, again. I want to report on the PER-34, and this is Harshaw Chemical Company TBD revision.

Okay. Little background of this. Harshaw Chemical Plant was located in Cleveland, Ohio. It received field -- feed material from various uranium mills throughout the United States and Canada and produced uranium compounds under U.S. government contract from 1942 through 1955. Now, the process is outlined in TKBS-22, Revision 1, and also in our Section 2.1 of our review.

It contained the source terms of uranium, as listed there on the right, a variety of uranium compounds, and it also had a few other radiological materials involved, which included some other low-enriched uraniums and other chemical compounds of uranium. Now, the documents for this site was February '07 SEC-66 was issued for August 14, through nineteen sixty -- 1946, through November 30, 1949, because of deficiency in bioassay monitoring prior to December 1949. In August of 2007, NIOSH issued the technical base document 22, Revision 1. And then in May of '08, SC&A issued a review of that TBD with six findings. In June of 2'09, NIOSH issued TBD Revision 1, and in August of 2024, we issued our review of the TBD

Revision 1, with no findings or observations.

Now, PER-34 was issued in December 2 -- 2011, and it was to address changes in Table 5-6 of TBD-22 concerning type S uranium intake values as outlined in SC&A's Finding 6 of the Revision 0. So, I should -- this brought us to August of -- the bioassay data, we see that in August of '42 through November of '49, NIOSH decided (indiscernible) for internal dose for reconstruction, so the SEC-66 was issued.

However, beginning in December 1st of 1949, they find that there was adequate information for internal dose reconstruction. However, did not appear to be a routine bioassay program and included all potentially exposed workers at all times. The monitoring was instituted for certain locations and operations, but not on a continuous basis. Therefore, use of co-exposure data for unmonitored workers needed. And in 1953, urinalysis data appeared to end.

As far as air sampling -- someone still has their mic on. We can hear papers rustling. Thank you.

As far as air sampling, there was no known radon concentration taken during the operation. Airborne dust samples were taken periodically starting in approximately 1943. First formal program was instituted around 1948. As far as external monitoring, beta and gamma dose to extremities, potentially high for uranium, hexafluoride ash and other residue. Workers -- the film badges at Harshaw begin on kind of an intermittent basis in August of 1944. Some improvements over the years were instituted. Did not appear to come routine until 1947, which appeared to be correlated with significant production increases.

So, our review of the TBD Revision 0, the first one, we reviewed it in May of 2008, find six findings, no observations. Finding 1 through 5, pertaining to external and internal dose errection method -- dose reconstruction and was addressed by this committee and closed in 2013. Finding 6 was concerned with the intake rates for Type S uranium. So, the intake rate for Type S uranium was too low in Table 5 and -- 5-6 and A-7 of the Revision 0. And then in Revision 01, these intake rates were revised for Type S uranium, and NIOSH issued PER-34 -- DCAS-PER -- to address that change in Revision 01 of the TBD. So, the only effect that Table 5-6, which was duplicated in A-7 for Type S uranium intake.

So, Subtask 2 -- or Subtask 1, we identified the circumstances necessitated PER-34. We reviewed both Rev. 0 and Rev, 1 of the PER and PER-34. Found that PER-34 did indeed address changes in Rev. 1 of the TBD that could potentially result in increased dose assignment. They show changes in 01 for other purposes and not potentially increased dose assignment. We had no observations or findings pertaining to Subtask 1.

Subtask 2 was to assess NIOSH's specific method for corrected action. Reviewed Rev. 1, compared text, figures, and tables to Rev. 0, and we found that the increase in Type S uranium intakes were correctly captured in the PER and in Rev. 1 and TBD, and had no findings or observation pertaining to Subtask 2.

Now, Subtask 3 is that we evaluate NIOSH's approach to identifying what DRs needed reevaluating because of PER-34. We found that NIOSH used the following criteria to identify the previously completed claims requiring reevaluation. Of course, the probability of causation of less than

50 percent re-evaluated (indiscernible) than that, most recent version of DR approved by DCAS on or prior to June 2, 2009, that's the date of the revised TBD issued, and employment at Harshaw between December 1, '49, and December 31, '53. These criteria was used to generate a list of potential -- six potentially affected claims.

NIOSH processing of six potentially affected claims, they removed one because intake was originally calculated using the bioassay data, and the Revision 1 of TBD indicates that should be used, so there would be no change in that dose assignment. Recalculated the dose and resulting POC for the five remaining claims using Revision 1 of the TBD. The new POC was less than 50 percent for each of the five claims and did not require returning of the claim for rework.

NIOSH evaluation of their search process. We evaluated how they identified these claims. At that time, we did not have access to the database used by NIOSH to identify and qualify the cases and the qualified re-evaluation. PER-34 did not provide a total number that met this inquiry or the number of claims removed. SC&A, from the information we could gather, that the search terms were appropriate and inclusive and had no findings or observation for -- pertaining to Subtask 3.

So, our recommendation for selecting cases under Subtask 4, conduct audits of the sample case mandated by PER-34. We suggest that one of the five reworked claims be selected to review that included assignment of Type S uranium intake in Table 5-6 of the TBD Revision 1. We reviewed the PER-34 and identified no findings or observation. We reviewed Revision 1 of the TBD and identified no findings or observations.

So, that's it in a nutshell. Any questions?

CHAIR BEACH: Nope. Thanks for suggesting we move forward with that, Ron. It was short and a good report.

And I will -- I know, Lori, you already know that the -- to work with SC&A to assign a case for this review.

MS. MARION-MOSS: This is Lori. Yes. I will be working with Kathy and Ron.

CHAIR BEACH: Okay. Perfect.

Any comments or questions from subcommittee members?

MEMBER FRANK: Nothing from Arthur.

CHAIR BEACH: Thanks.

MEMBER VALERIO: This is Loretta. Nothing here.

CHAIR BEACH: Okay. Thank you. I -- I'm -- I feel like we are missing Paul today.

So, with that, we're going to carry over the other items on our agenda to the next meeting.

NEWLY ISSUED GUIDANCE AND SUPPLEMENTAL TOPICS

CHAIR BEACH: And our next item is the handout SC&A provided for today's meeting with the -- the sites and then reviewed DR methodology templates and reports.

Kathy, are you ready to go through on that?

MS. BEHLING: Yes. And so, let's see if I can pull that up. Okay. Okay. There it is. Let's see. I'm gonna back up here. Well, that didn't work. Hold on.

CHAIR BEACH: And Rashaun, while Kathy's doing that, can we think about dates for a next meeting, maybe the April-May timeframe? Every -- I mean, everybody could think about that, if that will work for their calendars, and then we could get to that after this.

DR. ROBERTS: Yeah, it sounds good.

CHAIR BEACH: Thanks, Rashaun.

MS. BEHLING: Yeah. I -- I don't know why this is not coming up. Okay. Let me -- this is -- nope, that's not what I want. Okay. Let's try this again. Okay. Yeah, I'm seeing it.

CHAIR BEACH: Yeah, we're not seeing it.

MS. BEHLING: Okay. I'm gonna try one more.

MEMBER FRANK: We're still seeing the last -- maybe it's because the last slide set is still up.

MS. BEHLING: Yeah, -- yeah, that -- oh, here maybe --

MEMBER FRANK: Close -- can we close --

MS. BEHLING: -- should --

MEMBER FRANK: -- the last slide set and then move to the new slide set?

MS. BEHLING: Let me -- okay. No. Let me start sharing again. I think I have too many things open. Yeah, it does not want to open. Let me see.

MR. BARTON: The last slide says download, so that's (indiscernible) movement.

MEMBER FRANK: Yeah.

MS. BEHLING: Yeah, I -- all right. Let me -- now -- I apologize. Why

this does not want to open. Yeah, I'm seeing it. Okay. Let me do one more thing here, and if not, I'll try and talk you through it. I hope everybody has that. And --

CHAIR BEACH: -- available on the handouts on the NIOSH website too, isn't it, I believe? Yeah. I think it's --

MS. BEHLING: Yeah.

CHAIR BEACH: -- the first -- the eight page...

MS. BEHLING: Yeah. Okay. Let's see here, I want to go -- okay. Let's share. Yeah, I don't know what is going on here. All right. Can -- I'm going to get to this.

I want to talk just very briefly about one administrative item before we get to our list of recommended --

CHAIR BEACH: Yes.

MS. BEHLING: -- tasking. Back in April, it was April 15th of 2025, I sent out a revised protocol for our PER reviews. And we --

CHAIR BEACH: Okay. Yeah.

MS. BEHLING: Yeah. And we've talked about this so many times, and currently, when you look at the upfront material in our PER reviews, we list five subtasks, and Subtask 5 says, Prepare a written report with results of DR audits along with review conclusions. And where we do that under Subtask 4, so I revise that protocol. I, first of all, added more details to Subtask 2, 3, and 4 to reflect what we're currently doing, and I also removed some outdated information and updated the protocol with current data, and I eliminated this Subtask 5. And I have not updated the template that we use for our PER reviews, because I just wanted the subcommittee to

agree that this -- that they do agree with this revised protocol, that we eliminate that Subtask 5.

CHAIR BEACH: Yeah. And I feel like we talked about this at a previous meeting, did we not? I mean, I -- I remember finding it --

MS. BEHLING: We --

CHAIR BEACH: -- I was -- looked through my documents to try to find it again to bring it up, and I haven't -- I didn't locate it.

MS. BEHLING: Yeah, did -- Rashaun, that is what I sent to you to -- did -- did that get sent to the subcommittee? Maybe not.

DR. ROBERTS: When? When would you have sent that?

MS. BEHLING: I sent it -- actually, let me look at my emails here.

MR. BARTON: And -- and this is Bob Barton. I -- I believe that's correct. I mean, I think that Subtask 5 is sort of a -- I don't know, an artifact of how we used to do business many, many years ago, in which we do Subtask 4, which essentially accomplished all the previous subtasks so that we didn't really need to do Subtask 5 -- which was just -- just repetitive of what had happened between Subtask 1 through 4 -- and in which we examined the PER and how it was taken up and how it was actually used in actual cases -- which is Subtask 4. So, Subtask 5 was really just sort of redundant, if I --

MS. BEHLING: Right.

MR. BARTON: -- if I remember correctly.

MS. BEHLING: Yeah. Yeah, and --

CHAIR BEACH: I thought -- I thought we agreed back in the day, but it -- I -- like I said, I found it, but -- but it's been several documents back.

So, today, as I was going through trying to find it again, I couldn't find it. But if -- if you think it's -- I think we should probably resubmit that to the subcommittee, have it on our administration details, and --

MS. BEHLING: Okay.

CHAIR BEACH: -- close it out.

MS. BEHLING: Okay. Yeah, --

CHAIR BEACH: But I think we should give that -- Arthur probably hasn't had a chance to look at it, and I don't remember if -- I don't know if Loretta has -- remembers reviewing that, but we did review it, probably --

MS. BEHLING: Okay.

CHAIR BEACH: -- quite a while ago.

MS. BEHLING: Yeah. This is something that probably it got -- like, fell through the cracks a little bit because there hadn't been any meetings. And Rashaun, --

CHAIR BEACH: Yeah.

MS. BEHLING: -- I had sent that Monday, the 19th, and I know that was late, but after Josie and I had a conversation about the -- the agenda, I thought it might be a good idea to send it.

But I agree with you, Josie, it's best for you all to read through that again, and we'll -- we'll put that on the next agenda. Okay?

CHAIR BEACH: Okay. And --

MEMBER FRANK: Yeah, and this is Arthur. And, you know, I got a huge amount of stuff, some of which I did look at in some detail and some less so. If that could be sent as a separate document that I can review and be ready for the next time, I'd be grateful.

MS. BEHLING: Okay. Ooh, did I find something here?

CHAIR BEACH: Oh, look at you. It's up.

MS. BEHLING: Okay. All right. This is different, the sharing aspect, but -- okay.

This is the handout that I prepared, and up front I do have a listing of the DR templates that -- that we are going to ultimately review. We're still in the process of finalizing the review of the Albuquerque Operations Office, because I'm waiting on NIOSH to replace a case that they had given us. So, I didn't recommend any new templates for this time around.

But this table that I have showing now, Table 2, I'm going to go through this, and I'll -- I'll also -- I'm going to be maybe making a recommendation for one change. But first one is PER-82 which is the United Nuclear Corporation. And as I say in here, it assesses the effects of revisions to the -- the UNC TBD. And SC&A did review the SEC evaluation report, but not -- has not reviewed the TBD, so that's why I included that.

OTIB-65, internal dosimetry coworker data for Lawrence Livermore National Labs, here again, I go into the site -- the -- the worksite area in the -- on the web, and it didn't -- doesn't look like Lawrence Livermore National Labs have met for a very long time. And typically, these work groups meet for SEC issues, and so a lot of these OTIBs and even the TBDs don't get reviewed under those work groups. So, I'm suggesting that we review OTIB-65 here.

Okay. OTIB-72, this is the external coworker dosimetry data for Sandia National Labs in Albuquerque, New Mexico. And again, just something that hasn't been reviewed under the work group. TKBS-33, this

is the technical basis document for Chapman Valve. Rev. 2 includes a significant update, and it's written as that it constitutes a total rewrite. So, SC&A did review the initial exposure matrix and the SEC but has not reviewed this TBD. So, that's 33.

Also, TKBS-57, which is the West Valley Demonstration Project, Rev. 1 incorporated the SEC, but SC&A has not reviewed the TBD or the SEC evaluation report. And then PROC-61 is occupational medical X-ray dose reconstruction, and that provides guidance on deciding organ doses from occupational medical exams based on TBD information. And that's Rev. 4, and it indicates that it's a complete rewrite. I think we reviewed Rev. 0.

The last one on the list here, I'm going to suggest -- I have to look at something else from it -- that it -- rather than doing -- we recently reviewed Report 87, and I was going to suggest this as a just focused review to see if any of our observations were addressed, but I think that perhaps we could replace this was something that's maybe a little bit more important, and have to look at the -- I'm -- actually was thinking that we should look at the Albuquerque -- you know, let me -- let me just look at something real quick so that I can update this.

It -- okay. We have -- hold on just a second. We have never looked at Aliquippa Forge exposure matrix that I know of, and that's TKBS-0021. Rev. 2 was issued in 2015, and I just thought that might be a more appropriate document than just relooking at Report 87 again. So, those are my suggestions for new tasking.

CHAIR BEACH: Can you give me the -- the last one again?

MS. BEHLING: Yeah, and I apologize. It's --

(Whereupon, unknown participants speak simultaneously.)

MS. BEHLING: Yeah. It's ORAUT-TKBS-0021, and that's actually an exposure matrix for Aliquippa Forge in Pennsylvania for periods of operation from January 1, 1947, through February 28th of 1950.

CHAIR BEACH: Okay. Kathy, just a sec. We're having interference with the court reporter. So, if you're not, make sure you mute.

MR. RUTHERFORD: Josie, --

CHAIR BEACH: Okay.

MR. RUTHERFORD: -- can I offer something up? This is LaVon.

CHAIR BEACH: Yes, please.

MR. RUTHERFORD: Okay. I don't know if this is going to affect your recommendation on this or not, but I wanted to point out that we do have a new SEC petition that has qualified for evaluation for United Nuclear. So, I -- going through that TBD, you may or may not do that right now. You may want to wait till the evaluation report's out, but I wanted to at least make you aware of that and -- and see if that affects anything.

MS. BEHLING: Well, I -- if I can comment. I appreciate that. The only thing is, this is a PER for United Nuclear Corporation. So, whatever gets changed in the future, there'll be another PER, but this PER still exists out there.

MR. RUTHERFORD: Okay. It looked like it said TBD you were looking at the United Nuclear TBD after the SEC had been incorporated or, I mean after the DR had been incorporated into the TBD. I didn't -- I didn't get it that it was a PER.

MS. BEHLING: Yeah, I'm sorry if I -- I misspoke.

MR. RUTHERFORD: Okay.

MS. BEHLING: It's a PER.

DR. ULSH: Josie, this is Brant. Is this a good time for me to chime in with a comment?

CHAIR BEACH: Yes, go for it.

DR. ULSH: Okay. Well, if you consider new tasking, I think it's going to be really important to manage expectations here. You all know the chaos that, you know, we've experienced over the past year, and I can tell you that our current staffing, we -- at full staff, we have 18 health physicists, and we are down to 11, and that's counting managers as health physicists. And if I caught the numbers right when Kathy was discussing this at the beginning of the meeting, I thought I heard that there are 100 -- there are 23 open and 145 in progress -- I'm not sure if those are observations or findings -- and 79 in abeyance. And I can tell you that at our current staffing and budget level, you're looking at a several-year backlog.

I mean, we -- to be honest with you, dose reconstructions are job one, and SECs are job one A, and we are struggling to keep up with that. So, I would like to suggest that you consider focusing on prioritizing the already completed reviews that you want us to respond to, and -- and we'll -- we'll try to get to those quickly as we can. But if you keep piling things on the -- on the front end, that backlog is going to grow to several years. And I don't -- I just don't know if that's what you want to do, but.

CHAIR BEACH: Yeah, thanks --

MS. BEHLING: (Indiscernible) --

CHAIR BEACH: Yeah, thanks I -- oh, sorry. Kathy.

MS. BEHLING: No, I -- I was just saying that that is the -- that's the subcommittee's call. I'm just making suggestions as to what hasn't been reviewed. So, that's -- that's up to you, Josie.

CHAIR BEACH: Yeah, it's actually a concern that I had going forward as well. SC&A, you're very efficient in getting these done and out to the subcommittee, and they are piling up.

So, other subcommittee members, suggestions, comments?

MEMBER FRANK: I'm too new to really weigh in with anything meaningful.

CHAIR BEACH: Yeah.

MEMBER FRANK: Arthur. I mean, you -- you guys have the experience, and I'll be guided by -- by your judgment.

CHAIR BEACH: It -- it's really a tough situation, Kathy, because as we move forward (audio interference), we do pile on it more and more.

MS. BEHLING: I agree.

MS. MARION-MOSS: Hi, Josie. Hi Josie. This is Lori. Can I make a suggestion? I suggest that Kathy and I kind of go over our list, you know, comparing what SC&A is waiting on from NIOSH, and we look at that list realistically as to what NIOSH can actually submit to the subcommittee and -- and -- and coordinate our agendas accordingly. I also suggest if -- maybe, if we have a little bit more time in between meetings, that we can start working on reducing some of the backlog that NIOSH owes this subcommittee.

MR. BARTON: If I might, this is Bob Barton. I -- I -- to piggyback on what Lori Marion-Moss just said, I think it ab -- ab -- absolutely behooves

the subcommittee here. I mean, we dealt with it a number of years ago with the dose reconstruction subcommittee backlog. And so, I think that we, as SC&A, can sit down, and really -- I don't want to say prioritize, but the -- the -- the topics that could be, you know, discussed more immediately and -- and maybe come to some fruition on, I -- I think we could prioritize those. I think we could do that. I think, you know, me sitting down with Kathy and -- and Ron and every -- everybody else, I think that might be the best way to proceed.

CHAIR BEACH: Okay. And then including --

MS. BEHLING: Josie, --

CHAIR BEACH: -- we'll have discussion of backlog and what -- what can be moved forward.

And Kathy, what -- were you going to say something?

MS. BEHLING: Yeah, I was. I -- I understand and I agree. I will tell you this, we have -- you know, once we are tasked with something, we have six months to get that report to you. But we have -- we have -- like, right now, there are five reports that are being held up that we cannot move forward on because we are waiting on either supporting documents or for PERs, we're waiting on case -- some cases that we've requested under Subtask 4. Also, with the AOO template, we're waiting for a case. So, perhaps, if we -- it's -- I can work with -- with Lori to get that data, then we could finish those five reports that we've already been tasked -- tasked. And then not task us on anything in Table 2, and we'll go from there.

CHAIR BEACH: Okay. So, it sounds like, moving forward, you have some internal meetings planned and work with Lori to get the cases that you

need to -- to work on, and then looking at -- once the BRS is finished, also, I think that will be helpful to Lori and the -- that team, moving forward to getting some of these resolved.

I think that's what we should do. And you're also tasked this meeting the -- with the approval documents that we tasked for the April meeting, so there's some tasking, and then the review of the professional judgment, those six cases within PER-17, so we --

MS. BEHLING: Yes.

CHAIR BEACH: -- have that. That needs to be completed. And then NIOSH is --

MS. BEHLING: Correct.

CHAIR BEACH: -- selecting cases and getting cases to you, so I think that's probably a good -- good move for -- for today.

And Lori, let me ask you how much -- because I know we've been pushing to have meetings closer so that we could get rid of some of our backlog. When -- when would you suggest that a (audio interference) meeting would be good to get some of our work done? I suggested April-May, but that's probably too soon. So, I just don't want to wait six months and then not have stuff either.

MS. MARION-MOSS: Exactly. I agree with you. You know, I -- I -- I'd say May is fair. That's a fair time at this point, but I think once I can meet with SC&A, we could determine the best time to space our meetings out --

CHAIR BEACH: Okay.

MS. MARION-MOSS: -- so we can get this work done.

CHAIR BEACH: Okay. So, how about if we wait and not schedule a

meeting until you have had your internal meeting, and then we can -- we can go through Rashaun, of course, and -- and just email of what -- what your conclusion is.

Does that seem fair enough Arthur and Loretta?

MEMBER VALERIO: This is Loretta, Josie. That does seem fair. And I was thinking, are we having a full Board meeting in April as well?

CHAIR BEACH: I -- is it April?

MS. MARION-MOSS: Yes.

MEMBER VALERIO: Yeah, so I think May -- the May timeframe would work better for this subcommittee.

CHAIR BEACH: Yeah, I was thinking the same thing, which is why I picked that out.

So, okay, let's hold back. Would you keep me informed on when you're having those meetings and -- and how -- how they're progressing?

MS. MARION-MOSS: Oh, yes, I will. This is Lori.

CHAIR BEACH: Okay. And anything -- Rashaun, are you in agreement with this?

DR. ROBERTS: Yes. And just as a reminder for all of these meetings, there is a new approval system. So, you know, it isn't really advisable from that standpoint, because we have to, you know, get our FRNs approved, and then we have to get agency approval to even hold the meeting. So, you know, the speed, you know, by which we can have a meeting is affected by that as well. So, I just want (audio interference) you should bear those things in mind, you know, as we're trying to identify the timing.

CHAIR BEACH: Right, yeah. And -- and -- and we will go out far

enough where you have that time and not have to --

DR. ROBERTS: Okay.

MEMBER VALERIO: Josie, --

MS. BEHLING: Josie, let me --

CHAIR BEACH: Go ahead.

MS. BEHLING: Yeah, I think I'm hearing from Lori and maybe from you and from Rashaun that May sounds like it would be an okay time. It's just sometimes scheduling these meetings can be difficult with, you know, all the people involved. And so, do you think it's worthwhile going ahead and -- and trying to schedule a meeting, or am I misunderstanding something here?

CHAIR BEACH: No. No, I agree with you on that (audio interference) since we have subcommittee members on, can we look at a date and -- a tentative date?

Rashaun, would you be agreeable for that?

DR. ROBERTS: Sure, and we can just call it tentative, you know, so that you all can assess things. So, let me go ahead and get the calendar for May -- on May. And if you all would consult your calendars.

MEMBER FRANK: Yeah. I've got my calendar. This is Arthur.

DR. ROBERTS: Okay.

CHAIR BEACH: Arthur, what -- oh. Sorry.

DR. ROBERTS: No, go -- go right ahead.

CHAIR BEACH: I was going to ask Arthur what his dates were, because I know you're usually --

MEMBER FRANK: Yeah.

CHAIR BEACH: -- busy.

MEMBER FRANK: It looks like the only dates that I could do would be the 21st or the 22nd. I leave the following -- everything's booked before that. And -- oh, I'm sorry, I can't even do that. I'm leaving on the 19th for India till the end of the month. So, let's see. Ooh.

CHAIR BEACH: What about June?

MEMBER FRANK: Yeah. That's better. Oh, yeah, June 4 and 5th would be fine.

CHAIR BEACH: I like the 5th, but I'm open for --

MEMBER FRANK: the 5th (indiscernible) --

CHAIR BEACH: -- the 4th. Yeah.

MEMBER FRANK: -- a Friday.

CHAIR BEACH: Yep. Yeah. I like --

MEMBER VALERIO: Maybe some --

CHAIR BEACH: -- little one.

MEMBER FRANK: Would it be -- would it be another five-hour meeting like this or shorter?

CHAIR BEACH: Probably.

MEMBER FRANK: Probably. All right.

CHAIR BEACH: I would say yes.

MEMBER FRANK: Plan on it. Yeah, I can do the 4th or the 5th.

CHAIR BEACH: Okay. I'm agreeable to the 5th also.

MEMBER FRANK: Should I --

MEMBER VALERIO: This is --

MEMBER FRANK: -- hold the 5th?

MEMBER VALERIO: This is Loretta. Josie, either the 4th or the 5th works for me as well.

DR. ROBERTS: Okay. How about for NIOSH/DCAS, does either the 4th or 5th, you know, seem better from your standpoint?

MS. MARION-MOSS: This is Lori. Reasonable for me.

DR. ROBERTS: Okay. So, you'll see it sounds like you had a preference for the 5th. Is everybody okay with that?

MEMBER FRANK: Yeah.

DR. ROBERTS: Yes, okay. Then we will tentatively say Friday, June 5, for the next SPR meeting.

MEMBER FRANK: Would again, it start -- I mean, just so I can do some planning, starting at 11:00 again?

DR. ROBERTS: Yes.

CHAIR BEACH: Yes.

DR. ROBERTS: Then typically --

MEMBER FRANK: (Indiscernible) --

DR. ROBERTS: -- going through --

MEMBER FRANK: Yeah.

DR. ROBERTS: -- yeah, 4:30-5:00. Yeah.

CHAIR BEACH: Thanks, and --

MEMBER FRANK: (Indiscernible) hold, all right.

CHAIR BEACH: Okay. All right. Thank you everyone. Very productive meeting. Appreciate everybody's input. As we move forward, I'll look forward to hearing how your internal meetings have gone as we prepare for the April meeting. If you have any questions or comments or

need help, Kathy, let us know.

MS. BEHLING: Okay. Thank you.

CHAIR BEACH: Any other comments? If not, we can adjourn, I believe.

MEMBER FRANK: Motion to adjourn.

MR. BARTON: This is Bob. I'm just happy we're all meeting together again.

(Whereupon, several members and participants spoke simultaneously.)

CHAIR BEACH: -- tomorrow.

MR. BARTON: -- all talk tomorrow.

DR. ROBERTS: Thank you. Bye.

(Whereupon, the meeting was adjourned at 4:24 p.m. EST.)