Centers for Disease Control
National Institute for Occupational Safety and Health
Advisory Board on Radiation and Worker Health
Subcommittee for Procedure Review
Wednesday, October 31, 2018

The subcommittee convened via teleconference, at 10:30 a.m. Eastern Daylight Time, Josie Beach, Chair, presiding.

Members Present:

Josie Beach, Chair
Loretta Valerio, Member
Paul Ziemer, Member

Also Present:

Ted Katz, Designated Federal Official
Dave Allen, ORAU
Bob Anigstein, SC&A
Bob Barton, SC&A
Kathy Behling, SC&A
Liz Brackett, ORAU
Ron Buchanan, SC&A
Rose Gogliotti, SC&A
Stu Hinnefeld, ORAU
Jenny Lin, HHS OGC
Lori Marion-Moss, ORAU
John Mauro, SC&A
Jim Neton, ORAU
Tim Taulbee, ORAU

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Proceedings

(10:33 a.m.)

Welcome/Roll Call

Mr. Katz: Welcome, everyone, to the Advisory Board on Radiation and Worker Health. It's the Procedures Review Subcommittee. We haven't met in quite a while, and we have a change in membership since, because Wanda Munn, who chaired this Subcommittee faithfully since the beginning has retired this past year, and Josie was gracious enough to take on the chairmanship, and then Loretta has joined us, and John Poston, who is also -- wait, John wasn't with this one.

Chair Beach: No.

Mr. Katz: John Poston retired but he's -- but anyway, that's the change. The agenda for this meeting is posted on the NIOSH website, and the schedule for the meeting for today's date. We don't know if we will get through that whole agenda, and that agenda could have been even longer because there are some items that aren't there, but we'll just see how this goes.

There's only an agenda. The documents that we're discussing are documents that have been reviewed over quite a long span of time, so they are not re-posted. But most of them should be available on the NIOSH website. Also on the NIOSH website for this program -- there may be some exceptions -- for people who are interested after they hear the discussions.

For roll call I'll make one of the agenda items represent pose conflict of interest matters with any of the Board members, so we don't need to address conflict of interest. We have our Chair, Josie Beach, and our team members, Paul Ziemer and Loretta Valerio on the line, so we have a quorum. So let's just go through the rest of the roll call, and we've heard Stu Hinnefeld, but the rest of the NIOSH ORAU

Team.

(Roll call.)

Mr. Katz: Okay, then. And, Josie, it's your meeting. Let's just remind everybody that we have quite a few people on the line. Mute your phones except for when you are speaking; that will clear up the audio for everybody. Star 6 if you don't have a mute button. Press star 6 to mute it; press star 6 to get off of mute. Josie, it's your meeting.

Chair Beach: Thank you, Ted. Again, welcome everybody, to the first meeting after Wanda's retirement. I'm delighted to be able to carry on Wanda's work and the Subcommittee's work, of course. Loretta, thank you for joining us. If you need any help with anything or finding documents in the future, please don't hesitate to let me know. It can be a little overwhelming, I think, of some of the places we can find stuff.

First of all I want to ask, should we go over Lori's list and dispense with those items we were talking about just before the meeting started, or would you prefer to wait until the end of the meeting? I think, like Sue said earlier, these can be handled fairly quickly.

The first one on Lori's list was RPT-005; what are your thoughts, SC&A or NIOSH?

Mr. Hinnefeld: Well in my view, I mentioned earlier is that we could disposition all four of these by saying that these documents were changed to address items -- the findings -- that the Subcommittee had already placed in abeyance, meaning we had agreed to revise the documents. Revised documents are not posted on BRS, and the next step in the process, I believe, is for SC&A to review these revisions to see if we, in fact, faithfully resolved the findings from the original.

So if the committee agrees to it, we could just agree that that will be the path forward, and then for an upcoming meeting, then, SC&A would have that task to look through those revised documents.

I think we can treat them all four as a block. I don't think we need to do each one individually.

Chair Beach: Okay. I am in agreement with that, and the last one on the list was Norton. I wasn't sure if there was some more we needed to discuss on that, but --

Mr. Hinnefeld: Yes, it's on the agenda. Since it's on the agenda, maybe we'll just talk about that one. But we've done a revision.

Chair Beach: Okay. So maybe just identify the four; then there are two that are on the agenda that we will probably spend a little more time on. The other two are not on our agenda. Kathy, I guess -- is that okay with you?

Ms. Behling: That's fine, and yes, I chimed in, and tell you that the first item on the agenda is PER-59, and we are ready to discuss that. We have looked at the updates of that document, and the same with the OTIB-60.

The other two, the RPT-5 and PROC-006; those will have to carry over for the next meeting, because I haven't had a chance to review those yet.

Chair Beach: Okay. That sounds perfect then.

Ms. Behling: Yes. So the first item on our agenda was the PER-59, and I'm prepared to talk about that when you're ready.

Chair Beach: I'm ready right now. Is everybody in agreement with what we just discussed? Loretta and Paul?

Member Valerio: I'm in agreement, Josie.

Chair Beach: Okay, great. And Paul, are you okay with that?

Member Ziemer: Sorry, I was on mute. Yes, I'm in agreement.

Chair Beach: Okay, sounds great. So, Kathy, I'll go ahead and turn it over to you, and we can get started on Norton.

Mr. Katz: Okay. This is Ted. So just to be clear, whatever task things we do in this meeting -- in this case, PROC-5 and RPT 6, or the other way around -- the SC&A contract runs through February, so these need to be concluded well ahead of that, the end of the contract year; just to be clear. And that would hold for any other task we make as well.

Chair Beach: Okay; good to know that; thanks, Ted.

PER-59: Norton Company

Ms. Behling: Okay. This is Kathy Behling, and first I just want to congratulate Josie on her new position and also welcome Loretta.

I just wanted to make mention that in order to orient Loretta, and since some of the agenda items do go back several years, when we discuss some of the items on the agenda today we may give some history about those findings. But if you feel we're giving too much detail, just don't hesitate to stop us and redirect us.

So I will start with PER-59, which is Norton Company. Actually, I see on Lori's list they're mentioning Finding 3. There were three findings for PER-59, and let me start by saying, Norton Company is one of those facilities that does not have a stand-alone technical basis document.

It has what we've termed a DR template, meaning that the dose reconstruction methodology is incorporated into the Dose Reconstruction Report. So this is a separate process, now, that we go through. When we see one of these templates that hasn't been reviewed before, when it comes to our attention through something like a PER process, we do go ahead and review that methodology, which we have done here in PER-59.

Now, our first finding -- and again, we did discuss this during the last meeting, but I'll repeat these -- in the first finding the changes that were made to Norton included both internal and external exposures. But the first finding, when we reviewed this PER, we were not sure that there was enough information in the DR template to allow us to confirm the external deep and shallow doses for the residual period. During that discussion, David Allen from NIOSH said, I believe that that process of reviewing that methodology was actually done through the SEC process. So I was tasked to go back and verify if that was the case.

I was able to confirm that back in 2010, 2011 -- I think it was the 2011 time frame -- SC&A was tasked to do a focused review on the Norton SEC, and during that review we did look at this methodology. So we had confirmed that the methodology was appropriate and correct, and so at this point, this finding, from our perspective, can be closed.

Chair Beach: Okay. Any questions or comments from the work group? I'm okay with closing it. I re-reviewed the transcript from the last meeting and understand that it has been -- the methodology was resolved, so I'm fine with closing it. Paul, are you in agreement?

Member Ziemer: Yes, right.

Chair Beach: Okay. And Loretta?

Member Valerio: And I'm in agreement also, Josie. That was Finding No. 3, correct?

Ms. Behling: No. 1.

Member Valerio: No. 1, okay. Thank you.

Ms. Behling: Okay. Then we'll go on. The other thing I'll just mention -- because this may help to guide you through this process -- okay, it's being shown. If you all are on Skype, Rose is displaying the summary table that I provided that hopefully will help us look through this fairly long agenda, and I had emailed all

of you a copy of these findings also.

Then Finding 2; what the finding was, in the template NIOSH stated that there were nine references that were associated with the operational period at the facility. However, when we looked at the data closer, five of the nine were associated with the residual time period as opposed to the operational period.

NIOSH agreed with that finding, but it was discussed that perhaps they should be changed from a finding to an observation, which we have done. I guess the only thing we are waiting for -- I don't know if NIOSH is going to go ahead and make a change to the template at some point in time and whether you want this item to be put into an abeyance, but NIOSH is aware of it, and they do agree that this was just a minor inconsistency in the data.

Chair Beach: Kathy, I thought that Lori had updated, or the new methodology was updated. It's attached to Finding 3, though. Is that also for Finding 2? Did you guys look at that?

Mr. Allen: Josie, this is Dave Allen. Yes, both Finding 2 and 3 were mixed into that. I think we've only recently updated the BRS with that.

Chair Beach: Yes, the October 24th, so that's something, probably, that needs to go on the list for review, Kathy.

Ms. Behling: You are correct, yes. I see now that you did update it, and I did not have a chance to review that. But that can certainly be done quickly, and the same with Finding 3.

In the case of Finding 3, when we looked at the data that was generated for the air concentration data for the 62-63 time period, our numbers came in lower because we realized that NIOSH had inadvertently pulled a number from the short-lived column rather than the long-lived column. So they were overestimating their dose. So I assumed that correction was also made in this revision, Dave.

Mr. Allen: Yes, it was.

Ms. Behling: Okay. Okay, and I did not have the opportunity to look at that, but I will do that. That will be something that should be very easy and quick.

Chair Beach: Yes, and it's part of that list that Lori sent out, so I knew we'd be discussing it.

Ms. Behling: Okay. So we'll carry Findings 2 and 3 forward to the next meeting?

Mr. Katz: This is Ted. I mean, one is an observation and one is very simple, and as Dave said, it's corrected. I think you could just close it. It doesn't seem like it's the sort of complexity that's worth checking, even.

Ms. Behling: I agree. If you'd like, I can do a quick check after the meeting, or during a break --

Chair Beach: During lunch.

Ms. Behling: Yeah. Let's do it that way.

Chair Beach: Because Finding 3 is still a finding, correct? Just two --

Mr. Katz: Yes, 3 is a finding for sure, but it's a simple matter, and Dave said it was corrected, and I trust that. Kathy, you can look at it, but we don't need to carry over to the next meeting, I don't think.

Ms. Behling: Correct. Okay, very good.

Member Ziemer: You'll get back to us after the break, is that what you're saying?

Ms. Behling: Yes.

Member Ziemer: Because there's no reason to carry it up to the floor for the next meeting, really.

Ms. Behling: Right. We will try to resolve it during this meeting.

Member Ziemer: Thank you.

Ms. Behling: Okay. The next item on the agenda is DCAS TIB-13. Now, this is a finding; again, it goes back, and there's some history to it, but I believe I had asked Bob Anigstein to look at this, and I didn't hear whether he had signed in yet or not.

Dr. Anigstein: I am here.

Ms. Behling: Okay, there you are. Go ahead, I'll let you take over for this finding.

Dr. Anigstein: Okay. This is Bob Anigstein from SC&A.

Mr. Katz: Welcome, Bob. I'm glad to hear you're well again.

Dr. Anigstein: Okay. I've made a brief presentation on Skype, which I'm trying to get into right now. There we go. Everybody who has Skype, do you see the good-looking title page from my briefing?

Chair Beach: Not yet. Did you send that around, other than just the briefing, here?

Dr. Anigstein: No, I didn't, Josie. Frankly, I just got this put together rather -- I didn't know we were going to be using Skype, so I didn't want to be the only one. So I just put this together rather late yesterday, so I can certainly email it out later.

Chair Beach: Okay, that would be great. Thanks, Bob. And yeah, I see it. Does everybody else?

Mr. Katz: And please do, Bob. Send it to me after the meeting, thanks.

Dr. Anigstein: Say again?

Mr. Katz: Please do send it to me after the meeting, Bob.

Dr. Anigstein: Yes, I will certainly do that.

Mr. Katz: Thank you.

Dr. Anigstein: Okay. So Kathy Behling has stressed that this is a long, longstanding issue so I want to go over, particularly since there is one new member of the work group. We thought it would be wise to go over the history of this rather quickly. I'll just read, for those who don't have Skype, I'll just read from the right slide.

OCAS-TIB-13, Rev 0 was issued October 26th, 2005. The purpose -- I'm reading from the bulletin -- the purpose of this technical information bulletin was to provide guidance on the application of geometry-based correction factors to external dosimetry data for Mallinckrodt workers; in particular, job classifications.

The exposures for these were to various forms of uranium. There were three -- well, I'll say DCAS, to use the present name -- put together three exposure scenarios. One of them was to a large cylindrical metal ingot, 20 inches long, 13 inches in diameter, in close proximity to the lower torso.

Let me just editorialize a little bit. The whole purpose of this was -- the idea was that workers working with uranium might have it up close in their body, and as their film badge was worn at a location such as the lapel, which was probably the most distant location, very common for a male worker with a shirt with a collar, to clip the film badge onto his lapel -- so the film badge would get a lower reading than the body would, and the whole purpose is to what would be an appropriate correction factor in such situations?

So one scenario is a large metal ingot held close to the lower part of the body. Another one was the pitchblende, the uranium ore that would be spilled on the floor. The third one was a worker working with a denitration pot. Denitration essentially is a process where the uranyl nitrate -- the hexachloride, I think -- is boiled down to use uranium trioxide.

So then there were analyses of those doses in the

organs in the lower torso versus those at dosimeter locations. Initially, NIOSH used the Attila Code. This is a proprietary discrete ordinance called deterministic, unlike MCNP, which is Monte Carlo-based.

Used properly, they should produce very similar results. However, the way NIOSH had used it at that time was, instead of picking out a single organ, it would average over a range of organs in the lower torso. Then also averaged over a range of film badge locations that a worker could wear anywhere on his upper body. And so the geometry factor, and then they did a Crystal Ball Monte Carlo simulation of these ranges and derived an average.

So the geometry correction factor for the lower torso -- I won't read over them, they're on the slide here -- was 2.13. The ingot machining was a limiting scenario. So that's what we concentrated on.

So then SC&A was tasked to review this about two years later. Our review came out October 29th, 2007, and we had six initial findings. Four of these were discussing the text itself. We felt that there were comments that it could use editorial improvement.

Two of the findings, including technical in the sense of explaining what the parameters were, explaining how they were arrived at, and two of them questioned the results.

We called them Findings 4 and 6. We were going through a checklist which was in use at the time, and the same issue fell into two different categories. So we called them 4 and 6, but later on the work group correctly merged them into a single one. So Finding 6 was gone, it becomes part of Finding 4.

SC&A used MCNP to verify the NIOSH Attila Code. Attila is a proprietary code. It had to be rented; very expensive, so we did not use it. So we focused on the bounding scenario, which was the ratio of film badge dosimeter readings to doses at the lower torso organ locations from the uranium ingot.

Initially we came up with a correction factor just based on geometry of 7.6 with the dosimeter on the lapel, 10 centimeters through the left or right or the center of the body. Then we also went further, and it occurred to us that the radiation striking the badge coming from further down near the lower region of the body, the photons will be hitting the badge at an angle, a sharp angle, and there are correction factors for doses for the personal dose equivalent, it should be 10, for different angles. So we took that into account and by combining the two, we came up with a correction factor of 10.2.

But the main difference between our results and the DCAS results were differences in geometry. We made claimant-favorable assumptions. We assumed a tall worker. The greater the height of the worker, the greater the separation of his lapel or film badge to the organs in the lower body. Then we used a single film badge location rather than a range of them, and a single organ location; the lowermost organ would give you, again, the greater distance.

The first time this was considered by the Procedure Subcommittee was at their meeting on July 26th, 2010. Three of the findings were deemed to be correctly classified as editorial. NIOSH agreed to address them in the next revision of the TIB.

The revised TIB, OCAS-TIB-0013, Rev 1, came out November 23rd, 2010, and the wording was changed so it was no longer for Mallinckrodt; it applied to all uranium facilities. There were extensive editorials, revisions which were responsive. It was much longer, several pages longer, and it was responsive to SC&A comments.

However, there were no changes to the Attila with analysis or results. The exact same table was reproduced as I showed on a previous slide; I just used the table from the revision simply because it was a little clearer and easier to copy.

The Procedure Subcommittee met on January 5th, 2011. Findings 1 and 2 were editorially closed.

Finding 3 dealt with the -- we disagreed, because we had strange data with one of the DCAS staff members who had performed the analysis, and we were critical of the uranium photon spectrum.

However, by repeating our analyses, we found that since we were doing ratios, the actual photon spectrum used made very little difference in the ratios. So we considered that issue to be resolved.

Then as I earlier said, Findings 4 and 6 were merged into a single one, and NIOSH was to respond to Finding 5, which resulted in geometry.

The Subcommittee met again on September 19th, 2011. There was some discussion of TIB-0013, but there were no actions. On January 31, 2013, there was a technical call between SC&A and NIOSH, which dealt primarily -- I don't have the complete transcript of it; we didn't have a transcript -- it dealt with the issue of the correction for the angular incidence, and even though it affects the dose -- the HP10 dose is actually a dose to a slab against the body -- we agreed with NIOSH that there is probably not a sufficient basis to use this as a correction factor for the film badges. So we withdrew that and reverted back to the correction factor based just on geometry alone.

Then the Procedure Subcommittee met again on February 5th, 2013, just after the technical call. SC&A reported the results of the technical call, and Jim Neton reported that NIOSH was going to discontinue the Attila code and was going to repeat the analysis using MCNP.

He suggested or directed that NIOSH and SC&A should trade their MCNP files so we could inspect each other's files, which happened -- I think it actually had already happened.

So now I'll go on to the technical history; I will go on to Finding 4, which is, RE: the procedure, underestimate the maximum correction factor to be applied to the badge reading. Therefore, the

procedure did not provide adequate guidance for the finding's mainly favorable assumptions.

So we received the NIOSH MCNP analysis on February 4th, 2013. There were actually, from looking at the internal file, they had been performed the previous year. Again, we looked at the bounding scenario for the ingot machining.

So NIOSH now had a higher correction factor, more than twice what the original one was, 5.35. However, our analyses did not use a phantom, because we simply used points in space, and then we applied -- the ICRP 74 has factors for calculating dose based on photon fluence, and the phantom is already built into those tables. They use a phantom to determine what would be the dose from a parallel beam of monoenergetic photons, and then you code that into MCNP, and you span all the photon ranges that are used in the analysis, so there's no need to use a phantom.

Nevertheless -- that's just a technical comment or opinion -- nevertheless, NIOSH used a water-filled phantom. They're just simple cylindrical, elliptical shapes, and you form more or less an anthropomorphic form.

The problem with that is, their phantom, which happened to be the phantom that they had, was 5 foot 7 inches tall. Now, that is short; but for the ingot analysis they had used a 6-foot tall figure, 72 inches. The height of 67 inches is -- let me show you where I got the data. This is a publication -- it's called the Vital and Health Statistics Anthropomorphic Reference Base for Children and Adults, United States, 1988-1994 from the Third National Health and Nutrition Examination Survey. The acronym is NHANES III. It was put out by CDC.

This shows -- make it bigger --- the height in inches for males aged 20 and older, and the 67 inches -- the 25th percentile -- is 67.2 inches, so the 67-inch phantom is just below the 25th percentile, which means that 75 percent of the adult male population

is taller than that.

So we considered that is not a claimant-favorable assumption, because the taller the worker, the greater the separation of the badge from the tested organ, the greater the correction factor.

So instead we used the 95th percentiles, and that's common practice. You either use the distribution of the 95th percentile of the parameter, and that comes out to 74 inches or 6-foot-2, which is tall, but not an abnormally tall individual.

So let me go back to my slide. So we feel that the short figure reduces the -- I'm repeating myself --- and furthermore, they did not account for the fact that the film badge might be worn on the lapel, which is a little off-center to the body, and therefore slightly further away from the affected organ.

In our analysis, the SC&A analysis, we repeated -- subsequent in the process, we became aware of much new data, including the NHANES table, which we did not have access to or were not aware of when we first did the work in 2007. Also, since 2007; 2009 specifically, ICRP developed and published in the Publication 110, the Reference Male Computational Phantom. This was based on an MRI scan of a volunteer, and it segmented it into something like 140 different tissues and organs.

There is a table that lists the center of mass coordinates of this referenced individual standing on the floor, and the X, Y, and Z coordinates for every major organ and tissue. We specifically used the Z coordinate, the vertical height or the center of mass of the urinary bladder. That's the lowest organ that we commonly encounter in dose reconstruction, lowest in terms of geometry from the floor up.

Then for the film badge, we assumed that a film badge was centered on the clavicle or collar bone, and we got the Z coordinate or center of mass of the clavicle. When I said center, I meant vertically-centered. Horizontally it was displaced 10

centimeters to one side.

However, these data are based on the reference adult male that has a height of 5 foot, 9 inches. So we scaled it to get to the 59 inches, so we scaled it to the 74 inch to represent the 95th percentile male that is 74 inches tall.

So in the final analysis we came up with a correction factor of 7.27, versus NIOSH's 5.35. So this is based on the personal dose equivalent which is what is commonly used by the film badge companies such as Landauer in reporting the film badge results.

However, we had in an earlier time also done an analysis. These were repeated numerous times over the years using photon flux because NIOSH had used photon flux, and we found that the numbers are different -- the absolute numbers -- but the ratios do not -- within statistical error they were the same. So anyway, we believe that the higher correction factor is needed rather than the one proposed by NIOSH.

Chair Beach: Okay. Thank you, Bob. Is NIOSH prepared to comment?

Dr. Neton: Yes, this is Jim Neton. I appreciate Bob's very detailed summary of the history of the -- it's good to hear it, because it's been such a long time.

We have continued to work on this problem. ICRP 74 more recently has been subsumed by ICRP 116, which is now a voxel phantom model that allows us to model its individual organs, so we don't have to rely on averaging like we did in the original TIB. Nor do we have to rely on the highest organ that is exposed in the abdomen.

We are working on an implementation for ICRP 116. It's been in the works for quite a while; it's a fairly complicated model. But it's our opinion that ICRP 116 -- we would use ICRP 116 data to redo TIB-13, so we can then calculate the ratio of the dose for any organ in any particular geometry we want to.

We're working on that; I'm not sure exactly how far off that is into the future. I think I talked to Tim Taulbee yesterday, and the conversion factors for TIB-10 are close, even a matter of a month or so, and I think 13 is probably not much further behind. So we recommend that this be delayed until we reissue TIB-13 using ICRP-116 methodology.

Mr. Taulbee: This is Tim Taulbee. If I could just add a little bit more to that, Jim; the actual information will be rolled into a single TIB that will be all the geometry. It will be the glove box as well as, in this particular case, the ingots, the pitchblende pots and that kind of thing. It's one geometry, kind of correction TIB when we roll out ICRP 116.

But we are taking this into account, as Jim indicated, where it will be organ-specific, so there won't be kind of a limiting factor. It will be done on an organ-by-organ basis, and we are currently in the process of developing that as well as the tools which will perform all of the calculations all at one time.

We are currently looking at the current models that have been done for the glove box, as Jim indicated, for TIB-10. We have some additional drafts of that, but it's probably used in the three- to six-month type of time frame before we have that completed to where we could, I guess, in a sense, talk more to the full work group as well as the Board about ICRP 116.

Dr. Mauro: Jim and Tim, this is John Mauro; I have just a quick question. Does this mean that when the dose reconstruction is actually done, you're going to use the real height of the real person? Because I noticed that there was a difference of opinion on what the generic height should be for these correction factors in 5762. With this new tool, does that mean it could be done on a case-by-case basis with a real person?

(Simultaneous speaking.)

Mr. Taulbee: No. I don't think so. We would not need to account for the individual's height. We are using

the standard man and standard female, so male and female would be broken out, whereas they are not now for these. But we will be using the ICRP 110, as Bob pointed out there, that has come out in the last several years. Mainly the voxel phantom that we've been modeling everything off of, as well as the ICRP 116 when you did the dose conversion factors and added more organs to the listing that we currently have from ICRP 74. All of that is based upon those standard man and standard female phantoms.

Dr. Mauro: And just for my own edification, what heights are being used these days for the reference person in these standards?

Dr. Anigstein: Six feet, nine inches.

Mr. Taulbee: Five feet, nine inches.

Dr. Anigstein: I'm sorry, five feet, nine inches is the ICRP 89 model.

Dr. Mauro: Okay.

Dr. Anigstein: However, if you are going back, that is not the average for the -- first of all, this came out in 2002, and it was based on your generic Caucasians, Europeans and North Americans.

This is, however, not the U.S. average, which is -- I'm sorry. I just proved myself a liar. Just cancel what I just said. It happened to be the same as the 50th percentile.

Chair Beach: Okay. It sounds reasonable to wait until that new TIB comes out along with the ICRP 116. Paul or Loretta, any questions or comments?

Member Ziemer: Yes. I think it makes sense to delay that until we get the newer analysis. But I do want to ask Jim, is the issue of the location of the badge somehow taken into consideration in that case?

Dr. Neton: Yes, I talked with Tim about this yesterday, and I think the new approach we're using will allow us to vary the location of the badge, and

we pick the highest, and the badge will give them a claimant-favorable value, whether it be centerline, lapel, or pocket or somewhere else.

Member Ziemer: You could do multiple calculations and pick out out the claimant-favorable ones.

Dr. Neton: Correct.

Mr. Taulbee: That is correct. We are currently modeling center mass, the pocket, as well as the collar. It will vary a little bit, depending upon the organ that is chosen, for example.

Member Ziemer: Exactly. What are we using now?

(Simultaneous speaking.)

Mr. Taulbee: --- is in TIB-13

Member Ziemer: So we just stay with that until the new ones come. So that will take you think about three months?

Dr. Neton: I think three to six, yes.

Mr. Taulbee: Yes, that will be actually to where we can present them to the Board for the ICRP 116. Now, the rollout is going to be taking quite a bit longer than that. We're probably looking at a year to get it completely rolled out.

Dr. Neton: By the way, I might just add that this does not just affect the geometry correction factor. It will affect all of the dose conversion factors that we have currently been using that are in ICRP 74.

Member Ziemer: Oh, yes.

Dr. Neton: We will effectively end up with affecting almost all dose reconstructions.

Member Ziemer: Oh, wow.

Chair Beach: It's pretty big, yes.

Member Ziemer: Well, in any event, it doesn't make

sense to change it now, just forget the value and then have to change it again in a few months.

Chair Beach: No, I agree. Loretta, do you have anything?

Member Valerio: No. The one question I had was more about what Paul had asked about the location of the badge.

Chair Beach: Okay. And then, Jim, can we expect -- can NIOSH write something up on this, just a brief what we've just discussed and what's happening just so we can update the BRS?

Dr. Neton: Yes, we can do that.

Chair Beach: Something simple? Okay.

Mr. Hinnefeld: Josie, do you want us to just write that into the BRS?

Chair Beach: Yes, if that would be okay.

Mr. Hinnefeld: Okay.

Chair Beach: Ted, are you in agreement with that?

Mr. Katz: Yes. I mean, that's what we should do for everything.

Chair Beach: Right.

Mr. Katz: After this meeting -- and, Tim, does the new TIB already have a number so we can look for that when it comes out?

Mr. Taulbee: Yes. Give me a few minutes to look that up, and I'll get back to you.

Mr. Katz: Okay. Yes, just better to be on our radar. And so a question to the Work Group, is this conceptually right and hence in abeyance for SC&A review, or otherwise?

Chair Beach: I don't know if we --

(Simultaneous speaking.)

Member Ziemer: Aren't we in progress rather than abeyance at this point?

Chair Beach: I think we still are, Ted, because we don't have any idea what it's going to look like right?

Mr. Katz: Okay. Well, normally in abeyance just means we conceptually agree with the path forward, and we want to see the actual product before we close it.

Chair Beach: We haven't really agreed -- or NIOSH hasn't agreed. They're just changing the methodology, so --

Mr. Katz: Okay. That's fine.

Mr. Taulbee: The new TIB would be OTIB-89.

Mr. Katz: Thanks, Tim.

Ms. Behling: Excuse me, this is Kathy. Just for clarification, are we keeping this finding in progress or are we changing to in abeyance? I wasn't clear.

Mr. Katz: Keeping it in progress is what Josie just --

Ms. Behling: Okay. That's what I thought. Thank you.

Member Ziemer: This is the part -- I think in principle, once we have that new document, SC&A may have to take look at that too, before the Work Group gets it, right?

Mr. Katz: Yes, absolutely. It depends on the timing. If the document isn't coming out for three or more months, I probably can't task it until after we have a new contract.

Member Ziemer: Yes.

Chair Beach: Okay. Anything else on OTIB-13? And, Ted, I want to backtrack just a little bit. Earlier we were discussing the four items PROC-006. That actually has a new OTIB-88 attached. Is that

something that we need to task SC&A to review also, when they're looking at these four, or is it a separate item? It's associated with 006.

Mr. Katz: Well, if we have a finding that they need to review --- we have to talk about it, we have to know the details --

(Simultaneous speaking.)

Chair Beach: And the document has been canceled and then the new document is OTIB-88. I just didn't want to leave that hanging if we have to task it.

Ms. Behling: Yes. This is Kathy again. In fact, Ted had asked me to look at that and to see if I would recommend to the Subcommittee whether it was necessary for us to review it. That is one that I definitely would suggest to Ted that we review, because as he said, it's superseding other documents and other findings associated with that. So I think at least SC&A would suggest that that be something that would be tasked in the future.

Chair Beach: Okay. But it's associated with 006, but we asked you to look at -- so that's my question to the Work Group. Do we need to task that in association with those four that they're going to close out?

Mr. Katz: Well, again, if we're going to task it, it needs to be finished in February -- before February -- in February at least.

Chair Beach: Okay. I guess we can hear from Kathy after she looks at those four, if that's something that can be tasked and done before February. It was just part of that document.

Ms. Behling: Okay, thank you.

Ms. Marion-Moss: Josie, this is Lori. I wanted to make one correction. You refer to this document as OTIB-13 and it's actually DCAS TIB-13. It's different.

Chair Beach: You're correct, thank you.

Ms. Behling: Okay. This is Kathy Behling again. Are we ready to move on, Josie?

Chair Beach: Yes. We're onto DCAS TIB-4, or ORAU-TIB-4.

TIB-4: Maximum Dose at AWEs

Ms. Behling: Yes, ORAU-TIB-4. This is quite an old document; it's estimating the maximum plausible dose to workers at AWE facilities.

This document we had reviewed back in 2005, and there were two findings. Rose, can you take over the screen again? Okay. There are actually two findings. I think initially when I put my table together I only had identified one. There was initially a Finding 2 which said that the procedure was incomplete regarding required data, and Finding 6 that was still in abeyance regarding that the guidance wasn't claimant-favorable and instances of unknown parameters and also the breathing rate that was used for evaluating the intake.

This procedure has been canceled, and it's no longer used in the dose reconstruction process, and it's been superseded by other documents that have been approved for looking at internal doses -- looking at maximum doses at the AWE facilities. So in my opinion these two findings can be closed.

Chair Beach: Okay. Any discussion or questions on that, Loretta or Paul?

Member Valerio: No, I don't have any questions on this. So OTIB-004 will be closed because it's rolled over to other TIBs; is that correct?

Ms. Behling: That's correct.

Member Ziemer: Well, it's been superseded by other TIBs, so basically it didn't go anywhere, right?

Ms. Behling: That's correct.

Chair Beach: And so the BRS notification; will it

indicate which document superseded it, or is that a necessary detail?

Ms. Behling: It will take a lot of extra work to go through that, but I can do that. Often there are now site-specific AWE facility methodologies, but there are other generic AWE methodologies. I could perhaps work with Lori and come up with a list.

Chair Beach: Is that necessary? I'm asking the Subcommittee.

Ms. Behling: Oh.

Chair Beach: It's nice to -- I mean, I think it's nice to have that in there in case you were looking for it, but I don't know if -- I'm asking people with more experience if that's necessary.

Dr. Mauro: This is John Mauro. I seem to recall OTIB-33 may have been at least one of the documents; when you get away from this generic, very high airborne dust-loading that was used originally in OTIB-4 as a way of placing an upper bound for cases that were clearly non-compensable.

That's been removed, and I believe they have more realistic protocols. I believe one of them is OTIB-33 which, at least in that case, it's based on maximum permissible concentration assumptions that would spin off that, which would tend to place an upper bound under certain circumstances.

So I guess I gave you half of an answer, because I seem to recall that particular strategy; replacing OTIB-4. I think there was one other one also, but I don't seem to remember.

Ms. Behling: OTIB-18.

Dr. Mauro: Thank you.

Mr. Allen: Josie, this is Dave Allen. In reality, OTIB-4 was a complex wide overestimate for uranium metalworking facilities, and it's not used anymore. It was essentially in place until we could get some site

research done on a lot of facilities. In reality it's been replaced by a number of TBDs, some TBD-6000 and any number of documents that we have site-specific information for now. It would be difficult to point to just a single document and say that's replaced it.

Chair Beach: Yes.

Ms. Behling: Okay.

Member Ziemer: Yes, there is not a single document --

Chair Beach: -- have to do that extra work, then, Kathy. Thank you, though, for offering it up.

Ms. Behling: Okay.

Member Ziemer: Yes, there's not a single document like this was before. There are multiple documents for various situations.

Ms. Behling: Yes, that is what I was alluding to. Thank you, David.

Chair Beach: Okay. So we'll call both 2 and 4 closed due to other documents superseding ORAU-TIB-004. Okay, we're ready to move on.

TIB-12: Monte Carlo Method

Ms. Behling: Okay, and I will update the BRS with that. The next item on the agenda is the ORAU-OTIB-12, and this is a very similar situation. With the Monte Carlo methods for dose uncertainty calculations; something I would call an efficiency method that was used back -- we looked at this in 2007, and it's also one of these procedures that has been canceled. This efficiency method is no longer used. We can use other methods.

So again, the finding that had to do with -- the statistics were correct; however, the wording didn't necessarily reflect that. So again, I would recommend that we close this finding.

Chair Beach: Okay. Any discussion by Work Group members?

Member Ziemer: Well, is there any particular document that addresses this in a different way. In other words, is this covered by multiple documents like the previous situation, or is there a different document that deals with Monte Carlo methods for dose uncertainty?

Mr. Allen: Paul, this is Dave Allen. I might -- actually I can answer -- if Stu wants to. But if he doesn't want to, I will.

Mr. Hinnefeld: Go ahead, David.

Mr. Allen: Okay. OTIB-12 is essentially a shortcut of what is documented in other procedures, especially like IG-1, where we say we have a distribution for dose conversion factors, and it would be Monte Carlo'd together with a distribution for the dose. And the purpose of OTIB-12 was to essentially pre-run those Monte Carlo runs and create tables for, say, photon energy level and dosimetry and organ, and the dosimeter uncertainty, whether it was 5 percent, 10 percent, etc.

So all that was done ahead of time, and then you could just pull numbers out of a table and put it into your calculations. Since that time, the tools that we use have used at risk that can do the Monte Carlo for an individual case, and it's no longer necessary.

Member Ziemer: Okay, yes, thanks.

Chair Beach: Okay. That makes sense, so ORAU-OTIB-0012, finding 1 is closed. And SC&A will update BRS.

TIB-27: Supplementary External Dose Information for Rocky Flats

Ms. Behling: Correct. And we'll move on then to ORAU-OTIB-0027, and Ron Buchanan will take that finding.

Dr. Buchanan: Yes. This is Ron Buchanan, SC&A. And, again, to give a little background, OTIB-27 was a supplement to the Rocky Flats TBD early on in 2005. So we're going back a few years here.

And it had to do with, according to our finding in that particular evaluation, was the energy of the photon doses, what you should use for different radionuclides, and it gave a Table 6.10, which broke it down to depleted uranium, enriched uranium, and plutonium. And our question at that time, well, what do you use if those don't fit the category?

Now, that has -- the Rocky Flats TBD external document has been revised several times. Revision 1 was in 2007, February, and the Revision 2 came out in August of 2007, and then Revision 2 PC-1 came out in 2010, which I believe is the current revision, and in that it includes that table.

And so I guess the point now is, does the -- this Subcommittee want to continue this or transfer it to the Rocky Flats Work Group?

Chair Beach: Good question.

Mr. Katz: So, Josie, this normally would be -- this normally would be, since it's just a site profile issue, Rocky Flats is normally -- I mean, we have a Work Group for that. This would be what they would address.

Chair Beach: Correct. You're right.

Mr. Katz: Yeah.

Chair Beach: So I --

Member Ziemer: We had sort of a protocol when we made the transfer. This looks like one of those. And if you do that, I don't know if we still do this, but we artfully tried to formalize it by having the Subcommittee kind of formally request that the work take something of that sort, a formal handoff of the baton as it were.

Mr. Katz: Yeah. You normally send an email to the -- to the Chair just referencing it.

Chair Beach: Okay. And I'll make a note that I need to do that.

Mr. Katz: Okay.

Chair Beach: And if I need any help with the wording, I'll get with Ron on that.

Mr. Katz: Sure. And

that's Dave Kotelchuck.

Chair Beach: Right. Okay. And I was thinking Ron Buchanan, if I needed any -- okay. So I will take that on.

Mr. Katz: Thanks, Josie.

Mr. Hinnefeld: If I might offer an additional item about this. This finding is open on this TIB. This is Stu, I'm sorry, by the way. The finding that is open on this TIB has to do with a perceived essentially insufficient guidance in the site profile that the dose reconstructor may not have readily available, so they don't have the right guidance to choose I think it was spectral information. I forget if it's neutron or photon but spectral --

Dr. Buchanan: Photon.

Mr. Hinnefeld: Okay. So which of these spectra and distributions should you use? And, I mean, I have the correct guidance, and so it's largely, I'd say, a wording of the -- of the site profile or the TIB finding.

Well, by now in this program, we know that a dose reconstructor doesn't look at a TIB as he does the dose reconstruction. He has a tool, dose reconstruction tool for that site. And so I think a part of the evaluation, or the definitive part of the evaluation should be, does the Rocky Flats tool provide sufficient guidance -- in its guidance?

Is that sufficient, so dose reconstructors make the same choice all the time, rather than to try to fiddle with the words in this -- in this TIB.

Does that make sense to other people?

Dr. Buchanan: Well, the question was, on Table 6.10, if the worker was exposed to something besides the three radionuclides listed there, what does -- what photon energy assignment does the dose reconstructor use? That was the bottom line.

Mr. Hinnefeld: Right. And my point is that the dose reconstructor isn't going to be looking at this TIB as they do the dose reconstruction. They are going to be looking at their options in the tool. And so the evaluation of the tool to me is the important part of resolving this question.

Mr. Katz: Right. That makes perfect sense.

Chair Beach: And, Ron, are you following that? Are you --

Dr. Buchanan: Yes.

Chair Beach: Okay.

Mr. Hinnefeld: None of this gets in the way of transferring it to Rocky Flats. I just think that should be the issue that --

Mr. Katz: Right. Right. So that will get captured when Ron helps Josie with writing this up for -- for Dave. Yeah. Thanks Stu.

Chair Beach: All right. Ron, we'll talk after.

Dr. Buchanan: Okay.

Chair Beach: Okay. Thank you.

Ms. Marion-Moss: This is Lori. I have a question about protocol when we're transferring items to -- or issues to other Work Groups. How are we -- what's the protocol for closing out those items once they resolve

it in the other Work Groups?

Mr. Katz: Right. So -- this is Ted. So the protocol is the Work Group that receives it is supposed to close it, and they can -- this will go -- it will be closed. It will be in effect closed under the Procedure Subcommittee and the BRS. It will be opened as a -- as a finding in the Rocky Flats portion of the BRS, and then they would close it there.

Ms. Marion-Moss: Okay. So do we physically want to transfer this finding --

Chair Beach: Yes.

Ms. Marion-Moss: -- from OTIB-27 to the Rocky Flats Work Group?

Mr. Katz: We do. Production -- and that -- that will just be an element of Josie -- to go along with Josie's notes, yeah. That's a good point, Lori, if you would just -- if you could leave that over, that works.

Ms. Marion-Moss: I'll work with SC&A to get that done once we're ready.

Chair Beach: And I think I've seen other ones where it says, instead of saying "in progress," it says "transferred." And then it's got a nice arrow, so -- and then a comment that it was transferred to -- and where it was transferred.

Mr. Katz: Yeah. I've seen that, too.

Chair Beach: Okay.

Ms. Behling: This is Kathy again. I'm sorry. When we're talking about that, when I compiled that table of open and closed and in abeyance type items, when I came to transfer to another Work Group, I considered that closed in the Subcommittee. Is that correct?

Chair Beach: Right.

Ms. Behling: Okay.

Mr. Katz: Yes. That sounds good.

TIB-29: Coworker Data for Y-12

Ms. Behling: Very good. Okay. If we're ready to move on. The next item on the agenda is the ORAU-OTIB-0029, and that's internal dosimetry co-worker data for Y-12.

Now, the finding that is identified here is this finding associated with people submitting urine samples on Monday morning, and whether that 48-hour delay time was considered in assessing these values.

And I -- we reached out to Joyce Lipzstein. She was the one that initially had this finding, and she is on vacation right now. So she did send a note back to us indicating that, even though I was under the impression that this topic was discussed maybe not under OTIB-29 but in other arenas and had somehow been resolved.

Joyce is saying that with regard to the internal dosimetry co-worker data at Y-12, it -- she feels that Attachment B still does not take into account this Monday morning sampling schedule, and that that would result in an underestimation of doses for Solubility Type S, up to an order of four times lower, and Type N and Type S would be about two times lower.

So what I would suggest is that perhaps we carry this over to the next meeting when Joyce is available to explain this in more detail.

Dr. Mauro: Yeah. This is John Mauro. Just a little bit more information that might be helpful in focusing in on the issue. The last discussion we had had to do with the position was, well, the Monday morning grab sample is not entirely a correct representation of what has transpired at the weapons complex.

It was more like the samples were collected throughout the week and not necessarily always on a Monday morning. And as a result, it sort of buffered

or blunted the nature of the issue.

And so we're -- as I understand it, where we left it is there was a bit of disagreement regarding whether or not the standard practice, sort of almost universally, was -- you know, the person is continually exposed during the week, and then the weekend comes, he is not exposed, and then a grab sample -- a urine sample and a grab sample is taken on a Monday morning.

And that's one perspective. That's the one that was our understanding, and that would have that effect that you just described, Kathy. The alternative is that, no, it really wasn't like that. It was more of a -- a lot more samples collected throughout the process, not just on Monday morning.

And that may help focus the resolution of this and the degree to which one practice versus the other practice was standard practice. I just wanted to add that in because that was a little bit more information to help us understand the nature of the issue.

Chair Beach: Okay. Thanks, John. And to go back through the BRS, this finding goes back several years and we have had discussions on it. I just wonder if NIOSH has got any comments before we carry it over, or any perspective on the finding -- on finding 4.

Ms. Brackett: This is Liz Brackett with the ORAU team. I was looking at the BRS also, and what it says, the last thing, is we have -- we did look at the samples from the days of the weeks that they were collected, and we said that 40 percent or more of the samples were not collected on Mondays.

And we had presented that information, according to the BRS, but the response back from the Work Group was that we needed to demonstrate that the intake rates resulting from 40 percent not collected on Mondays were not substantially different from the intake rates that are currently in the OTIBs.

So that seems to be where it was left, according to the BRS and --

Chair Beach: Yeah. And that was my concern, that -- just waiting for Joyce just kind of puts this off a little bit more. Was there any answer from SC&A to NIOSH's -- what Liz just commented on?

Dr. Mauro: This is John. I guess my recollection is that, no, that -- we haven't taken a position on that -- that matter I just described on this.

Dr. Neton: Yeah. This is Jim. I think there -- it's a little more complicated than that. I don't think that we actually ever provided a formal White Paper that demonstrated this 40 percent sampling rate. I think if we brought it up in a discussion saying that that was our -- our impression in looking at the data. But I don't know that we ever formally transmitted an analysis.

Ms. Brackett: Right. That's the -- the BRS says that that -- it left it as we were to demonstrate that that --

Dr. Neton: Right. And so I think -- I think the ball is really in our court on this one.

Chair Beach: Okay. And that's kind of what I was wondering, too. So --

Dr. Neton: Yeah. But there's a lot of other issues that have evolved since that time. You know, we now have a more -- we have this approach for a co-worker model that we may need to go back and relook at the data anyway. And this is also -- the site is also likely to be an SEC all the way through 1976 after the next board meeting. We'll recommending an 83.14 to add. That doesn't necessarily obviate the need for a co-worker model, but --

Chair Beach: Right.

Dr. Neton: -- clearly, the metabolic cancers would end up getting paid anyway. But I do think that we

need to go back and do this analysis more formally and present it, so that we can get it back on the table, because I -- I looked really hard. I couldn't find any documentation that we actually submitted anything in writing on this -- on this issue.

Member Ziemer: Well, the OTIB has been canceled, though, has it, or --

Dr. Neton: The OTIB has been canceled, but the co-worker model has been entirely put into the Y-12 TIB, the internal dose TIB.

Member Ziemer: Well, the --

Dr. Neton: So there is no difference there.

Member Ziemer: Does the finding sort of get transferred into that, then? I mean, you still have to take a look and answer the question of how you --

Dr. Neton: You know, that's a good point. In a sense, it becomes a TIB issue. I mean, a site profile issue. And I don't know whether -- there is no Y-12 Work Group, if you will, to evaluate it. So I don't know what the Subcommittee would want to do with that.

Chair Beach: Then the Subcommittee keeps it; is that correct, Ted?

Mr. Katz: That's right. That's exactly right. The Subcommittee was going to keep Y-12, since we don't have a Work Group anymore to deal with that.

Dr. Neton: And that's fine.

Dr. Mauro: Jim, this is John. Quick question. Does this issue -- it sounds like one of those issues that could have application through more than Y-12.

Dr. Neton: Yeah. I think this came up in more than one site. Hanford comes to mind maybe. There was a few other instances where Monday morning sampling was --

Ms. Brackett: We actually had a paper on Harshaw,

because this came up there. And what happened there is when you start looking -- when you adjust for the five days of intake, two days off, then you have to look at all of the days. And so like Fridays you're over -- you're overestimating, some days you're underestimating, so it all kind of came out in the wash. And I know we're going to have to do something similar for Y-12, but we have addressed this at other sites.

Chair Beach: So maybe you need to put that paper together for the Work Group, then.

Dr. Neton: Yeah. The interesting thing, we have a lot of data on Y-12. I think my -- I looked this week and we have about a half a million bioassay samples.

Chair Beach: Wow.

Dr. Neton: It might be more than that. I saw, like, 497,000. Anyway, there is a lot of data.

Chair Beach: Okay. So we just punted this back to NIOSH to create a White Paper for this finding 4; is that correct? And is that --

Member Ziemer: How is this going to be carried along in the -- in the --

Chair Beach: It sounds like it will stay in progress.

Member Ziemer: Well, I mean, it -- if the OTIB has been canceled, do we still carry it on the books?

Mr. Katz: Yeah. Let's not. How about let's put that -- let's put this on the TBD for Y-12, or whatever it is. If it's part of the TBD, be it co-worker or however, put it on there as a finding. And also, if we could just note, you know, put some annotation in there, so that it's clear what we decided in this discussion, that there would be the White Paper.

Ms. Behling: Okay. This is Kathy. I can do that.

Mr. Katz: Thanks, Katy.

Chair Beach: Okay. Perfect. Thank you.

So then it will closed here or will it be transferred?

Mr. Katz: Yeah. It's closed here. But, I mean, it stays with the Procedure Subcommittee. It's just that it -- then we'd be tracking it on the right documents.

Chair Beach: Okay. So if we transfer it, then we can -- we can point it to a new document. If we just close it, I guess we could write it up and say where it's at, so either way.

Mr. Katz: You don't even need to, because you'll have -- you'll be tracking that other document, so it's not even really a worry. You can just close it here, move it however.

Chair Beach: Okay. So closing comment.

Mr. Katz: Yeah. And we'll have the finding for this -- for another document. That's all. But it will be a procedures document anyway.

Mr. Katz: Okay.

Ms. Marion-Moss: Okay. I'm confused. This is Lori.

Mr. Katz: Okay. So -- Lori, so we're going to -- if you don't have it under the procedures right now, the appropriate TBD for Y-12 will be under procedures for this finding to be reviewed -- resolved.

Ms. Marion-Moss: Okay. I got you now.

Mr. Katz: Does that make sense?

Ms. Marion-Moss: Yes.

Mr. Katz: Yeah. Okay.

Chair Beach: Okay. Thank you. Thank you, everyone.

Ms. Behling: Okay. Are we ready to move on?

Chair Beach: Yes.

TIB-33: Application of Internal Dose Assumptions for Best Estimates

Ms. Behling: Okay. Now, let me see if I can make some sense out of this next -- ORAU-OTIB-0033. This OTIB is application of internal doses based on claimant favorable assumptions for processing best estimates. That's the title of this OTIB.

There is a -- what I will call a companion OTIB, which is OTIB-18, that usually the two of them work together. OTIB-18 is -- let me get you the title -- internal dose overestimates for facilities with air sampling programs.

Now, OTIB-18 is a very conservative approach to internal dose assessment. And what had happened or happened in the past -- and, again, I would probably have to call on Liz to help me with this -- but OTIB-33 allows the dose reconstructor to have a grade -- it introduces a grading approach or reducing the doses that would initially be assigned by OTIB-18.

The finding that we had back in 2007 is that there is a considerable amount of judgment that is required by the reviewer in assigning workers to a given exposure category and determining how best to use co-worker data in perform -- performing missed dose calculations.

And there was -- I went back to several transcripts, and there was an initial discussion -- and this is when Mark Griffon was on the board -- and there was some questions initially about -- about a particular site, how do you determine that a particular site had a robust air sampling program under OTIB-18.

I believe Stu had mentioned that they would try to find additional information from the site authors, and then there was additional information at -- under another Work Group -- Subcommittee meeting, which talked about that, really, OTIB-33, even though the title indicates it's a best estimate type of procedure, it does -- it's not used to compensate. It's used only for denial.

I know at one point in time we had discussed changing the title of this OTIB, so that it was more clear, not that that is -- is, you know, a pressing issue at this point.

So I -- at this point, the finding, it still exists. Apparently, Mark Griffon was going to make some comments about the OTIB and some questions that he had thereafter, and that didn't happen.

So I think the best resolution for this particular finding is maybe to hear from NIOSH, and perhaps Liz can enlighten us on -- regarding how often is this procedure really used today, and to confirm that this procedure does not -- you do not use this to compensate. Is that reasonable?

Ms. Brackett: Yeah. I don't know. If you're looking for me to answer, I am -- I'm sorry, I didn't look at this finding before the call. So I'm not up to speed on the finding, but this is not used for compensation. There was a brief period of time when it was used for that when it was written, but it's only used for overestimates and has been for a number of years now. And I think it's used pretty frequently, although I -- I couldn't give you any idea of how often that is.

Chair Beach: This is used frequently, you said?

Ms. Brackett: Yes, I believe it is.

Chair Beach: And SC&A recommended closing it back in 2008. We left it open for comments to allow Mark Griffon, like you said, Kathy. So, gosh, yeah, where does that leave us now? Because we don't have --

Mr. Hinnefeld: This is Stu, if I could speak just a little bit here. I spent some time looking at transcripts of this, and Mark wasn't actually the person who asked for more time to consider whether it should be closed or not. It appears that Mark left that meeting before this discussion came up, because Mike Gibson was the member who said he thought Mark would want to look at this more. Mark never really opined on that.

At the next meeting, Wanda pointed out to Mark that this particular finding had been held for him to opine on, and he said, "Oh, gee, I hadn't realized. I didn't realize that." And so he hadn't done anything at that meeting. That was like an October meeting.

And then the following meeting, which was in December that same year, it wasn't discussed. So it kind of vanished. To me, I don't see any particular reason to keep this open. You know, SC&A recommended we close. No one currently on the board, and even Mark, didn't really have any particular findings, you know, any reason to -- to wait to close that. So I don't see any reason why this shouldn't be closed.

Chair Beach: Okay. I have to agree with you. Is there anything more background that we should review? Paul, were you on the board at -- were you on the Subcommittee at that time, and do you have any comments on this?

Member Ziemer: Well, yes, I was on the board at that time. I don't -- I don't honestly recall the details on that. The only question I would have now is, the nature of the wording in the -- it doesn't make clear what the problem is, other than it says a lot of judgment is required by the reviewer, but is that inherently bad? Or are they saying you could allow that much freedom of judgment to be present?

Ms. Behling: Okay. And this is Kathy Behling again. The wording in OTIB-33 is that it allows for applying a graded approach. And the judgment comes in regarding the category for the individual workers, and they have exposure potential, such as seldomly exposed, intermediately exposed.

And so I believe that's the genesis of the questioning about how much judgment is required for applying this OTIB-33. And it was a more essential or a more important question back at the time when we were under the assumption that this was a procedure that was used to both deny and to compensate. So --

Dr. Mauro: Yeah. Kathy, this is John. I'd like to reiterate that I was surprised to hear that this was only used to deny. I thought it was put in place as a way -- because if you had good information on the operations -- and I recall the way in which it worked, graded, was keyed back to what at that time was called maximum permissible concentrations.

And so I guess -- you know, I certainly accept if it's being used for denial only. That's fine. But I was surprised to hear that.

Ms. Behling: In fact, I believe when it was initially -- and correct me if I'm wrong, NIOSH -- when it was initially published, it was published in order to do best estimate cases, and it was used to compensate.

However, since then, it is no longer -- that is no longer the case. Perhaps there should be a change to this procedure to indicate that this -- first of all, change the title, and then also indicate in here that this is -- this approach is only an efficiency approach that is used to deny. Does that make --

Dr. Mauro: I have to say, in my -- in my opinion, just to give you my -- just as a health physicist, the approach that was taken in 33 seemed to be a reasonable approach for dealing with reality for a best estimate. And it may be certainly claimant-favorable, but not so over the top that one would only limit it to denials. I'm just offering that as a think piece.

Chair Beach: Okay. So I don't know if that helped me, though.

Member Ziemer: Is it still used?

Chair Beach: Paul?

Member Ziemer: Is it still used? Is it still used?

Chair Beach: I thought Liz -- Liz just said it was used.

Ms. Brackett: Yes. It is still used.

Chair Beach: And it has not been updated since this -- this original finding was put in place?

Ms. Brackett: No. It is still Rev 00, 2005.

Chair Beach: NIOSH, Kathy made some comments on changing the name, things like that. Is that something that you would consider, or what -- what is your thoughts on that?

Ms. Marion-Moss: This is Lori. I would say that we can evaluate it and get back with the Committee to determine whether or not any changes are warranted at this point in time in terms of the title or an update.

Chair Beach: Okay. Do you need anything specific from the Work Group or the Subcommittee on that, Lori?

Ms. Marion-Moss: I would say if Kathy can update the BRS reflecting what she said today, and NIOSH will respond.

Ms. Behling: Yes, I can do that.

Chair Beach: Okay.

Mr. Katz: This is Ted. But I guess I'm not clear. It seems like SC&A previously recommended this to be closed, this is just now a question of how we title our documents, not its use or its correctness. So it seems like we can close it and get this off of the Subcommittee's table, because it doesn't seem worthwhile.

Ms. Behling: I guess the only other thing that seems to make sense to me is, even if the title is changed, typically there is some wording put into these OTIBs that it should only be used to deny.

So if it's still being used, wouldn't you think that's something that should be included into the OTIB?

Mr. Katz: Yeah. And just to be clear, I wasn't making any comment about whether -- whatever wording is appropriate to chastise you. That all seems fine. But

the practice isn't a problem, it sounds like, and so that's what I was saying. We still can get this off the Subcommittee's table. We don't need this to carry this thing on.

Ms. Behling: I agree.

Ms. Marion-Moss: I agree as well.

Ms. Behling: The only question I have is, then, how do we follow through to ensure that this --

Mr. Katz: Well, I mean, we're not -- we can make that correction, and we can disclose this to the Subcommittee.

Chair Beach: Yeah. If we're comfortable closing the nature of the finding, I think the rest of it just falls on NIOSH.

Paul, how do you feel? Are you comfortable with closing this?

Member Ziemer: Well, I guess I'm willing to close it. It still puzzles me as to what really is -- the real intent of the finding is, I mean, other than stating -- yeah, there is a lot of judgment here. What they have in mind is somebody demonstrating that -- that reconstructors are correctly using their judgment on dose reconstructions.

But if that's the case, we were looking at that sort of overhaul anyway, right? After Mark's original paper, looking at --

Chair Beach: Yeah. I agree with you. But what I'm seeing in the findings and the reason for closure isn't really clear. I know SC&A, John Mauro, agrees with NIOSH's response, but if you look through the table, there is -- there is nothing attached, so it's very difficult to go back and see what they're actually agreeing to.

Dr. Neton: Yeah. This is Jim. I think this issue has come up in many, many different forms related to using professional judgment and how much exposure

to assign to a person. And we've gone through this -- in the use of the co-worker model, for example, whether you use the 50th percentile or whether you use the 95th percentile of distribution, this is exactly that sort of issue.

And it always comes up, well, is professional judgment involved? And we always say yes, there is, but there's a lot of tools available to the person doing dose reconstruction to use their professional -- in forming that professional judgment decision.

So I think this issue has come up many times, and we've put it to bed numerous times.

Chair Beach: Yeah. And, Jim, I don't disagree with that. I just think the BRS needs to be clearer, so we can follow it, and what was agreed upon and how it was agreed upon, because if you're just going back and looking at the BRS, it's not clear, what SC&A agreed to or the reasons for closure and then leaving it open because we had more questions, but then the questions were never asked. So --

Member Ziemer: Well, you know, if they were saying that dose reconstructors were not properly using the -- or making the right judgments or something like that. A finding that they have to use judgments, to me that's not a finding. It's just -- you know, yeah, they do have to use a lot of judgment. What's the finding there? Are they doing it wrong, or what? That's what I'm wondering.

Ms. Behling: Okay. This is --

Member Ziemer: I think there will be trouble even agreeing that it really is a finding.

Ms. Behling: Okay. This is Kathy Behling, and perhaps I can explain this, because early on I remember when looking at OTIB-33 in different dose reconstructions, in some cases the dose reconstructor would use this graded approach by saying, "Okay. We're going to assume that he only worked half of the employment period that the

individual actually worked."

In other cases, they would -- they would reduce the MPC hours or -- and do different -- they used different approaches. It wasn't consistent the way that it is going without regarding --

Member Ziemer: Yeah. That's what I was looking for.

Ms. Behling: Okay.

Member Ziemer: You know, the timing is really lack of consistency, but that's --

Ms. Behling: Yeah.

Member Ziemer: -- you have to use judgment, but that's -- there's a lack of consistency in how it's used.

Ms. Behling: Yes. I -- early on, I personally saw that in different dose reconstructions, is the approach that was used to grade -- you know, to grade -- apply a grading factor here.

Member Ziemer: Yeah. And, in practice, if you wanted to solve that issue, to close it, you'd have to develop some method for assuring that there is consistency. And I think we've done a lot, not just on this particular document, but overall in finding clear consistency on judgment, you were sort of addressing that anyway, but that's wider than this particular document.

The judgments occur all the time. We've had a lot of discussion on it.

Ms. Behling: And we're addressing that in another -- in another Work Group as well right now.

Member Ziemer: Exactly. Exactly.

Dr. Mauro: Paul, this is John Mauro one more time. Using it only for denial, I understand that the issue can be closed, but I just have a higher level. You see, it seems to me that if you're in a situation where you're making a judgment, and you decide that --

what you want to use, and, remember, you're making this judgment to ensure yourself that you're placing -- you can deny.

It almost opens up a door, well, what do you do when you can't? That puts you into SEC territory. In other words, what is your alternative then? If it turns out you cannot use this, which I always felt was a reasonable way to place a plausible upper bound, given the construct of the overall set of protocols, I guess it's 18 and 33.

Doesn't this open you up to taking one tool out of your box to be able to address issues related to SECs? You no longer can use this as a way to reconstruct doses, only to deny.

So I guess I'm raising just a little higher level question of whether or not you really want to do that to this procedure, which seems to be a perfectly good procedure for reconstructing doses under the right circumstances, and using appropriate judgment.

But to limit it only to denials seems to be doing a disservice to this procedure. I don't know if anyone wants to react to that.

Dr. Neton: John, I think you're confusing what we're doing here. I think you -- this is part of the efficiency process. And I would say it's sort of a better -- best/better/good type estimate situation where you use the efficiency process, and if it's -- you know, you can do a very high estimate, and if a person is not contestable, you're done.

This procedure -- in my opinion, this allows you to do a slightly more refined estimate but not go all the way to a full-blown individual dose analysis estimate and still deny the person. It's a time-saving device.

Dr. Mauro: Okay. And if that's how you plan to use it, that's fine. I'm just saying that it seems to me that it -- you only could use it, though, to deny. And I was surprised to hear that, given that --

Dr. Neton: Yeah. And you've got to look at the timeframe when this was developed. I forget what year it was issued, way back in 2005 maybe, where we didn't have a lot of co-worker models, you know, a lot of the sites weren't fully developed, so I -- I don't know that -- Liz says this is used a lot. I'm surprised to hear her say that because, given that we have full co-worker models of all of these tools developed now, I don't know how often this would actually be used. We can research that a little bit, but, again, this was developed in a timeframe when co-worker models weren't much in existence, and it was still an overestimate but a better estimate.

Dr. Mauro: Okay.

Dr. Neton: And you could deny the process claims, you know, through the system.

Chair Beach: Is this one on the radar to be reviewed or to be -- I guess not canceled, but is it up for reviews coming up?

Dr. Neton: I'm not sure what you mean by "review." It's -- we're discussing that, because it's a SC&A review of the procedure, but --

Chair Beach: No, no. I meant the OTIB to be updated.

Dr. Neton: Well, I don't believe it's on any schedule at the current time.

Chair Beach: I was just curious if it was.

Member Ziemer: Well, I think at this point there is no reason we shouldn't just close this. I don't see what we would do by keeping it open. I mean, what would be the -- what would be the -- what would you be asking for if you didn't close it?

Ms. Brackett: I am being told by folks who know better than I that this is not used a lot anymore. My interest came from people asking me questions. But the people who deal with the dose reconstructors say this is not used extensively anymore.

Member Ziemer: We don't -- we don't lose anything by just closing this item anyway; do we? I mean --

Chair Beach: No. The only thing we could do is ask NIOSH to give us some examples, and I don't know if that's --

Member Ziemer: I don't know if that's worth doing even at this point.

Chair Beach: -- if that's worthwhile either. So I think I am in agreement to close it. Paul and Loretta?

Member Valerio: Yeah. I'm in agreement to just close it. And we're just closing the finding, so, I mean --

Chair Beach: That's what I'm finding in this -- in this TIB.

Member Valerio: Yes.

Member Ziemer: Yes.

Chair Beach: Okay. And we are still discussing judgment and -- so that -- that subject is ongoing. Okay. So we are in agreement to close finding 1 in OTIB-0033.

Member Ziemer: Right.

Chair Beach: Okay. All right. So what is your pleasure? It's lunch time. Do you want to try to go through a couple more or break for lunch? I'm just talking about you East Coasters.

Ms. Behling: This is your call.

Chair Beach: It is not my call. It is 10:00 here. Would you --

Mr. Katz: I'm good with breaking now. I mean, because it's sort of arbitrary, it doesn't really matter the time to --

Chair Beach: No, it doesn't. Okay. So break for an hour until 1:15. Well, 12:15? Yeah. 12:15 east time.

Ms. Behling: If I can just ask David Allen a question. Where can I find a Norton template? If it's -- if it's within a dose reconstruction, can you just email me?

Mr. Allen: I will double-check, but I think Lori attached it to the finding 3.

Chair Beach: She did. She attached it to 3.

Ms. Behling: Okay. You'll find it on finding 3.

Chair Beach: Okay. Very good. Thank you. Appreciate that.

Okay. So we'll break -- so 1:15, is that --

Mr. Katz: Yeah. Sounds good.

Chair Beach: Okay.

Mr. Katz: Thanks, everyone.

(Whereupon, the above-entitled matter went off the record at 12:47 p.m. and resumed at 1:15 p.m.)

PER-59: Norton Company (continued)

Chair Beach: Okay. So, Kathy, let's go back. Did you get a chance to look at the Norton PER-059?

Ms. Behling: Yes, I did. And I did confirm that Finding 2, which had to do with the fact that some of the air samples were in the residual period, not all of them were from the operational period, was text added to a paragraph saying "operational and post-operational period just samples were used". And so, that corrects that finding.

And the second finding had to do with a miscalculation of the long-lived alpha emitters, and that was corrected by making changes to all of the inhalation and ingestion values in the annual uranium intake rates during the residual period table. So, I did confirm that, our findings, which that was addressed.

Chair Beach: Okay. So it's clear, then, we've already closed 1. If there is any discussion, of course, we can

have that. Finding 2 and Finding 3, I estimate that those can be closed also, based on the addition to the template for Norton, is that correct?

Ms. Behling: That's correct from my perspective.

Chair Beach: Okay. Any discussion, Paul or Loretta?

Member Ziemer: None from me. It looks fine.

Chair Beach: Okay. And then, we will address OTIB-88 at a later timeframe. I think, Kathy, you already have that as a recommendation to review?

Ms. Behling: Yes, I do have that recommendation, and I think we'll discuss that a little bit later also.

Chair Beach: Okay. Sounds great. So, we are closing all three findings with PER-059.

TIB-60: Internal Dose Reconstruction

And then, the next one we're looking at is OTIB-60. We discussed that this morning. It's part of that group that NIOSH sent over with the transfers.

Ms. Behling: Correct.

Chair Beach: This version was posted on October 24th. I don't know if you've had a chance to look at that, Kathy, or if you need to read that.

Ms. Behling: I have looked at that. When I was preparing, I realized that there was a new version available.

And OTIB-60 is an internal dose reconstruction OTIB. And the finding, what it boils down to, the finding really had to do with some confusion with terms that were being used and an inconsistency in terms, such as "better fit," "reasonable fit," "satisfactory fit," and some of the descriptions that were used to describe measurement errors. And it was recommended that maybe we be a little bit more consistent and use terms such as "underestimation," "overestimation," "best estimate". And I read through the new OTIB,

and all of those changes have been made and everything seems to be much more clear.

Chair Beach: Okay. So, is that a recommendation, then, to close Finding 2?

Ms. Behling: Yes.

Chair Beach: Okay. Any discussion?

Member Ziemer: Agree to close.

Member Valerio: I agree to close, Josie.

Chair Beach: Okay. And this is Josie. I also agree to close.

Mr. Katz: Yes, I think it's an observation rather than a finding to close, but yes.

Chair Beach: Okay. And I will change that to observation also.

Ms. Marion-Moss: Josie, this is Lori. I can't hear you. You sound faint.

Chair Beach: Okay. I'll put the phone closer. Is that better?

Ms. Marion-Moss: Yes, that sounds better.

Chair Beach: Okay. Thanks for letting me know.

Ms. Marion-Moss: I also have a question. Kathy, will you be closing these in the BRS?

Ms. Behling: Yes, I was planning on it, unless you prefer to do that.

Ms. Marion-Moss: No, I do not. Thank you.

Ms. Behling: Okay.

Chair Beach: And before we move on, Kathy, if you go down to 0060-06, it doesn't say "closed". It actually says, "addressed in finding," and that's an unusual term. So, is that something we need to

change or address?

Ms. Behling: What happens sometimes is that we identify a finding that is discussed in more detail maybe in another finding. And it actually may come across as being two separate findings, where it should have been maybe one.

In this particular case, if that is saying "addressed in another finding," I'll change that, but I will make this closed.

Chair Beach: Okay.

Mr. Katz: Yes, there are a few of those, Kathy.

Ms. Behling: There are a few of those in this OTIB?

Mr. Katz: Well, not necessarily this OTIB. I just noticed in some outgoing materials that there were a few of those.

Ms. Behling: Yes, early on, that happened more frequently than it does now.

Mr. Katz: Yes, yes. Okay.

Chair Beach: Okay, and we can address those as we go. Or if you just get bored someday and you want to just go through this -- anyway, I'm just kidding.

(Laughter.)

Okay.

PR 3: Performing and Reporting Dose Reconstruction

Ms. Behling: Good. And then, if we want to move on, next on the list is OCAS-PR-003. And again, this was an older document. We looked at it back in 2005. And the procedure is actually performing and reporting dose reconstruction.

Now the finding was that the procedure is ambiguous regarding individuals who are responsible for the various steps in the dose reconstruction process.

Again, this procedure has been cancelled, and the information in this procedure was superseded by PROC-6, which is the external dose reconstruction procedure. And we had looked at that, and we felt that our concerns about the ambiguity were addressed in PROC-6.

Now, I will make mention that OTIB-88 that we've just been discussing about, that is going to make this PROC-6, the external dose reconstruction turn from a procedure into an OTIB. And so, I'm not sure what other changes were made in that, but it includes updated dose reconstruction approaches and also mentions that the change from the PROC to the OTIB includes comments submitted by the Subcommittee on Procedures Review.

So, again, I'm thinking that perhaps OTIB-88 would be recommended for us to look at or for someone to look at.

Chair Beach: Okay. Is that something that can be done prior to February?

Ms. Behling: I would think so, yes. I think this is going to be -- we're familiar with the PROC-6 and, also, PROC-60. And so, I don't think that should be a difficulty to review.

Chair Beach: Okay. I'm going with tasking that, Ted. Is there any reason why we shouldn't?

Mr. Katz: No, no, that's fine. It's not really a whole new review at all.

Ms. Behling: Correct.

Chair Beach: Okay, so be it.

And then, any discussion on closing the finding out on PR-003, Finding 1?

Member Ziemer: Well, I agree that we should close it. The document has been cancelled anyway, but in the record we should show that closed, I guess.

Chair Beach: Okay. And, Loretta, if you have no concerns, we'll consider this closed.

Ms. Behling: Okay, it's closed.

Okay. Then, moving on on the agenda is ORAU Report 0078, Technical Basis for Sampling Plans. And this is Ron Buchanan.

RPT 78: Technical Basis for Sampling Plans

Dr. Buchanan: Yes, this is Ron Buchanan, SC&A.

And Report 78 was Technical Basis for Sampling Plans. This was the method that NIOSH proposed to use to sample different databases. And they had some details in it. And then, we reviewed it. We did not add any findings. We discussed this here in a previous Procedures Work Group.

We did find that the method did have fixed parameters and variable parameters. The fixed parameters was the total populations that you're going to sample from and the total number of picos in the population.

So, what this is looking at is seeing, when you transfer it from, say, hard copy or some known good copy into an electronic database, then you go back and you sample to see what the error rate was on transferring your data in, typing it into the electronic database, because most of your original data is not in computer-readable form. And so, it's prone -- you know, there could be some errors. And what is the acceptable rate? And then, it tells you how to determine what your rate is in the sample and, also, what sample size you should take to confirm a certain risk.

And what we wanted to point out in that was that there are fixed parameters, which is total population, and the number of picos in that transformation. Now there are some variables, which is the producer risk, consumer risk. The producer risk is how many is likely of identifying problems that weren't there, and

consumer risk is lacking data that should be there, and what your acceptable error rate and what your unacceptable error rate is. And then, this gives you some derived or observed value.

And so, that's essentially what the report does, and I won't go through that because we've covered it before. And there was an agreement, except at the end of the discussion the Work Group had requested that NIOSH provide some followup on supporting the data of why these values were chosen, such as the producer risk and the consumer risk was chosen at 2.5 percent. The acceptable error risk was at half a percent. And the unacceptable error risk was 1 percent, I believe, for the critical fields and 5 percent for all fields.

And so, SC&A really wasn't tasked for anything. I used it to give some background because it's been a while since we visited it.

So, I guess at this point, did NIOSH come up with any further information to support the values they chose for the variable parameters?

Mr. Hinnefeld: Jim, are you prepared to talk about that one?

Dr. Neton: Yes. We looked around. We could not -- I thought the idea was, was there any guidance out there that we could hang our hat on that would help us with validating the parameters we used? And we didn't find any.

But I also sense that Ted polled David Richardson on this issue, and he was not aware of anything, either. So, we came up dry in response to this task. There doesn't appear to be any previous relevant guidance out there, standards or otherwise, that we can rely on to support the values that we use, although they are pretty conventional, 1 percent, 5 percent-type values. And I actually picked the 1 percent value for the critical level, the critical values, and the 5 percent for all the other data, which made intuitive sense to me.

Ted, am I right on that that you polled David Richardson on this?

Mr. Katz: Jim, you're exactly right. And I think I distributed around to the whole Subcommittee, although Loretta wasn't on there at the time, David Richardson's response that he wasn't aware of anything.

I mean, there's no benchmark out there except, as Jim says, these are pretty customary levels for other things, but not for the same kind of cooker.

Chair Beach: Yes, I do remember the email that went out.

Mr. Katz: Sorry, Josie, what?

Chair Beach: I said I do remember the email and the answer that came back. So, where does that leave us then?

Mr. Katz: Well, I think this is a matter where there's nothing more to do. There's no sort of example out there to use as a benchmark. NIOSH is creating a benchmark --

Chair Beach: Okay.

Mr. Katz: -- I think. I mean, it's up to you guys, but there's not much more you could do.

Chair Beach: Okay. Paul, Loretta, any comments, questions?

Member Ziemer: Not really. I think I'd have to follow Jim Neton's approach. It's somewhat intuitive, and in the absence of sort of a standard way or some standard values, you're making a judgment on what seems to make sense. And you could select some other slightly different numbers, but I guess these are as good as any you could think of for the situation.

Chair Beach: All right. This may fall under professional judgment.

Member Ziemer: I think, yes, in a real sense, that is, is it reasonable? Is it a reasonable value to use? If not, why not?

Chair Beach: Right. Okay. Any other discussion?

(No response.)

I think we can formally close this. There's not actually any findings, but are you in agreement with that?

Member Ziemer: How does it appear in the matrix? Does it appear as a finding?

Chair Beach: No, uh-uh.

Ms. Behling: No, uh-uh.

Member Ziemer: Well, because this is an observation, right.

Chair Beach: It just is insinuated in the RPT-0078 and did not have any specific findings in the sampling plan and estimates a value -- an evaluation report was attached. So, this is a little unusual. I mean, I haven't dealt with one that's not a finding.

Mr. Katz: Well, it's not a finding because the Subcommittee raised its questions.

Chair Beach: Right.

Mr. Katz: But it wasn't a finding because there's no, really, discrepancy or obvious problem per se, except the question of -- it was a followup request basically.

Chair Beach: Right.

Member Ziemer: Yes, I was just asking, how do we enter it into the system?

Mr. Katz: So, I think you want to just record in the BRS that, like we consulted outside, like David Richardson on the matter, and neither the program nor David are aware of any existing standard for these levels for this sort of program. And that will be it, right?

Member Ziemer: And that the Subcommittee agrees that we should proceed with the values that NIOSH has recommended.

Mr. Katz: Yes, something like that, that you consider it reasonable, whatever.

Member Ziemer: Yes.

Ms. Behling: Okay, I can update the BRS with that information.

Chair Beach: Okay, it sounds great.

Ms. Behling: Okay. And I guess we can move on, then, to DCAS-PER-55, which is TIB-6000. And again, that's Ron.

Dr. Buchanan: Okay, yes, this is Ron again.

Dr. Mauro: TBD-6000, Putzier effect.

Dr. Buchanan: Yes.

Dr. Mauro: Oh, Ron, do you want to take it? Okay, because I wrote a report on that. I thought it was mine, but if you want to take it, it's all yours.

PER-55: Cases A and B

Dr. Buchanan: No, John, I want you to do the Putzier effect.

Okay. There's two parts to this. No. 1 was that we reviewed two cases, and we had a question on the cases. And then, during the discussion, the Putzier effect came into question. And then, I'll let John take care of it.

So, Part A is the cases. Now, PER-55 was issued in September of 2014, and it was changes to TBD-6000. And so, we were assigned two cases and re-reviewed those cases. One worked at Hunter Douglas Aluminum Corporation, and another one worked at B&T Metals. And so, these were in the early years.

And we went through, and the one in B&T Metals, we

found out there was no changes to the internal dose, only the external dose. So, it didn't really apply. But those are the only cases NIOSH could find to supply us with. And so, we really just evaluated the first case.

And we didn't find any problems with it. We just had the question that it was less than 50 percent when they started, and they used a constant distribution for the internal dose. And then, when they reworked it, they used a -- let's see, I want to make sure I get this right. They used a log-normal distribution for the internal dose, and then, reworked it; they used a constant. And it went over 50 percent.

And so, we reworked it both ways. We got the same values they did and everything, but we had the question. It was, why was this done differently? And we presented this report previously, and NIOSH was supposed to get back with the Subcommittee here to explain the differences in those two internal dose distribution assignments.

Mr. Allen: This is Dave Allen. I'm ready to discuss that a little bit here.

As I recall from the last meeting, I mean, we stated that the original dose reconstruction doses were put in as a constant, and that was in error. As I recall from the last meeting, it was the Subcommittee wanted us to go back and make sure this was not a systemic error, that it was simply isolated to this one case.

And I could tell you what I've done to try to do that. I started by looking at other cases for that particular site, since often we will take the last claim done for that site and use that as a starting point for the next claim. As it turns out, there's only one other claim from that particular site, and that dose reconstruction was done after the case in question. But I looked at this one, and it was done correctly. It used a log-normal distribution with a GSD of 5.

So, then, I looked at the case in question and the

actual IREP input sheet. You can see in parameter 2 that they actually, that the dose reconstructor actually put in a GSD of 5 in there, but failed to change the distribution type from a constant to a log-normal. So, it was not used, that 5 was not used by IREP.

So, you can kind of see just from back that it wasn't a misunderstanding. They understood what was supposed to be done, and it was a simple error that they didn't change the distribution type.

I, then, went one step further and I looked at all the cases from this PER, and there were several hundred. And every time I opened one up, many of them were some prescriptive dose reconstruction technique from an appendix or a TBD that this situation doesn't really apply to. It had its own distribution.

So, the best I could do was I ended up just randomly checking about 10, until I found 10 that were supposed to be a GSD of 5 with a log-normal distribution, and the first 10 that I randomly came across that were supposed to have something like that did, indeed, have a GSD of 5. So, I don't think I can say definitively that no error has ever occurred before, but I can say pretty certainly it's not a systemic issue. It's not something that's carried forward over and over for this site or for this particular type of dose.

Dr. Buchanan: Okay. That's reasonable. I'll turn it back over to the Subcommittee to make a final decision on it.

Member Ziemer: Was there anything in the guidance that's a problem? Because the finding is to address the guidance.

Mr. Allen: Well, to answer your question --

Member Ziemer: Whether or not the guidance is correct is a different thing than whether or not people used it correctly.

Mr. Allen: Right, and the guidance, I don't think there was any problem with the guidance. And like I said, looking at this particular case, the dose reconstructor realized it was supposed to be a log-normal with a GSD of 2 because he changed the GSD to a 5 -- I'm sorry. It was supposed to a log-normal with a GSD of 5, and you can see where he changed it to a 5 in IREP. He just forgot to change the distribution type.

Member Ziemer: Right.

Mr. Allen: So, he apparently understood what it was supposed to be. So, I don't think there's a problem with the guidance.

Dr. Neton: Yes, Paul, this is Jim.

The Finding 1 listed, talks about guidance on how to use the Putzier effect, and I think that's a different issue that's going to be talked about next.

Member Ziemer: Say that again, Jim? I missed what you --

Dr. Neton: Well, if you're looking at Finding 1 under --

Member Ziemer: Yes.

Dr. Neton: -- the findings under PER-55, Finding 1 is a different issue, when it talks about guidance, on the Putzier effect.

Member Ziemer: Guidance on when and how to use it, right?

Dr. Neton: Yes, that's different than what Dave just talked about with the --

Member Ziemer: Yes, that's why I was asking the question.

Mr. Allen: Oh, I'm sorry, that's actually Finding 2.

Chair Beach: Okay, and it sounds like, Dave, you went back and looked at, randomly looked at 10

other cases and didn't find that same issue? That's correct? That's what I heard, right?

Mr. Allen: Right, that's correct. I couldn't find any indication it's a systemic issue.

Chair Beach: Yes, it sounds like a simple error.

Mr. Allen: Yes.

Chair Beach: Okay, I'm okay with that.

Loretta?

Member Valerio: I'm fine with that.

Chair Beach: Any other questions, Paul, on that, or are you okay with that?

Member Ziemer: No, no, I just wanted to clarify that we understood, if we're closing the finding, we're closing the finding that relates to the guidance, which, in a sense, turns out the same, because you looked at, Dave looked at how it was used. It was consistently used. So, that implies that people knew how to use it correctly. I guess it does.

Chair Beach: Correct, yes.

Member Ziemer: I'm just wanting to make sure that, when we close it, we're closing what we think we're closing.

Chair Beach: Okay.

Member Ziemer: I'm good on it, though.

Chair Beach: Yes, and then, Ron, did you go over Case B yet?

Dr. Buchanan: Well, Case B, yes, we covered that previously. It was one that didn't have any changes in internal. It had a change in external. But PER-55 was only concerned with internal. So, we had no findings, but didn't verify much.

Chair Beach: Yes, that's where my question came up.

So, we originally asked for three. We did two. Is there an opportunity to do another case or will that do?

Dr. Buchanan: Well, I think that in this particular situation they found only one that even halfway qualified. They found one we reviewed and a second one didn't have any internal. So, I don't think there's any other -- NIOSH has to speak to that. If I recall right, that's the way it was.

Chair Beach: Yes.

Dr. Buchanan: And then, during the discussion last time, the Putzier effect came up. And then, I'll let John Mauro address that.

Chair Beach: Yes. Okay. Before we move on, because that's the next item, are we in agreement to close the Subtask 4, this first item? Because there's two listed here, but the first one has to do with Subtask 4 that's the case review. The second one has to do with the Putzier effect. So, I'm asking if we are ready to close the first.

Mr. Katz: So, you just need to hear from Loretta. Paul already answered.

Chair Beach: Yes.

Member Ziemer: Which? Are we talking about 60 now?

Chair Beach: No, this is 65. So, we had the first -- the first one is the Case A and Case B in subpart 4. And then, the second item, which we haven't discussed yet, is the Putzier. So, I was questioning whether we were okay to close the first item, which the two cases that were reviewed.

Member Valerio: Right, and I believe that they're ready to close.

Chair Beach: Okay.

Member Valerio: The explanation was pretty good to me.

Chair Beach: Okay. So, that one is now closed.

COURT REPORTER: Speaker, please identify yourself.

Chair Beach: Are you talking about me, Josie, or Loretta?

COURT REPORTER: Loretta. Thank you.

Chair Beach: I think he wants you to identify yourself, Loretta.

Member Valerio: Oh, sorry. It's Loretta.

(Laughter.)

And I agreed to close Finding 1, the first finding with the case reviews.

Chair Beach: Okay. And Paul said, yes, he's okay close, and I'm okay to close. So, the first one is closed.

And then, we can now move on to the second, which is the Putzier effect. And I believe John's going to take that on.

Dr. Mauro: I'd be glad to, if we're ready to go with that.

Chair Beach: I think we are. Thanks.

TBD-6000: Addressing Putzier Effect

Dr. Mauro: Okay. Yes, one of the issues associated with the cases, it's often referred to as the Putzier effect. It's sort of an enigma, but let me give a brief background.

These individuals working at these old AWE facilities often handled uranium at uranium conversion facilities and uranium metal handling facilities. And the last time we talked about this case was, I guess, January 2017, and Ms. Marion-Moss explained that we had a concern with the way in which the external dose to the skin from the metal, the uranium, was calculated. And the concern had to do with this very

unique circumstance called the Putzier effect, which could substantially, if that effect is in place when they're handling the metal, the uranium metal, could substantially increase the dose to the skin.

As you know, we're seeing a lot of cases these days where the skin is the issue, cancer of the skin, for a variety of reasons, but mainly because skin cancer is excluded from SECs. So, we're actually doing a lot of cases that deal with skin cancer.

It turns out there is this unusual phenomenon called the Putzier effect. When metal, uranium metal, is melted and put into billets, slabs, rods, for various machining into fuel and handling, it turns out that, for reasons that I won't get into now, unless you would like to talk about it, what happens is the melted uranium put into a mold, it very often will have its short-lived daughters present at the time of the melting. That's primarily thorium-234, and it's a strong beta emitter.

And that's all fine because the thorium would be sort of like uniformly mixed in the melted uranium and we understand that. But it turns out, for a short period of time, on the order months after that uranium is melted and molded into a particular form for further handling, the thorium-234 migrates and finds itself near the external surface of the metal, whether it's a metal slab, an ingot, a rod.

And it substantially increases the beta radiation field, and perhaps even the gamma, but I'm not going to get into that now. Right now, the literature is very strong saying that, yes, you can have a 10- to 20-fold increase in the external beta radiation field in the vicinity of these recently melted uranium ingots and rods. It has to do with the cooling process and the thorium sort of migrates during the cooling process. As the uranium cools after it's melted, it migrates to the near-surface. And it stays there for a while. It decays with a 24-day half-life.

So, what happens is, after a few months, that sort of like unusual circumstance goes away, and the

uranium is just like any other uranium, where its short-lived daughters, thorium-234 and the protactinium, are there in equilibrium with the uranium-238 and other uranium. And you're dealing with this conventional uranium.

Now, given that as background, so the Putzier effect is this unusual circumstance that lasts for a few months after melting uranium where the radiation field is elevated substantially, 10 to 15 times higher. And if a person is handling the uranium at that time and is close to the uranium at that time, the radiation exposure that that individual would receive would be 10 to 15 times, for the skin, higher than, let's say, after the Putzier effect sort of goes away because the thorium decays away near the surface, and we go back to a normal situation.

Now, during the last meeting on January 6th, 2017, there was a considerable discussion of this issue and what do we do about it. Because it's an issue that could have a substantial effect on how we reconstruct the doses to workers. And bear in mind, this would be workers where they're not wearing film badges. Okay? You know, the open window/closed window film badge. Because if they were, you would know if they were experiencing some elevated exposure to beta emitters because you would read it.

But, very often at these old AWE facilities especially, they weren't issued badges. And when you have that circumstance, then you have to try to reconstruct the workers' doses based on models, understanding what he is handling, what the material is, his proximity to it, and how long he may be in close contact or close to the metal. Because the beta emitter itself, you know, doesn't have a great range. It will go out a meter in air.

So, a person, if it's like a meter or closer, or actually in contact with the metal, in that relatively short time period for a few months after the metal is freshly melted, is going to experience substantially higher doses than when the Putzier effect is not present.

Okay. I wrote a white paper on this dated October 19th. I'm not sure if it's been distributed. It basically goes into this issue. The bottom line is I think we still have a problem, and let me explain why.

An argument is made during the January 6th, 2017 meeting that -- well, what happens is, when you have a circumstance where a worker is working with uranium, and you don't have film badge data upon which to estimate his external exposure, you resort to a generic protocol called TBD-6000. It's in widespread use. It's been thoroughly reviewed, and it's an excellent document.

And it basically gives you what exposure rates, rad per year, from beta and gamma exposure individuals might experience based on mathematical models that understand, that demonstrate what the -- this is a physics problem. This is the exposure a person would experience in rad per hour, and assuming how many hours per year he works, you could figure out rad per year to the skin and to the whole body or any organ.

Now the argument was made -- now this particular case, this one case that we're talking about as part of PER-55 -- the argument was made that, well, yes, they drew upon TBD-6000 to reconstruct the skin dose. And the issue that was raised was, well, did you take into consideration the possibility of the Putzier effect? That is, maybe -- because when you go to the lookup tables in TBD-6000, when you draw upon that, it doesn't explicitly take the Putzier effect into account. It just assumes you've got melted uranium with its short-lived daughters in equilibrium throughout the metal.

But the argument was made at the January 6th, 2017 meeting, and in the transcript it's described. This is considerable discussion on pages 14 through 40 regarding this matter. And the argument is made that, well, the lookup tables that you use in TBD-6000 when you don't have film badge data and you have to resort to this generic analysis that has widespread applicability to many, many facilities, you

could draw upon that and reconstruct the doses. And the default values that are tabulated in Table 6.4, and the way in which they are used, is conservative, and conservative enough, bounding enough, to take into consideration the Putzier effect. And, well, that's the argument that is made. And so, as a result, we don't have to worry about this.

I have to say I don't agree with that conclusion. Let me explain why. When you look at TBD-6000, it basically is based on these models, MCNP models, that say, well, the beta radiation dose rate by contact is about 230 millirad per hour. And that's from uranium and its progeny, mainly thorium-234, in equilibrium, uniform throughout the slab or the rod.

And it's that assumption that's built into the lookup tables in TBD-6000, along with the assumption that a person would spend about 50 percent of his time in close proximity or in contact with the uranium, and therein lies how you get the values that are in the lookup table in Table 6.4 of TBD-6000.

And now, in my mind, that would actually, if you had a uranium slab without the Putzier effect, and you, in fact, spent half your time in direct contact or up close to the uranium, yes, the values in table in TBD-6000 would be great and claimant-favorable. But, if you click in the Putzier effect -- let's say it turns out the person that's actually handling it is receiving and working with metal that is experiencing the Putzier effect. And as I said, this occurs over about a three-month period after the metal is melted and formed. The exposure rate would be 10 to 15 times higher from beta emitters than the values as reported in TBD-6000.

Now the argument that, well, there's enough conservatism -- and I'm presuming, and please correct me if I'm wrong -- that that conservatism is embedded in the amount of time the person is in proximity. For example, they are assuming 50 percent time the person may be in direct contact or close up and personal, close within a foot or a meter,

of the uranium. And it doesn't take any credit for the fact that maybe the worker might be wearing gloves that could actually shield the beta.

But what I'm saying is that that exposure rate would be, under those circumstances, 10 to 15 times higher. And it's clear that there's really nothing about the way in which they develop the exposure rates there in the lookup tables in TBD-6000 that account for that, unless you want to argue that the 50 percent of the time in close proximity or in contact with the slab, or whatever, is so conservative that it accounts for the Putzier effect. But I don't think it does.

In other words, that would mean the person would be in close contact with it for about an hour a day, as opposed to four hours a day. So, the argument that built into TBD-6000 is enough conservatism to account for the Putzier effect is not convincing to me.

In this report that we prepared on 10/19/2018, it describes all that. In fact, there's a very nice attachment that was provided to that SC&A report that Bob Anigstein and Dick Olsher prepared a number of years ago, where they ran the Monte Carlos to see, well, what do we believe to be the external exposures from beta and both gamma and Bremsstrahlung, as a function of contact, as a function of distance, from different geometry materials where there is no Putzier effect. And our numbers show that they are in very good agreement with -- reasonable agreement -- with the lookup tables in TBD 6000. But it's clear that they do not account for this 10- to 15-fold higher beta exposure rate that you would experience during those time periods when the Putzier effect might be in place.

So, we sort of have a little bit of a dilemma. It's hard to say if you're at a given uranium conversion or uranium-handling facility whether or not the circumstances exist where the worker is actually handling, just this window of time of several months where the Putzier effect could very well be in effect, whether it was there or not.

And so, unfortunately, we had a circumstance where this is a big difference in the dose, the dose rate, to the worker, but it would only occur under certain circumstances. And I believe, looking at a lot of AWE sites, that it's not easy to determine whether or not the worker himself was in that, happened to be handling uranium metal that was experiencing the Putzier effect.

So, in a way, we have ourselves a bit of a dilemma. It's not an insignificant effect, but it only occurs under certain circumstances. And so, I don't think we've really adequately aired out -- and I do believe that the current numbers in TBD-6000 are not conservative enough to account for the Putzier effect. And that's the position I take, I'm taking, SC&A is taking. And it's all written up in this White Paper dated 10/19/2018. So, as far as I'm concerned, we've got a little bit more to talk about.

Mr. Allen: John, this is Dave Allen. Can I reply to that?

Dr. Mauro: Please do.

Mr. Allen: I haven't seen that White Paper. I didn't see anything about it. So, I wasn't really ready for this conversation. But I seem to recall we did discuss this in the TBD-6000 group. As I remember, the winning argument here was not so much the median dose that you're discussing, and like to discuss a lot, but it was the fact that it's entered as a log-normal distribution with a GSD of 5, which makes the 95th percentile almost 15 times the geometric mean, which puts it right in where you're talking.

Dr. Mauro: No. The GSD of 5 puts all these runs for the external doses in TBD-6000?

Mr. Allen: Yes.

Dr. Mauro: So, the lookup table --

Mr. Allen: Is a geometric mean.

Dr. Mauro: Okay. And there is the application of a

GSD of 5?

Mr. Allen: Yes.

Dr. Mauro: I have to say, if that's the case, then I have to agree with that. See, I didn't see that in any of the transcripts. I went back through the transcripts and did not see any explanation of that, that that was the basis for it. I thought the basis for it was the contact time, which was not acceptable to me. But, if you have a GSD of 5 as being applied across the board to all of these TBD-6000, then, as far as I'm concerned, the issue is resolved.

Mr. Allen: Yes, it's easy to verify --

Chair Beach: Oh, go ahead, Dave.

Mr. Allen: I'm sorry. I was going to say it's easy to verify. Just looking at TBD-6000, you can see that it describes or it calls for a GSD of 5.

Dr. Mauro: Okay, let me look at it. I opened it and I read it, and I may have a little egg on my face because I did read it and I didn't see the GSD of 5. Could you point out to me where that is?

Mr. Allen: I'll have to open it up and give you the page number in a few minutes. I can email you.

Dr. Mauro: Oh, that would be great. Because if that's the case, then, you know, what I did is I read it. I read TBD-6000 and I read the transcript, and I have to admit that I did not see -- I see the lookup table, Table 6.4, but I didn't see language of GSD of 5 in the text. I very well could have been missed it. But, if you point that out to me, this is problem is solved.

Chair Beach: Okay. So, when Dave is looking that up, is there some way we can have that White Paper added onto the BRS, the 10/19, I think you said, '18 White Paper? Or what was the year?

Dr. Mauro: Oh, yes, I wrote it dated October 19, 2018. It's relatively recent.

Chair Beach: So, can we get that added to the BRS? And then, with John looking up, after Dave finds the page number, and then, have that written up, that we can make that official if John agrees that that can be closed? And then, we can come back to this.

Ms. Behling: I can certainly add that to the BRS.

Chair Beach: Okay. It's just nice to have it in one spot.

Ms. Behling: Absolutely.

Chair Beach: Okay. And then, can we go ahead and move on while you're doing that, John, unless there's some discussion? I don't want to -- if Paul or Loretta have any questions on this?

Member Ziemer: Well, let me just make two comments. Number one, I'm pretty sure we went through all of this before. I don't know if it was with this group or one of the other Work Groups, because we had a lot of discussions in the General Steel Industries when we were talking about this effect. And I think the same discussions took place. Josie, you're on that. You recall that, too?

Chair Beach: I do recall.

Member Ziemer: I think we had all come to a resolution on that.

The other thing, just some housekeeping things here, I just want to make sure I'm in the right spot. So, on the issues resolution chart that we're using on TBD-6000, where are we? Where are the two --

Chair Beach: We are on PER-055, and then, it's the TBD 6000.

Member Ziemer: Yes. Yes, but, then, you're talking about these two cases?

Chair Beach: Yes, that was on the BRS. So, that was subpart 4.

Member Ziemer: Okay. I'm not seeing it on the chart here.

Chair Beach: It's not.

Member Ziemer: Okay.

Ms. Behling: Yes, I apologize.

Member Ziemer: I was just trying to see if you had dumped it somewhere that I had lost track of. Okay.

Chair Beach: The chart is helpful, but the BRS is --

Member Ziemer: Yes.

Chair Beach: -- you need to kind of follow that.

Member Ziemer: Yes, yes. I don't have the BRS open right now.

Chair Beach: Yes.

Member Ziemer: Okay. I'm good.

Chair Beach: Okay. Loretta?

Dr. Mauro: Dave, this is John. I think I found the place where I saw -- I see a bit of the reason why I was thrown for a loop on this. On page 37, there's a couple of statements made. One does refer to a GSD of 5. It, in another part, discusses specifically using something in Table 6-4. And this is where I was not -- I went to Table 6-4 and you're supposed to use those values. But there is another statement above it that talks about GSD of 5, and therein lies the reason for my perhaps misinterpretation of its use.

So, what I'm hearing from David is that, when you make your runs and you put in the annual exposure rate in the column of the GSD, you guys always insert a value of 5 for a log-normal distribution.

Mr. Allen: Yes. Just I was going to say, it was page 37 where I was going to point to.

Dr. Mauro: Yes, yes.

Mr. Allen: And it says, for each annual dose -- and it's describing the table, what you do with it.

Dr. Mauro: Yes. It's the paragraph that follows that threw me.

Mr. Allen: I don't see anything in there about distributions.

Dr. Mauro: Yes. Right. No, you said "data and table that should be used," and I just went to that.

Mr. Allen: Yes, the sentence before that, it says each of those --

Dr. Mauro: Yes. Yes, it does.

Mr. Allen: -- should be in a log-normal --

Dr. Mauro: Yes, it does. And that's why I just asked the question. So, if we were to look at the runs, there would be a GSD of 5 under column parameter 2.

Mr. Allen: Right. That's what you're going to see. And this will be for extremity dose at the particular issue, but you're going to see that with the other external doses, too.

Dr. Mauro: Right. I'm with you. Okay. That being the case, I stand corrected.

Chair Beach: Okay. So, that takes care of this issue then, this finding?

Dr. Mauro: Yes.

Chair Beach: Okay. So, if we go ahead and add that where John wrote up on 10/19/18, and then, final comments, I would say we can close this, unless Loretta has any other comments.

Member Valerio: No, I don't have any comments. I was actually looking at the same table --

Chair Beach: Okay.

Member Valerio: -- to verify that. But I think, yes, I

believe that we basically close it at this point.

Chair Beach: Okay. I would say that is closed.

Okay. Thank you. Are we ready to move on to PER-49, the Paducah cases?

Ms. Behling: If so, that would be, again, Ron Buchanan. And can I also ask Rose to pull up the PER-49 report on the screen? Because these are case reviews and we have to be cautious about how much information we divulge.

Chair Beach: Right.

Ms. Behling: Ron, whenever you're ready?

PER-49: Paducah Case Reviews

Dr. Buchanan: Okay. This is Ron Buchanan again.

PER-49 was changes in the Paducah Gaseous Diffusion Plant TBDs. And this was issued, PER-49 was issued in August of 2016. And so, we were tasked with doing the Subtask 4 review of cases. We recommended that, since these were external doses -- now what these were were revisions in the medical, TBD-3; environmental, TBD-4, and external, TBD-6.

And so, we had four recommendations there on page 6 and 7. Criterion 1 was to have a default X-ray frequency assigned sometime between 51 and 73. External dose -- environmental dose assigned for some years. Criterion 3 was increase in neutron dose, and Criterion 4 was technetium-99, external dose assigned.

Well, NIOSH went through the cases that were involved that were impacted by this PER and could only find one case that would satisfy part of Criteria 1. That was a default X-ray frequency assigned during a certain period, and they didn't have any with non-smokers. So, part of Criterion 1 and Criterion 3, which was increased neutron dose. Did not have any with assigned environmental dose because they were

assigned other doses, assigned an environmental dose in this case, and did not have any technetium-99 assigned because of the organ being deeper in the body, and so it wouldn't impact it.

So, we had one case that partially fulfilled what we would have liked to have seen. And so, we reviewed that case. That case was for a worker that at the Paducah Gaseous Diffusion Plant, worked in the early years of operation. And we looked at the case and we looked at the previous original total doses assigned and the new doses assigned, found out there was an increase in assigned dose in the internal. And some of the external doses were reworked using the newer criteria. And so, some of the doses decreased. Now the overall POC increased, but it did not change the outcome in the case.

And so, we went through the changes that the PER recommended and TBD-3, and find that there was some external X-ray doses assigned in the rework. And we recalculated those values and agreed with the IREP dose assignment. So, I had no findings there.

TBD-4 was not used since the worker was covered by other dose assignments. So, that was not involved.

And then, TBD-6, there was an increase in neutron dose. SC&A went through and recalculated dose and found that they were correct and agreed with the reworked dose reconstruction. And we gave examples in the report there on pages 9 and 10.

We also looked at the technetium-99 dose, external dose, and found out that it shouldn't have been assigned because of the location of the cancer in this case. And so, we agreed that was approached correctly.

So see on page 11 of our report, part of the criteria was met using what we would have liked to have seen. We reviewed the case and found that it was reconstructed in accordance with PER-49 and had no findings in this case.

So, that's a presentation of our report and open for discussion.

Chair Beach: Okay. Thank you, Ron.

Is there any discussion on this?

Member Ziemer: Well, I have no questions on this one.

Member Valerio: I have no questions on this one.

Chair Beach: Okay. It seems pretty straightforward, and I agree.

I don't have any questions for you, either, Ron. Thank you.

Do we agree that we can conclude that this was done correctly and we can close it, although there's no findings, but --

Mr. Katz: Right. You could just write in the BRS that the Subcommittee accepted the report.

Chair Beach: Okay.

Mr. Katz: Yes.

Chair Beach: All right. And we can move on to 60, PER-60.

PER-60: Blockson Case Reviews

Ms. Behling: Okay, that's mine.

PER-60, again, this is Subtask 4. It's case reviews, and it's Blockson Chemical Company.

I'll start by going to page five and just give you a little history as to the PER that had been generated prior to this and how it impacted what we did in this case.

PER-20 was issued back in 2007. And we reviewed that PER and we were also assigned two cases to rework. During the review of those two cases, we had

three findings. Those three findings had to do with the calculation of ingestion, or inhalation and ingestion for certain doses to tissues of the GI tract.

And what was actually prescribed in the TBD, and what was being done in dose reconstructions, was not consistent for one of our findings. One of the other findings had to do with the workbook that was being used. The inhalation tool workbook for Blockson also had an error in it associated with not having some DCF values incorporated.

So, that prompted, ultimately, Revision 4. There was a Revision 3 in between there that included some minor changes in just small doses under PER-36, but the Subcommittee decided that we didn't need to look at that because of the small doses and the few cases that were affected.

But now, PER-60 was issued, and PER-60 actually was addressing the findings from Subtask 4 review under PER-20. Therefore, there was no need to do a full PER review and we only looked at two cases under this review.

And the criteria associated with those cases is shown on page 6. We wanted to look at one case that resulted in higher internal doses after the inhalation and ingestion intakes were compared, and then, one case that where the internal doses did not increase.

What had actually happened in the correction of this TBD is, for some, like I say, of the tissues of the GI tract, rather than using inhalation, it recommended, the TBD recommended to use ingestion. What was changed is they actually went one step further and said let's make a tool now that compares inhalation and ingestion and selects the highest. And so, that was the correction to the TBD.

So, in our case reviews, starting on page eight, he worked, as you can see, for over 30 years and was not monitored. And Table 2-1 shows the original doses and the reworked doses. And since the PER is really dealing with internal dose, our protocol is to

focus on just the internal dose.

So, we go into Section 2.2.1. For the original dose, the ingestion dose was assessed and the individual was considered a production worker, and the appropriate target organ was selected in the ingestion tool. That resulted in a dose of 1.125 rem.

For the reworked case, the new Blockson Building 55 tool was used, and that actually compared the inhalation and the ingestion dose and resulted in the inhalation dose being slightly higher. And so, we reviewed everything, ensured that all the data was put in correctly, and we had no findings with the review of this case where the doses increase.

For the second case, on page 40, again, the individual was not monitored. Again, the individual was considered a production worker. In the original dose reconstruction, it was determined that the inhalation dose would be used for the residual period, and a dose of 65 millirem was calculated.

When the rework was done, again, a comparison was made between the inhalation and the ingestion, and it was determined that the inhalation was higher and that was used. The doses were a little bit lower in the reworked, and that was due to the fact that -- the reworked doses were slightly lower than the original because the start of the residual period in the Blockson TBD was changed from 1962 to 1960. So, for this individual who worked strictly in the residual period, there was a longer period for depletion. And so, the doses were slightly less.

And we reviewed everything and agreed with everything that NIOSH did. We also looked at the new tool and could confirm that the updates and the new tool, they had the appropriate DCF values incorporated.

So, I don't know if there are any questions, but we didn't have any findings.

Chair Beach: Okay, good review, Kathy. Thank you.

And I have no questions with this. Loretta or Paul, do you, either one, have a question?

Member Valerio: I have no questions.

Member Ziemer: Sorry, I was on mute again.

Just one question on the residual period. You said it decreased from -- what was it again?

Ms. Behling: The residual period for this second case, the dose actually decreased. The original was 65 millirem, and in the reworked case -- oh, let's see here -- I think the dose went down by like 10 millirem. I don't even know if I have that listed in here.

Member Ziemer: The dose goes down, but the residual period time went up?

Ms. Behling: Yes. Even though the same parameters were used, the inhalation dose, the dose went down because the residual period started in 1960 rather than in 1962.

Member Ziemer: Oh, it started later? I got you.

Ms. Behling: Yes, yes.

Member Ziemer: Yes. Okay. I'm sorry. Okay, I've noted it.

Chair Beach: Okay. Well, if there are no others questions, it looks like we can close this review.

Member Ziemer: Right, right.

Mr. Katz: So, you're just accepting the report.

Member Ziemer: Yes.

Chair Beach: Accept the reports and close it.

Ms. Behling: Okay.

Chair Beach: And then, we can go on to 64, Dupont Deepwater.

Ms. Behling: And that's John Mauro.

John, are you on the phone?

(No response.)

Okay. Maybe John left us. I will try to contact John.

And maybe we can move on to PER-66, which is Ron Buchanan.

PER-66: Huntington Pilot Case Reviews

Dr. Buchanan: Okay. This is Ron again.

So, if we look at PER-66, it was a Huntington Pilot Plant. And there were changes in the TBD for this plant issued in 2013. And so, SC&A was assigned to review a couple of cases from this, a couple of the rework cases. Because of changes in ingestion and inhalation changed values in the TBD, we were to concentrate on internal doses. So, that's what we did.

And you see, starting on page nine of our report, in October of 2016, we were provided with the first case and see that this was a Huntington Plant employee in the early years, worked there a number of years and had a cancer, of course. And so, NIOSH had originally done a DR in 2003 and reworked in 2015 under the PER-66 guidance.

We see there on page nine, on Table 1, that the internal dose did actually increase for this cancer, and the POC increased. However, it did not change the outcome of the case.

So, SC&A reviewed the internal dose assignments in the reworked case. And on page 10 there, we go into our evaluation, and we see that what this did was include some additional radionuclides. Besides the plutonium and the neptunium, the revision included americium, thorium, and technetium. And so, depending on the solubility types, we reworked this.

My computer here wants me to sign in again. Okay, get that out of the way.

And so, we reworked it and compared our IREP input tables with those assigned in the reworked case. And we found that they were correct. And so, our task was the internal doses. We found no problems with that case.

And so, we moved on to the second case, which starts on page 11 of our report. This was, again, Huntington Pilot Plant, a worker who worked there in the early years and had several cancers. And we see that the original dose reconstruction was in 2004, and it was reworked in 2015, according to PER-66.

Look at Table 2 there on page 11, concentrating on the internal doses. We do see, indeed, that the internal doses do increase for the cancers. And again, the total PoC did increase substantially, but they did not change the outcome of the case.

So, again, we reviewed the case and the dose assignments. We see on page 12 there, we ran the chronic annual dose workbooks for the total doses from all the radionuclides, including the new ones added by the revisions, and we came out with the same solubility type as providing the highest dose. And we matched the IREP input tables, and we had no findings in this case.

So, that brings us to page 13, which is the summary page. And again, we had no findings with the reworked two cases, reworked under PER-66. However, we did find -- well, it didn't impact this case -- we did find Table 5 of the revised TBD of 2013 had, apparently, some mathematical errors in the last three entries. And we outline that in our report on page seven, going back to that.

We had a finding there, and we find that the thorium-230 ingestion -- what happened was, when they revised the TBD, they changed from picocuries per year to picocuries per day. And so, each value had to be divided by 365 days per year. And this is done correctly in Table 5, except we found that, for some of the latter entries, and that was thorium-230 ingestion. It needed to be divided by 365.

Technetium-99 inhalation needed to be divided by 365, and technetium-99 ingestion in Table 5 needed to be divided by 365.

So, it wasn't an error on the part of the dose reconstructor, and this was not used in the two cases, but it was an error in the TBD. It appears to be a mathematical error.

That is our report on that case. Open for questions.

Chair Beach: Okay. I don't have any questions on the two cases.

Paul or Loretta, on the cases, any questions?

Member Ziemer: No questions on the case. I do have another sort of question or comment. Having been on this Board for this many years, I probably shouldn't have to make this comment.

But I want to ask again, or remind me, is the program legally required to go out to decimal places on the calculations? We have one here that comes out 49.87. We all know that that's not 50. I don't know, Jim, if you could answer. Legally, are we -- the program has always gone to those multiple decimal points, but is that a requirement by law?

Dr. Neton: No. This is Jim. It's not a requirement at all. And I remember having this conversation a year or two ago.

Member Ziemer: I've brought it up before, I know.

Dr. Neton: Yes.

Member Ziemer: It always bothered me. It sort of bothers me in general when they go out to as many significant figures as they do, given the uncertainties. But when I see a number like 49.87, I start to feel concerned for the claimant.

Dr. Neton: Yes, I hear what you're saying. And there's no legal reason we couldn't round.

Chair Beach: But, with that now, would you round up or down?

Member Ziemer: Well, if you followed the usual rounding laws, 49.8, you would round up.

Chair Beach: Exactly.

Ms. Lin: Just to note that the Department of Labor is the only one that actually does the POC calculation.

Member Ziemer: Yes.

Ms. Lin: So, any rounding would be done on the part of DOL.

Member Ziemer: Yes, yes, I understand that. I just wondered what's driving it to do that.

Dr. Neton: You know what? Those are calculated -- the IREP does put it out to two decimal points. It has been that way historically since the program started.

Member Ziemer: Yes, yes. Well, it's not an issue we can solve here. I just wanted to be on record that I'm concerned that we always do that.

Chair Beach: Yes, I looked at it and had the same concerns, Paul.

Ms. Gogliotti: Paul, this is Rose Gogliotti.

Member Ziemer: Yes.

Ms. Gogliotti: I just wanted to note that, when the POC is this high, they're required to use Enterprise Edition, which brings a lot more statistical certainty to that value. It involves a lot more iterations than the average iteration.

Member Ziemer: Well, yes, I understand that. With a computer and all the information, you can carry these out to a hundred decimal places. But the question, philosophically, is really, is there any real meaning to that? I mean, you could have a rule or Labor could have a rule -- we can't do anything about it -- that

you round to a full number, whatever it might be.

Dr. Neton: When you think about it, Paul, what happens if you round up and you get to 49.51 or --

Member Ziemer: Well, you'd have to have a rounding rule. If you had a rounding rule in advance -- but when you get up to within a hundredths of, you know, 49.87 -- well, I've explained my point. That's all we can do. I understand there's problems no doing it also, but, anyway, just a concern.

Chair Beach: Yes, and a well-noted concern, too, I'm sure.

Loretta, anything? Questions?

Member Valerio: No questions on the two, no.

Chair Beach: Okay. And then, the Finding 1, NIOSH, have any comments on that?

Mr. Allen: Yes, this is Dave Allen.

We acknowledge there was an error. There was an error in the TBD on those three entries. It's a small part of the dose of the contaminants in uranium. So, it, essentially, ended up being an overestimate of a small dose. But actually have a revision in process right now just to change those three numbers. It's, unfortunately, not completed today. So, we intend to have it done before the next meeting anyway.

Chair Beach: Okay. So, then, Rose -- or I'm sorry -- Lori, can you take that on, to update that finding in the BRS? And hopefully, if it's finished by the next meeting, it can --

Mr. Katz: Well, you can close it now. I mean, they've acknowledged it and there's no reason to keep this one over.

Chair Beach: Okay. And I was just talking -- closing it is fine, but, also, making sure we follow it through on the BRS.

Mr. Katz: Yes, yes.

Chair Beach: Updated version. Okay.

Mr. Katz: Yes.

Ms. Marion-Moss: Yes, I'll do that, Josie.

Chair Beach: Okay. Thanks. Appreciate it.

And then, did we get John back?

Dr. Mauro: Yes, this is John. I'm back. I'm logging on right now to get the -- I guess you're interested in Dupont Deepwater?

Chair Beach: Yes.

Dr. Mauro: Yes, I have to admit, I didn't look at that in preparation for this conference call. So, quite frankly, I'd have to go back and take a look at the issues and figure out where we were.

Ms. Behling: Okay. John?

Dr. Mauro: Yes?

Ms. Behling: This is Kathy.

Dr. Mauro: Sure.

Ms. Behling: Ron has several in a row here that he has to address, and the next one is going to be a rather lengthy discussion. If Ron would take OTIB-44, would that be okay with the Board? And perhaps give John a little bit of time to look things over?

Mr. Katz: That sounds like a good idea.

Ms. Behling: Is that okay with you, John?

Dr. Mauro: Yes, that's fine. Sure.

Ms. Behling: And, Ron, are you prepared for OTIB-44?

Dr. Buchanan: Yes, I am.

Ms. Behling: Okay. Thank you.

Dr. Mauro: Say, Kathy, one thing. The BRS section dealing with these particular issues, I have your table summarizing the briefing that you distributed earlier.

Ms. Behling: Yes.

Dr. Mauro: But the actual BRS portions, because I haven't looked at that, any way that you could somehow forward that Dupont material to me?

Ms. Behling: Okay.

Dr. Mauro: That would be very helpful.

Ms. Behling: Okay. There were no findings, but I'll send you the report.

Dr. Mauro: Oh, there were no findings? So, there's nothing in there --

Ms. Behling: No. All you have to do is present the report to the Subcommittee. We have not presented this report to the Subcommittee yet.

Dr. Mauro: Okay. And this is Dupont Deepwater?

Ms. Behling: Yes.

Dr. Mauro: Okay. Let me see what I can do. And if there's anything that you could forward to me, that would be helpful.

Ms. Behling: Okay. Okay, Ron, go ahead. I'm sorry.

TIB-44: Y-12 Badge Dosimetry

Dr. Buchanan: Okay, that's fine.

Now OTIB-44 is not going to be quite as simple as what we've been going through so far. Because OTIB-44, Revision 1, was issued in April of 2013, and the purpose of the document was to provide parameters for log-normal prediction density of gamma doses for Y-12 workers during the period 1947 and 1979, and I'm on page six of that report.

And the main outcome is Table 7-1 on page 33. Now this is to be used to derive the coworker 50th and 95th percentile gamma doses in OTIB-64. And so, what we're going to do is, we have three in a row here. We've got OTIB-44, which is gamma at Y-12, external gamma doses. We have OTIB-46, which is external beta doses at Y-12. And then, what they do is they combine these into OTIB-64, in which they actually derive the external gamma and beta doses from those two documents into the 50th and 95th percentile for the years '47 through '79.

Now, saying that, you know that's going to involve a lot of statistics. And I'm not a statistician. Harry did the statistical evaluation. I put the report together and other parts of it, but he did the statistical analysis. And so, I will present a summary of our report, but if there's any in-depth questions on the findings, the statistical methods, we will have to wait to get Harry to address those.

So, saying that, going from page six, page six and several pages after that just outline kind of what the OTIB-44 was about. And then, we start our evaluation on page eight in Section 3.

And what we did, we evaluated the approach that NIOSH used. In other words, did they address the problem correctly? And secondly, we looked at the statistical methods to what, in detail, methods did they use to address the problem. And thirdly, what about the documentation? Was there any problems with understanding the text or mislabeling, or anything like that? So, that's three sections we looked at, and we do that for all three, OTIB-44, OTIB-46, and OTIB-64.

And so, right now, we're concentrating on the gamma at Y-12 in OTIB-44. And we see that they used the approach by developing coworker gamma dose parameters consist mainly of mu, sigma, the geometric mean, and geometric standard deviation, and the expected values. And these are summarized in Table 7-1 of OTIB-44. And then, they also

developed, derive and apply a scalar factor in Section 7.4 of OTIB-44. Of course, this is all for the period of 1947 to 1979.

The approach they used, we had no problem with their approach. So, we had no findings in the approach section.

Now, before I get into statistics, for all three of these OTIBs, we find that Y-12 had some of the most detailed records. However, just a little bit of background. Y-12 started way back in the beginning of the Manhattan Project, in that period, and it's still operating today. It's had a long history. And they were one of the first ones to use film badging and have a large number of people.

And so, in the early years, in the forties and fifties, the film badge results did not necessarily follow a log-normal distribution or anything we normally used. And so, there's some issues with that.

In the mid-fifties, they did monitor mainly the highly-exposed workers, which back then that was the chain of thought: monitor those people actually handling it, the radioactive material. They didn't monitor everyone.

And then, in '61, they started monitoring everyone. And so, essentially, what these OTIBs do, they go back and they look at 147 most exposed individuals and their records. They compare them before 1961 and after 1961. And then, they also have some data for other people prior to 1961 in the early fifties and forties.

And so, they try to look at these and create models that will explain what could have happened in the past, because we didn't have a lot of data in the early fifties and the forties. And so, all of that is to explain kind of the approach that we're faced with here, and this has been going on since I got in the program in '04.

And so, this particular OTIB looked at the gamut of

dose distribution. To prepare it, they used OTIB-64. And so, we looked at the statistical methods in Section 3.2 there on page eight. And we find that they did use the Maximum Likelihood Estimation, MLE. We compared that to some other regression analyses, several methods there used, and we found that the simulations gave similar results. And so, we had no issues with them using the MLE method.

Now the remaining sections there give some detail on looking at, I think, '61 versus 1960 doses, and some other doses, in more detail. And so now, what we had found there was they looked at the quarter, quarter 1, quarter 2, quarter 3, and quarter 4, and expected and said that there was some difference in it.

Now SC&A analyzed the 140 -- or analyzed this same data. We did not really see, or Harry did not really see, a difference in some of these quarters. And so, we address this later in detail, but that was one of the issues.

Now Section 3.2.3 on page nine, they set some limitations in the TBD, on pages 27 through 31. And we agreed with those limitations on the dose reconstruction application, had no problems with that.

So, I'm kind of going down through as the TBD progresses because it is fairly complex. Our Section 3.2.4, pages 31 through 34, addressed the use through the third quarter of 1956. So, kind of the point was to go from the forties to the third quarter of 1956, which did not follow good log-normal distribution or any other predictable model well.

And in the fourth quarter of 1956 -- see, the last quarter of 1960 was when they used the highly-exposed workers' data; 1961 forward was everyone -- was no badge. And so, we had a finding there in data up through 1956, the third quarter. And that is, we should not use the model to predict backwards in time because you don't know if the situations were the same. And if you do predict backward in time -- two parts of this finding you see there on the page -

- it is that the shape or the uncertainty should increase, be like a funnel effect. You might not very well -- where you have data, if you go back in time, you are less certain of it, even if you can show that it is applicable to a prior time. And so, that was Finding 2.

And then, Section 3.2.5, on pages 33 and 35 of OTIB-44, we use a procedure after the third quarter of 1956, when we do have some better data that does follow a more predictable model. And again, this iterates Finding 3 on page ten, that it is unlikely that the precision predicted by the MLE model would be as tight as perhaps is depicted in the OTIB-44. And in regards to the number of samples you have, you still don't know for sure what's going on back there.

And so, that is analyzing the data through 1961. Now, in Section 3.2.6, on pages 35 through 37, it is the application of scaling factor. To digress a little bit here, it is that, if you've gotten some data before 1961 that you feel is good data for the highly-exposed personnel, and you look at their average doses, and then, you look after 1961 for the same group of workers, did it remain the same or less? And, of course, as time went on, health physics got better; generally, the doses went down. And so, you don't want to assign a lower dose pre-1961 than you should.

So, you look at the dose and compare the two for these special individuals that were monitored during both periods, and you say, okay, what kind of scaling factor is there between pre-1961 and after 1961? And then, you can apply that to the people that were monitored part of the time pre-1961 and say that most of the workers pre-1961 that had good records show a 1.5, a 50 percent increase. So, you can look at a worker that has spotty data in pre-1961 and apply 1.5 times their dose to estimate their dose or the coworker dose during that time.

And so now, the problem with that is you have to have the same work environment. You have to say

that pre-1961 the persons that you're trying to estimate their dose for had the same work environment after 1961 as pre-1961. And so, this is Finding 4 on page 10. It's difficult to say the worker had the same exposure unless you have detailed information that he worked on, all these years, doing the same job and with the same type of material.

So, that is the four findings. We agree with their approach. They had four findings and the statistical analysis, which, again, I say Harry has to address these details on that.

And then we looked at the documentation, the text, and did we find any errors in that? And so, our observations cover those. That's on page ten.

And we see it has our Section 3.3, Evaluation of Occupation, and we have several observations there. I'll just briefly go over these because NIOSH would have to address these in detail and see if they agree with these problems. It's mainly typos of references or units.

Observation 1, on page 33, it looks like it needs units of dose of millirem added to Table 7-1.

Observation 2, on page 33, was that the caption on the label of the table should include '47 to 1979, not to '65, because it presents through '79, which it's supposed to.

Observation 3, on page 36, again, it uses a term "GM". I think it should be replaced with the "mu" on that because there's no GM listed in Tables 7-2 and 7-3.

Observation 4, on page 36 -- and this has been an issue going back to 2005, when we first began these, the Y-12 -- the scaling factor, if you have E to some value plus the scaling factor, then if you don't want to make a change, if it should be zero because it's in the exponent, and not 1 -- if you have 1, well, then it adds a bigger value. So, I believe it should be a zero, instead of 1.

And so, that was four findings, four observations. This is summarized on page 11 there. And we have arrived at this point. So, we have provided this report of our evaluation in July of 2017. And I don't think NIOSH has responded formally to it, but I'll turn it over to them, if they have any comments at this time.

Chair Beach: Okay. While NIOSH is gathering their thoughts, Ron, excellent report. I like the way you documented, laid out where the findings were, the page numbers. The appendix in the back was very helpful also. So, good reporting.

Dr. Buchanan: Thank you.

Dr. Neton: Yes, this is Jim.

We're still looking at these findings. This is, as Ron pointed out, some pretty detailed statistical comments in there. And we're not prepared at this point to address the findings.

Chair Beach: Okay. Then, those remain in progress, correct, Ted, unless there's questions, of course, from the Work Group?

Mr. Katz: Yes.

Member Valerio: I don't have any questions, Josie.

Chair Beach: Okay. Paul?

Member Ziemer: I have to remember to get off of mute again.

No, I have no questions. Very good report, Ron.

Chair Beach: Yes, I suspect we can probably go through 46 and 64 the same. So, if you're ready, Ron, you can go ahead and move on to 64.

Mr. Katz: And if -- not now, because it's probably not ready now -- but if you guys at NIOSH can figure out sort of a timeline for when you'll be ready to address each of these new reports, again, just send a note to me and the Work Group about that. Then, that will

help us plan for when to figure it into the agenda for a meeting.

Dr. Neton: Yes, we can do that.

Mr. Katz: Thanks.

Dr. Mauro: Josie, this is John Mauro.

You guys are cutting into my trick-or-treating time, you know that.

Chair Beach: If Ron wants to take a break and you're ready to do --

Dr. Mauro: Yes, mine is going to be real easy. It didn't take me very long to figure out what was going on on Dupont Deepwater. So, if you wouldn't mind, give me five minutes, and I will go through this.

Member Ziemer: You can still trick and treat, John.

Dr. Mauro: Well, my grandchildren are all making the rounds and we're going with them. So, you know how it is.

Member Ziemer: Yes.

PER-64: Dupont Deepwater Works Case Reviews

Dr. Mauro: Anyway, let me take care of this. I apologize, I wasn't prepared for this. I wasn't aware that I would need to cover it.

But Dupont Deepwater, there's, in fact, a report, a PER review, where the most important thing is that there were changes made to the TBD or exposure matrix for Dupont Deepwater, whereby, you guys recall, it used to be TBD-6001, and it had an attachment that dealt with Dupont Deepwater.

But, in the process of describing that original guidance, it drew heavily on TBD 6001. Now, when TBD-6001 was withdrawn, the appendix dealing with Dupont Deepwater was revised a couple of times. And SC&A was authorized to review those revisions.

So, we are current with respect to the review of the exposure matrix and guidance for Dupont Deepwater.

And we went through their process, and all issues have been resolved. The current version of the Dupont Deepwater exposure matrix, all issues resolved. There's nothing on the table.

So, what that means is, in going into a PER where we are looking at cases, what happens is, the only real thing we need to do, which is what we did in this report that you have before you, is look at cases. Now, as part of that process, we said that, well, we would recommend that we review cases that meet three criteria.

One is that the PoC is between 45 and 50 percent, and one is where there was a worker that was monitored for internal and external exposure during the operations period, and another case where the worker was monitored for internal/external during the residual period.

NIOSH and the Board identified two cases that met those three criteria. One of the cases met two of those criteria. So, we only needed two cases.

What we did, then, in our report, what we do is we describe the new evaluation. And basically, what our job now is simply to say, okay, we know that the Site Profile is fine. Now all we have to do is take a look at a few cases and confirm that, in fact, the Site Profile and protocol that is approved were, in fact, implemented in the real world with real cases.

And those are the three criteria, and we had these two separate cases to review. And so, we walked through a process where, first, we summarized what was the original analysis that was done using the old TBD-6000-type protocol. And then, we summarize and describe the new NIOSH evaluation using the new, improved Site Profile, the complete standalone document. And then, we have an evaluation. You know, we actually summarize what was done by way

of external/internal doses during the residual and the operational period.

Well, the bottom line is that we reproduced all the numbers for both cases. We matched all their numbers for all the pathways, for external/internal, residual and operational period, and we have no findings. So, as far as we're concerned, you know, we are prepared to recommend closing out this part of the process and these cases where they met the criteria. So, that would be the outcome of this report.

By the way, the report I'm referring to is DCAS-PER-064. It's called Subtask 4. As you know, Subtask 4 is part of the PER review process where we review cases, and it's dated December 2016.

And that concludes my overview of this particular issue.

Chair Beach: Okay, thank you, John. And it is in the BRS and the report is attached.

Paul, Loretta, any concerns with closing or any questions?

Member Valerio: I don't have any questions.

Member Ziemer: I have no concerns. We can close it, as far as I'm concerned.

Chair Beach: Okay. Then we are closed, and we can move back to TIB-46, if, Ron, you're ready for that.

Dr. Mauro: I am going to break. It's John. Nice talking to everyone, and I'm out going trick-or-treating. Enjoy your evening.

Chair Beach: Right.

Dr. Mauro: Okay.

Mr. Katz: Have fun, John.

Dr. Mauro: Okay.

TIB-46: Beta doses at Y-12

Dr. Buchanan: Okay. This is Ron back again.

Okay. I think we got the trick, instead of treat, here.

So, we're going to look at OTIB-46, which is the evaluation of the beta doses at Y-12, in cohort three. And it's Y-12 again. The purpose of the document was to look at the beta doses for Y-12 workers during the period '47 to 1979. The results are derived, summarized in Table 9-2 on page 41 of that OTIB. And again, this will be fused into OTIB-64 to derive the 50th and 95th percentile beta doses.

And we see that, again, on page 5 of our report there, in Section 2, we go through a breakdown, a summary of what the OTIB-46 intended to do. And then, I go on page six, Section 3. It actually starts on page seven. These are our evaluations.

And again, OTIB-46 looked at developing coworker beta doses using mu, sigma, geometric means, geometric standard deviation, and expected dose values, similar to 44.

We found that this was appropriate, considering other models. And so, we had no issues with the approach used.

And so, we move on to the evaluation of statistical methods, where the details take place. And this is Section 3.2 on page seven. It starts there.

Our first section, 3.2.1, we've got Table 4-1. We see that this table provides some summary of the operation at Y-12. And so, we had Finding 1 there because we find that the Wilcox reference of 2001 used to create this table provides some information that shows changes over the years, in the late forties and early fifties, not necessarily indicating that the same work was done in all the years and in later years.

So, Harry's concern here was that the worker

regression models should not be used to extrapolate either the beta or the gamma doses. This came out in OTIB-46, but it applies both in our previous OTIB-44 and for this OTIB-46, Finding 1, concerning the changes in operations, major events, certain regression models being used.

And then, we have Section 3.2.2, which is at pages 28 through 29 of the OTIB-46. This outlines the regression analysis, the density, and other analysis.

And again, Harry went through this, and we looked at the patterns and we find Finding 2 there on page eight. You expect Figure 1 and Figure 2 of Appendix A of our report here show no difference in pattern of reduction in gamma and beta doses, '56 through '61. Therefore, the use of two different models for beta and gamma is not supported. So, in other words, OTIB-46 used a different model than OTIB-44. However, Harry feels that this was warranted in using our comparisons in Figure 1 and 2 of Appendix A.

Now we looked at Section 3.2.3 of our report, which is pages 30 through 33 of OTIB-46. And this is film badge data in Figure 8.1. We looked at this information, and we have no findings or issues with that.

And so, pages 34 and 39 of OTIB-46, and it's limits on dose reconstruction, and it's the same as with gamma. We had no statistical issues with their statements on those pages.

And then, in just our Section 3.2.5, in pages 38 through 44 of OTIB-46, that's the procedures parameters and scaling and MLE. We find that the linear model in 46 for beta dose is a very different model than used in 44 for assigning missed gamma dose. And that's outlined in Figure 4 of Appendix A.

And that brings us to Finding number 3. This is concerned with the estimated geometric means increasing linearly as we go back from '61 to '47. So, in other words, we're looking, trying to predict backwards. We see that this is not necessarily

applicable to this, and especially predicting forward. And so, the model, according to Harry's evaluation, should not be used to predict forward the final two years of the sampling period. And he explains some of the abnormalities shown in Figure 3 in our Appendix A. And so, this is an issue that he has identified with using predictions from this data.

So, those are the three findings they had from a statistical basis. We looked at the approach. We had no problem with that. We looked at the statistical basis, and there were three concerns there, three findings. And then, we looked at the text and the usability of a document. And we have five observations there, and they're fairly minor, just like before, but we'll briefly go through them here.

Observation 1 on page 29 of the OTIB, this is on page nine of our report. This is the text refers, in Section 7.3, refers to box plots. However, we could not find any figure numbers provided. And so, it would be nice to establish the figures referred to there.

Observation 2, page 42 -- and this is Table 9-2 -- only provides prediction density parameters for beta dose to be used later for the period 1947-1965. However, the purpose of page eight states it's supposed to go through '79. So, we wondered where the data from '66 to '79 is.

Observation 3, on page 43, again, we have the scaling factor pertains to -- they used the term "one". And we believe that should be zero.

Observation 4, on page 45, the units of millirem should be added to the dose of 2,361 there in the last sentence, we believe.

And Observation 5, on page 45, let's see. Again, it's the scaling factor of one, and we believe that should be zero.

And so, those are the three findings and the five observations. And so, turn it over to -- NIOSH said they haven't had time, I believe, to respond. So, I'll

turn it back over to the Work Group.

Chair Beach: Okay. And so, the same conclusion here. NIOSH will review, and then, get back to the Subcommittee of when these can be answered or addressed, is that correct?

Dr. Neton: That's correct.

Chair Beach: Okay. Another good report, Ron. And if you can take a breath and go on -- oh, I'm sorry. Any questions, Paul or Loretta?

Member Valerio: No questions, Josie.

Member Ziemer: I have no questions.

Chair Beach: Okay. So, Ron, if you're ready --

TIB-64: Y-12 Coworker External Dose for National Security Complex

Dr. Buchanan: Okay. This is OTIB-64, released in April of 2013. And this is coworker external dosimetry data for the Y-12 National Security Complex.

And so, we're going to take the OTIB-44 and OTIB-46 data, and this is external gamma and beta, respectively, and we're going to create a coworker model determining the 50th and 95th percentile coworker gamma and beta doses during the period 1947 to 1979.

Now we have to realize that when we evaluated OTIB-64, we make the assumption that the data is okay. And so, we still have the issues in OTIB-44 and OTIB-46 that we did it independently. We said, okay, if this data is correct, or we did it correct, or whatever, then does OTIB-64 address it to create a coworker model properly? And so, that's what we did on this report.

And we see that -- we're working on page five of our report here -- that the coworker data is the whole of the crux of all of this work that would be in 44 or 46 and 64. It leads down to Table 7-1B on page 15,

which lists the 50th and 95th percentile gamma and beta doses for 1952 through '79. And Table 7-1C, page 16, listed at 47 and 51, and we're not sure why it's split that way. And that's one of our observations. But that's the way it is. And so, these two tables contain the primary results of all this work for the purposes of DR.

Now for construction/trade workers, as you know, there's usually an increase in their dose. And so, these values are adjusted according to OTIB-52 to provide for adjustment to process claims for construction/trade workers.

So, that's the end result of all this work. And we see, again, have evaluated the approach, and that, starting on page six, is our evaluation of OTIB-64. We evaluated the approach to this method, and we did not identify any issues with the general approach to 64 to derive the coworker doses.

So, this brings us to the evaluation of statistical methods, page seven of our report, Section 3.2. And so, we evaluated statistical methods used to combine OTIB-44 gamma and OTIB-46 beta into a usable coworker model.

And during this, we addressed specific periods data that was used in this model. And so, again, I won't go through the details, all of them. Section 3.2.1 is a comparison of the 1962 Health Physics Report and the CER doses.

And we see in Figure 1 we agreed with that comparison. Then, it can be used. And we had no findings in that section.

And we go on and we compare some more of '52 to '56, health physics and CER. We compare, on page eight, compare some '48 and '49 data using regression analysis. And on page nine, it is a comparison of '48 and '49 beta doses. We provide some figures for those.

On page 12, a comparison of '48 and '49 gamma

doses. Again, this is all statistical work. And we provide some figures on page 13 and 14 of that data, showing how we reached our conclusion. And then, we did some comparisons of incorporating non-detects.

The bottom line is we had no findings on the statistical methods or results in OTIB-64, provided the input data is correct from '44 to '46. As I say, that's quite a bit of statistics that we both agree on.

And so, we see, on page 15 now, we see that we did have some observations, just like before, in Section 3.3. So, a third leg of the stool was we evaluated the documentation and the usability.

And Observation 1 and 2 there, on page nine and ten, I think the wrong reference is used. It uses UCNC 1957, and I think it should be amended in 1957. It's a minor point, but it might want to be corrected.

Observation 3, on page 13, it's not obvious why Table 7-1A only covers the period '47 to '51, instead of a complete review of '47 to '79. It may be that, because of missed dose, methods were changed between those two pivot points, '51 and '52, but it was stated in the text. So, that was an observation. It didn't really affect the outcome, but we weren't really sure why.

The same way with Observation 4, on pages 15 and 16, of OTIB 64. It's not obvious why Table 7-1B and 7-1C are separated between years '51 and '52. It may be, again, because of the way the missed dose is calculated or something. It's just, as far as usability, it would be nice if the tables would just cover the period 1947 to 1979 in one table without breaking it up. But it really had no bearing on the results. It would just be easier to use.

Observation 5, on page 16 now, we're talking about page 15 of OTIB-64. It says that, step 2, it says, "The missed dose was not added to the resultant gamma doses from OTIB-44," et cetera, et cetera. And our question was, did this also apply to OTIB-46 beta

doses for that period? It's not stated. We just observed that it wasn't stated.

Observation 6, on page 16, it says that beta dose, 95th percentile values for 1947 and 1951 might need adjustment for dose reconstruction, because, essentially, they went over the allowable limit set at that time. And so, we assumed they would be adjusted back down to 25 rem a year, or whatever it was. However, this was not spelled out in the text. So, it might, for consistency between dose reconstruction, it would be useful to spell that out.

And Observation number 7, on pages 34 and 35, it looks like the units in millirem may be added to Table 8-6 and 8-7 and 8-8, as appropriate.

And so, in summary, on page 16, Section 4, we see that we had agreed with the statistical approach. We agree with the statistical methods we used and the derivations, and we had seven observations. It would help to clarify some of the application of this OTIB.

So, again, I assume that NIOSH is not ready to respond, but I'll turn it over to the Work Group.

Chair Beach: Okay. Is that correct, NIOSH, the same?

Dr. Neton: Yes, the same thing.

Chair Beach: Okay. So, any questions or comments, Loretta, Paul?

Member Ziemer: Yes, I would pose a question, I think a question to Jim Neton actually. Once NIOSH has completed the responses on these three documents, can you give us kind of a feel, based on what you're seeing in terms of the findings? Are they going to be substantial in dose reconstructions? Are they going to have to be done at Y-12, numberwise? Is there anything here that gives you a red flag that it will be likely to have to do a lot of new work?

Dr. Neton: I think it's too early to tell. I don't think

there's going to be major changes, but I can't say that there won't be some minor tweaks in some of the doses --

Member Ziemer: Okay.

Dr. Neton: -- based on uncertainties. It incorporates some uncertainties, but the short answer is I don't know.

Member Ziemer: So, there's nothing jumping out at you that looks like it would be a substantial issue then?

Dr. Neton: No.

Member Ziemer: But too early --

Dr. Neton: Yes. Most of the issues center around that backwards interpolation, you know, where the data was sparse in the early years.

Member Ziemer: Yes.

Dr. Neton: And we're going to look at that and try to make some sense out of SC&A's comments on that. But I don't think there's going to be major whole sections.

Member Ziemer: Thank you.

Chair Beach: Okay. Thanks, Paul.

Do you have any sense of timing? I know Ted broached that earlier.

Dr. Neton: Yes. I think this, as with the other one, we'll prepare a schedule and put it out as soon as we can. We have to meet with ORAU and figure this out. I really can't say right now how long it will be.

Next Work Group Meeting/Plans

Chair Beach: Okay. With 10 minutes left -- I know we were going to adjourn at 3:30 -- I propose that we move on to the next Work Group meetings. Does everybody agree?

Ted, are you okay with that?

Mr. Katz: Yes, I'm okay with that. You want to find a date to start with?

Chair Beach: Yes.

Mr. Katz: Okay. Does everybody have their calendars? It sure is easier if we can pin it down while everyone's actually on the phone.

Chair Beach: Yes.

Mr. Katz: Okay. So, let me give you a ballpark for as soon as we could meet, if we want to, this Subcommittee, so that we can meet the Federal Register notice and all that, and departmental clearance of those.

Okay. So, we are at October 31st. Okay. The soonest we could meet, I would say, is about the week of January 13th. That would be the soonest.

Chair Beach: Okay. And another Wednesday meeting, do you think?

Mr. Katz: Any day of the week is okay. Friday is not great some weeks, but most of that is open.

Now, to meet that soon -- I didn't go back and look at the agenda. How far did we get through the agenda, Josie?

Chair Beach: We've got three on the second page. So, 86, 76, and 81.

Mr. Katz: Okay. So, not a whole lot?

Chair Beach: And I doubt Y-12 will be ready by then.

Mr. Katz: Right. I mean, there is an item or two that wasn't on the agenda that we could add. But a question is, do we want to wait until we have a fuller agenda as opposed to meeting as soon as we can?

Chair Beach: No, I'd say we should wait.

Mr. Katz: Yes. I think that makes sense.

Ms. Behling: This is Kathy.

There are about five additional documents that have been submitted that we haven't presented yet. Well, I could go through -- I have a second table. But this table, I think a lot of the findings are waiting on NIOSH. But there are a few things.

Mr. Katz: So, wait. Kathy, I just want to make sure I understood you. You have about five other documents that have been reviewed and we're waiting on NIOSH findings or --

Ms. Behling: No, I'm sorry. There are five additional documents that have been submitted to the Subcommittee that we haven't presented.

Mr. Katz: I've got you.

Ms. Behling: So, that would be a total of eight documents that have to be presented to the Subcommittee.

And then, I had put together a second table that I could perhaps send out to NIOSH, because all of the findings here -- there are older findings also -- seem to be waiting on NIOSH, although Lori did give me some updates on the Grand Junction template. And so, there are a few other items I think that could be addressed perhaps.

Mr. Katz: Okay. So, we could, I mean, as an option, we could have a meeting where, one, Kathy could get -- Lori, those that we're waiting on NIOSH responses, not including the Y-12. Clearly, that will take a little more time perhaps, but ones that have been outstanding longer.

We could have a brief meeting -- we don't have to meet for five hours, or whatever -- and get the rest of the reports presented plus deal with whatever more responses can be completed in February. We can't plan further out than that anyway.

Chair Beach: Sure. I think that seems reasonable.

Mr. Katz: I'm trying to reach a reasonable compromise, given that NIOSH would have to get more work done as part of this.

What about, for example, the week of February 11th?

Chair Beach: I'm available that week.

Mr. Katz: How is that for others? Say, February 13th?

Member Ziemer: I'm available.

Member Valerio: I'm available.

Mr. Katz: And is that okay with Stu and --

Member Ziemer: Maybe the idea would be to block that off, and then, see where we are in terms of having actual documents available to read.

Mr. Katz: Well, we would have, we definitely would have at least eight SC&A presentations we could get completed, which would be good.

Member Ziemer: Yes.

Mr. Katz: So, I think, in any event, it would be good because that's the end of the contract period, too. So, it would be good to get those presentations from SC&A, I think.

Member Ziemer: Yes. Yes.

Mr. Katz: SC&A has a little bit of followup work from today, and they could also get that presented.

Chair Beach: Right, and if there's any older stuff --

Mr. Katz: Absolutely, absolutely.

Mr. Hinnefeld: Ted --

Mr. Katz: Stu?

Mr. Hinnefeld: -- in response to your question about my availability, I am available on February 13th, but

that is my first day back from vacation.

(Laughter.)

I don't do any of this work, anyway.

Mr. Katz: Okay.

Mr. Hinnefeld: I mean, this is all done by other people. So, that's okay with me.

Mr. Katz: And, Lori, is that okay?

Ms. Marion-Moss: I will say yes.

And I would also like to add, is it possible for, Kathy, you and I to get together offline and take a look at where we're at, and possibly come up with an agenda?

Ms. Behling: Absolutely. Absolutely. I already have a table prepared.

Ms. Marion-Moss: Okay. So, let's talk offline shortly following this meeting, you know, sometime soon.

Ms. Behling: Okay. I'll send you what I have.

Mr. Katz: Okay. The sooner, the better, actually, because of what I have to do in terms of getting an agenda approved through the Department. So, yes, that would be good for you guys to do that.

Okay. So, let's set it for February 13th, 10:30 a.m. again?

Chair Beach: Yes.

Mr. Katz: That's great.

Adjourn

Chair Beach: Okay. Anything else for the good of the Subcommittee we need to discuss?

(No response.)

Mr. Katz: No. I think we can adjourn then.

Chair Beach: Okay, we are officially adjourned. Thank you very much.

(Whereupon, the above-entitled matter went off the record at 3:26 p.m.)