Centers for Disease Control
National Institute for Occupational Safety and Health
Advisory Board on Radiation and Worker Health
Subcommittee for Procedure Review
Wednesday, February 13, 2019

The subcommittee convened telephonically at 10:30 a.m. Eastern Standard Time, Josie Beach, Chair, presiding.

Members Present:

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

Also Present:

Ted Katz, Designated Federal Official
Ron Buchanan, SC&A
Dave Allen, NIOSH
Bob Anigstein, SC&A
Bob Barton, SC&A
Kathy Behling, SC&A
Elizabeth Brackett, ORAU Team
Nancy Chalmers, ORAU Team
Mark Fishburn, ORAU Team
Darin Hekkala, ORAU Team
Stu Hinnefeld, NIOSH
Rose Gogliotti, SC&A
Tom Labone, ORAU Team
Megan Lobaugh, NIOSH
Lori Marion-Moss, Niosh
David Marsh, ORAU Team
Wade Morris, ORAU Team
Jenny Naylor, HHS
Jim Neton, NIOSH
Tim Taulbee, NIOSH
Tim Vitkus, ORAU Team
Rob Winslow, ORAU Team

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(10:31 a.m.)

Welcome/Roll Call

Mr. Katz: So, I'm guessing we have NIOSH and ORAU folks on the line. Let me get started with roll call. Before I do roll call, let me address -- we deal with a whole bunch of different documents here.

Just to make sure, I don't believe that we're dealing with any documents relate to anyone's conflicts, but I'm not 100 percent certain of that. I've scanned them all and I didn't notice any sites.

But let me just, for safety sake, note that, for Josie -- Josie's our Chair -- Hanford is a conflict. The documents related to Hanford are a conflict.

For Paul, ORNL, that's a conflict. And the only one other that's really pertinent, could be, is LANL after 2000, the year 2000.

Member Ziemer: Right.

Mr. Katz: Right.

And then, Loretta is basically, for Loretta it's just everything in New Mexico and Pantex, but that's it for Loretta.

I don't think we're going to address any of those documents. But, anyway, if they come up, then those individuals will recuse themselves for their conflicts.

So, we have the three Members of the Subcommittee. So, we have a quorum, and I'll note that we have to have all three Members to have a quorum. Josie is the Chair.

And so, I'll go on from there to see who we have on for NIOSH/ORAU.

(Roll call.)

Mr. Katz: Okay. And then, we don't have any public comment session, but if we have any members of the public who are in attendance, now would be the time.

Okay. Then, I think since everyone is staff who is on, or a Board Member. I probably don't need to say this but the materials that can be posted for this meeting are posted on the NIOSH website. And there will be some other materials that cannot that will be presented via Skype. So, you folks probably need your Skype on. I know Bob Anigstein has a presentation on one of the documents that he would like to do through Skype. So, you might want at some point to get onto Skype for this meeting and explore that. We have the Skype connection there. It can be forwarded to some other desks.

Okay. Josie, it's your meeting.

Carryover Items from October 31, 2018 SCPR Meeting

Chair Beach: Okay. Thank you, Ted.

It looks like we have a very full agenda today. We're scheduled to go until 3:30. I'm assuming that's okay with everybody. We'll do a lunch break in between.

Kathy, I thought we would start with the carryover items and just get a brief update on those before we start in on the -- I know we have some new items to be presented. So, does that work for you guys?

Ms. Behling: That's fine with me, Josie, yes. Would you like me to get started?

Chair Beach: Yes.

Member Ziemer: That's good for me, Ziemer.

Chair Beach: What was that, Paul?

Member Ziemer: I said it was good for me, Ziemer.

Chair Beach: Perfect. Thank you.

And, Loretta, you're okay with that, I assume?

Member Valerio: That works for me, yes.

DCAS-RPT-005, Alternative Dissolution Models for Insoluble Pu-239

Chair Beach: Okay. So, we'll just start down the agenda with RPT-005.

Ms. Behling: Yes, and I can lead with that. But RPT-005 is Alternative Dissolution Models for Insoluble Plutonium-239.

And what had happened is, we reviewed this report. It was reviewed by Joyce Lipsztein. And we resolved all of the issues. There were initially two findings that were changed to observations, and they are still in abeyance.

And just prior to the October meeting, we received an updated report from NIOSH, an updated Report 5 from NIOSH. And I had contacted Joyce, and she reviewed the original report to look at and review this revision, just to ensure that these two observations were addressed in a satisfactory manner.

However, Joyce has been on travel for several weeks and has not had access to her government computer. So, unfortunately, I'm going to have to ask if we can carry this item over to the next meeting.

Mr. Katz: Well, you cannot carry it to the next meeting because it's under this contract, but you can get it done, you have to get it done this month.

Ms. Behling: Okay. I was wondering about that. Yes, I can contact Joyce and make sure that she sends out a memo or a White Paper, whatever she feels she needs to do --

Mr. Katz: Sure.

Ms. Behling: -- by the end of this month. Okay?

Mr. Katz: Yes, that would be great. Thank you.

Ms. Behling: Okay. Very good. We'll handle it that way, and I apologize for that.

Chair Beach: And we've had discussion on it. So, I think we were just waiting for her and that memo. Is she off travel now? Do you know, Kathy?

Ms. Behling: I think she's going to be back shortly. I've been in communications with her, but I will certainly work with her and get something in your hands before the end of the month.

Chair Beach: Okay. That sounds great. Thank you.

Dr. Neton: Kathy, this is Jim.

Ms. Behling: Yes?

Dr. Neton: There were one finding and one observation. And the one finding that was changed to an observation is the one that Joyce was reviewing, which had to do with the selection of curves, the clearance curves for Mound.

The other one was just a typo that we fixed. I wonder if it would be just as good now to close that one, if that's okay. It was really just to change two words in the procedure for this document, unless you would rather wait and do them both at the same time.

Ms. Behling: Do you mind if we wait and do them both?

Dr. Neton: Yes, that's okay.

Ms. Behling: Yes. I am showing still two observations, although both of the observations do have to do with that Mound Case 13.

Dr. Neton: Well, no, one was actually a typo where we said they should be used as defaults for Mound and Savannah River Site. And we deleted Savannah River Site because it was just a cut-and-paste error.

Ms. Behling: Yes. Okay, yes, I see that down there.

Dr. Neton: That's the only thing that we really affected there.

Ms. Behling: Okay.

Mr. Katz: You can close that. There's nothing to that.

Chair Beach: That one's the 02, correct?

Ms. Behling: Yes.

Chair Beach: Yes.

Ms. Behling: That's Observation 2. Yes, all right, that's fine. We'll close that.

Mr. Katz: Yes. I assume that's okay with the Work Group. It seems straightforward.

Chair Beach: Yes, that seems fine. Paul and Loretta, you're fine with that?

Member Valerio: Yes.

Member Ziemer: Yes, I'd be fine with that. I think we should close it right away.

Chair Beach: Okay.

Ms. Marion-Moss: Josie, this is Lori.

I just wanted to point out one thing, that the title of that document is not Insoluble Plutonium-239. It's 238.

Ms. Behling: Okay. Thank you. I'm sorry.

Chair Beach: Okay, we'll make note of that. Thank

you.

Ms. Behling: And would you like me to go on, Josie?

Chair Beach: Yes, please.

Ms. Behling: Okay. The next item under the carryover list is the --

Member Ziemer: Let me interrupt just a moment. If that is correct that it's 238, then we need to go back into earlier documents which continued to call that 239. For example, carryover information identified that, I think, as 239 also, did it not? I'm looking back just trying to pick that up.

Chair Beach: Which carryover? Are you talking about the agenda, or?

Member Ziemer: Yes, the title for this one, 005. I'm trying to look back into the earlier notes to see how we titled that, if the title is incorrect as well in the documents. It's not critical now, but --

Mr. Katz: Yes, so I think, Kathy, if you just will check? I mean, the agendas don't need to be sorted at this point, but if you'd check to make sure that the SC&A documents are titled appropriately?

Chair Beach: Yes, I'm looking at the SC&A document now from January 2017. It lists it correctly as 238.

Member Ziemer: Okay. Thanks, Josie.

Chair Beach: The table summary that Kathy sent out has 239.

Ms. Behling: Yes, I'm sorry, that's my mistake.

Member Ziemer: Thank you.

Chair Beach: Looks good, Paul. Thanks.

Mr. Katz: Yes, thanks.

DCAS-TIB-013, Selected Geometric Exposure Scenario Considerations for External DR at Uranium Facilities

Ms. Behling: Okay. And if we move on, then, to DCAS-TIB-013, actually, I will turn this over to Jim Neton.

There was one finding -- this is Selected Geometric Exposure Scenario Considerations for External Dose Reconstruction at Uranium Facilities -- and there was a Finding 4 that is still in progress. The finding had to do with the procedure underestimates the maximum correction factor to be applied to badge readings.

And I believe we had a fairly long discussion on this during the last meeting. Bob Anigstein made a presentation, and Jim Neton had a thorough follow-up discussion that he was going to include into the BRS. And I did look at the BRS this morning, and I see that Jim has included some wording there. But I'll turn this over to Jim.

Chair Beach: Okay. That sounds great. Thank you.

Dr. Neton: Okay. Thanks, Kathy.

Yes, this is not a long follow-up discussion, although we don't necessarily disagree with SC&A's findings in principle. But what I put into the BRS is what Josie suggested. It is that the completion on this finding is going to be contingent upon the issuance of OTIB-89, which is describing NIOSH's implementation of the revised dose conversion coefficient contained in ICRP 116. So, it didn't make sense for us to go and revise the dose conversion factors, to, then, have to go back again once TIB-89 came out and redo them. So, we're waiting until the completion of TIB-89, and, as I indicated in the BRS, that's currently scheduled to be completed in the beginning of 2019. So, it really is sort of just a placeholder I put in there that says it's going to be a little while before we're done with

this finding.

Mr. Katz: Can I just, for clarity -- so, is this something where the solution is already -- I don't recall -- discussed and understood, and it's just in abeyance, or is it actually that you have to work it out when you do that new document?

Dr. Neton: I think the nature, some of the findings are going to be taken care of when we do ICRP 116. We are going to have organ-specific dose conversion factors that didn't really exist under the old methodology, and that was part of what SC&A's findings related to.

Mr. Katz: Okay. So, then, it's not really in abeyance yet, but --

Dr. Neton: Yes, it's in progress, is what I would call it.

Mr. Katz: In progress, right?

Dr. Neton: Yes.

Chair Beach: Yes, and that's how it's listed in the BRS also.

Mr. Katz: Okay. Thanks.

Member Ziemer: So, that would remain in progress? This is Ziemer.

Dr. Neton: Correct, yes.

Chair Beach: Yes. Yes.

Dr. Neton: Yes, until we get 116 done.

Mr. Katz: And what's the timing of that?

Dr. Neton: June. June.

Mr. Katz: Okay. Thanks. Okay. So, then, if you have a meeting before June, there's no point having this

on the agenda.

Member Ziemer: Now will that also require an SC&A review, then, before we see it again?

Chair Beach: I would say yes.

Mr. Katz: Yes, we might as well, right? We might as well. Yes, when that comes out, I can task it for SC&A, so that we get SC&A to have a look at it before we discuss it at the Subcommittee, which means it will be sometime in the fall probably that the Subcommittee takes it up.

Chair Beach: Okay. That sounds reasonable.

Mr. Katz: Yes.

ORAUT-OTIB-0029, Internal Dosimetry Coworker Data for Y-12

Ms. Behling: Okay. Are we ready to move on to OTIB-29?

Chair Beach: Yes.

Ms. Behling: All right. OTIB-29 is the Internal Dosimetry Coworker Data for Y-12. And again, there was one outstanding finding that had to do with this Monday morning collection of urine samples. And we had a discussion on this during the last meeting, and the finding is still in progress. And I believe the follow-up action was for NIOSH to prepare a White Paper to address this issue and to satisfy our concerns. I did not see that White Paper. I didn't see it attached to OTIB-29 on the BRS. Perhaps I missed something.

Chair Beach: Yes, I looked for it and didn't see it.

Mr. Allen: This is Dave Allen.

You didn't miss anything. We didn't put together a White Paper yet. After the last meeting, looking at

the BRS and looking at the transcripts, it was real confusing to me exactly what it was and whether everybody's on the same page as to what they wanted to see.

For the issue, there's kind of two different topics. One is the concept that, if you have some percentage of samples not taken on Monday, that it greatly diminishes the collection you would make. And the other topic is how many samples were not taken on Monday, essentially, throughout the different years at Y-12.

And it really seems like, on that first part, over the years we've had agreement and, then, didn't have agreement and, then, did have agreement. And it seemed like some people were under the belief that we had agreement on that and it's just the second part that we needed to do. And others, I'm not so sure. There was never any formal closing or any official agreement on even that first topic. So, I kind of needed to figure out exactly what it was the Subcommittee was expecting in this White Paper.

Ms. Behling: Would it be beneficial for SC&A to go back and clearly state what we are looking for? This, again, would be Joyce Lipsztein. I could get her involved, if the Board would like us to do that.

Mr. Katz: Well, listen, I mean, as Dave was suggesting, this is an old -- I mean, part of it, this was dealt with years and years ago already, unless there's something special about Y-12 with respect to Monday morning --

Mr. Allen: I went back and looked, and this one was originally dealt with in 2005, and then, it was resurrected and picked up again in 2009. And as you probably remember, 2005 for sure and to some extent 2009, we weren't very good at formally closing issues. And even 2009, we weren't real good at formal documentation and White Papers being saved

in the BRS or somewhere, where it's very difficult to follow the trails as far as what we discussed and what, if anything, was closed. We could even bounce back and forth from 2009 to where in one meeting we had agreement on that first topic, and the next meeting they didn't.

So, it's almost to the effect of, if you want to go back to the trail, it's almost unrecoverable and we're kind of starting from scratch on this. So, it depends on what the Subcommittee wants and what everybody's memory is.

Member Ziemer: This is Ziemer.

I recall that Joyce had some concerns about this issue. I thought SC&A had some White Paper or something on it. You didn't find anything, Kathy, on that at SC&A?

Ms. Behling: Well, I was actually looking -- at the last meeting we had discussed that NIOSH was going to prepare a White Paper, and I was looking for that. I can go back and dig through the records, also, and see if there was a White Paper prepared by Joyce. But I agree with you, Paul, I know that she still has some issue with this Monday morning sampling, and perhaps it is strictly associated with Y-12. But I can, like I said, go back and try to resurrect the concern that she still has.

Dr. Neton: This is Jim.

I don't really recall Joyce ever producing a White Paper on this, but I do recall a series of email communications on this issue. I looked for them and I couldn't find them. But Joyce provided us, through email, some examples I think, is what we had.

Ms. Behling: Yes.

Dr. Neton: But I cannot find them.

Ms. Behling: Okay. It sounds to me, if you're in agreement with this, that the easiest path forward is for me to discuss this with Joyce, have her clearly put her concerns, you know, go back and put her concerns down, and present that to you, so that we can move forward with this issue once again.

Mr. Katz: I think you also need to put in there the transcript, what was already discussed and agreed to. Because I do recall that this was responded to by NIOSH. So, I missed the point where it was resurrected, but I thought it was responded to and it was pretty clear that it was a no, never mind, the Monday, because of the way -- there was a whole logic to it that was discussed at one of those meetings, but you can find that.

Ms. Behling: Okay. I will search through the transcripts then.

Mr. Katz: Okay.

Chair Beach: Well, and probably when this stuff is going back and forth, if NIOSH would have sent out a memo or an email letting SC&A know, and the Subcommittee, that you were having issues with this, we could have maybe resolved this prior to this meeting.

Mr. Katz: Yes, true, but --

Chair Beach: So, just something for the future, just so we're not stuck carrying it over again when it could have been easily handled possibly.

Mr. Katz: Yes.

Ms. Behling: Okay. All right. So, I am ready to go on to OTIB-44, if there's no other questions.

Chair Beach: Okay, and we're clear on what -- you're going to take that on and then send, before the end of the month again, something out --

Ms. Behling: Yes.

Chair Beach: -- with whatever the question is? Okay. Thank you.

ORAUT-OTIB-0044, Historical Evaluation of the Film Badge Dosimetry Program at Y-12 Part 1 - Gamma Radiation

Ms. Behling: Yes, I will.

Okay. ORAUT-OTIB-0044, and this is, again, the Y-12 plant. And it has to do with the film badge dosimetry program for gamma radiation. And Ron Buchanan reviewed this OTIB and made a presentation at the last meeting.

During his presentation, he identified four findings and four observations, and those are in the BRS and they're in progress, I believe. And we were just waiting for some response from NIOSH, and I'm not sure if you've had an opportunity to do that. I didn't see anything in the BRS.

ORAUT-OTIB-0046, Historical Evaluation of the Film Badge Dosimetry Program at Y-12: Part 3 - Beta Radiation

Dr. Neton: Yes, this is Jim.

Both 44 and 46 are still undergoing the internal development. They've been assigned. I believe we have a completion date now.

Lori, do you have that date?

Ms. Marion-Moss: The estimated completion date is approximately in June of this year.

Dr. Neton: Right. That's what I thought. So, they're on the schedule, but there's competing demands on people's time, and they're in progress. Hopefully, they'll be finished by June.

I believe the same thing applies to OTIB-64 review as well. All those few Y-12 issues are being worked on by the same staff.

Mr. Katz: Okay. So, on 44, 46, and 64. And it would be good, either Lori or Kathy, whoever picks up the BRS, when we have proposed delivery dates, it would be good if we just put that note in there, if there's a place for it in the BRS, because, then, when you look there, you'll know this isn't going to be ready for the next meeting or it is, whichever.

Ms. Behling: That's a good idea, Ted. In fact, when I update the BRS from this meeting, I will include that in our statement.

Mr. Katz: Yes. That's sounds great. Thanks.

Member Valerio: So, Ted or Josie, this is Loretta.

Would those also require an SC&A review?

Chair Beach: Yes.

Mr. Katz: There's always that. There's always that.

Chair Beach: Yes.

Mr. Katz: But, then, I can task those things at a meeting.

Member Valerio: Okay.

Mr. Katz: So, I can task SC&A.

Member Valerio: Okay. Thank you.

Mr. Katz: Yes. Thanks.

Ms. Behling: Okay. So, it looks like that concludes all of the carryover items, because you've addressed now all of the Y-12, which was OTIB-44, OTIB-46 and OTIB-64.

So, if you are ready, SC&A has submitted some

additional reports to the Subcommittee that haven't been presented yet. And we can start with ORAU Report 86, which was done by Ron Buchanan.

Chair Beach: Yes, that sounds good. Is there a presentation with that?

Ms. Behling: Yes, there is.

Chair Beach: Okay.

Ms. Behling: And, Ron, are you ready?

Dr. Buchanan: Let me get off mute here and pull this up here. Okay.

Rose, can you present that on the screen?

Chair Beach: I'm seeing it, Rose.

Is everyone else seeing it?

(Chorus of yes.)

Dr. Buchanan: Let me get it in order here. This is a little out of order of what I had set up.

Ms. Behling: Is it possible to make that bigger on the screen or is that it?

Member Ziemer: It's a little hard to read. Maybe we can blow our own screens up. Let's see.

Ms. Behling: Yes.

Member Ziemer: Yes, if you hit Full Screen, it will get bigger.

Ms. Gogliotti: Exactly. And there's also something that will expand the frame at the upper right-hand corner of the Skype. It's two arrows.

Are people able to see it now?

Member Valerio: Yes.

Mr. Katz: This is just the document, anyway.

Ms. Behling: That's correct, yes.

Member Ziemer: I found if you hit Actual Size, it gets bigger also.

Ms. Behling: Yes.

SC&A Presentations of Previously-Submitted Reports to the SCPR

ORAUT-OTIB-0086, Internal Dosimetry for Coworker Data Completeness Test

Dr. Buchanan: This report was assigned to SC&A in October of 2017, and it's the Internal Dosimetry Coworker Data Completeness Test Report. It was issued in September of 2017.

And so, this was a test of, looking at the coworker sampling to see if it fit certain criteria and could be used as a, in coworker models. And so, Harry also worked on the mathematics of this. In the report there on page 6 and page 7, we go through kind of a rundown of what the mathematics that were used in that, in the OTIB, and then that just kind of summarizes it for you because it's pretty detailed.

And so, we look at our evaluation starting, actually, on page 7. We had no findings. We went through the math of this and determined that they did use an appropriate test and set it up correctly, used common and defined terms. Hence we had no findings in this. We did have a couple of observations. The observations are shown there on page 8.

We would just like to emphasize that, although we agree with what they said -- and we went through this before: how do you set these parameters? What is the allowable risk involved in both the producer, the one that produces the coworker data, and the person using the coworker data to make a model?

And so, you have a producer risk. You've got a consumer risk, and you've got acceptable errors and unacceptable errors. Just to refresh your memory a little bit, we went through this in the past to look at what is acceptable and we did some research, and some of the other people did some research, too, and did not find any accepted values, that 95 percentile, or something like that. We did find that NIOSH used a recommendation of 2.5 percent risk on both the producer and the consumer, and a simple error risk of 2.5 percent and overall error risk of 5 percent. It seemed to be somewhat in the norm. There doesn't seem to be good guidance there, but we found that these were acceptable.

We just wanted to emphasize in Observation 1 there on page 8 of our report that these are variables that can be set by the users, and they seem to be reasonable, that they can be changed. And so, you would throw away or accept more data, depending on where you set risk values at.

Observation 2 was the fact that they used the term original dataset, that they referred to a computer-readable dataset in electronic form that was provided from a hard copy. And this is kind of confusing. We always think of an original as, to me, the handwritten cards or the original printout of a computer, or something like that. And so, it was a little bit confusing to the reader until you had read the whole document a time or two and got it straight in your mind.

Observation 3, we see that there seemed to be an error there in n, the number used. They said 25 and it should have been 24, but that looked more like an editorial error. And so, it did not really impact results.

And so, overall, although this is a fairly short review presentation, we did do all the legwork on it and find out that it was appropriate and really had no issues on the findings or various observations in this review.

Chair Beach: Okay. Thank you, Ron.

Any questions from the Subcommittee Members?

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

Member Ziemer: No, that's fairly straightforward. I assume they'll change that to 24. But, other than that, it looks reasonable.

Chair Beach: Okay. And then, I'm not sure how to handle the observations. NIOSH, have you had a chance to look at this?

Dr. Neton: Yes. This is Jim.

We appreciate the fact that there were no findings, and the first two observations, really we note them, but I don't think we're going to change our procedure because of them. And the third one is literally a typo, and I don't know that it's worth -- this is a point of procedure actually now, whatever it is -- revising it for that change in the value.

Member Ziemer: It doesn't change what you're going to do, does it?

Dr. Neton: No, it doesn't change anything. It's really just a reference of a number --

Member Ziemer: Right.

Dr. Neton: -- and it's addressing a table. And we could certainly fix that the next time the procedure is revised, but I would think that we accept these observations and they could be closed.

Chair Beach: Yes, that was kind of my thought also, with a note that, when you revise it, that you can look at that.

Are we in agreement with that, Loretta and Paul, that this can be noted; it can be noted in the BRS that this was discussed and the findings all closed?

Member Ziemer: Well, observations closed, yes.

Member Valerio: Yes, close the observations, right.

Chair Beach: Observations, yes.

Member Ziemer: I'm good, yes.

Chair Beach: Okay. Sounds like we're all in agreement with that.

And, Kathy, can you go back and do that at the end of the meeting?

Ms. Behling: Yes. Yes, I will. I will close these three observations.

Chair Beach: Okay. Thank you.

Member Ziemer: Okay.

DCAS-PER-076 (ST4), Aliquippa Forge Subtask 4 (Case Reviews)

Ms. Behling: Okay. Now we're going to move on to DCAS-PER-076, and this is our Subtask 4 Report.

And I will wait for Rose to pull that up.

Mr. Katz: And while she's pulling it up, just to note, since we're talking about cases here, don't speak too much about particulars.

Ms. Behling: Yes.

Mr. Katz: Yes. Thanks.

Ms. Behling: Yes. Okay. And as Ted said, this is a case review. PER-76 is a PER associated with the Aliquippa Forge facilities that rolled uranium. And I'll give you just a little bit of history as to what we reviewed on the Aliquippa Forge.

Back in 2014, NIOSH had issued PER-45 that had to do with Rev 1 of the Aliquippa Forge TBD, and SC&A

did review that. That review resulted in eight findings and two observations. Ultimately, NIOSH revised the TBD. Rev 2 of the TBD addressed the issues associated with PER-45 findings, and the Revision 2 of the TBD resulted in PER-76. And since the TBD had been reviewed and the changes to Rev 2 incorporated our findings from Rev 1, the only thing we had suggested that we needed to do to follow up is the Subtask 4, to do a Subtask 4 case, so review one case that was impacted by these changes.

So, that is what this report presents. Now since the PER focuses on changes to internal and external dose in the residual period, we recommended that we review either two cases that had doses assigned for external during the residual period or internal during the residual period, or if one case satisfied both, we would review one case. And that is what we did; we reviewed one case.

If we go down to page 7, this particular worker worked with Aliquippa Forge for roughly 10 years. There were no dosimetry records. And therefore, the doses were based on the Aliquippa Forge exposure matrix.

If we scroll down to Table 2-1, during this process we evaluated both the original doses and the reworked doses, and those doses and the PoCs are shown in Table 2-1. As can be seen there, obviously, this case was not compensated.

You can also see there was a significant increase in the external dose and only a slight increase in the PoC. And I'll explain a little bit of that, the review for that, a little later.

In looking at the original external dose, the exposure matrix at that time used Table 13 values and DCF values from IG-001, the External Dose Reconstruction Implementation Guide. We looked at those doses and calculated the dose that you see in

the table. Those doses were entered into IREP as a log-normal distribution with a geometric standard deviation of 1.5.

The original internal dose, they also used inhalation and ingestion values from Table 13. They compared solubility types M and S, and it was determined that M resulted in a higher dose. That value, it was a modest dose, as was shown in Table 2-1, and that dose was entered into IREP as a log-normal distribution with a GSD of 3.

The reworked external dose, the TBD, the exposure matrix changed to data being included in Table 5-1. And so, they pulled information out of Table 5-1, used the DCFs again from IG-001, and it resulted in a much higher dose, in fact, a 42-fold increase. The significant increase in the external dose is due to changing the starting air concentration or air sample in the residual period. The air sample had been treated as part of the operational period, and now it was including the residual period. And so, that resulted in these significantly higher external doses.

The reworked internal dose, also data came out of Table 5-1 for inhalation and ingestion. Again, type M solubility was selected as resulting in the higher doses. For inhalation/ingestion, they use an F1 value that is a maximum value, and it looks at all the absorption types and assigns the highest for the selected organ. And again, that dose increased only slightly.

SC&A reviewed all those assumptions and considered them reasonable. We also went in and did our own calculations, as shown on page 9 of the report. We were able to match NIOSH's numbers. So, we have no findings with the external dose.

And internal dose, also, we went into the CADW inputs. We verified that everything was entered into the CADW correctly, and we were also able to confirm

the doses that were calculated for internal dose. So, there were no findings with this review of one impacted case.

Are there any questions?

Chair Beach: Kathy, this is Josie.

It looks straightforward to me. I have no questions at this time.

Paul or Loretta?

Member Valerio: I have no questions.

Member Ziemer: No questions here.

Chair Beach: Okay. That was unanimous, no questions.

Ms. Behling: Okay. I will just make a note in the BRS that we did do the Subtask 4 report, there were no findings, and the Board accepted this report, the Subcommittee accepted the report.

Chair Beach: Okay. That sounds great. Thank you.

Ms. Behling: Very good.

Mr. Katz: Excellent, Kathy.

DCAS-PER-081 (ST4), Hooker Electrochemical
Subtask 4 (Case Reviews)

Ms. Behling: Okay. Thank you.

We will move on to DCAS-PER-81, which is the Hooker Electrochemical Subtask 4. This is Ron Buchanan.

Dr. Buchanan: Great. Ron Buchanan of SC&A.

If you can pull that report up, Rose or Kathy, whoever is at the projector?

Okay. So, this was a Hooker Electrochemical PER. There have been three revisions to this OTIB for Hooker Electrochemical, technical-based documents, since it was issued in 2011. And so, considering this, all the cases had to be gone back and reviewed and reevaluated to see if they needed a rework.

And so, we find now the problem with these smaller sites is that it's kind of difficult to find a case that sets the criteria of the PER, the dates, internal/external, different conditions, and fall between 40 and 50 percent. And so, some of these cases, some of these sites only like have maybe 100 cases, and a lot of them fall below 45 percent. So, that doesn't leave too many to select from.

In this case, there were only three that even came close to meeting criteria of greater than 45 percent PoC. And so, we recommended selecting one that fell between 45 and 50 percent, and then, there was only one there and there were a couple that fell above 52 percent. So, we recommended selecting one of those. So, NIOSH did provide us, in January of 2018, two cases, the one that fell between 45 and 50 percent and one that fell above 52 percent. So, those were the two cases we reviewed, and we reviewed those in accordance with the directive of reviewing, and we only looked at the things that were changed by the PER.

Now, in this case, the PER did cover quite a few things, in that the external and internal changed for both the operation and residual period. So, there was a case that we found that had some of these changes in it.

And so, if we look at the first case on page 7 there, we see that this represented a Hooker worker that worked there quite a few years in the early years of its operation and had several cancers. The initial dose reconstruction for this under the old guidance was done in 2012. And so, it was reworked in 2017 to

consider the changes in doses according to the revised TBD.

The original dose reconstruction, the PoC fell between 45 and 50 percent, and the reworked fell between 45 and 50 percent. It increased about a percent and a half, but still not over 50 percent.

So, if we go down and look on page 7 of our report, we see that Table 2-1 there summarizes it for you. And it compares the original dose reconstruction to the recent one done under the PER-81. We see that the doses for the different cancer sites did increase slightly for both internal and external, and the PoCs for each increased slightly, but not significantly that it would change the outcome of the case.

So, we did go through the workings of this. Page 8 there lists the original external dose and the original internal dose, and how they were determined, and the combined PoCs, total dose and PoCs. And then, page 9 describes the rework of the external and internal doses, and we used Table 7 of the revised TBD there, at least in 2016. And we did the calculations as it prescribed and compared that with NIOSH's dose assignment and the total PoC. We see were in close agreement and had no issues or observations in that section.

And for the details of the calculations, it is on page 10. We see that we did have one observation on external. We went through the calculations and we found that, although not wrong, it was unusual, in that the dose conversion factor for the skin, it's usually used as 1.0, according to OTIB-17. However, this case used the dose conversion factor for skin out of the IG-001 recommendations.

And so we wondered why. We looked at several other cases for Hooker and found out -- and I list it there on that page, the next, the case numbers -- and found out that that was used, the IG-001 dose

conversion factors for skin was used in those cases also. So, we listed it in an observation because we were wondering why that was done, where it normally used 1.0 from OTIB-17. That was the observation for the external dose for the first case.

Page 11 shows the internal dose, talks about it. The internal dose mainly changed because the inhalation rate changed from 2.2 to 3.2 dpm per day in the inhalation, and the ingestion increased to 34.2 dpm per day. Both of these were increases. So, you would expect the dose from the previous dose reconstruction to increase in the reworked dose reconstruction.

And we went through and did these calculations using the IMBA program for the particular cancer sites. We derived the same internal doses as the reworked case from NIOSH showed. And so, we had no issues with the final version and the final dose assignments for internal dose.

However, again, sometimes we have to go back and calculate some other things to see if it makes sense. And we found that the internal dose for the skin actually was higher in the previous dose reconstruction than it was in this dose reconstruction. Now, for the other cancer, it went up, which we would expect, and agreed in both cases with what we would calculate.

So, the bottom line is it's not obvious from the documentation available how the higher value in the first dose reconstruction, why it was higher than in NIOSH's second dose reconstruction for the skin. And so, although it didn't affect the outcome, we agree with their outcome of the dose assignments and the PoC, it just remains to see why that was higher previously. It wasn't obvious from the documentation in the original dose reconstruction why that would be higher. And so, that was Case Number 1. That was a 45-to-50-percent PoC, and that was the only one, out

of all of the 100 cases, that fell in that area.

We did evaluate one greater than 52 percent, and the problem with that, as we show on page 12 there, was that the worker worked at two different sites. And in the reworked dose reconstruction, they had just used the dose from the second site and not reworked the Hooker site because they didn't need to. The reworked dose from changes that had taken place in the other site the worker worked at gave a very large PoC, and they didn't need to include any more dose from the Hooker. And so, there was nothing really to check on the dose reconstruction because they weren't charged with reviewing the other sites, the dose reconstruction under PER-81.

And so, in essence, we had no issues, had no findings, and just had the two observations, which I had previously mentioned about the dose conversion factor and the higher internal dose from the previous dose reconstruction; didn't see why it was higher in the previous one than in the second one when the intake increased.

And so, that concludes my presentation in this case.

Chair Beach: Okay. Good presentation. Thank you, Ron.

I guess I have a question. Is there directions to the dose reconstructors to use the IG-001 instead of the TIB-0017, or can the dose reconstructor use either one?

Dr. Buchanan: I can't answer that question, Josie, and that is our question.

Chair Beach: I thought NIOSH made --

Member Ziemer: Well, I was a little puzzled, also, by this, although it didn't have much effect.

Jim or someone, can you clarify exactly what's going

on here?

Dr. Neton: This is Jim. I thought Dave Allen or Tim might be able to help out on that question.

Apparently not.

Mr. Katz: Is Dave on the line?

Member Ziemer: Just the fact that the number hasn't been affected much or is there some rationale for selecting one versus the other?

Dr. Neton: Is Dave or Tim on the line still?

Chair Beach: Are you muted?

Dr. Taulbee: Yes, I'm here. This is Tim.

I'm sorry, could you repeat what the question is?

Chair Beach: It's just within Ron's Observation 1 where the dose reconstructor used the IG-001 instead of OTIB-17. I was just wondering if there was direction to the dose reconstructor just giving the leeway to use either or if there was a reason why IG-001 was used.

Dr. Taulbee: I would have to go into more details or do more research to actually know why they chose to not use one. But, in general, OTIB-17 was intended to replace, basically, the DCFs that were in IG-1. And so, my opinion, not going into the details here, OTIB-17, the DCF of 1, is what should have been used here. But, again, I don't know without going into more details.

Mr. Katz: Okay. Who's the lead for Hooker normally at DCAS? Tim or Jim?

I mean, I don't recall from work group meetings who. Is it Dave Allen or is it --

Dr. Neton: Dave has been working on the Hooker

issues.

Mr. Katz: That's what I thought.

Dr. Neton: I don't know if Dave is not there or --

Mr. Katz: Yes, maybe someone could just get a hold of Dave and get him back on the line at some point because he may be able to clear this up.

Dr. Neton: The PERs are normally his bailiwick.

Mr. Katz: Yes. Okay. So, if someone can just get him back on the line at some point during the meeting, that would be great.

Dr. Neton: We'll do that.

Mr. Katz: Maybe close this out, this question.

Ms. Marion-Moss: I just sent it to him.

Mr. Katz: Oh, okay. Thanks. Thanks, Lori.

Chair Beach: And then, on the second observation, Ron, you're just wondering why that dose went up? And SC&A couldn't pinpoint on why that was based?

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

Yes. The intake increased, and yet the dose decreased from the original dose reconstruction. So, we couldn't find out why the original dose was high as it was because we didn't calculate that high a dose for the original dose when we went back and tried to rework it. And we calculated the same dose they did in the rework and we agree with that in the final, but the original one done earlier, we couldn't duplicate it. And also, why was it higher -- when the intake increased, but the dose went down, that was our question to them.

And it really was kind of borderline on whether we should go back to the original dose reconstruction,

but when trying to match it and make logic of it, it wasn't obvious why the original internal dose was greater than the final one, when the intake increased.

Chair Beach: Right.

Member Ziemer: The bottom line on that one is you're really trying to verify the final one anyway.

Dr. Buchanan: Right.

Member Ziemer: The rework. So, it sort of, in a sense, doesn't matter what the original one was.

Dr. Buchanan: Correct. Unless it didn't include something that should have been included in it, like it was in the original.

Member Ziemer: Yes.

Mr. Allen: Dave Allen. My phone completely died. I had to find a new one and dial in.

Mr. Katz: That's all right.

Chair Beach: Darn it.

Mr. Allen: Yes, I think Stu's locked up on him, too. There's something wrong with our system here.

Chair Beach: Well, I'm glad you got back on.

Did you get a chance to see what the question was?

Mr. Allen: I know what the two observations are. I heard right to the end of Ron's presentation.

Mr. Katz: So, Dave, the first question is, why in these cases did we use IG-1 instead of OTIB-17?

Mr. Allen: Right. If you look at --

Mr. Katz: Are you on speaker phone? There's an incredible echo.

Mr. Allen: Yes, I know there is and I am, but it's quiet in the office here. That got better. Can everybody hear me now?

Chair Beach: Yes.

Mr. Katz: That's better.

Mr. Allen: Okay. Good.

As far as that Observation Number 1, the purpose of OTIB-17, or the title even in OTIB-17, is for evaluating film badge doses. Whereas, Hooker was actually a modeled dose.

And the difference being, as I understand it, with the shallow dose on the film badge, you never really know for sure if it's beta dose or some very low-energy photon dose. So, the favorable approach at that point is to assume that it's a beta dose as far as the dose conversion factor goes. That gives DCF of 1 instead of something lower.

But, as far as when you're modeling the dose, by definition, you know what it is you've modeled and you can go ahead and use IG-1, which is what we normally do with Hooker.

Hopefully, that answers it anyway.

Mr. Katz: That seems pretty clear.

Mr. Allen: Then, as far as Observation Number 2 with the lymphatic and the skin systems, what you see with the dose reconstruction, the original one was a very high-end efficiency measure, I guess you would say, to where, with the prescriptive intake like that, you would find out if a lymphatic system type S is the favorable absorption type. Whereas, with the skin, it was type M.

And what we've done is rerun, with the prescriptive ones, we rerun to make these organ intakes, and

then, you use the favorable one.

(Telephonic interference.)

Mr. Katz: Your phone line is gone again.

Mr. Allen: All right. That's a little better now.

In general, we will try to say that it's one solubility type that a person inhaled, which is what we did with the PER. So, in the PER what you see is a type S solubility for both the skin and the lymphatic dose. In dose reconstruction you see that it looks like we even had two different types of material. It was type S for lymphatic, type M for skin, which is an overestimating assumption. So, it was an efficiency measure. That's the difference, and that's why you see the skin dose drop quite a bit between the dose reconstruction and the PER.

And I hope that answered the question.

Mr. Katz: Yes, that makes sense.

Chair Beach: Yes. SC&A or Ron, any other questions with the explanation?

Dr. Buchanan: This is Ron Buchanan of SC&A.

No, I understand on the internal. On the dose conversion factor, you say you used the IG-001 because it was the model dose, as opposed to OTIB-17, because that was based on film badge and could have been beta dose. How is model dose -- don't you originally obtain that data from the film badges, though? So, wouldn't it be subject to the same problem?

Mr. Allen: If the information originally came from film badges, yes, but that's not what Hooker was. Hooker was like an MCNP type of calculation.

Dr. Buchanan: Oh, okay. Thank you.

I'm okay with that, Josie.

Chair Beach: Okay. Any questions from Paul or Loretta?

Member Ziemer: No, I think that clears it up for me. I think we can close this out.

Chair Beach: Okay. Yes, I was just going to suggest that.

And, Loretta, are you okay with that?

Member Valerio: Yes, I'm good with closing it. That was a good explanation. Thank you.

Chair Beach: Okay. So, we are closed for the Hooker.

And we are ready to move on to 062.

DCAS-PER-062: OTIB-0052 Revisions

Ms. Behling: Okay. This is Kathy Behling again.

And this is PER-062. PER-62 has to do with revisions to OTIB-52. OTIB-52 is Parameters to Consider When Processing Claims for Construction Trade Workers.

Now, under our review of the PER, our initial review, we look at a total of five Subtasks, but we look at the first three Subtasks, and then, make a recommendation under Subtask 4 as to doing reworked claims. And you can see, on page 5, our Subtasks 1 through 3.

Now I'm going to start out on page 7 with Subtask 1. Subtask 1 has to do with the circumstances that necessitated the PER. OTIB-52 was issued to provide guidance for reconstructing doses to unmonitored construction trade workers, and they use site-specific coworker data and multiply that by a 1.4 adjustment factor.

Now there is a fairly complex history that I'll try to

work through here. To start with, in 2007, OTIB-52, PC-1, the page change revision, was issued. And that page change was issued to change guidance with regard to penetrating/non-penetrating and internal dose pathways.

SC&A was tasked to review OTIB-52, Rev 00, in 2006. As a result of that review, there were 16 findings that were identified, and they are shown on page 7 and 8 of the report.

Then in November of 2007, PER-14 was issued. PER-14 addressed adjudicated construction trade worker claims at DOE sites where coworker models had not been established. And so, that was the reason for the issuance of PER-14.

Then, on February of 2011, Rev 1 of OTIB-52 was issued. That addressed some of the initial 16 findings that SC&A had on Revision 00.

In July of 2011, SC&A reviewed OTIB-52, Rev 1. We were actually tasked during that review to determine which of SC&A's original findings were addressed in Rev 1 and to provide recommendations to the Subcommittee as to the status of the remaining findings.

Then, in March of 2012, SC&A reviewed PER-14. That resulted in a total of six findings. Three were conditional because we weren't able to confirm some of the data.

This, then, resulted in the review of -- oh, this review led to NIOSH issuing Rev 2 of OTIB-52. That was issued in 2014 and, ultimately, resulted in this PER, PER-62, to address the changes in both Rev 1 and Rev 2 of OTIB-52.

So, SC&A reviewed the information leading up, obviously, to the issuance of this PER, and we agree with NIOSH's changes and the need for this PER.

And now, if we move on to Subtask 2, Subtask 2 shows corrective -- or it talks about corrective actions that NIOSH did to establish the sites that were involved, that were affected by these changes and, also, the number of cases.

So, initially, to establish the applicable sites, NIOSH generated Table 3-1. Let's see here. Okay. They established a list where the coworker data had been developed using monitored workers, and in sites where PERs were planned or already issued, they were not included in PER-62.

So, in the table, those that you see that are marked yes were considered in this PER. Those were the sites that were looked at in this particular PER.

And then, step 2 of their process was to determine the population of claims at each site. First, our review, SC&A's review, we looked at the entire list of sites where there's covered employment under the EEOICPA. And we compared that to Table 3-1, and we did determine that NIOSH accurately captured all the sites.

But I did have one observation. I couldn't see any documentation that the Albany Research Center, that there was a forthcoming PER for that. Now Albany Research Center is one of those, quote -- I should call it template or where the guidance, the dose reconstruction guidance is actually embedded in dose reconstruction reports. So, I'm not quite sure why I didn't see any documentation, but maybe it has to do with the fact that there's no standalone document for the Albany Research Center. But that was one thing that came to my attention.

For assessing the number of cases, SC&A doesn't have access to all of the IT tools that NIOSH does. But, based on doing a search of NOCTS, I was able to get an approximate, get close to NIOSH's numbers. So, I felt comfortable with that.

Also, SC&A reviewed the three PERs listed in Table 3.1 and confirmed that the PERs were issued after OTIB Rev 2. And those were associated with Bridgeport Brass, Electro Metallurgical Company and Paducah Gaseous Diffusion Plant.

Since SC&A can't assess forthcoming PERs, we also included an observation that's more of a recommendation. I just thought, in order for us to follow through to ensure that all of these sites that need to be assessed get assessed, perhaps we could maintain a list of those sites, be informed when a PER is issued, and, obviously, maybe review the PERs, as we have in the past, to assess the selection of the reworked cases were adequately captured for all potential construction trade workers. So, that's Observation 2. We had no findings with the methodologies.

Okay. And we'll go on to Subtask 3. Subtask 3 is NIOSH's approach for identifying the number of DRs requiring rework. What NIOSH did is they developed a list of keywords for identifying construction trade workers, and those keywords are listed in the first paragraph under Subtask 4, and include things like crafts and teamsters and boilermakers and pipefitters, and so on. Those keywords were used to query dose reconstruction reports and NOCTS.

NIOSH also went an extra step to do a text search of dose reconstruction reports for cases and sites using the names of the sites that were considered under this PER. And all of that keyword and text searching of dose reconstruction reports and NOCTS resulted in the identification of 1,969 potential cases.

The population was reduced because, and if we scroll down a little bit, in going through those cases, some were duplicates. Some cases the PoCs were greater than 50 percent. In some cases, the dose reconstruction was already under review. Several were already compensated under an SEC. Some of

the cases were Nevada Test Site cases with employment starting after 1957, which I believe all workers were monitored at that point in time, so it didn't apply. And also, the Clinton Engineering Works employment did not include 1949 and -- I mean, '48 and '49 timeframe. So, based on reducing that 1,969 initial cases, that resulted in about 1,006 cases.

And SC&A reviewed the keyword list, and we thought it was thorough and accurate. As I said, since we don't have the ability to assess the cases or do a word search in the dose reconstruction reports -- and in talking to David Allen, I think their IT people spent about three days coming up with the cases for that. Therefore, our assessment is limited to the methodology and criteria that was employed, but we do agree with what NIOSH's approach was. So, there were no findings associated with Subtask 3.

And then, finally, Subtask 4 is where we determined how many cases should be looked at that were potentially impacted. We're just recommending -- well, there were, as I said, 1,006 cases. One case that was recalculated resulted in greater than 52 percent; 992 resulted in less than 45 percent, and there was one case with a PoC between 45 and 50 percent. It just seems that that would be maybe the logical case to review, the one case with a PoC between 45 and 50 percent. And so, that was our recommendation under Subtask 4.

And that concludes our review of PER-62.

Chair Beach: Okay. Kathy, you got a complicated one, didn't you?

(Laughter.)

Ms. Behling: Yes. The history, yes, was somewhat complicated, and it was a struggle to try to do some of the searches. And I do appreciate David Allen's help on explaining how their IT people went about

that. So, I felt satisfied that that was done adequately.

Chair Beach: Okay. So, let's move back to the observations in the first part, the Subtask 2. Any comments or questions on either of those observations, on SC&A's conclusions?

Ms. Behling: And, Josie, I don't know if I can just interject a second here, but David Allen probably would -- I hope he's still on the line. He could probably answer my question about the one site where I didn't see any documentation data; PER was forthcoming.

Chair Beach: Yes, for the Albany Research Center?

Ms. Behling: Yes, yes.

Chair Beach: Okay. And that's why I was hoping NIOSH could chime in here.

Mr. Allen: Yes, this is Dave Allen. I can't answer that one, too.

Chair Beach: Okay.

Mr. Allen: I'm not sure how to answer it. But, when we put that list together for this PER, we were looking at anything that we were using the coworker analysis for, any coworker doses. And that does include Albany Research Center.

Then, once we started going through the PER, we looked at the Albany Research Center and found an unusual situation there. OTIB-52 correction factors apply to the measured dose, but not to the missed dose. As it turns out, Albany Research Center, at the time we used the coworker, really doesn't have much of any exposure. And all, 100 percent, of the film badges we used were non-detectable. So, essentially, the entire coworkers is just a missed dose, and there is no OTIB-52 correction. So, there

was really no reason to do a PER associated with that OTIB-52. And that was after we had put it into this PER to say that it did have a coworker.

So, it left me in this strange position. I'm not quite sure how to close this gap other than we need to get it on the transcript here today, that, as Kathy said, there is no PER forthcoming because, as it turns out, there really is no effect.

Chair Beach: Okay. I mean, that makes sense. That's a reasonable explanation of why it wouldn't have been on the list.

Member Ziemer: This is Ziemer.

Can you remind us, what did they do in Albany Research Center or what was the size of the work with the materials?

Mr. Allen: Well, it's actually kind of a pretty ugly one. They did a lot with some uranium, thorium, what they call rare earth, in like the '50s, et cetera. But the site was a government site that fell under the Bureau of Mines, Department of the Interior. As such, it's not covered under EEOICPA.

Later, they did some work for Y-12 in 1971 or '72, a small amount of work. I'm trying to think. At that point, they were -- somehow that became covered. I have to look. I can't recall the details, but somehow that was no longer Bureau of Mines, I think, at that point. But, somehow, this became covered.

Member Ziemer: So, it was a very limited covered time?

Mr. Allen: Yes. And then, after that time, later, I think maybe around 2000 or maybe in the 1990s, it became part of the Department of Energy. It is actually a national lab now, but their work is with primarily biomass fuels, which I'm told means, essentially, trying to find a way of burning sawdust

to get energy out of it.

But they also have remediation going on from the past nuclear operations back in the '50s. That was when it was Bureau of Mines. So, it gets very, very muddy as far as what was going on, et cetera.

The timeframe where we got the coworker, as I recall, it's during this remediation period where DOE ended up taking some liability or responsibility for cleaning up that work from the '50s. Even though that work is not really covered under the OTIB, it's still covered under FUSRAP. They were cleaning that up with their own contractors. They were not using Albany Research Center employees, which is what we would be covering. So, it gets very muddy, but we did a coworker with Albany Research Center employees that were badged, and none of them had any recordable dose. Well, like I said, everything about that site is strange and it gets very confusing.

Chair Beach: Yes, it sure does.

Mr. Allen: Did that answer your question, Paul?

Member Ziemer: Yes. I couldn't remember even seeing much about this before. But it doesn't really impact much. I guess in terms of what we're looking at here, it doesn't have much impact on the bottom line in terms of these observations here.

Chair Beach: No, it doesn't.

And then, anything else on 1?

Observation 2. Have I still got everybody?

Mr. Katz: Yes, you do.

Chair Beach: Maintaining a table. Dave or anyone, can you comment on that?

Ms. Behling: Well, Josie, this is Kathy.

That is just something that I thought just so that we can keep a list and sort of check off the list that, okay, a PER has been listed for -- because there's 20 sites that we're expecting, and maybe only 19 now, based on David's explanation. But I just thought, because we usually look at the PERs, but maintaining a list ensures that, yes, all right, we're going to check that one off to ensure that the OTIB-52 issue was addressed at that site.

Mr. Katz: So, I think that that one, SC&A, you guys can just keep a list --

Ms. Behling: Yes.

Mr. Katz: -- of which ones you haven't looked at for this item. And when you look at the PER, you can also address this.

Ms. Behling: Correct. Right.

Mr. Katz: When you can task the PERs -- there's really nothing more that anybody needs to worry about. SC&A can keep this item on their to-do list for when they check a PER for other uses.

Ms. Behling: Yes, exactly.

Chair Beach: So, the table you created on page 10, that Table 3-1, that's a pretty good table to start with. I don't know if NIOSH or someone knows that one is coming out, maybe --

Mr. Katz: I don't think it's worth -- I mean, they might as well, when they're going to review the PER, they can make a decision at this point.

Chair Beach: Yes.

Mr. Katz: But they don't need a special notice in that.

Ms. Behling: Okay. And am I correct, then, in assuming that we should be taking the Albany Research Center off of this list?

Mr. Katz: Right.

Ms. Behling: Okay. And I'll make note of that, that that was the discussion for Observation 1, in the BRS.

Mr. Katz: Right. That's good.

Chair Beach: Okay. And then, I think we can close these two observations, is that correct?

Ms. Behling: Okay.

Mr. Katz: Right. Well, I guess accept the report, right, because there's no findings?

Chair Beach: Yes.

Mr. Katz: If that's good with the whole Subcommittee.

Chair Beach: Yes.

Member Ziemer: Yes, I agree.

Member Valerio: That's fine with me.

I do have one question, though. On Table 3-1, on some of these sites that there's a PER forthcoming, do we have any kind of a timeframe on when these will be ready, especially from some of the sites that we're actively working on?

Mr. Allen: This is Dave Allen, NIOSH.

I think that almost answered the question here. Some of these sites are under an active review by the Board, and a PER is usually something we put together after the document has been revised and everything is said and done. We shouldn't have to go through for each change, and then, go through all these cases again for the next change, et cetera, et cetera. We try to make sure it's at some final version and we're not going to be changing it in the near future before we start the PER.

Mr. Katz: Right.

Mr. Allen: So, it comes down to various Board groups as far as how close we are to closing an issue and whether I could even guess how close we are.

Mr. Katz: Yes. So, anyway, the answer is, no, we don't have a timeline.

(Laughter.)

Chair Beach: Okay. And our next review is for -- I know it's Bob Anigstein's Birdsboro Steel.

Are we ready for a break before we get to that or is everybody ready? Because I think that one will maybe take a little while.

Mr. Katz: Yes. What does everybody want to do? It's just coming to noon right now.

Member Valerio: Either way works for me, Josie.

Chair Beach: Okay. How about you NIOSH folks? You guys are at the lunch hour.

Dr. Neton: This is Jim. I could use a break for lunch.

Chair Beach: Okay. So, do you want to take a half-hour or an hour?

Dr. Neton: A half-hour works for me.

Chair Beach: Okay. Great. I'm good for a half-hour. Ted, are you okay with that?

Mr. Katz: A half-hour? Sure. Whatever. That's fine.

Chair Beach: So, everybody's fine for a 12:30 restart?

Member Valerio: That was a half-hour, Josie?

Chair Beach: Yes.

Mr. Katz: Yes.

Member Valerio: That works for me.

Member Ziemer: I'm good.

Chair Beach: Okay. Let's break for a half-hour.

Mr. Katz: Okay. See you at 12:30.

(Whereupon, the above-entitled matter went off the record at 11:56 a.m. and resumed at 12:32 p.m.)

DCAS-PER-077 (ST4), Simonds Saw Subtask 4

Mr. Katz: Let's skip over maybe to Simonds Saw. There's no finding. So, it should make it easier in terms of whatever Dave might be required to do.

Ms. Behling: This is Kathy Behling.

It is PER-77, which is Simonds Saw, is Bob Barton, and I am just emailing him right now because --

Mr. Barton: Hi, Kathy. I'm on the phone.

Ms. Behling: Okay. Thank you.

Mr. Barton: Yes, no problem.

Ms. Behling: So, we're ready to start PER-77, Bob.

Mr. Barton: Okay. So, this is for Simonds Saw and Steel. It is obviously the steel mill that operated from early 1948 through 1957 built near Niagara Falls. They rolled uranium and occasionally thorium, just to give a little background on it.

So, I think probably the best thing to do would be to start on page 6, kind of briefly go over what the main updates were to the TBD that started this whole PER.

So, if we're looking at page 6, really both the external and internal dose assignments for both operational and the residual period were updated in the most

recent TBD. And if we look at -- we're on page 6 -- you can see that, for the occupational period, the external and internal intake rates were modified and recalculated, so that instead of having a distribution, we essentially have 50th and 95th percentile values. Again, that's both for the external dose rates and internal intakes during the occupational period.

And the TBD now contains very explicit instructions that you assign the 50th percentile to any sort of administrative workers and you have to assign the 95th percentile to operational workers. So, that's for the occupational period.

For the residual period, both the internal or external dose assignments were both reevaluated. And one of the main things that changed was the exposure time, which is obviously significant in the residual period. It went from 2,000 hours to 2500 hours.

So, when we went through and said, okay, based on these changes, what kind of criteria do we want for cases to look at, basically, it was three main criteria; this is also on page 6. We wanted to look at a production worker or production workers with at least some employment either in the operational period or residual period, or both.

We also wanted a worker classified as administrative because, again, one of those main changes was going from a distribution which would have been assigned to every worker to delineating between the 50th and 95th percentiles, depending on what type of worker category you fell into.

So, if we can move along to page 7, I obviously can't say much about this, but it describes some specifics about the case. What happened is, as I said, one of the criteria we were looking for was to go over a dose reconstruction for the administrative category. But, as it turns out, none of the dose reconstruction assignments were actually evaluated using that 50th

percentile. So, they were basically all considered operational workers.

So, we ended up with a single case that had the requisite employment in both periods, as you can see here. Okay. And if we can scroll down on that page, Table 1, you can kind of see the differences in doses from the original dose reconstruction, again, looking at Table 1.

We derive dose reconstruction through Revision 2 of the TBD, and we see there's pretty significant increases in both -- well, mainly in the external dose and, also, the internal dose increased a little bit. And the total dose went up by about a factor of 7.

One of the changes here that might look a little weird is the original dose reconstruction assigned a medical x-ray dose, and a revised x-ray dose is not assigned. And that's sort of a programmatic policy that comes out of OTIB-79, which is Guidance on Assigning Occupational X-Ray Dose.

Essentially, what it says, if you had x-rays administered on the actual site, then they must be accounted for, or if it's unknown, they must be accounted for. But, in this case, there's documentation that shows that, for any sort of medical exam, they were sent offsite to a local hospital.

So, we can move on and talk about the assessment of external doses. Really what I want to talk about is what the differences are between these. I believe that is in Section, yes, in Section 2.2.2, which is at the bottom of page 8. It starts with those bullets there.

And the main difference is, obviously, the worker is assumed to be an operations worker. So, under the new TBD, we assigned the 95th percentile as a constant; whereas, before it was assigned as

essentially the 50th percentile, which is the log-normal GSD. And those GSDs were really exposure-scenario-dependent, you know, air submersion, direct exposure from the uranium billets and/or rods.

Both DRs actually use the same external dose rate for the residual period, but, obviously, as I said, the new DR assumes 2500 hours at that exposure rate, as opposed to 2,000 hours. So, that would increase the dose fairly significantly.

They changed the geometry, because if you're in a residual period and you're assuming that you're basically submerged in this cloud of radioactivity for the purposes of external dose, they change the geometry to isotropic; whereas, before we see AP geometry.

The dose correction factor was chosen to be the midpoint value rather than an max value. So, that would lower the doses some. I think really what happens is, when you start to get into that best estimate territory, you really don't want to expect to choose more realistic exposure failures as opposed to bounding values in an overestimate case.

Another change was that, towards the end of this Energy employee's career, they didn't work the full year. So, again, I think this is another sort of best-estimate approach; whereas, in the first dose reconstruction, dose was assigned for that entire final year of employment. Whereas, in the revised, it was prorated based on the amount of the year that that worker was actually employed.

As I said before, any sort of medical x-rays were removed from the dose reconstruction as a programmatic policy change.

So, as far as the external exposure, we went in, we checked all the IREP inputs. The total doses were increased maybe by almost a factor of 7, and we had

no problems with that. We really had no findings on the external dose, the changes, and it seemed to be all in line with the TBD revision.

I can move on to internal dose or I can take questions at this point.

Chair Beach: I think you can go ahead and move on, Bob.

Mr. Barton: Okay. This Energy employee was not monitored. So, coworker intakes were going to be assigned. Similar to the external exposures, the internal intakes were prorated to the last day of employment. The operational period intakes were assumed to extend to the end of 1957, and that's a change in the TBD where the operational period was extended a year per Revision 2. This dose reconstruction was actually done with Revision 0. So, I believe that change of extending the operational period one year happened in Revision 1. So, that was one change.

Obviously, the 95th percentile intake was applied because this worker was considered a production worker. That was one of the main changes, was the breakout of that distribution into essentially two bins based on what your job classification was.

If we scroll to figure 1, what I'm showing here is the increase in uranium intake rates. As you can see, it's very significant once you get into that residual period that, even in the operational period, they're all higher for this individual because now we're using the 95th percentile.

Another change was that technetium-99 was added to the recycled uranium contaminants. Previously, only plutonium and neptunium had been included, but it's pretty common practice now, I think, to evaluate all three of those main recycled uranium contaminants. So, that was one change.

Thorium was removed. The original dose reconstruction occurred prior to SEC-157. So, during an operational period, thorium dose reconstruction is no longer possible and feasible. So, that was removed from the dose reconstruction.

But there was still thorium intakes evaluated for the residual period, which were assumed to be, roughly, 1 percent of the uranium intake rates. And that was sort of based on documentation of production.

Also, some thorium daughters were added that weren't included in the original dose reconstruction.

So, adding all these changes, I ran IMBA, came out with a total internal dose just slightly less than 1 rem. And that's .87 rem, which is slightly higher than the NIOSH dose of .85 rem, but the doses are very close. I'm not sure where that slight difference resides. I know in the files provided by NIOSH the workers that were used were -- and I ran IMBA directly, and I think it took roughly 25 to 30 IMBA runs to get all the contaminants in there, and then, you added it up all in an Excel file. So, it could be a bounding issue or it could have been possibly human error on my part cutting and pasting it. I'm not sure, but it's pretty small. So, in evaluating that internal dose, SC&A had no findings.

Are there any questions? That's pretty much it. This one was a fairly simple one.

Chair Beach: Thanks, Bob. Good report.

I don't have any questions. Do you, Paul and Loretta, have any?

Member Valerio: I don't have any.

Member Ziemer: I don't.

Chair Beach: Okay. That's a unanimous no questions from either Paul or Loretta.

And I would move that we accept this report and close -- there's no finding or no observation to close, but we can just close it out officially in BRS, that we accepted the report.

Member Ziemer: I agree.

Chair Beach: And Dave, are you back in the building or are you still outside?

Mr. Allen: I just walked back in. I'm still trying to warm up.

Chair Beach: Okay. Well, I'm glad they didn't keep you out there too long. Take a minute and go ahead and put Bob's slides or presentation back up. That maybe will give you time to get back to your office.

Mr. Allen: Oh, I'm in here. I sat down already.

Chair Beach: Oh, okay. Perfect.

Jim's probably glad he stayed home today.

Dr. Neton: Yes, I am. I'm glad I stay home most Wednesdays.

Chair Beach: Most Wednesdays? Oh, good.

All right. It looks like Bob's report is back up. So, Bob, whenever you're ready.

Dr. Anigstein: Okay. Is my presentation visible?

Member Ziemer: Yes.

DCAS-PER-073, Birdsboro Steel

Dr. Anigstein: Okay. I want a word of caution. There was a version of this presentation that was posted on the web, on the DCAS website. And this is slightly different.

One difference is it includes some material that would not have been allowed in the presentation on the

web. And so, when I come to material that is protected, you'll see it is in red. That's mostly a reminder to me not to vocalize, but everybody can read the data, but I won't be speaking it. As I said, this is not exactly what you will -- if you downloaded it, what was sent out, this is not exactly the same.

This is the review of DCAS-PER-073, which is the Birdsboro Steel Foundry and Machine Company. Since this is probably not familiar -- it certainly wasn't familiar to me before I started -- let me go into a quick background of the history of this facility. This I downloaded from the Historical Society of Pennsylvania website.

While it was open, Birdsboro Steel Foundry and Machine Company in Birdsboro, Berks County, Pennsylvania -- later changed its name to the Birdsboro Corporation -- was known as the oldest foundry in the United States, tracing its roots back to William Bird's New Pine Forge, founded in 1740.

Birdsboro Steel provided products to the United States military for every major conflict through the Korean War. The company closed in 1988 after a lengthy strike and an inability to increase to compete with increasing foreign steel imports.

The first minor observation is the name of the facility somehow got corrupted. All the contemporary documentation from the 1950s calls it, according to the posting from the Historical Society of Pennsylvania, which I downloaded just very recently, it's the Birdsboro Steel Foundry and Machine Company. And somehow, in 1987, there was a huge memo, handwritten, elimination recommendation, which correctly identified the owner as the Birdsboro Steel -- they use an ampersand sometimes -- & Machine Company.

And just to go into what the meaning really means, a steel foundry, for those who are not in the business,

is a facility that pours cast steel into molds, as opposed to a steel mill which rolls the steel. So, this was a steel foundry because that's what they did.

And they also had a second business where they made machinery for other steel mills, for their own use and other steel mills, rolling mills. And therefore, they called it the and Machine Company. And somehow the ampersand got mislocated and it's since then been called, referred to in the documentation as Birdsboro Steel and Foundry, which, frankly, doesn't make any sense. It's not a steel and foundry; it's a steel foundry.

Anyway, that's just a suggestion that it is possible for NIOSH to change the name without running into legal problems. And I'm going to refer to it as the Birdsboro Steel Foundry and Machine Company.

Mr. Katz: Yes, Bob, however DOE lists it is the name that we have to live with. But certainly we could send a note to DOE about what its correct name might be, but we have to run by the facility name that is given by DOE.

Dr. Anigstein: I was afraid of that, but I raised my point anyway.

Mr. Katz: But, anyway, thank you.

Dr. Anigstein: Now the only documentation -- this is very sparse documentation -- the only documentation about AWE operations at this facility is that there was a record of a shipment of eight assorted pieces of uranium billets, weighing 346 pounds total, that were received from Birdsboro for storage at the Lake Ontario Ordnance Works. That's a facility that was run by the New York office of the Atomic Energy Commission, the AEC.

And so, nothing else is known about this, except they just noted in one of their weekly or monthly reports, you know, with all the ins and outs, everything that

was shipped to that facility, everything else that was shipped out of the facility, it's just listed as just like a one-line notation about the 346 pounds.

The other thing we do know is that Birdsboro was involved in the design of a rolling mill for Fernald, which is a logical choice since they built machinery for rolling steel, and therefore, they would have the expertise, despite it's not an AWE facility, but this is an engineering design.

And it's my opinion -- and actually, it coincides with the opinion of the author of Appendix BB, Rev 0, which was that these were rolling. These billets were the results of rollings at Birdsboro.

Again, just as a matter of definition, a billet, which can be shaped as a cylinder usually or it could be a rectangular prism, is an intermediate product between an ingot and the final product, in this case uranium fuel rods. So, first, they take the ingot and close it down to a billet, and then, later in another operation, they turn it into a rod, which is long and much thinner.

The other documented instance of AWE activity is that there were five 1-to-2-inch-thick wafers, presumably of uranium, that were shipped to Birdsboro from Model City, New York, which is, essentially, the location of the Lake Ontario Ordnance Works. There was a letter dated February 1st notifying someone at Birdsboro that this material has been shipped. So, it could have been that day or it could have been prior to that day. My guess is it will be the same day; they made the shipment and then they sent out the letter.

They were described in detail. They gave the weight of each of these five pieces, and they were weights that ranged from 1.9 to 2.5 pounds, for a total of 11.5 pounds.

And there's nothing about what it was for except, as it says here, as I point out here, that it says, after completion of work -- they don't say what the work is -- this office should be contacted before disposition of material. AEC was very, very diligent about tracking every bit of uranium since it was considered precious material at the time.

And there is no documentation of its purpose. NIOSH speculated that these were subject to microscopic analyses of grain structure, which is reasonable. These are small pieces, and there was such an analysis performed on uranium rods rolled at a Bethlehem Steel plant in Lackawanna, New York, that was reported in the trip report. There's no reference that this has been done at Birdsboro, but it's plausible.

So, now I'm going to go back to our task. Subtask 1 was to assess NIOSH's evaluation and categorization of the issues that necessitated DCAS-PER-073 and its potential impact on dose reconstruction.

I will give, again, background now of NIOSH activity. The first document of this, the relevant document, was TBD-6000, Rev 0, produced by Battelle under contract to NIOSH, which gave generic guidance for AWEs that worked uranium and thorium. It was issued December 13th, 2006.

Then, in November 21st, 2007, again, the Battelle contractor issued Appendix B, Rev 0, that specifically addressed the operations at Birdsboro. Then, in 2011, TBD-6000, Rev 1, was issued, and I believe the main author was Dave Allen.

And following that, four years later, June 2nd, 2015, there was an Appendix B -- I'm used to saying BB because that's ESI -- Appendix B, Rev 1. According to the blurb on the cover page, it was revised for conformancy with TBD-6000, Rev 1. However, once you read it, it's a complete rewrite. There's very little

carryover from the Appendix B, Rev 0.

And I point out a comparison here. So, there were only two years that were the covered period. They thought at one time there was a suspicion there could have been activity in 1962, but that was later dismissed as not likely there was uranium there.

So, we see that the operations were different in the two years, at least as far as the Rev 1 or Rev 0 was concerned. And so, the inhaled intake went down from 209 picocuries per day to 42.9. That's so in '52, it also went down, but not as much.

However, the ingested intake went up significantly from 1.95 to 30. So, it was about a 15-fold factor in '51 and an enormous increase, about 200-fold, in 1952.

External exposure was small to begin with, a millirem per year range, and it didn't change much. It went down a little from Rev 0 to Rev 1.

So, the operational period was two years. It was not possible -- given this, it was not possible for NIOSH to exclude any cases by period of employment or otherwise, because NIOSH could not a priori say, well, will the doses be smaller because the inhaled intake went down or will they be larger because the ingested intake went up? And part of it would always refer to what organ we're talking about. Lungs, obviously, are most sensitive to inhaled intake; the alimentary tract is more sensitive to the ingested intake.

Consequently, since it was not possible to exclude any cases, and there were only four claims during the covered period -- there was a fifth one that was outside the covered period that was disqualified -- the simplest thing was to simply redo all four cases.

Going on to our next subtask, assess NIOSH's -- so, Subtask 1, we agree with NIOSH's decision about

how to address this. Subtask 2, to assess NIOSH's specific method of corrective action. Again, the reason stated for revising Appendix B was a revision to TBD-6000. However, a comparison of the revised TBD showed there were really no significant changes in the exposure pathways for organs other than skin that would affect the Birdsboro Site Profile. However, NIOSH did perform a fundamental revision of the exposure scenarios, based on a reassessment of the handling and working of uranium at Birdsboro, resulting in major changes in exposure scenarios.

Another fundamental change was in the methodology used to address the ingestion pathway. In Appendix B, where, one, NIOSH postulated that Birdsboro had received the uranium in order to perform microscopic analyses of metal surfaces, NIOSH assumed that Birdsboro cut the pieces to prepare samples for analysis and that the work took 8.8 hours, which is one-fifth of the 44-hour workweek assumed for this period in TBD-6000.

NIOSH postulated that Birdsboro received the billets on April 17th, the earliest date that billets were produced at Simonds Saw and Steel in support of design at Fernald's rolling mill. The machining of the billets at Birdsboro was assumed to take place on the same day. The machining of the five wafers was assumed to take place on February 1st, '52, the date of the AEC letter notifying Birdsboro of the shipment.

First, again, is an historical note for Observation 2. The standard workweek being 8.8 hours is based on a misinterpretation. The 44-hour week, which was assumed for a certain period in the early '50s by TBD-6000, was based on work that was done 8 hours a day Monday through Friday and working half a day on Saturday, which was common practice. There is documentation for that, and actually, I can even cite personal experience, having been working during that period of time. That was common. So, again, it does not change things very much, but it is an

anomaly.

The other observation that mixes the dates of operation, and will have a trivial effect on the estimated basis, but these scenarios should be plausible. The billets were rolled in Lockport, New York, on April 17th. They could not have been machined at Birdsboro 300 miles away on the same day, especially it's in a machine, but it assumes it takes an entire workday. So, a more likely date would be two days later, April 19th, allowing one day for shipping after the rolling. It makes a very slight difference in the exposure probably.

Then, the wafers in 1952 were shipped by Railway Express from Model City, New York, over 300 miles, from Birdsboro. So, if the letter would have been written the day the metal was shipped, the wafers could not have -- it is implausible the wafers could have been machined on the same day. If it fell on a Friday and we assume a full day of machining, the earliest likely date would be February 4th, the following Monday. So, we recommend that NIOSH adopts April 19th as the date for processing 346 pounds of billets and February 4th for working on the five wafers.

All right. Now we're getting to the dose analysis. Occupational internal dose, they nailed this one. NIOSH assumed an air concentration with geometric mean of 3,160 dpm per cubic meter, which is the daily weighted average for a surface grinder taken from TBD-6000 during operations in both '51 and '52. The airborne activity settled to the floor at a rate of 7.5 times 10 to the minus 4 meters per second. Calculated surface contamination of about 75,000 dpm per square meter. This activity then became resuspended. Using a resuspension factor of 10 to the minus 5 per meter, NIOSH derived an airborne activity of 0.751 dpm per cubic meter would reduce the calculated intake during the working hours following the first operation in 1951 until the second

operation in 1952.

The second surface grinding operation, assumed to have taken place on February 1st, also generated airborne activity settled to the floor, doubling the previous level of surface contamination, which, in turn, doubled the airborne activity due to resuspension during the main operating period.

SC&A performed a revised analysis of the rates. We assumed that if the billets in 1951 were rolled at -- that these were test rollings done at Birdsboro. So, we used the daily weighted average of the rolling operator, which was higher than that of the surface grinder during the 8-hour workday, and during the 8-hour workday under 8.8 hours, on April 1951. We assumed, again, during the activity, during an 8-hour period, resulting in a surface contamination of 76,000 dpm per square meter as opposed to 75,000 that NIOSH had, which resulted in the resuspended airborne activity of 0.761, slightly higher dpm per cubic meter.

The rest of the intake calculations parallel those performed by NIOSH, except we assume that a surface grinding of wafers took place on February 4th, '52, and the workdays were 8 hours on weekdays and 4 hours on Saturdays. We calculated the actual workweek following the rolling or machining of uranium based on the calendar for assessing intakes of resuspended activities. As a result of this activity, there is an increase for the total intake in 1951, but a decrease in 1952, for a decrease of approximately 3.4 percent of the total inhaled intake, assuming somebody worked during both years.

So, the observation is the methodology used by NIOSH had a net effect of slightly overestimating the inhaled intakes of uranium, but we don't consider that to be a major -- we did not make that a finding for this. It did not have a major impact.

Next, we turn to the ingested intakes. According to NIOSH OCAS-TIB-009, it's not suitable for estimating adjusted intakes because the uranium sheeting operation was short duration. It would not have allowed the uranium airborne sufficiently long to achieve equilibrium, which is assumed in OCAS-9, in TIB-9.

So NIOSH instead estimated ingestion on the basis of the calculated surface activity levels, assuming an ingestion rate of 1.1 times 10 to the minus 4 square meters per hour, meaning whatever is the contamination, which is just slightly over -- it comes out to like 1.1 square centimeters. So, whatever is the contamination on 1.1 square centimeters on accessible surfaces -- it would be the floor as well as the work surfaces -- this would be the amount ingested per hour.

So, I just did an example calculation here. Given the surface activity concentration calculated by NIOSH in '51, the ingestion rate would be 8.26 dpm per hour, which I'm just confirming that, this calculation.

We compared this methodology with that in OCAS-TIB-009, cited three pathways that contribute to the ingested intake. The first is -- I'm just listing it for technical completeness -- the first is Mode 1. That is the ingestion of material that is inhaled. So, it is coughed -- so, some of them inhaled things that's coughed up and swallowed, is one that's a main mechanism. And that need not be considered because the inhalation pathway already accounts for that. The ICRP lung model assumes a certain fraction of reflux into the mouth and swallowing.

The second is the position of the airborne activity on the beverage cup. And the third is the hand-to-mouth transfer from a contaminated surface, which corresponds to the NUREG-5512 mechanism.

During the prolonged operation up here, which is

when the TIB-92 had been used, the two latter pathways, Mode 2 and Mode 3, by coincidence, happened to be approximately equal contributions. But when there are no uranium operations, the airborne activity is greatly reduced. So, it is very little, very small. So, the fallout onto the beverage cup would be negligible. However, the Mode 3 would still work. There is still contamination on the surfaces and there is still the hand-to-mouth transfer of the contamination.

So, usually OTIB-9 is simply, TIB-9 is simply quoted as, I think, 20 percent of the airborne activity is ingested every day. But if you go into the details and use the equations that are presented in the document, and follow the calculations, it assumes that 10 percent of the activity on the worker's hand, which is given an area of 4 by 6 inches, is ingested, and the surficial activity of that hand was equal to that on the surface, contaminated. He puts his hand down, picks up dirt, and somehow during the next hour or during the rest of the day, that gets transferred.

Using that same surface contamination level and applying TIB-9, we have an ingestion rate of 14.5 just through Mode 3, the same hand-to-mouth transfer that is assumed by the NUREG/CR-5512. We would have 14.5 dpm per hour for an 8-hour day instead of 8.26. So, this is inconsistent because TIB-9 has been used extensively for many things. And just because this was after the cessation of operations does not invalidate the hand-to-mouth transfer of the surface contamination.

So, it's not claimant-favorable. We're making this observation for two reasons. One is that this is an overarching issue that applies to other sites and should be applied in a wider context. Also, this is, again, technical point, but I think it is very significant. It's important. It is that the ingestion, the datum was correctly cited; 1.1 times 10 to the minus 4 is the

correct number. The source, however, is incorrect, in that it's NUREG-5512, Volume 3, is where this value appeared, not Volume 1.

Now this may sound like it would be like a trivial distinction, except that the history of this -- well, there was Volume 1 and 2 came out in '92. These were in support of NRC's clearance rule. They wanted to release a previously used facility for unrestricted use. By '99 -- but there were models in that and there were also values given which were not based on very much data. I mean, they basically had, well, we have values of 10 to the minus 4, we have values of 10 to the minus 3, so we'll settle on 10 to the minus 4, which was not very rigid.

However, the NRC then commissioned Sandia Laboratory to specifically investigate the parameters to be used in the models, and this was a very thorough study of details. It came out with a lot of data points and constructed a probability density function and found 1.1 was the average. So, even though the numbers are very different, it's much better supported, it's much more acceptable.

And so, consequently, I have to confess, at the beginning, we said, well, why are they getting away from TIB-9 if that was already used? This is a very thoroughly researched value and this is a good value. So, we concur that this is acceptable to be used for Birdsboro TBD.

Next, we go to the external exposure from penetrating radiation. Now, first, we have exposure to uranium metal. And NIOSH assumed the operator handled the uranium metal for one week in '51 and again in '52. And the standard TBD-6000 approach, distance of 1 foot, 50 percent of the work time for the duration for an operator. But, for '51, they assumed the source was a short billet, and 52, they assumed the source was a slug.

Well, the table here is taken -- it's consistent with the TBD-6000, but it goes beyond it. Because that table -- I believe it's Table 6.1 -- is based on a report in Radiation Protection Dosimetry that was commissioned by NIOSH and was by Jerry Anderson, who I believe it was a NIOSH staff member, and Nolan Hertel, a professor at Georgia Tech, and calculated Bremsstrahlung doses from natural uranium and did research on several cases. It was all based on physical measurements, all computerized measurements, computerized analysis using MCNP.

And the long billet is much more consistent with the billets, with the pieces of billets that they handled in 1951. The outer diameter of 5 inches is what was produced at Simonds, I believe it's Simonds Saw. And the weight of 376 pounds is very close to the 346 pounds of the billets. So, I propose that -- well, it's true, it was cut up into five pieces, or eight pieces. But I propose that this is a better guide than the short billet which is thicker, much lighter, much less weight. So, I propose that we use the dose rate of .703 millirem per hour on the long billet as opposed to the .461 for the short billet.

And that includes these two values. Yes, that's the per hour and then the annual dose has added to it the .0462 millirem from contaminated surfaces in '51.

For '52, NIOSH adopted the exposure from the slug. And the slug is a hollow -- it's called the Clinton slug also. Clinton was the code name for Oak Ridge during the war. And it's a hollow cylinder which definitely does not correspond to the wafers that were examined in '52. And a flat plate would be a better representation. The plate has the weight of 6.87 pounds, which is in the same ballpark, at the 11.5 for the separate -- now these were separate pieces.

So, you probably wouldn't have been exposed -- it wouldn't have been a single site, but there could have

been several, more than one being handled. And if you had to choose between these sites, this would be, to my mind, the more plausible. And the dose rate, the annual dose goes from 1.28 millirem to 5.21 millirem. Now, again, these are not highly significant doses for purposes of reconstruction, but nevertheless I think it's actually more correct.

Again, I just down below -- I've already gone over that.

Next, we have the exposure -- and here is the most significant part of the analysis -- exposure to radiographic sources. NIOSH did not address other sources of exposure that were documented that they were present at Birdsboro at the time of the uranium work.

Kathy interviews survivors of one worker and others. They said, reported the use of radium, cobalt-60, x-ray machines and the betatron. But what is particularly telling is a verbal description of a photograph showing the use of sources that was consistent with the fish pole technique for radium radiography. And I will allow everyone online who has access to Skype to read the red text, which I would not be allowed to read out loud.

However, the operation mentioned here is quite consistent of these photographs which were -- well, actually, it's from an NRC Brochure 52, I believe. But we had to kind of borrow from the ORAU museum at Oak Ridge because they had a better copy and we had permission to use it.

So, you see a worker handling a source here, taking it out of its shielded container. And here, you have a simulation of a worker holding a source at the end of a long pole -- that's what we call a fish pole, referred to as a fish pole -- during the exposure. Now this is a posed photograph because, actually, you could not get a good radiograph because the worker's hand is

just not steady enough and exposures sometimes take hours.

And here again is the photograph from 1940. Actually, it's from a book published in about 1940, I believe, '40-41, again, showing, and you can see, the background, the radiant dangers involved, which is consistent with the survivors' testimony here and probably more radioactive signs. And so, it's quite clear that there were radiographic sources.

Further evidence is I conducted an interview with a former worker whose name was furnished by you during -- one of the claimants. And he said there was a betatron. He did work later. It was not during the covered period, but not that much later, just a couple of years later. He reported they had a betatron, a 500-millicurie radium source and a cobalt-60 source. There are more details that I'm not allowed to voice here.

Next piece of evidence is a document that was found at the University of Illinois at Urbana-Champaign, which I should list by one of the advocates for workers at GSI, actually, who did his research in betatrons. And he sent me a page that lists Allis-Chalmers betatrons. The document was dated December 26th, 1952.

And it states that Birdsboro Foundry had a 22-megavolt betatron installed in '52. So, it probability would have been towards the end of the operational period but nevertheless it needs to be considered.

And then, further documentation is a published volume put out by the Steel Founders' Society of America, published in 1961, that Birdsboro had non-destructive test facilities comprising a 24-megavolt betatron. That's not a mistake. What Allis-Chalmers did -- we know that from the researchers -- they first produced betatrons with a 22-megavolt acceleration and, later, by changing from an electrical circuitry, I

think the capacitors, they were able to do it at 24. So, they went out into the field and made field modifications, and they had 24-megavolt betatron, and ended up with a 25-megavolt betatron.

And they also had a 300-kVp x-ray machine, which is consistent with what GSI had; a 200-millicurie cobalt source, which is also -- that was the strength -- I didn't list it here, but that was also what the former worker that was interviewed also said, by the time he was using it, it had decayed to 200 millicurie. So, with a 5.8-year half-life, depending on what year you're talking about, you can see what the strength was. And 500 milligrams of radium, which is, you know, a milligram of radium is just about the same as a millicurie.

Also, just based on research that we've done, particularly with GSI, over the years, a facility in those days that does steel casting almost necessarily will have radiographic sources because the castings are subject to defects, inclusions of slag material that gets caught in the thing. And a customer is not going to want to have a casting with defects. So, they will actually require as part of the package that's delivered to them the casting be accompanied by certification that it has been x-rayed and they actually send the films, or copies of the film, to show, yes, here it is; it's a nice, clean casting. Of course, sometimes the castings aren't clean, and they go in and dig them out, dig out the imperfections and fill it in, just like a dentist will fill a cavity in a tooth which he diagnoses through an x-ray.

So, it would be illogical of them not to have had three radiation sources. We do know that GSI, which, incidentally, was also furnishing castings for the military, we know that they had radium and later a betatron at the operation. So, this is just completely reasonable.

In which case, since there was no one really from

Birdsboro that we can interview that was there during that time -- there was one worker who was alive at the time of the CATI interviews. He will be into his nineties. I made a cursory attempt to call him, but didn't succeed. So, I didn't follow it up.

Having spent a great deal of time on the part of NIOSH and SC&A and Board Members in developing exposure matrixes with GSI, I will propose that the same external exposures -- that this would constitute surrogate data that could be applied to Birdsboro, because the main source of this exposure and this triangular distribution, the three values that were developed for the early years at GSI, these would serve as surrogate data.

And these would be limiting values. So, they don't include the exposure to uranium metal that we talked about before because these are in roentgens per year; the other one is in milliroentgens per year or millirem per year, actually. So, there would be a trivial contribution of the values. So, there's no need to add the uranium.

Similarly for 1952, since we know the betatron was installed sometime in '52, and the DCAS practice is usually to give credit for the whole year when there is a source, in addition to this -- because we assumed for GSI that the same worker that did radiography with radium also part of the time was operating, part of his time was operating the betatron -- and so, we have this 5 rad per year air kerma from 30 keV photons, residual radiation after the betatron was shut off that was adopted for GSI.

Now the neutron dose is slightly lower than for GSI, because GSI, we assumed that they were radiographing uranium. Well, we know they were radiographing uranium. Here they were not, most likely. So, consequently, the neutron dose would just be from the normal radiography of steel in the betatron room, and the workers are very effectively

shielded against photon radiation. There are these 10-foot-thick walls. But it does not completely shield them from neutron radiation. So, there was a neutron dose that was applied, but it's smaller than what was applied to GSI, based only on this steel radiography.

And then, we might as well, if there should be any administrative personnel -- and there aren't at the moment, but maybe future cases -- we could adopt the same exposures, the same external exposure as at GSI of like 571 millirem per year for the two years.

So, this is the only finding. They neglected to address the external exposures to documented radiographic sources.

Now we turn to beta dose though. None of the cases that were -- none of the claims for Birdsboro at the present time include skin cancer, but, nevertheless, the TBD needs to address skin doses just in case such a claim should come up.

And so, we agree with the NIOSH assumption that the beta dose, the non-contact beta dose, so the rest of the body other than the hands and forearms, should be 10 times the photon dose. We did some MCNP calculating and found this is a reasonable assumption, provided we use that shape that was recommended by SC&A. And then, plus the beta dose from contaminated surfaces that was calculated by NIOSH is a small contribution.

So, we end up with .703 millirem per hour times 10, times 44 hours per year, 50 percent, and add the 4.48. We end up with 159 millirem, for a beta dose of 51.

For '52, we agree with the beta dose that NIOSH -- consistent with analysis of the uranium wafer.

Again, we make this an observation since the changes in skin dose would be small compared to the large dose -- I mean the large external doses

mentioned just before also affect the skin. So, when you have several roentgens per year to the skin, the difference of a few tens of millirem are not very significant. They should be addressed, but we don't think it was important enough to be a finding.

Next, we turn to Subtask 3, which is to evaluate the PER-stated approach identifying the number of dose reconstructions required for the evaluation of dose. So, NIOSH searched all computed claims and verified employment at Birdsboro site that had a probability, PoC, of less than 50 percent. They found four claims.

SC&A tried to verify. We looked at the Department of Labor Birdsboro webpage. We found five cases. However, once we investigated the NOCTS, we saw there were five claimants, but one of whom was outside the covered period. So that we agree with NIOSH's identification of four cases.

And we went through them to see, well, how are these going to be affected by this PER? So, even though we were not tasked with a case audit, but since we have to look at these cases to see whether they were properly identified, we just did a summary examination of the case.

And the first one in the order in which they were performed, they were, even prior to TBD-6000 and relied on OTIB-0004, which specified maximum plausible intakes and external exposures. And the intakes and doses were orders of magnitude greater than those in Appendix B, Rev 1.

Then there was a second DR that the report was issued after TBD-6000, Rev 0, but prior to Appendix B, Rev 1, or Rev 0. And the DR relied on TBD-6000 for external exposures. Intakes were based on data from Simonds Saw scaled to the ratio of the masses of uranium handled at Birdsboro Simonds Saw.

Then, the third DR was performed. The date on the

cover was after Appendix B, Rev 0, but it did not use Appendix B, Rev 0. The external doses were based on OTIB-4. The internal, just like the previous case, based on Simonds Saw. And both of these DRs had intakes orders of magnitude lower than Appendix B, Rev 0 or Rev 1.

The fourth one was the only DR based on the intakes and external exposures in Appendix B, Rev 0.

So, our observation is that DR Number 1 could have been excluded from the PER, or you can say, well, there's such a large overestimate of the doses and it was still denied compensation, they could have said they don't need to review it. But it was probably simpler just to go ahead and do all four cases.

So, we have no findings pertaining to the identification of claims that were impacted by DCAS-PER-073.

Okay. Subtask 4, we were not tasked with doing a Subtask 4 review, but we were by extension expected to come up with recommendations that the Work Group, the Subcommittee could use in deciding whether to assign out a Subtask 4 and how to select the cases.

So, as usual in a Subtask 4 review, we need to audit cases that present a range of parameters that adequately characterize the cases evaluated by NIOSH. Since we had already performed a cursory examination of the PER reports, which is on the previous page, and it was very easy to do since the cancer site appeared on the cover page, we simply looked at the actual cases to determine the selection criteria.

I can't voice this, but these are the four cases. They're different. One, two, three, four, five different organs. These two are really part of the same large structure, but they're considered separate organs

and separate cancers.

So, this gives you a wide range of cancer types. Also, in two of the cases there are two cancers. So, it will give us an opportunity to see, to verify that the PoC was correctly calculated by combining the PoCs of the two individual cancers, and we would have the --

Mr. Katz: Bob?

Dr. Anigstein: Excuse me?

Mr. Katz: Can I just interject here? I mean, the criteria for selecting cases to review --

Dr. Anigstein: I'm sorry, say it again?

Mr. Katz: Can I interject here? I mean, the criteria for selecting cases for Subtasks 4 are expected to be just based on how do you evaluate the changes made, really not these other factors. So, all we need is the generic criteria, what changes need to be evaluated by a case. That's it.

Dr. Anigstein: Okay. Okay. Whatever. This is the end.

I will just say, usually, when we're asked to prepare a memo, a separate memo, suggesting how the cases should be selected. I thought I would combine this.

Anyway, this is the end of the presentation. So, I will be happy to answer questions.

Mr. Katz: Okay.

Chair Beach: Thanks, Bob.

There's a lot of questions. But one, in particular, back on your Finding 6. I'm looking for my notes real quick. Observation 7, you talked about that being an observation, and if NIOSH based it on the long billet -- and NIOSH will have to answer whether they agree with that or not. If they don't use the long billet, does that turn that into a finding, in your mind, or?

Dr. Anigstein: Probably not because this would be a -- the major, if they do accept the finding, the major source of radiation dose would be the radiographic sources. So, these become minor, minor changes. So, it's always a tossup whether to call something a finding or an observation.

Chair Beach: Right.

Mr. Katz: Okay. Because it shouldn't be a tossup really. Observations are cases where it doesn't affect the correctness of the dose reconstruction. Findings are when the dose reconstruction is incorrect. You're just producing a dose, a dose estimate that's incorrect. So, it actually should be pretty clear-cut.

If a dose is trivial, then it can be an observation. But if a dose is substantive, then it's a finding. That's the way we categorize these.

Dr. Anigstein: Okay. I guess it could be a borderline case where even -- I mean, an insignificant dose is defined as less than a millirem that we don't even talk about. But here, we have 159 millirem, and I suspect -- I didn't calculate what the NIOSH dose is, probably more like 100. So, that could make a difference.

So, it would be a recommendation that we should change this to a finding?

Mr. Katz: If 59 millirems is substantive in terms of the dose, in terms of probability of causation estimate, then yes. If not, no. But I leave that to -- you guys are the experts on what matters.

Dr. Anigstein: I'm sorry, I'm not sure I followed.

Mr. Katz: Okay. So, you're saying 59 millirem difference. If there is a 59 millirem difference that can change the outcome of a dose reconstruction, then it is a finding.

Dr. Anigstein: Yes. Okay.

Mr. Katz: If 59 millirem is as trivial as 1 millirem, in effect, for a PoC sake, then you can leave it as an observation.

Dr. Anigstein: All right. I agree with that. I accept that.

Mr. Katz: Yes.

Dr. Anigstein: So, do I need to do anything, or?

Member Ziemer: No.

(Laughter.)

Member Ziemer: Well, let's ask some other questions first maybe.

Mr. Katz: Yes.

Member Ziemer: First of all, let me ask, did NIOSH consider any cleanup occurring after these sources are handled?

Dr. Anigstein: I don't believe so. Dave could answer that.

Mr. Allen: Okay. This is Dave Allen.

Could you repeat that?

Member Ziemer: I'm asking whether any cleanup was considered after whatever tests were made. So, I'm a little confused. For example, it says that NIOSH assumed the operator handled the uranium metal for a week. But, elsewhere, it implied that whatever was done was done in a day. And whether it is a day or a week, was there any cleanup that occurred? Are we saying that the total handling time for a year was basically 8 to whatever it was, 8 and a half hours in a year?

Mr. Allen: As I recall -- I might not be clear right on this -- but I think we accounted for handling metal for one day, and then, accounted for the contamination for the rest of the year.

Member Ziemer: Okay. So, that's what wasn't clear to me. So, you're assuming that they worked in a contaminated area for the full year without cleanup or with cleanup?

Mr. Allen: We did not account for any cleanup.

Dr. Anigstein: I believe my recollection of this is that the machining took a day, consequently you had this airborne activity for a day and settling out for a day.

Member Ziemer: Right.

Dr. Anigstein: But it stayed there the rest of the -- in other words, it started when the first metal was worked in 1951 and it continued through the end of '52, and then, it just abruptly stops. There is no residual period.

And the handling was for purposes of external, and so forth. External exposure purposes, the handling took a week. For internal, for the generation of the dust, the machining or rolling, or whatever it was, took a day.

Member Ziemer: So, in essence, if there's no cleanup and there's residual activity sitting around for the year, then we end up having to account for the radiographic sources for the full year, even though they only handled the uranium for a day, is that correct?

Dr. Anigstein: Well, if the '51 to '52, if the covered period --

Member Ziemer: Yes, but I'm really asking you, is there really a defined covered period already in place that assumes it's a full year?

Mr. Allen: This is Dave Allen.

I think I know what you're asking. Right now, the DOL covered period is 1951 and 1952.

Member Ziemer: Got you. That is, we end up dealing with those radiographic sources, we suddenly jump to some pretty big doses?

Mr. Allen: Right. And as Bob pointed out in his presentation, the actual work is more like a day or a week in '51 and --

Member Ziemer: Right.

Mr. Allen: -- and one day in '52.

Member Ziemer: Is there some reason to think that they didn't do any cleanup, and would that change things much?

Mr. Allen: I don't know if it will. I mean, as far as dose testing goes, it's just dose from that contamination left over from one day. It didn't amount to --

Member Ziemer: It didn't amount to much by itself?

Mr. Allen: Right.

Member Ziemer: Okay.

Mr. Allen: I think I know where you're going, and it's --

Member Ziemer: Well, I'm concerned about the numbers are going to be pretty big from the other stuff.

Mr. Allen: Yes, and it's always been kind of a question mark with the Department of Energy, or the Department of Labor, with these intermittent jobs as far as, if you worked one day in '51 and one day in '52, is the whole year covered; is the whole time

period in between covered?

Member Ziemer: Yes, yes.

Mr. Allen: I mean, I think we could probably get them to end the covered period in February of '52, but they've still got the 1951 to 1952. I'm not sure how they deal with it.

But that does bring up, I mean, I would like to respond to the one finding anyway, the radiography, if I could.

Member Ziemer: Well, I think you're going to have to respond to that because that's substantial if you are saying two years.

Chair Beach: I don't know if we should take these one at a time. Like the first observation, I'm assuming we can close that because we -- I mean, yes, NIOSH can change whatever the name on their documentation, where appropriate, but we can't change the way it's been designated.

Member Ziemer: No, no, I understand that.

Chair Beach: Yes.

Member Ziemer: It just wasn't clear to me in talking about handling things for a day, assuming a week --

Chair Beach: Right.

Member Ziemer: -- and then, adding -- I think Bob is quite right in raising the issue of the radiographic sources. We certainly had that issue at General Steel Industries and that's still the idea. It sounds like at least -- I don't know to what extent we can actually clarify that everything that you named there actually was there. I mean, we can -- it's likely that they were, but do we know the sizes of the sources that they had, for example?

Mr. Katz: Well, I guess before we get into that, could

we hear from Dave? There's some big issues here.

Mr. Allen: Yes, this is Dave Allen.

And that's the exact point. I mean, we did look at this a little bit when we were putting this together because we did have some information that they had a betatron. What we found was that the Army Corps of Engineers let a contract -- essentially, the Army was going to take over this plant and start making tanks, and the Army Corps of Engineers put a contract out to expand this facility in order to do that.

That expansion was to include putting on the Corps of Engineers in extreme tight order or quality control which included a betatron machine. But that contract wasn't put out until -- it was signed March 7th of 1952, and the contract wasn't completed until June of 1954. So, it does not appear that the betatron was there during the actual AEC work there, 1951 into February of '52.

Member Ziemer: See, that's a very important point in this thing that could definitely change the numbers.

Mr. Allen: That's why I've been trying to get in here. We looked at that and decided the betatron wasn't there during that timeframe. The rest of the stuff as far as radium and cobalt sources, all the information we have essentially comes after that timeframe. It may or may not apply during, but we don't know.

We came to the decision that we were not going to include the radiography until we know or at least had some reason to believe that it was there in February of '52 at least. And right now, everything we have says the 1960s it was there and 1954 it was there, but we don't have anything that really says it was there prior to February of '52. That's why --

Dr. Anigstein: Dave, I saw that same information that you're citing. But what convinced me was this listing

of Allis-Chalmers betatron where they listed it as installed in 1952, this one piece of paper.

Mr. Allen: And that's possible, but the expansion that it was going to be used on wasn't completed until '54, and the contract to build that building and install it wasn't signed until March of '52, which comes after the February of '52.

Dr. Anigstein: But the use of -- again, I agree that there was some ambiguity there. But the fact that they needed the castings that they were doing, had been making ever since the beginning, and they had been steel casting I think starting during World War II. It's just industry practice was to do radiographs, and the simplest way of doing the radiograph was with radium. So, the things that were --

Mr. Allen: That's interesting. I'm sorry, Bob.

Dr. Anigstein: No. I mean, to think that they would be sending out the castings without any quality control is just not --

Mr. Allen: But the other interesting thing about this site was that the Navy controlled it during World War II. They allowed Birdsboro to start using it in, I believe it's '46. They allowed Birdsboro to use what was the storage areas for what they called pressed steel operations, not castings, but pressed steel.

And then, Birdsboro leased the casting area to Penn-Ohio Steel Corp, a different company altogether. There's actually some legal cases in there about the property tax. But I don't know for sure when Penn-Ohio Steel stopped using that, but I know they were using that area in '49 and '50, and it seems like it all stopped when the Army decided to take over and start expanding the plant, so that they could build the tanks.

Dr. Anigstein: There were actually two facilities, two separate buildings. There was a Birdsboro foundry

and there was something called armor cast, which was built, which was on the same site, which was built during World War II by the Navy for the use of the Navy. And the thing is, the Birdsboro was a foundry from back in the 18th century. So, they did not stop making castings.

Mr. Allen: It actually seems like they did, like they went to go there, Penn-Ohio Steel, and they were using the storage areas for pressed steel.

Member Ziemer: Let's see, I think we're going to need some more detail on this. We obviously can't solve this issue today.

Mr. Allen: Yes, I think I can put together something and send it out. Like I said, nothing is going to be a definitive story here, but I think it came down, for us anyway, it came down to the idea that we can't really show that any of this was there in '52. We can always revise the TBD later, if we find some information.

Mr. Katz: So that sounds good, to get a written response from NIOSH.

Mr. Allen: Yes.

Mr. Katz: Yes.

Chair Beach: Okay. So, on the finding, I understand we need to get a response from NIOSH. Do we want to wait to close out any of the observations until after we get that back?

Dr. Neton: This is Jim.

I think some of those observations are going to require some kind of writing because --

Chair Beach: Yes.

Dr. Neton: -- some of them do involve some fairly technical nuances in our program.

Chair Beach: Okay. Well then, we'll just go ahead and wait on those.

Then, Ted, this is affecting Subtask 4. We're going to hold off on tasking any of those, is that correct, today?

Mr. Katz: Yes. There's not much point really in tasking that, given the murkiness of where this is headed.

Chair Beach: Because I definitely on this one -- on PER-062 was one that was recommended as Subtask 4 tasking. And I guess I'm just questioning even tasking that with contract employees.

Mr. Katz: Well, yes, we can't actually task anything today. Okay

Chair Beach: That's what I thought.

Mr. Katz: Yes. But you can certainly let your wishes be known about Subtask 4 because the Subcommittee won't be meeting for at least another three months, but yes.

Chair Beach: Right. Okay.

Mr. Katz: Yes.

Chair Beach: I think that's the only one. So, on this one, we're going to wait and NIOSH will take this and answer the observations and Finding 1, correct?

Mr. Katz: Yes. Right.

Chair Beach: Okay.

Ms. Marion-Moss: Josie, this is Lori.

I have a question, and I don't know who can answer it. But has Appendix B been reviewed by the AWE Work Group?

Chair Beach: I believe it's the TBD-6000 Work Group, is that correct?

Mr. Katz: It is TBD-6000, but no is the answer.

Ms. Marion-Moss: The answer is no?

Mr. Katz: I don't think we ever --

Member Ziemer: We never did Birdsboro.

Ms. Marion-Moss: Oh, okay, never Birdsboro.

Mr. Katz: That's why this is all coming up. That's why this is all coming up now.

Ms. Marion-Moss: Yes. Okay. Thank you.

Chair Beach: Okay. So, we're going to leave those findings as open or in progress?

Mr. Katz: Yes, I think in progress is good.

Chair Beach: In progress? Yes.

Any other questions, Loretta?

Member Valerio: I had one question, and I'm trying to find it. Was the operational period the entire year 1951?

Mr. Allen: Currently, DOL has it listed as 1951 and 1952. They have a knack of just making whole years unless you ask them to narrow it down to some specific dates. As it was with this one, we were just doing the two-day operations thing and whether it was the rest of the year on the residual contamination or not didn't much matter. So, we never asked them to try to narrow that down.

If that becomes part of the issue with radiography, et cetera, we can probably do that. I think there's enough information for them to narrow it down to February of '52. But, currently, it's --

Member Valerio: So, in this finding looking at dose, for the residual contamination would the 2,000 hours of exposure be used or the 2500, because they were working an extended workweek by working that half-day on Saturday?

Mr. Allen: I think the 1952 I believe we are using 2200 hours a year, if I recall. And yes, we're currently using the entire year, but almost all of it is just the residual contamination there, exposure from that. It's pretty small.

Member Valerio: Okay.

Chair Beach: Okay. And then, Bob, the last question, I wasn't 100 percent clear. Are we going to change one of the observations to a finding or are we --

Dr. Anigstein: Yes.

Chair Beach: Okay.

Mr. Katz: Yes, I don't think you need to reissue a report for that. I think you can just capture that in the BRS.

Ms. Behling: I will do that.

Dr. Anigstein: I'm sorry, capture that in an email?

Mr. Katz: In the BRS.

Dr. Anigstein: Oh, the BRS, right. Okay. Okay, Kathy can handle that.

Ms. Behling: I can take care of that.

Chair Beach: Okay. Anything more on Birdsboro?

Ms. Marion-Moss: This is Lori.

Which one is going to turn into a finding, which observation?

Dr. Anigstein: Seven.

Ms. Marion-Moss: Seven, okay, thank you.

Member Ziemer: Was that the issue of the 58 millirem?

Mr. Katz: Yes.

Dr. Anigstein: That was just -- I didn't actually calculate it. I didn't actually have a number in front of me. It was just a rough observation.

Member Ziemer: Using Ted's criteria, I don't see that going to a finding.

Mr. Katz: Okay. That was my question to you all. I didn't really get an answer. But if that doesn't move the needle, then it can stay as an observation.

Chair Beach: Yes, maybe SC&A needs to look at that and --

Member Ziemer: Compared to the radiographic sources, 58 millirem is almost negligible.

Dr. Anigstein: I agree.

Member Ziemer: It's not normal if it is.

Mr. Katz: Right. Well, as I said, if it doesn't move the needle, then you can keep it as an observation. That's the criterion for deciding.

Member Ziemer: I think the thing that's going to move the needle is going to be the radiographic source.

Dr. Anigstein: Oh, absolutely.

Mr. Katz: Right, but that may or may not actually come into play after Dave gets back to us, and maybe even DOE, on this matter.

Member Ziemer: Yes, yes.

Chair Beach: Okay. So, am I hearing that we're

leaving seven observations and one finding at this time?

Member Ziemer: I would --

Chair Beach: It wasn't clear.

Member Ziemer: I would suggest leaving it as an observation, but --

Mr. Katz: Okay.

Member Ziemer: SC&A is going to deal with it, right?

Mr. Katz: Right, correct.

Chair Beach: Okay. Then, Kathy, cancel that change, I guess, at this point.

Ms. Behling: I'm taking notes.

(Laughter.)

Chair Beach: Yes. Okay. And I wasn't clear. That's why I asked the question.

Ms. Behling: I'm glad you did, yes, ask it.

Chair Beach: Okay. So, are we ready to move on to the next item, Idaho National Lab?

Ms. Behling: No, that was an old agenda. That's been removed, and I apologize for including that initially.

The next one on the list, actually, is PER-80.

Now, Bob, do you want to take --

Dr. Anigstein: Could I request a five-minute break?

Ms. Behling: Absolutely, yes.

Dr. Anigstein: Okay. I'll be back.

Ms. Behling: In fact, I was going to say Ron Buchanan is up for the next three. So, he may want a break

also.

Ron, are you prepared to do OTIB-88?

Dr. Buchanan: Yes.

Ms. Behling: Okay. So, we will move, then, ahead to ORAU-OTIB-88, the External Dose Reconstruction.

Chair Beach: Okay. Is everybody okay with that?

Member Ziemer: Yes.

Member Valerio: Yes.

ORAU-OTIB-088, External Dose Reconstruction

Dr. Buchanan: Okay. This is Ron Buchanan with SC&A.

And if you could bring up our report on OTIB-88, External Dose Reconstruction? And I'll wait until you get it up there.

Okay. This was an OTIB that was released that was to replace Procedure 6. And this is OTIB-88, External Dose Reconstruction, issued in September of 2018. It was to replace Procedure 6 by the same title which was issued in 2006.

And it was also to facilitate cancellation of Procedure 60, Occupational Onsite Ambient Dose Reconstruction for DOE Sites, issued in 2006.

So, we evaluated this revision. Actually, it's a new OTIB -- it replaces Procedure 6 -- 88. And so, OTIB-88, again. I'll give a brief outline, and I do this generally because I realize most don't have time to read all of these detail. I'll try to give you an idea of what it contains before we get into the evaluation, which starts in Section 3 on page 6.

And we evaluated the technical approach, methods used and documentation in OTIB-88. We found that

it was reasonable and useful, presented some good guidelines for the dose reconstructor, in Figure 2-1, and had no -- really -- problems with the approach.

We did do the evaluation of the methods used, and we agree with that and found them useful and the equations correct and the math correct.

We did have one important observation, Number 1. Maybe NIOSH can shed some light on this. But I know in my past dose reconstruction I used the reference to Procedure 60 a lot to determine external dose for site-specific locations. And if this is going to replace that, then that information I feel should be brought in. So, Observation 1 is that we need to retain the information in Procedure 60, Attachments A, B and C, in some form or another, because OTIB-88 lacks that information. And so, the dose reconstructor would have to go to each site and find out what the ambient dose was, what the policy was.

The appendix in Procedure 60 is very useful and it gives each site, a summary of each site, and it gives when, the Appendix A gives when that site included the external ambient dose in the dosimetry badge readings and not for almost all the major sites. And so, it's very useful. So, I would strongly suggest that somehow the information in appendix of Procedure 60 be included in OTIB-88. And so, that was the only major observation.

Section 3.3, on page 7 of our report, it appears that there might be a factor of 2 that was included that shouldn't have been. Now this was just an example calculation. So, we didn't count it as a finding, just an observation on page 21 of OTIB-88.

We see that on page 20 it states three times the 95th percentile is derived by multiplying the number zero by the LOD value. However, on page 21, they divide it by 2 for the 95th percentile. And so, it appears to us that this should be not divided by 2, and it would

increase -- in that example it would increase the 95th percentile dose by some fraction. And so, while it's not important as far as the dose reconstructor construction instructions, if you read this and applied it, it would be too low of a dose.

So, that was the only two items. Other than that, we had no issues with OTIB-88, but strongly suggest that that information be included in it that would be eliminated by eliminating Procedure 60.

Any questions on that?

Chair Beach: Okay. Good report.

Any questions? And if not, does NIOSH have a comment on it?

Dr. Neton: This is Jim.

I've read the review, but I do not have an opinion at this point. I wonder if anyone, either Tim Taulbee or anyone from ORAU, cares to comment on these two observations.

Dr. Taulbee: This is Tim Taulbee.

I guess one thing that I would like to point out, and that is that I guess I disagree a little bit with Ron as far as the information would be lost if we cancel Procedure 60, because it does appear in other procedures or other Technical Basis Documents. So, I don't believe the information will be lost. Will it be less useful or less easy to find? Perhaps.

And that's something that we could take and think about a little bit here from that standpoint as to whether we want to try and keep it all consolidated in one place or let it go out to the individual site Technical Basis Documents, which is really where it should reside if somebody is doing a dose reconstruction. That's the whole reason we have the Site Profiles. You've got all of the different chapters,

all of those different Technical Basis Documents, all in one place. And so, that's kind of the goal of why that would be moving out there.

But I do see some merit with of Ron was pointing out of keeping them all in one place, so that somebody could look it up easily, and I think that's something we can think about.

Chair Beach: Okay. Thank you.

Any other questions?

Mr. Fishburn: This is Mark Fishburn with ORAU.

I thought I would point out, also, that on the second observation on the equation error, that Ron was correct, and that the equation is being used correctly by the dose reconstructors, but it was put in the Attachment A incorrectly. So, we will get that revised.

Chair Beach: Okay. And then, shall we just wait for a memo after you look at the first observation and determine if that is something you want to maybe -- anyway, just give us an idea of what you decide on that.

Mr. Katz: We can just get an email from them on what they decide to do, but I don't think we need to hold this open for that.

Chair Beach: Yes. Okay.

Mr. Katz: It's just an observation in my --

Chair Beach: Right, right, right. Okay. Then, I'm fine with that. We'll leave it to NIOSH to send out an email just informing us what they decide.

And if the Subcommittee agrees, we can close both of these observations.

Member Ziemer: Right. So, Observation 2 will be corrected.

Chair Beach: Yes, we just heard that.

And Observation 1 closed, and then, we'll hear from NIOSH on an email.

Everybody agree with that?

Member Ziemer: Yes.

Member Valerio: Yes.

Chair Beach: Okay. Loretta?

Member Valerio: Yes.

Chair Beach: Okay. Then, Kathy, can we just do a little housekeeping for a sec?

Mr. Katz: So, we accept this document, right? Accept this report?

Chair Beach: Yes. Correct, yes.

Mr. Katz: Right.

Chair Beach: Sorry, I didn't use those words.

Mr. Katz: No, that's okay.

Chair Beach: And then, just a housekeeping item for Kathy on the RPRT-0079. I know you said that that was a mistake. But when I look it up in the BRS, it shows as open. Can you just close that, just to take care of that, to finish that?

Ms. Behling: Actually, 79 went to a work group.

Chair Beach: Okay. So, then, we need to put it as transferred. There's no findings, but it just shows as an open item for us.

Ms. Behling: Yes, I will. I will do that, correct.

Chair Beach: Okay. Thank you.

Okay. And then, if Bob's back, we'll move back to PER-80, 080, General Steel.

Dr. Anigstein: Okay. Is it showing up on the screen?

Mr. Katz: Yes.

Dr. Anigstein: Okay, so this is a Subtask 4 review of five cases reevaluated by NIOSH using TBD-6000 Appendix BB Revisions 2 and 3.

Okay. So I'm going to fill in background information and then we'll talk about the case. Two of the Subcommittee Members are intimately familiar with GSI Appendix BB but Ms. Valerio may not be.

So I'm just going quickly over the history of the -- not of the site, but of the analysis of the site.

Member Ziemer: -- on the screen yet, Bob.

Dr. Anigstein: Excuse me?

Member Ziemer: Are you going to put something on the screen? I'm not seeing it.

Dr. Anigstein: You're not seeing it.

Mr. Katz: It's there now. It just popped up.

Member Ziemer: Here it comes maybe.

Chair Beach: Rose just put it up.

Dr. Anigstein: The screen should say background information, is that --

Mr. Katz: Yes, the screen. It says five cases. It's the report.

Dr. Anigstein: Yes, that was the -- I just -- no, not the report. I have a presentation even though it

hasn't been posted.

Mr. Katz: Yes, it's not on the screen.

Dr. Anigstein: Just a second. Give me a second.

Chair Beach: Yes, and after doing that, Bob, if you haven't sent that out could you send that to Ted also? Your presentation.

Mr. Katz: I don't think Bob can hear us. Bob, are you there? Bob, are you back? Maybe he's finding it to send it to Rose or whoever's running the screen.

Dr. Anigstein: Is it there now?

Chair Beach: Yes, Bob, it's there now.

Mr. Katz: Yes, it's there. And Bob, will you please send me both this and the prior presentation?

Dr. Anigstein: Will do.

Mr. Katz: Thanks, thanks.

Dr. Anigstein: Okay. I should now be on page 2. Is that what everybody sees? Background information.

Mr. Katz: Yes.

Chair Beach: Yes.

Dr. Anigstein: Okay. So, the first documentation on GSI came out in June 25, 2007. It was Appendix BB Rev 0. It was reviewed by SC&A.

There was information -- we used information from meetings and interviews with former GSI employees and their applicants.

We performed independent analyses of exposures and doses and we had 13 findings.

We jump forward to June 23, 2014. DCAS put out Appendix BB Rev 1, which incorporated new

information resulting from new analyses.

This was reviewed by SC&A and we had 10 findings.

Then there was DCAS-PER-057 March 11, 2015 which was based on Revision 1 and we evaluated all previously completed findings.

And SC&A did a sub task for review of DCAS-PER-057 and resulted in four findings.

Then there was Appendix -- DCAS put out Appendix BB Rev 2 May 26, 2016. They resolved 8 of the 10 findings on Revision 1.

And then there was a Revision 3 came out in February 2017 which resolved the two remaining findings. So, there were no open findings.

DCAS-PER-080 was based on Revisions 2 and 3. Three is for -- if anyone doesn't realize it or doesn't remember was really just wording changes from Revision 2. Nothing really major. Clarifications. But so that's why it was Revision 2 and 3 and again they reevaluated all previously completed findings.

So SC&A audited five cases selected by NIOSH and the DRs affected by PER-080 and our job was to answer two questions. One was, was the exposure scenarios and DR methodology in Rev 3 applied correctly.

I'm just going to say Rev 3 because Rev 3 encompasses Rev 2. And was the methodology consistent with NIOSH practices for other claimants and for other work sites.

And again now we're going to see a great deal of red on here because these are case reviews which I can't talk about in detail.

So the first case, they have the job, you see the job category. And we conclude that based on his job

description the worker worked inside the plant and was assigned -- and was therefore correctly assigned to the operator category. Anyone inside the plant according to BB will be considered an operator unless proven otherwise.

The period of employment spanned -- there were two periods of employment. The first one was during the AEC operations and the second one was during the residual period.

Here we showed the cancer and the date of diagnosis. The POC under the original dose reconstruction which was done under Rev 0 and then do POC under the PER, it jumped almost threefold but nevertheless was not compensable.

So we reviewed the external doses shown during the AEC period. So the target organ for the external dose was correctly identified by NIOSH.

The external exposure rate was based on the latter part of the AEC period. I think I can tell you this is the dose given to everyone. So 9,000R per year. It doesn't identify the worker.

The dose conversion factor depended on the organ and was -- the surrogate organ that was used correctly.

And it was entered as a fixed distribution and then the dose was prorated since the EE did not work an entire year. Each year was not a full year, prorated to reflect this period of employment.

Our comments are that NIOSH used a fixed value of the dose conversion factor.

Member Ziemer: Hold on, Bob.

Dr. Anigstein: Excuse me?

Member Ziemer: Hold on just a second. Annual

exposure rate 9,000R?

Dr. Anigstein: Yes. For one year. Annual exposure rate -- oh, I'm sorry.

Member Ziemer: Not 9,000 surely.

Dr. Anigstein: Sorry. That was a comma, should have been a period.

Member Ziemer: Right.

Dr. Anigstein: Sorry. I'm sorry. Thank you for catching it. I think it was one place instead of 9,000R.

Member Ziemer: Basically 9R per year.

Dr. Anigstein: 9.002. Okay. So then they used the fixed value which appears to be inconsistent with the uncertainty distribution recommended by OCAS-IG-001 which recommends a log-normal distribution on the DCF.

However, in the present case the fixed value was appropriate because our MCNP simulations showed that for this exposure scenario 85 percent of the exposure is from photon energies greater than 250keV.

Whereas NIOSH assigned a DCF 430 to 250keV. So the maximum DCF for exposure to photon in this energy range is much lower than the one that NIOSH used.

So therefore the DCF that they used yields a bounding estimate. And considering that with a bounding estimate a fixed value would be appropriate.

However, we would suggest should there be any future revision that maybe this should be explained so that the reader doesn't say why did they use a fixed value.

And the doses, we found the doses to the organ in question were correctly assigned.

During the residual period the exposure rate for everyone during the residual period -- again, this is a typo. It's 0.2925MR per year I believe. I'm not quite certain.

Dave Allen, do you remember was that MR or R per year? It looks high.

Mr. Katz: You know, when you send me the presentation you can correct it if it needs correcting, Bob, instead of worrying about it now.

Dr. Anigstein: Right. I believe -- right, I will do that. Okay. So then we had the exposure multiplied by the dose conversion factor for photons and an AP orientation. And these are for this particular organ. These are the DCFs for the 30 to 250keV and the more than 250keV. That was divided.

And so these exposure rates or bounding estimates for the DCF was correctly applied as fixed values. Again, the doses were prorated to reflect duration of the employment during the residual period.

Next we turn to neutron doses. The neutron ambient dose equivalent, actually I could -- it's in the TBD was 751 millirem per year.

And then you multiply by the dose conversion factor for the organ in question. And this was based on neutrons with energies less than 10keV.

And this is claimant-favorable for all the organs listed in OCAS-IG-001. And therefore it was used even though the neutrons were most likely higher energy. So this is a bounding estimate and therefore again doses are appropriately entered as fixed values. And they were prorated to reflect the EE's period of employment.

Next, internal doses. Internal doses we audited as we do by doing independent calculations using the DCAL computer code, which we have verified gives very close to the same values as IMBA.

We calculated doses for each calendar year from inhaled and ingested intakes of U-234 as listed in Appendix BB. So in our model we start with the first day of employment and end on the day before the cancer diagnosis.

And using a surrogate organ we found notable differences for some areas. And we presume that these differences stem from the methodology in the chronic annual dose CAD notebook that assigned daily doses during the partial exposures, uniformly during the entire calendar year.

In other words they take the total annual -- they take daily intakes, multiply by the number of days if it's less than a full year and then spread them out over the whole year therefore reducing -- keeping the annual intake the same, but reducing the daily intake.

And the total calculated dose for the period from the beginning of employment until date of diagnosis was I'll just say a few millirem in both cases.

And the numbers matched within -- the total numbers matched within the significant figures here.

So given that this was a small value and good agreement between the total dose discrepancies in the annual would have no impact on this case. So we confirmed that NIOSH correctly calculated the total internal dose to the organ in question.

External doses from medical X-rays. There was one chest X-ray during each year of the operational period the EE was employed. The acute organ dose was assigned for each year.

It was assigned as a normal distribution with a standard deviation that was equal to 30 percent of the mean dose. And we confirmed this was correctly done.

Going on to the second case. The job description again indicates that he worked inside the plant and was correctly assigned the operator category.

His employment started during the AEC period and then continued into the residual period.

His diagnosis organ and date is given here. The POC again jumped by about threefold and was still not compensable.

And the external photon doses during the AEC period were based on the target organ was correct, were based on the triangular uncertain distribution, which is listed here during the first year of employment.

The DCF was applied for 30 to 250keV photons and the AP orientation entered as a triangular distribution. And the dose was prorated to reflect the period of employment.

He was also given an air kerma dose of -- everybody during this period got the air kerma dose of 5.112 rad per year from 30keV photon. And this was applied to the organ in question with the appropriate DCF. And was entered into IREP as a constant distribution.

And the doses were again prorated to reflect the period of employment.

Member Ziemer: And Bob, you have the 9,000R in here again.

Dr. Anigstein: Yes, I see that.

Member Ziemer: You need to correct that.

Dr. Anigstein: Will do. Then the external dose during the residual period, we have an exposure rate that

I'm going to check and make sure we got the right units here.

The exposures were divided equally between photons up to 32-250 and 250keV, multiplied photons using the DCFs for the organ in question.

Again these are bounding estimates so the DCFs are correctly applied as fixed values.

And finally the neutron dose rate was taken from Appendix BB Table 8 multiplied by the DCF for neutrons for the organ in question.

And DCFs again less -- energies less than 10keV. Claimant-favorable and the bounding estimates.

And this is pretty much repetition from the previous case. The fixed value was used. It appears to be inconsistent but in fact it's correct.

The triangular distribution, the reason for the fixed value for the external exposures, '52 to '62 -- not this worker, but for -- generally, generically was based on the radiography of steel castings using sealed radium-226 sources.

The average photon energy of radium-226 in the sealed source with its progeny is 655keV. And since the DCF was used for 32-250keV photons this is highly claimant-favorable because the maximum DCF attributable.

So therefore the derived doses represent bounding estimates and so a fixed value of DCF is appropriate.

NIOSH correctly assigned doses to the organ in question from external exposure from the AEC period.

Next, internal doses. So we audited internal doses again using the computer code, calculated doses for each calendar year from inhaled and ingested

intakes. This from first day of employment until the day before diagnosis.

Now, in this case the NIOSH dose for the first year was 15 percent higher than our calculated value. The smaller values in some subsequent years.

We hypothesize that the differences are from how NIOSH supported intakes the years of partial exposure. So since the internal dose is a significant fraction of the total dose, this now becomes important in this case.

And so we performed new analyses to try to replicate what we think NIOSH did. And so we changed our model to distribute the intakes over the entire year even though the EE worked for less than an entire year, but then reduced the daily intakes.

We reduced the daily intakes and kept the annual intake the same. And doing this we were able to match the NIOSH doses within 1 percent. So we believe we were correct in our assumption that this is how NIOSH did their analysis, spreading out the intakes over an entire year when there was only a fraction of a year of exposure.

And this was a subject of a finding in our review of the previous PER-057 which is the PER for Appendix BB Rev 1. And we're told that the CAD tool could only accommodate full year of exposures and that the DR analyst therefore had to change the daily intakes to account for shorter exposure by prorating them.

And this issue was discussed at a meeting of the Procedures Subcommittee on January 10, 2017, and Dave Allen said that the CAD at that time, that the CAD tool has been revised. It is now able to model actual daily intakes and the actual beginning and end dates.

So we examined the spreadsheets that are part of this CAD tool in the current DR, and we found that

the dates and the actual daily intakes were correctly listed. However, the tool used for its internal calculation -- it still used the earlier version of the tool by distributing the intakes over the entire year.

So apparently the tool was simply changed to simplify the -- the DR analyst didn't have to do this by hand. The tool did it for them. But it still used the assumption that the worker was exposed for an entire year to a lower daily intake.

So our observation is that NIOSH used an efficiency measure to estimate doses. We made this observation because the total internal doses -- the total over the period of years calculated by NIOSH and SC&A agree within three-tenths of a percent.

And since -- given the good agreement the POC was significantly less than 50 percent. The difference in annual doses was not likely to affect the compensation decision. However, the methodology could affect the outcomes in doses where the POC is much closer to 50 percent.

Next, external doses from medical X-rays. These were correctly assigned for each year of the operational period with a normal distribution -- standard deviation correctly computed.

So then -- we already know that there was somewhat repetition between the first case and second case, but there were significantly different -- it should have been discussed.

The next three cases are really unremarkable. The same comments apply. So instead of going through each case in detail, I'll simply say that the sources -- the source of exposure were similar to those addressed in the first two cases and there were trivial differences between NIOSH and SC&A analysis.

I want to jump to a summary, jump to the end, the summary of the five cases. So we have here in the

first column the case numbers, the job descriptions, the dates of employment, the -- there's two periods of employment, this one has one period, this one has again two periods.

The organs were different organs for each one. That will give us a range of dose models. And this is of interest because the first three, I believe, were done under Appendix BB Rev 0, and the dose changed about threefold in each case.

The last two had previously been done, the -- initial DR under Rev 1, and in one case the dose went down, in another case the dose went up, but not greatly. Same general ballpark. And again the POC in the first three cases was just about three times higher whereas in the last two cases there were minor differences in the POC.

And so now I'll go back to my summary and conclusions. We audited the five cases selected by NIOSH from 71 claims that have been reevaluated.

The PER addressed changes in doses prescribed by Rev 1, 2 and 3. At least one of the prescribed doses during each year of operational period increased after Rev 1. So NIOSH was correct in evaluating all GSI claims with DR that were completed before February 9, 2017.

The date of issuance of -- type of revisions -- Revision 3 with employment during operation period and the POC less than 50 percent.

SC&A had previously reviewed DCAS-PER-057 following Revision 1. Review produced three findings and several observations. These findings arose out of methods used by NIOSH to implement Rev 1, not from failure to follow prescriptions. Others included a review of the job category included -- assigned to each worker.

Current review showed all five workers had been

properly assigned to the operator category, external organ doses conformed with external exposure specified in Rev 3 and with guidelines for converting those exposures to organ doses in OCAS-IG-001.

Inhaled and ingested intakes of uranium were correctly assigned for the calculation of internal dose. Doses from medical X-rays were correctly assigned in each case.

In summary, we find that NIOSH correctly implemented changes to the DR methodology in Appendix BB Rev 3 and therefore fulfilled the intent and purpose of DCAS-PER-80.

Any questions?

Chair Beach: Very thorough report, Bob. Thank you. We only had one observation, correct?

Dr. Anigstein: Yes.

Chair Beach: Any questions from Subcommittee Members?

Member Ziemer: I have none. Appreciate all the work you did on this, Bob.

Dr. Anigstein: Thank you.

Chair Beach: Yes, very detailed. Loretta?

Member Valerio: I don't have any questions. And again, thank you for a very detailed report.

Chair Beach: And then any comments from NIOSH on the observation?

Mr. Allen: This is Dave Allen. All I can say is Bob is right. I reported previously that the tool was changed to where it would do the daily things now. As it turned out I had a misunderstanding about that change. It's actually the tool is doing prorating like we were doing outside the tool before.

But our guys have been instructed to anything that falls within their best estimate, the 45-52 percent range that they need to use IMBA instead of using that tool for the internal dose.

Even though like Bob pointed out, I mean, it's usually a small difference. The biggest difference is the first year, and then it tends to get smaller and smaller as you get like five years away. It's pretty much the same total dose.

But they have been instructed now to use IMBA instead of that tool.

Chair Beach: Okay. And is that something you'll change if that's revved ever?

Mr. Allen: If what part is revved? If what is revved?

(Simultaneous speaking.)

Chair Beach: Go ahead.

Mr. Katz: I was just going to say the TBD, if the TBD were updated.

Mr. Allen: The TBD doesn't mention which tools to use. The TBD gives the right number, it's just our method on implementing that was to use this CADW tool.

Chair Beach: Okay, that makes sense, and it sounds like you've corrected that in-house. So does the Subcommittee agree to close -- accept SC&A's report and close this?

Member Ziemer: Yes, I agree.

Member Valerio: Yes, I agree.

Chair Beach: So the only thing, Bob, if you would make your corrections to the slides and send those to Ted that'll complete this.

Dr. Anigstein: Yes, I'll do that.

Chair Beach: Thank you very much.

Dr. Anigstein: I'll probably do it tomorrow.

Chair Beach: Okay. And are we ready to move on or?

Mr. Katz: Would anyone like a comfort break?

Chair Beach: That's what I was just going to ask.

Dr. Anigstein: I'm going to sign off since I don't expect any further questions.

Chair Beach: Okay.

Mr. Katz: Thanks, Bob.

Dr. Anigstein: Very good, okay.

Mr. Katz: Five minutes okay? Ten minutes? Tell me what works for everyone else.

Chair Beach: Ted, let's go 10 minutes and take a break.

Mr. Katz: Okay. So, 10 minutes, so about 10 to we'll restart.

Chair Beach: Okay.

Mr. Katz: Okay, thanks.

(Whereupon, the above-entitled matter went off the record at 2:40 p.m. and resumed at 2:52 p.m.)

ORAUT-OTIB-0006: Dose Reconstruction from Occupationally Related Diagnostic X-Ray Procedures

Dr. Buchanan: Okay, this is Ron Buchanan of SC&A. And we're on the home stretch here. So we're looking at OTIB-6, well it's actually OTIB-0006 Revision 5 issued 2018.

Now, this replaces Revision 4 which was issued in 2011. And so you can see I think the initial one was back in '04 or '05, something like that. So it's been revised a number of times.

And so what we're looking at is the latest revision, and we reviewed this very recently. And so I'm going to present a summary of our evaluation. Now, as you can imagine this is entitled Dose Reconstruction for Occupational Medical X-ray Procedures.

And so it's a lengthy document, 114 pages I believe. So there's plenty of room for evaluation on this. And I tried to provide -- and a lot of meat to it, so I tried to provide in section 2 there starting on page 5 some of the information.

And one thing I want to clarify is kerma is the kinetic energy release in unit mass. And -- had run into that before. We don't use that too much in our presentation.

And we see that we start our evaluations on page 7. And we have evaluated the technical approach used and the documentation in OTIB-0006. And so we'll discuss these items.

And we find -- so we broke this down, the technical approach, into several areas. And one was equations and units.

And so we agreed with them in general. Just observation 1 there on page 7 could use some clarification on the dose conversion factor units in Appendix B Tables B-1, 2 and 3. The captions on those tables have a factor of 10 to the minus 3, and we really couldn't see where that applied, why it was there and what it applied to because all the units other than that cancel each other out.

Member Ziemer: Is somebody moving the Skype to the right pages? Okay, here it comes.

Dr. Buchanan: Page 7 is where I'm at now. So that was an observation, and we'd just like to have NIOSH address if that was a typo or a misunderstanding of why that should be applied. So that was the equations and units.

The terminology. Since this dealt with a lot of different terms, we compared it to other documents used for medical X-ray and found out it was consistent and didn't have anything new or unusual in it so we agree with that.

Now I'll move on to the technical information starting on page 8. And so as you can imagine, this document contained pages and pages of tables. And so what we did was we did a preliminary review of it all to see if it was technically correct and appeared reasonable, and then went back and selected some of the values and tried to determine where they came from.

For example, if they listed a given dose or a given distance and gave a reference, we tried to find out if that was correct or not compared to other references or the references they gave. And so these are listed as observations in that some of these things we need clarification of how these -- where they came from or how they were derived.

And so observation 2 on page 8 there, the chest thickness. They listed Table 3-1 of OTIB-0006 chest thickness is 24 centimeters. We don't have an issue with that because we looked at other references and we find it ranges in 20 to 25 and 20 to 26.

However, in the previous revision of OTIB-0006, Revision 4 in 2011 they used a chest thickness of 23 centimeters. And so we just wondered why that was changed. That was observation number 2.

Observation number 3 was a similar thing. The difference in the source and its distance. Again, Table 3-1 of OTIB-0006 lists an SID for the cervical spine

lateral procedure of 72 inches or 183 centimeters, and then footnote B it states that this is done to reduce magnification.

We didn't really understand that since ICRP Publication 34 lists a SID difference of 102 centimeters for both the lateral and AP view for the cervical spine X-ray. And so we was wondering why that was a different value than what the ICRP recommended.

Now on page 8 again observation 4 needs some references and derivation for kerma values listed in Table 4-1. So this is kind of a problem area when you have a table with a lot of values in it and they give some references. I understand NIOSH can't give a mathematical derivation of everything they have in the table.

However, some of these references they provide are hundreds of pages long. So it's hard to back check to where the value if they give a value in the Table 4-1, where it was derived from because we're not sure where they got it even if a reference is stated because it's, like I say, hundreds of pages.

And then sometimes -- and there's a conversion that goes from exposure to kerma. And so how they -- what values they used as the original raw data.

I'm not sure how this could be solved other than if I had the PDF page it would certainly help to trace it back. And some of the ones that weren't obvious how they derived those values.

Now, observation 5 again on page 8 is a little simpler to address. The thoracic and cervical spine dose assignment after 1970 needs clarification because Table D-1 lists the dose conversion factors for determining the dose equivalence from this X-ray view through 1970, but that doesn't say anything about after 1970 whereas like for the chest -- section

does.

Just need clarification on if this means that this view is supposed to be used afterwards or just through 1970 kind of like the PDF exposure wasn't used after a certain period in the '50s. Need clarification of when this is supposed to be used or not used.

Okay, and then we have observation 6 on page 9. And this is references for the breast dose. OTIB-0006 Table B-3 footnote E and Table B-13 footnote F list a reference of Huda and Bissessur as the reference for the breast.

However, that reference only provides -- the only time it mentions breast in that whole document it uses a factor of 0.1 for the lumbar spine AP and 0.00 for the lumbar spine lateral.

And so it was not obvious how the values in Table B-13 page 107 for the breast was derived using that particular reference. I don't know if it's an incorrect reference or they did the calculations and it's not obvious how they derived those values.

And so that brings us to observation 7. This is kind of like the last one I gave. Because we feel that we need to retain the important values on attachment C of Procedure 0061.

I bring this in, Procedure 0061 into OTIB-0006 because I understand -- it's my understanding that Procedure 61 is going to be -- well, it doesn't contain attachment C of the older Procedure 61.

And it says okay, we didn't include attachment C in the latest revision of Procedure 61 because you can use the information in OTIB-0006.

Unfortunately OTIB-0006 does not contain the detail that the older revision procedure 61 had in attachment C. And let me explain this a little bit.

In X-ray dose reconstruction you have mainly the entry skin dose usually to the back, and so to determine the dose to other organs it's basically the skin you have to know what the remote dose is and other things. And so it isn't just one value.

And so you run into several scenarios when you do the dose reconstruction as I list on page 9 there. Three scenarios.

Okay, one is that the site provides complete skin dose information for various skin locations. Some of the bigger sites, DOE sites provide this. They'll have it for the ankle, for the chest, whatever, for a PA chest X-ray or a lateral. And so that's good. You can use that. You don't need Procedure 61.

Now, some sites don't provide any X-ray information so you have to default to OTIB-0006 which provides all these default values for the different skin locations. So those two are pretty clear cut.

Then you come to situation 3 where a site provides some information. They have like the entrance skin dose. But they don't go to the full table of skin doses and provide all the remote and exit skin doses and stuff.

So in that case you have to work with the entrance skin dose and use the equation in the older Procedure 61 Rev 3 of 2010 Attachment C to look up those tables and look at the different doses, the exit skin dose, the remote skin dose and such.

And so this information -- if Procedure 61 Rev 3 of 2010 Attachment C is no longer used or no longer available and OTIB-0006 and the revised Procedure 61 does not contain those equations.

Now, perhaps NIOSH has those in their computer and they bring them up and stuff, but anybody looking from outside does not have a document to support it.

And so I would recommend that the information in Attachment C of Procedure 61 Rev 3 2010 somehow be retained in the revised Procedure 61 or included in OTIB-0006 because it's -- the revised 61 says to use OTIB-0006 if you need it.

And so that's my recommendation on observation 7. Unless I'm missing something somewhere that this information in Attachment C is being carried forward.

Now, so that was the seven observations. I had no findings. Mathematically and everything dose values was correct. And of course dose reconstructors probably won't be looking to see where all this information came from, Table 4-1 and such, but we did in our evaluation.

Now, on page 10 we have the documentation. A long document. Minor editorial issues such as referring to the old table numbers in the previous revision was carried over to Revision 5 and such, or missing words that make a sentence incomplete or paragraph that need correcting.

Now, it's up to you if you want me to go through each one of these in detail, but they're mainly an editor can go through and see what the problem is and change it. There really isn't any dose reconstruction issue to discuss at this point.

So, Josie, do you want me to go through each one or just leave that to NIOSH to look at that?

Chair Beach: I would say no unless somebody else would like to have those read out. Hearing none -- oh, go ahead, Loretta, sorry.

Member Valerio: Sorry, Josie. I was going to say I don't think we need to have them read out.

Chair Beach: Yes, I don't either. Okay. So do you have anything else, Ron, then?

Dr. Buchanan: No, that's all the presentation for OTIB-0006.

Chair Beach: Okay, nice job. Good presentation. Sounds like it was a hefty document to go through.

Dr. Buchanan: Yes, it encompasses quite a bit.

Chair Beach: Yes. So any questions from the other Subcommittee Members?

Member Ziemer: It obviously is not clear what the sort of default values are on these issues.

Chair Beach: Right.

Member Ziemer: I would think that most of these would be fairly simple. Well, let me ask Jim or one of the other NIOSH people.

In most cases you don't have all the personal information like chest thickness for the people in question. So you would be defaulting to some sort of standard man and standard woman value. Isn't that correct?

Dr. Neton: That's correct. This is Jim.

Member Ziemer: Okay. So it sounds like SC&A is having some difficulty in actually clarifying what the choice of values are.

I can understand that they might change some and actually if you had information even on gender -- well, you have gender information. But on perhaps some other factors you may go to particular tables.

But for the most part it seems like there's pretty simple default values. You just need to clarify where they came from.

Mr. Allen: Dr. Ziemer, this is Dave Allen. I think on that particular one and maybe some of the others what it amounts to is the document describes where

the numbers came from and what parameters were used, and it describes that we used 24 centimeters for chest wall thickness and then came up with a lung dose or whatever dose.

Member Ziemer: Right, right.

Mr. Allen: And that particular one if I remember right we noticed in the last revision that I think -- I could get this wrong, but I think it was -- we were using 24 centimeters for most of the calculations, but we found a couple where we actually used 23.

We wanted to make that consistent which is what the change was. I may have that backwards, but as I recall that's what the change was.

Dr. Lobaugh: Yes, Dave, it went from 23 centimeters in the previous revision to 24 in this current one. And like you said there were some -- sorry, this is Megan Lobaugh.

There were some inconsistencies throughout the document. But then also comparing to some more recent information that came out, ICRP 110 the voxel phantom, the 24 agrees closely with that as well. So that was one thing that we did look at in deciding whether to go with the 23 or the 24.

Dr. Neton: This is Jim. I think -- my understanding is that this TIB is undergoing internal revision as we speak for other issues, internal consistency issues and others.

It makes sense to me that we will look at these seven observations and incorporate them as they make sense in this revision that's underway and report back as to which ones we considered and incorporated, which ones we didn't feel were particularly useful for clarity.

Member Ziemer: Yes, and I suppose if there's a reference that's pretty extensive you might have to

call out a particular section of the reference so someone can easily pick up where the value came from.

Dr. Neton: Yes, those kind of changes seem pretty straightforward.

Member Ziemer: Yes.

(Simultaneous speaking.)

Member Ziemer: -- easily solved.

Chair Beach: That sounds reasonable, Jim. So it is under review right now. Do you have a completion date or anything in mind?

Dr. Neton: Megan or Dave might know better. I don't.

Mr. Allen: I don't think we're to that point yet. We've got a few items that Megan's already working on, and then this came out, and I think she's already itemized some of this, but I don't think we're really. You know, like I said most of them are pretty simple.

But I don't think we're really ready to commit to a particular date at this point.

Chair Beach: Okay. So then we'll leave this in NIOSH's hands and then to report back on your progress at a later date.

Mr. Allen: Sounds right to me.

Ms. Behling: Josie, this is Kathy Behling. And so these seven observations will go into in progress in status?

Chair Beach: Yes.

Mr. Katz: Right.

Chair Beach: Okay. So if we're ready we have two more left. How's the timing? I know we said we'd be done at 3:30. Are we sticking to that?

Mr. Katz: I need to stick to the 3:30, yes.

Chair Beach: Okay. Do we have time to do either of these before the 3:30, or should we hold those over to the next meeting and identify another date? I don't know if we can do that. Can we, Ted?

Mr. Katz: Well, if we can get one of these in let's do it. Otherwise let's talk about the next date. But I don't know how long either of these will take.

Chair Beach: Okay. So Kathy, I guess I'll ask you of that.

Mr. Katz: Actually, there's three, right? There's three. There are three. There's OTIB-0006, 0045, and Peek Street.

Ms. Behling: We just covered the OTIB-0006.

Mr. Katz: Oh, I'm sorry.

Chair Beach: Forty-five and then Peek Street.

(Simultaneous speaking.)

Chair Beach: Kathy, what do you think? Get either one of those done in --

Ms. Behling: Ron, I'll get your opinion on OTIB-0045. I do not think we can get in Peek Street.

Dr. Buchanan: I think I can do 45 in about 10 minutes.

Mr. Katz: Okay. Well, why don't we go ahead and knock that off then. If that's okay with you, Josie.

Chair Beach: Yes, that's perfectly fine.

ORAUT-OTIB-0045: Historical Evaluation of the Film Badge Dosimetry Program at the Y-12 Plant in Oak Ridge, Tennessee: Part 2 - Neutron Radiation

Dr. Buchanan: Okay. If you want to bring up OTIB-

0045, I've got it here.

Okay. OTIB-0045 is a historical evaluation of the film badge dosimetry program at Y-12 in Oak Ridge, Tennessee, Part 2 neutron radiation issued November of 2009.

Okay, this folds into OTIB-0044, 46 and 64 for Y-12 which we talked about previously in the last meeting and was alluded to earlier in this meeting. And so this was done in 2009. And so we did a brief overview of it again in section 2. We'll go to page 8 which is our evaluation.

Now, before we start talking about this we need to just briefly remind ourselves neutron is a little more difficult to measure in that especially in the NTA film days, back in the earlier days that the film being able to detect neutrons fell below threshold, usually around a half or 0.7 MeV. Anything below that was lost since you couldn't count the star -- in the film.

And so this came out later after this was used for a number of years. And so what they essentially do, you have to go and look at the neutron energy spectrum and try to estimate how many fell below that threshold so we can make a correction factor to increase your reading to cover those ones that were missed.

And so this is the reason that we have to go into more detail on neutron measurements. And we see that we will evaluate the statistical method used, the technical analysis, and documentation used in OTIB-0045.

Now, essentially what OTIB-0045 did, it took 375, about that many positive neutron dose results from Y-12 over the years that NTA film was used and analyzed those in view of the different neutron energy fields that were possible at Y-12, derived an N over P value, a neutron to photon ratio so that they

could use that.

Most everybody was monitored for gamma rays and their photons and had fairly good readings, so they can do an N over P and assign then a neutron dose in addition to the photon dose.

And so what we wanted to do was number one evaluate how -- the statistical method they used, how they went about doing it, and then some of the N over P values, how those were derived and of course the documentation will be important.

And so the first thing is the statistical method. They used maximum likelihood to analyze this data.

And we had done a fairly thorough review of that in OTIB-0024 previously and applying it to this document we found that it was acceptable, and we found it was applied correctly and had no findings in the statistical method used.

We did have one observation in that there seemed to be an inconsistency in the GSD, geometric standard deviation values listed in Table 7-1.

They did the QQ plots in the figures, showed those and it's summarized in 7, the results in 7, in Table 7-1.

And the GM values were identical. The GSD values were slightly larger in the table than they were in their respective QQ plots.

So we don't know if there's a reason for that or if that was just a mislabeling in the plots or the table. So that was our observation number one on page 8.

Now, as I say neutron response of NTA film depends on the energy spectrum of the neutron. And so what we had to do -- what NIOSH did was go in and look at the major sources of neutrons at Y-12 during this period.

And these were four major sources, and one was an 86 inch cyclotron that operated in the '50s through 1961.

And so they broke this down. We're looking at page 8 here, the 86 inch cyclotron. We see that they broke it down into the dose equivalent, about 46 percent fell in the lower energy 0.1 to 2 MeV and about 54 percent in the 2 to 20 MeV.

And so they estimated that 30 percent of the neutrons fell below the 0.7 MeV threshold NTA film. So this gives you a correction factor there of 1.4. So you multiply your measured value by 1.4 to include all the neutron dose.

And then the angular dependency, if NTA film is irradiated from the front or the side at an angle its response is different. And so the overall correction factor was 1.3, and that was obtained from a previous NIOSH document we have evaluated and agreed with.

So you have to take the 1.3 times 1.4 and end up with 1.8 for the neutron dose correction factor. And we agree with that.

And that was also recommended in OTIB-0051 page 8-1 -- Table 8-1. And so we agreed with the cyclotron correction factor.

Now, the next one -- so we do this for each of the major sources. The encapsulated neutron sources and the chemical operation area. So these are the three major areas here.

And so we look at the encapsulated neutron sources. We know that we have our alpha N reaction in californium-252.

The alpha N reaction creates neutrons centered around 4 MeV, californium around 2 MeV. So what percent falls below the threshold there.

Okay, we agree on the angular dependency. No problem there. What percent falls below the threshold?

Well, we have finding 1 there. We found that -- there's inconsistency in the threshold for the shielded encapsulated sources found in OTIB-0045 of 40 percent compared to OTIB-0051 which said there's 51 percent.

And so they give a higher correction factor, an overall correction factor of 2.7 compared to 2.2 in OTIB-0045.

And we feel that their correction factor for shielded neutrons -- for californium source would be okay because it's a lower energy and it's also -- the unshielded sources, californium sources.

But if it's moderated you had more neutrons of lower energy and it's below the threshold. So we had that finding 1.

We go on then to the chemical operation area where it had uranium hexafluoride stored in a storage area. And we had a very similar issue there, finding 2, inconsistency in the NTA threshold missed fractions -- chemical operation area.

OTIB-0051 recommends 54 percent and 45 recommends 1.7 which is 40 percent. So we summarize this on Table 1 on page 10 at the bottom there. We compared OTIB-0045 and OTIB-0051 recommendation in that table.

We have some agreement on the californium source, 86 inch cyclotron, but the shielded neutron sources and the enriched uranium sources we see a disagreement in those. So that was the two findings.

Now, another issue was deriving the N over P ratio. Fortunately they provided a lot of good data in this document, the actual dosimetry readings by

department they went to.

In OTIB-0045 they eliminated two departments, production and chemical department and production processing department. They had all positive neutron doses and no new gamma doses which isn't physically possible. Probably they recorded it as zero if it was below LOD value on the gamma.

And they -- OTIB-0045 removed that data. And we went to try and see if that were technically reasonable, and we agreed that that looked like an abnormality and should be removed.

We looked at other departments that might fit in that category. We did find machine maintenance shop, department 2003 had several neutron readings like this that OTIB-0045 did not remove.

However, out of 375 data points it wasn't really significant, and it had a very, very slight claimant-favorability so we didn't include that as a finding or observation.

We pretty much agree with their derivation of interval P values. Did have an observation number 2 on page 12 which we need clarification -- I think the dose reconstructor needs clarification on some things.

And observation 2 there which concerned -- didn't really affect outcome. It just wasn't stated if a minimum gamma dose was used for the neutron to gamma derivation of the dose if it fell and zero was recorded.

Was this applied to all the values that were calculated or just to the four departments that it was talking about in that section. A fairly simple question, we just need clarification.

And then the last item was on page 12 there, assignment of neutron dose, observation 3. It would be very helpful for DR and have consistency in dose

reconstruction if the exact time period to use these N over P values was stated in the OTIB because it mentions several times on '50 to '80, '50 to 1961 or something.

And so we need an exact month and date that it's supposed to start at -- Table 7-1 applies to and an exact month and year. So it would be applied uniformly.

And then we had a couple of minor documentation which was carryover from the old revision into the new revision. And that's it in a nutshell.

Chair Beach: Okay. Thanks, Ron. Any questions? I know that was quick.

Member Ziemer: Ron, this is Paul. What was the shielding material for the neutrons? Was it always water or paraffin or something? How consistent were the shielding materials when you looked at those ratios?

Dr. Buchanan: Well, they were usually hydrogenous materials of some kind, usually paraffin for most of the calibration sources and tech sources and stuff. Usually paraffin with a cadmium jacket.

Member Ziemer: So they always used the cadmium jackets?

Dr. Buchanan: I couldn't say for sure at Y-12.

Member Ziemer: Well, I'm just wondering whether there was a consistency in the -- because a lot of times they use just the hydrogenous materials. Sometimes they use the cadmium or some other absorbent, neutron-absorbent material like cadmium.

But I'm just wondering the consistency on that in establishing those ratios.

Dr. Buchanan: No, I -- I don't know.

Member Ziemer: Can't answer that. Okay.

Chair Beach: Okay, any comments from NIOSH?

Dr. Neton: No. This is Jim. I think this is lumped into that other category of the review of the beta gamma which is the neutron component. We'll address these all at the same time.

Chair Beach: All together. So add this to the 44, 46, and 64 list?

Dr. Neton: Correct.

Chair Beach: That sounds reasonable. So we're going to hold over the template for Peek Street until the next meeting.

A couple of -- just for the Subcommittee on tasking, I know we can't task right now, but it's something we could -- potentially Ted could send out a tasking.

The one that came up was PER-062 Subtask 4. NIOSH recommended -- or I'm sorry, SC&A recommended one case for Subtask 4. Do Subcommittee Members agree with that or have any concerns?

Member Ziemer: Fine with that.

Member Valerio: I agree, Josie.

Chair Beach: Okay. So, Ted, is that something you can just make a note of?

Mr. Katz: Yes.

Chair Beach: On the technical guidance there was two documents that SC&A recommended reviewing. Is that something we can discuss now, Ted, to see if we --

Mr. Katz: We can discuss it. I'm almost out of time here. But we really need to get -- from NIOSH about -- since we don't really know exactly what's what with these.

So you have the input from SC&A in this table as to why they're suggesting it be reviewed, but it would be helpful to have a perspective from NIOSH as to whether this makes sense.

Chair Beach: Is that something that NIOSH can just send out an email again to the --

Mr. Katz: Yes. That would work fine. The PER-087 of Battelle-TIB-5000, if you could just give us your thoughts about whether these are ready for SC&A review, appropriate for SC&A review given what is already under the bridge and so on and what's going on, that would be very helpful. Then I can handle this after we have another contract.

(Simultaneous speaking.)

Mr. Katz: That sounds good.

And then I don't think we can schedule at this point because we don't really have much on our plate. So I think we need to wait till we build up enough of the stock of material.

Adjourn

Chair Beach: Okay, that makes sense. All right, well then I would say we are ready to adjourn.

Mr. Katz: Yes, and thanks for a very productive meeting.

(Whereupon, the above-entitled matter went off the record at 3:30 p.m.)