CENTERS FOR DISEASE CONTROL AND PREVENTION

NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH (NIOSH)

ADVISORY BOARD ON RADIATION AND WORKER HEALTH (ABRWH)

SPECIAL EXPOSURE COHORT (SEC) ISSUES (INCLUDING THE 250-DAY ISSUE)

WORK GROUP MEETING

WEDNESDAY, FEBRUARY 11, 2026

The meeting convened at 11:03 a.m., Eastern Standard Time (EST)

with Dr. Henry Anderson, Chair, presiding.

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Members Present:

Anderson, Henry, Chair

Beach, Josie, Member

Ziemer, Paul, Member

Registered Participants:

Roberts, Rashaun, Designated Federal Officer (DFO)

Adams, Nancy, NIOSH Contractor

Barton, Bob, SC&A

Behling, Kathy, SC&A

Buchanan, Ron, SC&A

Fitzgerald, Joe, SC&A

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

Hughes, Lara, NIOSH

Mangel, Amy, SC&A

Marion-Moss, Lori, NIOSH

Nelson, Charles, NIOSH

Ostrow, Steve, SC&A

Ulsh, Brant, NIOSH

Registered Members of the Public:

DeGarmo, Denise

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PROCEEDINGS

(11:03 a.m. EST)

WELCOME AND ROLL CALL

DR. ROBERTS: So, good morning, everybody. Thanks for your patience. The Advisory Board on Radiation and Worker Health meeting of the Special Exposure Cohort, or SEC, Issues Work Group is now. I'm Rashaun Roberts. I'm the design -- designated federal officer, DFO, for the Board.

Let's go ahead and get into a few logistics for the meeting. There is an agenda and there are other meeting materials for today, including the presentations. And you can find everything on the NIOSH website, meetings for February 2026. Since Board members who have conflicts of interest with regard to this work group really can't sit on the work group, there -- there are no conflict of interest for the work group members here today. Other staff, as we move through the roll call, will need to state any conflicts that they may have, although there shouldn't be conflicts even for others today. But let me start with Anderson.

CHAIR ANDERSON: Present, no conflicts.

DR. ROBERTS: Beach?

MEMBER BEACH: I'm here. Good morning.

DR. ROBERTS: Good morning.

Ziemer?

MEMBER ZIEMER: Here.

DR. ROBERTS: Okay. NIOSH, DCAS, and ORAUT?

MS. MARION-MOSS: This is Lori Marion-Moss, NIOSH, no conflicts.

DR. NELSON: This is Charles Nelson, NIOSH, no conflicts.

DR. ULSH: And Brant Ulsh with NIOSH, also no conflicts.

MS. HUGHES: This is Laura Hughes with NIOSH, no conflicts.

DR. ROBERTS: Anyone else NIOSH, DCAS, ORAUT? Okay. Let's move to SC&A.

MR. BARTON: Bob -- Bob Barton, S&CA, no conflicts.

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

DR. ROBERTS: Anyone else with --

MR. FITZGERALD: Joe --

DR. ROBERTS: -- SC&A?

MR. FITZGERALD: Yeah. Joe Fitzgerald, SC&A, no conflict.

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

DR. OSTROW: Steve Ostrow, no conflicts. That's it for SC&A.

DR. ROBERTS: Okay. Great.

How about HHS and contractors?

MS. ADAMS: Nancy --

MS. HOLZBERGER: Malia --

MS. ADAMS: -- Adams --

MS. HOLZBERGER: -- Holtzberger. Malia Holtzberger, HHS, OGC, no conflicts.

MS. ADAMS: Nancy Adams, NIOSH contractor.

DR. ROBERTS: Any other HHS -- people from HHS or contractors?

How about DOL, DOE, the departments? Hearing none, are there any

members of the public who like to register their attendance?

DR. DEGARMO: Dr. Denise DeGarmo, authorized petition representative for petitions 256, 266, and 267.

DR. ROBERTS: Welcome.

Okay. Anyone else in the public who would like to register attendance?

Okay. Well, thank you. And again, welcome to all of you. I just need to go over a couple of things before I give the floor to Andy, who chairs the SEC issues work group.

So, to keep everything running smoothly, everyone, please make sure that you're muted on Teams or make sure that your phone is muted when you're not speaking. If you are attending via telephone, press star six to mute yourself if you don't have a mute button, if you need to take yourself off mute, press star -- star six again. If you're on Teams, the mute button should be the microphone icon somewhere on your screen, and you want to just periodically check to make sure that you're not coming off mute again.

The agenda, presentations, background documents that are relevant to today's meeting are on the DCAS/NIOSH website. Again, if you're participating on the telephone, you can find them on the website. If you're on Teams, you should be able to see the presentations and follow along that way. All of the materials were sent to Board members and to staff prior to this meeting. And with that, I will turn the floor over to Andy.

CHAIR PRESENTATION: OVERVIEW AND STATUS OF THE SEC ISSUES WORK GROUP

CHAIR ANDERSON: I want to thank everybody for coming in. I apologize for my CDC computer not being willing to turn on even today. So, I have now switched over to the University of Wisconsin system, and that seems to be -- I got my camera working, and I can see everybody in talk as well.

So, today it's the -- our Advisory Board on Worker Health and dealing with the special issues for SECs. And for quite a while, we've been going on having discussions and utilizing what are now co-exposure models. Some of you remember, started out as coworker models where -- attempting to find or utilize exposures from workers who were actually working as part of the team, a group of four workers may be in the area working, and only one of them would be monitored and therefore was likely that the exposures would have been quite similar.

Then we moved away from just the coworkers of the worker. We're trying to do dose reconstruction on to going to expose -- co-exposure models now, people in areas -- and that's kind of where we are today looking at it as we've moved to dealing with issues of contractors as well as the various tradesmen that moved all over and had different type of exposures from those actually embedded in the regular activities of the facilities.

NIOSH/DCAS PRESENTATION: "A DISCUSSION OF COMPLETENESS IN CO-EXPOSURE MODELS" WHITE PAPER (JANUARY 26, 2023)

CHAIR ANDERSON: So, we'll get an update here on the co-exposure model reviews that have been done to date by NIOSH and then hear from

SC&A, and then we can bring our discussions up to the current time and where we need to go from here.

So, who's doing NIOSH?

DR. ULSH: That would be me. This is Brant Ulsh.

CHAIR ANDERSON: So, okay. Go ahead. Yeah.

DR. ULSH: Okay. So, I'm going to try to share my screen.

CHAIR ANDERSON: You're not on the agenda by name.

DR. ULSH: Okay. Well, I'm going to go ahead and share my screen, so if you'll send your good thoughts my way. Let's see if this works.

CHAIR ANDERSON: Yeah.

DR. ULSH: All right. My slides should be coming up. Rashaun, can you see them?

DR. ROBERTS: I can.

DR. ULSH: Okay. All right. Great.

So, again, my name is Brant Ulsh, research health scientist with DCAS, and I'm going to be talking today, mainly from a document that I didn't write. It's the white paper that you see on the screen here. And it was written by a member of the Oak Ridge Associated Universities Team (ORAU) Team, Tom LaBone, back in the beginning of 2023. Tom has since retired and is hopefully sitting on a beach with an adult beverage somewhere, and the main reviewer from our side was Tim Taulbee, and Tim has also retired, so hopefully he's right there beside Tom.

Here's an outline of the main points I'm going to cover today. Just a brief history to, you know -- especially over the past year, we've met pretty infrequently. And so, let's all come up to speed and be on the same page so

that we're all starting from the same place. I'll talk a little bit about some of the basic terms, just to make sure that I'm using them the same way all of you are, including co-exposure models and data completeness. And then I'm going to talk about the effects of incomplete data sets. And then I want to cover some of the points from SC&A's review. And I think I can explain some of those by looking at our starting assumptions, the role of the appropriate role of regulatory compliance and how we interpret that, and then I'll cover -- I'll just have a few words about stratification before I conclude.

All right. So, the history, first of all, how did we get to this point today? Well, I think the originating document would be DCAS IG-6, Section 2.2 that covers the use of co-exposure models in dose reconstruction. And then in 2022 at a Sandia working group meeting, it was requested that NIOSH prepare a report on data completeness. And in response to that request later, or I mean, at the beginning of 2023, we issued the white paper that you saw on the title screen, and it's shown again here, "The Discussion of Completeness and Co-Exposure Models." And SC&A reviewed that document later in 2023. And I know that Bob's going to be giving a presentation right after me to cover their review.

All right. Let's talk a little bit about co-exposure models and what they are. So, don't be afraid. This is the most complicated figure in the slide. I didn't make it. I just cut and pasted it and the main point that I want you to get from this is what we're trying to accomplish with co-exposure models. So, if you start with the population of all workers, there's going to be some workers who were exposed and some workers who were not exposed. And

then in each of those two groups, there's going to be some who were monitored and some who were not.

So, what we're trying to do is take the population of monitored workers, some of those monitored workers were exposed and some were not. But that makes up the population of data that we have, and we want to use that data to estimate the exposures for workers who were not monitored. That's what we're trying to do. That's the -- that's the bottom line from all of these ovals and lines. That's what we're trying to do with co-exposure models.

So, let's talk about data completeness. So, first of all, some basics. It makes -- these may not be intuitively obvious, but co-exposure data sets are always incomplete -- always by definition. Why is that? Well, if the data set was complete, if every worker who had an exposure potential was monitored and we had all of their data, we wouldn't need a co-exposure model. So, by definition, the fact that we're trying to come up with a co-exposure model means that it's an incomplete data set. And the question that we're trying to answer is, is there enough data from the most highly exposed workers to create a representative or a bounding model? It's not representative and bounding; it's representative or bounding.

Because if the model -- it doesn't have to be representative if it's a bounding model. I mean, in the most extreme example, if we had the data for the most exposed worker, that's not representative, but it's certainly bounding. And on the other hand, the model doesn't have to be bounding if it's representative. So, if we have a data set that accurately and precisely represents the monitoring data for all of the exposed workers, it doesn't

have to be bounding; it just has to be representative. So, it's one or the other.

Now, the NIOSH/ORAUT white paper that I'm talking about today introduced the term "missingness," and that's the opposite of completeness. And data sets could be incomplete either because there are workers who were monitored, but their records are not available to us. In other words, those records are missing. Now, what -- why might that be? Well, it could be that workers monitoring data was in a logbook somewhere, and it didn't get copied into the electronic data set that we're using. Or maybe there was a fire at the facility and some of the monitoring records were destroyed. Those are just a couple of hypothetical examples.

Another way a data set can be incomplete is that workers who may have had an exposure potential were not monitored, and the model -- don't misinterpret that, because that's probably the most common situation, because there's a regulatory threshold for requiring monitoring workers who were judged to have an exposure potential below that threshold were not monitored for regulatory compliance, which is what the sites are concerned about. So, it's not that they did anything necessarily wrong, it's just that they weren't required by regulation to monitor those workers. But in this program, we want to account for that. We want to account for workers who may not have been monitored for whatever reason but may have had an exposure potential. And that's what we're trying to do with the co-exposure model.

So, what are the effects of incomplete data sets? Is it a problem if a data set is incomplete? Well, it might be, but it might not be. So, in this

first example -- I've got a little crude graphic up here. If there are records that are not included in the data set that we have and those records are kind of sprinkled at random throughout the distribution of -- of data, of coworker data, that's not a problem because our data set can be representative. What if they're not sprinkled at random, the missing records are not sprinkled at random, but rather they're concentrated down at the low end, workers who had low exposure potential? Again, that's not generally a problem for us. Our -- our co-worker data set will be biased high, but that's okay. We can accept that as long as the model is sufficiently accurate.

Now, where there would be a problem for us is if there were records that were missing from the co-exposure data set, and those records preferentially came from the highest exposed workers. That would mean -- it could mean that our coworker data set is biased low, and that's a problem for us. So, by and large, I don't want to bury the lead here.

When I read SC&A's review of this report, by and large we're in agreement. There are just a few issues where SC&A took issue with parts of our conclusions, but they're not -- well, I don't want to speak for SC&A, but in my mind, they're not really major issues. The lead here is that they by and large agreed with us. So, I just want to cover those two little -- I think there's two -- little points and explain why this SC&A and us might have come to different conclusions.

So, the first one has to do with a statement that we made. And you see it here in the first bullet where we start with a presumption that the data are complete. And then we do some internal and external checks of the data sets to look for signs that there is missing -- there are records missing.

And SC&A in their review took issue with that. They said we should not start with the presumption that the data are complete, nor should we start with the presumption that they're incomplete; you should start with the presumption that we just don't know. Maybe they are, maybe they're not.

So, why do NIOSH and SC&A have different starting assumptions on this point? Keep in mind, I don't think this is a major point, but -- a major point in this context, but it does have some ramifications in the larger context of this program, and, so I want to spend a little time going over this.

I think that in large part is because we approached this from the basic scientific method and hypothesis testing. So, this is a foundational part of the scientific method. And here are some points that if you're not trained in the sciences, you may -- it may not be obvious, but it's not possible to prove a hypothesis. You cannot prove a hypothesis. All you can do is rigorously test it and disprove it or fail to disprove it. So, I'll go into some examples that will clarify this a little bit.

But if we have a hypothesis and we do a bunch of tests and we can't disprove it, it gives you some confidence that maybe that hypothesis is correct, but it only takes one example, one better test to disprove it. So, defining hypothesis appropriately is absolutely critical to the scientific method. A hypothesis has to be falsifiable. If you can't falsify it, it's not a scientific hypothesis.

So, we start with a null hypothesis. Say for instance, this is the hypothesis that we're trying to disprove. And I'll go over a couple of examples. And then the alternative hypothesis is what we're really interested in. And the burden of proof is always on the alternative

hypothesis to provide an observation that disproves the null. And this is the larger issue that I think has some ramifications throughout our program into some of the SEC discussions that we have. So, let me start with the general example, and I hope this will make it a little bit more clear.

Let's say we're -- we're considering a new drug for diabetes. We'll start with a null hypothesis that the drug has no effect on blood sugar. Now, obviously that's not what we're hoping is true. That's not what we think is true. We have a promising new drug. We hope that it does have some effect. We hope that it lowers blood sugar. Well, that's the alternative hypothesis. So, the null is no effect; the alternative is that it lowers blood sugar.

And so, we do our tests. You know, we give the drug to a number of patients. And if we see consistent results that this drug lowers blood sugar, then we reject the null, and we accept the alternative. And hooray, we go make a lot of money selling our new diabetes drugs.

In terms of our program, here's an example: Let's say we're looking at, just to make up an example, plutonium exposure data from Rocky Flats. And we want to know can we use this for a co-exposure model. We'll start with the null hypothesis that the data set is complete. That's what we meant when we said we start with the presumption that the data is complete.

And then against that we test -- we do a bunch of tests to try to disprove it, and we can test an alternative hypothesis that the data set is missing randomly distributed records. That wouldn't be a problem for us, but we could also look at alternative two, that the -- the missing data are

from the low exposed workers. That's not a problem. Or we could test the alternative that we're selectively missing high exposure data. That would be a problem.

But those are all the alternative hypotheses, and we're trying to disprove the null. So, how would you disprove the null that the data set is complete? Well, you would find -- you would take your electronic records database, and you would compare it to logbooks. And if you saw a logbook with data in it that was not in your electronic database, you've just disproved the null. You've shown that it's not complete. So, that's what we're trying to do.

So, why not set the null as the plutonium exposure from Rocky -- data from Rocky Flats may or may not be complete? That's sort of the equivalent of what SC&A was suggesting; you shouldn't go in with the presumption one way or the other. Well, why wouldn't you do that? Because you can't test it. You can't disprove it. That covers the waterfront. So, that's not really a scientific hypothesis.

And maybe it wasn't clear from our white paper that that's the context that we were referring to. And that, I think, is maybe the genesis of the minor disagreement, what I think is a minor disagreement. Why not set the null hypothesis as a start by assuming that it's incomplete? Because you can't falsify that. That would mean that your alternative hypothesis is that the data is complete, and we could do all of our tests and say, well, all the data that we can find is in there.

But you can always argue that there's some box somewhere that we haven't discovered yet. And so actually, the data is not complete. That's

called proving a negative. And a lot of times in our SEC discussions, we get -- we come to loggerheads over this idea of proving a negative, and here it is. You can't start with the -- the null hypothesis that the data is incomplete because you can't disprove it. That doesn't mean that the data is or is not incomplete. It's just not possible to prove it or to disprove it.

This is a logical fallacy. It's a well-defined logical fallacy. You know, part of your education as a scientist is you have to study basic logic, including logical fallacies. And this is one of them, proving a negative. It's also called shifting the burden of proof.

And the problem with logical fallacies is that they lead you to incorrect conclusions. You jump to conclusions that aren't necessarily supported by the data. And so, an example might be that we have evaluated the radiation protection program at some site, and it was designed to monitor the highest exposed workers. We didn't find any relevant regulatory compliance violations. We evaluated the monitoring data. We found no evidence that the highest exposure potentials were unmonitored. Therefore, we conclude that we can bound the dose.

Well, we can never prove that there wasn't some hypothetical black operation where people were unmonitored. I mean, you can speculate that, especially if there's no requirement for providing evidence to support that speculation. You can't prove it. We can't prove that there isn't some undiscovered file cabinet full of data out there somewhere, especially if there's no evidence required to support that speculation. But that doesn't mean that the data is actually incomplete. You just can't disprove that. And that's what we're referring to when we're talking about proving a negative.

Okay. Regulatory compliance. What is the appropriate interpretation of regulatory compliance. Well, first of all, regulatory compliance is not necessarily related to the ability to construct a co-exposure model. So, if we look at the regulatory compliance history at a particular site and we don't find anything that indicates, you know, that they were out of compliance, that doesn't necessarily by itself prove that we can use co-exposure models to reconstruct the dose. And similarly, if we find, oh, there were five violations from this site, that in and of itself does not mean that we cannot reconstruct those.

So, what use is looking at regulatory compliance? Well, regulatory compliance can add to the weight of the evidence when you're evaluating a co-exposure data set. So, we will look at the history of violations. Are there any that are related to their internal dosimetry program, are there any related to their external dosimetry program? If there are, do those findings have anything to do with our ability to reconstruct dose, or for instance, it's a regulatory requirement that every year a site issues a report to every monitored worker telling them what their results were. And say they were late; they didn't do it for a year. Well, that's a regulatory compliance violation. That doesn't necessarily compromise our ability to do dose reconstruction, though, because if we have the underlying data reports, we can do it. So, you have to evaluate those -- any regulatory compliance issues for their relevance.

Okay. Finally, the second issue where SC&A and NIOSH were not completely in accord was stratification. And again, in my opinion, my opinion only -Bob can speak for SC&A - I think this is kind of a

misunderstanding. So, we talked about in our white paper that if the radiation program at a facility is mature and functional, and that's an important caveat, stratification is not needed, and a bounding stratified co-exposure model is likely to assign some higher -- higher doses to the low exposed workers than an unstratified model would and assign lower doses to the higher dose workers, but those are the workers who are most likely to be monitored anyway.

We only note that to set the expectations for stratification. We're not saying that as reasons why we should never do stratification. We are not trying to imply that. And I think maybe that wasn't quite clear. And stratification, when there are in fact no significant differences in groups of workers, it will produce -- in the white paper, it said less accurate. And I'm loath to challenge Tom on anything related to statistics. I think it's less precise, but that's probably a discussion that I'd have to join him on the beach for.

Workers have to be -- in order to use stratification, you have to have the ability to assign workers to the appropriate groups accurately. And frequently we don't have that. If we do, then we'll consider stratification.

Now, stratified co-exposure models will result in some workers being assigned more dose and some being assigned less. But that's not in and of itself a reason to do or not do stratification. I just want to set the expectations for that.

Stratify -- the most important part is that if you have an issue with incomplete data where -- you remember, I showed that if we have missing records from -- selectively from the higher exposed workers, stratification is

not going to solve that problem for you. So, that's the point that we were trying to make about stratification is don't have unrealistic expectations about what stratification can do for you. If the data is sufficient to do that, we will do it.

So, in conclusion -- here are the conclusions: By definition, a co-exposure model does not require all the data. It just means that we have to have enough of the highest exposed workers to use to estimate the doses from unexposed workers. And if a radiation protection program is working properly, then workers with the high exposure potential are more likely to be monitored. But missing data, like, you know, if the records were -- were actually collected and they're just not in our database, that -- that can exhibit any pattern.

Internal and external checks of the data, that's what -- that's part of the process of how we evaluate a co-exposure data set. We look for incomplete data. It's not feasible to establish some universally applicable objective criteria. SC&A and we seem to be in agreement on that point.

And the null hypothesis has to be that the co-exposure data set is complete. And then we go to great lengths to try to disprove that by doing all kinds of internal and external checks, looking for data that we have access to that's maybe not included in our coworker data set.

And regulatory compliance is not sufficient in and of itself to judge whether or not we can use co-exposure data -- whether it's complete enough for us to use. And finally, stratification cannot solve the problems of data missingness or monitoring missingness.

So, that is my last substantive slide. Here's my picture again with my

contact info, and I will be happy to take any questions if any of you have any.

CHAIR ANDERSON: Anybody have a question at this point?

MEMBER ZIEMER: Andy, this is Paul.

CHAIR ANDERSON: Go ahead, Paul. Yeah.

MEMBER ZIEMER: Well, I don't actually have a question first. Brant, very, very good presentation, even though you weren't the originator, but you have done a good job and explaining it. I -- I want to sort of re-emphasize the one point, and that is the importance of the null hypothesis. And I -- I do agree that often gets overlooked. And I think the understanding of why that's important to do -- doing these exercises and -- on co-exposure models, a clearly scientific way, is important to have that as the starting point. So, I just want to reemphasize what Brant has already said. I think it's very important.

DR. ULSH: Thank you, Paul.

MEMBER BEACH: I'm gonna -- this is Josie. I'm gonna try and ask a question that's coherent on the data completeness and you're developing, I know, coworker models for several sites. Do you know how many sites you're developing those for now? I know Hanford, Savannah River. I don't think I know of anymore. Is it -- do you guys have a checklist, Brant, of when you're developing the coworker models to say -- determine if you do have -- if the data set is complete or not complete? Do you have just a basic checklist that you go through --

DR. ULSH: Okay.

MEMBER BEACH: -- kind of at the start of this?

DR. ULSH: So, I'm in the conference -- in our conference room, Josie, with Chuck and Lori, and we're looking around at each other trying to figure out how many sites we're doing coworker sets for. Six, maybe.

MS. MARION-MOSS: I'm thinking it's about six. This is Lori. I do --

MEMBER BEACH: Hi, Lori.

MS. MARION-MOSS: -- believe -- hi -- we're working on six -- coworker models for six sites.

MEMBER BEACH: Can you give me an idea of your -- the percentage of completeness on those?

DR. ULSH: We're scratching our heads again, Josie.

MEMBER BEACH: Okay. Well, because I know this is -- this is a huge question, which is why we're having this meeting and why we're discussing this. And I'm just curious of where you're at with all six of those. If you're in -- if you're close to completion on any of them.

MS. MARION-MOSS: Let -- let me ask the question. This is Lori again. Is anyone from ORAUT on the call that may be able to help us out with that?

MS. MARION-MOSS: No, that --

DR. ULSH: Now, why don't we take that as a follow --

MEMBER BEACH: It's okay.

DR. ULSH: -- up, Josie.

MEMBER BEACH: Yeah.

DR. ULSH: And to your second part, is there a checklist, yes. We have a specific procedure that we follow for constructing coworker data sets. I will follow up with you and let you know which one that is.

MEMBER BEACH: That's -- is that is that the OG-6?

DR. ULSH: No, you're thinking of --

MEMBER BEACH: Or is it a different one? Okay.

DR. ULSH: No. You're thinking of IG-6. That's kind of --

MEMBER BEACH: Yes, yes.

DR. ULSH: -- overarching document. This is more --

MEMBER BEACH: Okay.

DR. ULSH: -- specific. It would be --

MEMBER BEACH: Okay.

DR. ULSH: -- I think (indiscernible) an OTIB. And I'll copy --

MEMBER BEACH: Yeah. Yeah. If you just run that by me. I've tried to read up on most of these, but just curious kind of your basis of starting. And then if you get to a place where you say, oh, we absolutely can't do a coworker model or can we, and what do you have to overcome to get there. So, okay. Thank you. That's -- that's all I had.

DR. ULSH: Okay.

DR. ROBERTS: Sorry to interrupt. Brant, if you guys could send that to the entire work group, that would be great. Thank you.

DR. ULSH: I will -- should I send it to you, Rashaun, and let you send it to the whole work group or just copy you? I'll do it either way.

DR. ROBERTS: You can send it. You can just copy me.

DR. ULSH: Will do.

CHAIR ANDERSON: Other questions?

MEMBER BEACH: Sorry. Just as a follow up, too, it would be nice for this work group to know how many -- I know we already said six, but kind of what -- where you're at in those coworker models. I'd be interested in that.

I don't know if anybody else would be.

DR. ULSH: Okay.

MEMBER BEACH: Thanks.

MEMBER ZIEMER: No, we would all be interested in it if the -- if we can -- as long as you're trying to track it down.

DR. ULSH: Sure. No problem.

CHAIR ANDERSON: I kind of look at it in a -- more of a qualitative sense. We're trying to reconstruct the dose for an individual. The coworker model that's being developed seems to include all data for everybody. So, what you're doing is you're trying to estimate a dose for any for any -- for everybody could -- you could use the coworker model for everybody at some point. So, it's --

MEMBER BEACH: Yeah.

CHAIR ANDERSON: -- for me it's kind of so how do we use the information on the worker as to where he worked or what he worked, and -- and then our -- I mean, originally we were looking for workers that were doing similar tasks at similar points in time. I mean, in the coworker model -- I haven't looked at it recently, but it looks to me like what you would tend to do is the only variable data in it other -- once you got your model is the years that the individual worked and the periods of time. Doesn't really do anything different for types of jobs or types of classes of individuals. So, it's really not coworker. It's all workers at the facility, as -- as I understand what you're looking for in the data set.

DR. ULSH: Well, let me give some caveats that you probably intended, but I just want to make sure. When we are talking about

coworker data sets, yes, it's all of the data that we have that by definition though, we're trying to apply it to workers who were not monitored but we judge did have an exposure potential. So, those are the ones that we're trying to estimate using the coworker data.

Yes, in the large part you're right. We just have to know when the worker -- you know, what their employment period was, but also we do, in a lot of cases, decide whether we're going to apply the 95th percentile or the 50th percentile coworker data based on professional judgment on what their exposure potential might have been when we can.

And then in terms of applying it to anyone regardless of their job, that is true for an unstratified coworker model. But if we have sufficient evidence that we can do stratification, we'll do that. It's just not often that we do have that level of detail. So, you probably intended all that. I just want to make sure --

CHAIR ANDERSON: Yeah. No, I -- I -- I'm just saying is -- and then the next thing would go back to look at, I thought in the actual legislation, it talks about what to do when you don't have any monitoring data on an individual. And -- and that seems to be, again, more qualitative. It's what's the highest dose that could have been -- or that you've identified a period of time at the facility, and you assign it to them.

Now, that is likely to overestimate for a lot of people, but I think we have to be careful not to get lost in a dose reconstruction generic approach to using the data that we have to assign a dose to individuals who we have no data on. All we have is their work and experience at the facility. Again, we have interviews with workers, but all of those are not giving us

quantitative data.

And what the model is trying to do is give a quantitative number to the exposure. And again, when you say the likelihood that they may have been -- you know, and do we think that there they were -- they were -- it was likely what they may have been exposed then it's kind of how do you do that and what constitutes evidence that it fit in to that likelier group.

DR. ULSH: Yes. And those are the natures of -- that -- that's the nature of the discussions that we typically have in working group -- or, you know, site-specific working groups where we present a co-exposure model and -- or if -- or even, for instance, in the dose reconstruction subcommittee, a lot of times SC&A will evaluate whether or not they agree with our application of the coworker model. Did we assign the right percentile to 95th or 50th or did we do it the right way. That's usually some of the things that they review in those contexts.

CHAIR ANDERSON: And how -- how often is that 95th percentile or whichever one you use have measurements at the facility that you're including in the model that were higher than that 95th percentile?

DR. ULSH: A --

CHAIR ANDERSON: Again, I'm going back to the -- what the -- what the statute says. I mean, that -- that -- you could argue that --

DR. ULSH: Well, --

CHAIR ANDERSON: -- that's, you know, not an appropriate thing to use, but it's kind of -- I think that kind of tried to address the qualitative measure of it. And if you have measurements, then you use -- you assign the person when you can't really know that much about them. We're trying

to refine that, but again, then we get them to, you know, how likely these exposures were. And then I would back up to now you may have one measurement for a person, but they -- they worked there 25 years, and so you have part of their work history that you have no data. Are you doing your coworker model for segments of their work period?

DR. ULSH: Yes. So, --

CHAIR ANDERSON: Do you have models -- you have exposures generated by the coworker model for five years out of 15 years of employment.

DR. ULSH: Yeah, that is actually the most common application of co -- coworker models where we will have a particular worker, like you said, where they do have some monitoring data, but there are gaps in their monitoring and could be for legitimate reasons, maybe not. We don't know. We will use the coworker model to fill in those gaps. That's the most common application for doing that.

With regard to what the regulation says, I don't want to get too deep in that because I'm not a lawyer, but I think you're thinking of the part of the regs where it says that we have to be able to bound the dose or do a more accurate dose reconstruction, one of those two. And so, I think the coworker model would be our way of satisfying that requirement. Of course, part of development of a coworker model is figuring out how to apply it. We want to make sure that --

CHAIR ANDERSON: Right.

DR. ULSH: -- that the population you're applying it to, it's representative of them. That's one of the things that we look at.

CHAIR ANDERSON: I mean, there's lots of uncertainties on the -- I mean, that's -- I mean, we're -- we're just trying to get our -- I want to say, our best estimate -- the higher end of the best estimate is a 95 percent or 98 percent or whatever.

DR. ULSH: Yeah. I mean, you know -- you know, our general philosophy. We're trying to make sure that if we err, we're erring on the high side. That's still our objective anyway.

CHAIR ANDERSON: So, how -- how many dose reconstructions do you do that it's 100 percent of your -- of their -- you're generating 100 percent from their full work history versus filling in gaps? I mean, I think we've looked at what's the impact of using various -- it's like a limit of detection, sort of how we address that. You assign some dose, but typically that -- that dose doesn't add so much that it -- it makes a major difference. It's -- it's just to provide data it covers their whole period of time.

DR. ULSH: So, with regard to your question of how often do we do this partial fill with coworker data compared to where we use -- I think maybe you were asking, versus the situation where there's just no worker for the data, and we use coworker data to give them a dose. Is that kind of your question?

CHAIR ANDERSON: Well, I mean, it -- the question is what's the dose --what's the definition of coworker? Is a coworker just somebody who worked at that facility? And I think there's been some discussion about or NIOSH has talked about using broader -- all of the awarded individuals' database, which would include all different facilities. So, I think you've been using it here for a given facility.

DR. ULSH: Yeah.

CHAIR ANDERSON: And can you stratify or not by the type of work or -- I mean, there's uncertainties in the -- you know, you -- in your presentation there, you have that you may inappropriately assign somebody into a exposure or to a worker group. I mean, you're just doing the best you can.

DR. ULSH: Yeah. And part -- so, I have to confess to a difficulty on my part. When -- you know, I worked at NIOSH before and then I went away and did other things, and then I came back. And while -- while I was gone, the terms changed from coworker to co-exposure. And both of those terms have specific meetings. And for me, I still -- I still just slip into saying coworker all the time. So, I think -- and I'm looking around the table -- Chuck and Lori will correct me if I'm wrong. Coworker means the guy standing next to me doing the same task, and he was monitored and I wasn't. Co-exposure means that larger group from, say, Rocky Flats where we have all of their -- all of the monitoring data for all of the workers, and we assign some percentile to a guy. It's not necessarily from the guy that was standing next to him. Is that correct? Okay. They're nodding their heads. I think I got that right.

CHAIR ANDERSON: Right. That -- that's -- that's right.

DR. ULSH: Are there any other questions for me?

MEMBER BEACH: I just want to make another comment. I think for me, the development of the coworker models or the -- or co-exposure, or however we're working is -- it's holding up a lot of discussions at sites waiting for the outcome of these models. So, that's -- that's a bit of a

concern that -- the length of time it's been taking to put these together, I -- and I know it's huge.

DR. ULSH: Yes, it is. And I think, in large part, it's because it's -- it's considered in general a TBD issue. And so, we focus a lot on the SEC end of things. And it's only -- I mean, this is too strident a statement, but it's only once the SEC process has finished that we then turn our major attention to the TBD part of the process. And that's where the coworker models get taken up.

MEMBER BEACH: Yeah. But sometimes those SECs got cut off at a premature date and -- that's my opinion -- maybe two or three years, four --

CHAIR ANDERSON: Yeah.

MEMBER BEACH: -- years, five years early, and then we switch over to the coworker and really the SEC issues are not yet complete in some cases. Not all sites, but --

CHAIR ANDERSON: Yeah.

MEMBER BEACH: -- in a couple that --

CHAIR ANDERSON: Yeah, I --

MEMBER BEACH: -- I'm talking --

CHAIR ANDERSON: -- I think going back -- going to the coworker model or the co-exposure model was kind of the backstop for you can't do -- you don't have enough data or you don't trust the data that it's broad enough, accurate enough through the whole period of time to support being able to do dose reconstruction. So, if you don't have the coworker model, your alternative is we really can't do the dose reconstruction, so it's an SEC.

And I think that's what's being often held up is, is it a -- because you don't have enough data to do a coworker model and we don't even have a good -- how we're going to do that. It should -- it become -- falls into the make it an SEC for specific periods of time.

DR. ULSH: Yeah. And we do have a pathway --

CHAIR ANDERSON: And I think that's what held it up that it's -- NIOSH deciding that we need to have -- we can't do the dose -- dose reconstructions unless we have a coworker model.

DR. ULSH: So, we do have a pathway to handle a situation like that. Let's say we're looking at an 83.13 petition and it's wound its way through the process and gotten to the end, and it's a situation like Josie described where, you know, maybe they wanted to get it up to 1990, but the -- the petition ended in '87. And we say, well, for those last three years, we'll use a coworker models. Okay. So, the 83.13 process ends.

We go to do a -- developing a coworker model and or co-exposure model. And we find out, you know what, we really can't do this. We can't do a co-exposure model. We always have the pathway available to us that we can do an 83.14 and add years to a -- to the SEC class.

CHAIR ANDERSON: So, can you tell me how many times you've looked for a coworker model and been unable to do it?

DR. ULSH: No, but I --

CHAIR ANDERSON: No. I mean, that's right. I mean, the -- the -- I mean, kind of the consensus has been we can always -- we have enough data at all of these sites that we could do a coworker model. And that's what you have -- have spent a lot of time doing to the best of your ability.

And that, I think, is what led to some of this delay is because that takes a lot of time and staff time to work on those kind of issues.

DR. ULSH: You are correct. It does.

CHAIR ANDERSON: Yeah. And it's the same as doing stratification. Then it's -- so, how many people in a small category do you need to be able to stratify, so.

DR. ULSH: Yeah, exactly.

CHAIR ANDERSON: You know, the -- the impediments -- I mean, it's kind of, again, on the qualitative side, that's what we as a Board need to look at, is the -- developing a coworker model so that you can do some dose reconstructions. If it takes five years to do, is that consistent with the way the program wants to operate? Now, if you have a coworker model you can -- you have in place that you can use, then in -- in a specific site, that may be a way to avoid or sufficient to exclude doing an SEC on the site.

But I think at least what we're hearing from a lot of the workers is they're waiting to hear, is it going to be an SEC or not. And that goes on and on, because the confidence in the coworker or co-exposure model development never gets quite to completion. So, I think that now that we're coming back together, it's kind of what is the framework to say yes, you could do a coworker model, but you don't have the resource to do it. So -- and the time, and what is a cutoff time to say it -- it ought to -- you know, part of it become an SEC.

DR. ULSH: Well, I don't think there is any kind of a statutory time limit on developing a coworker model. The only thing like that that I can think of is that when an SEC petition comes in, an 83.13 petition, we have

180 days to prepare our evaluation report. And then, as you know, that's the start of the Board's deliberations on those petitions and those we don't -- I won't say we don't have any control over it, but that's -- that's up to you guys how long you want that to go on. And I don't know how you would -- I can't really comment on what you as a Board member should do if you get to a situation where you decide, you know what this -- this coworker model thing is just taken too darn long, let's just recommend an SEC. I -- you know, I can't comment on that.

CHAIR ANDERSON: No, I know, but I -- I'm partly -- I mean, you're presenting to us and -- and we're -- I'm -- I'm really kind of addressing members here around the Board, because those are the kind of decisions yes or no. I mean, typically we don't get involved with this until you've done your review and said we can do the dose reconstructions. And then our job is to look at, you know, is that true or how confident are we that what you -- how you propose to do it is appropriate. So, you know, that -- I'm just saying looking at the history over the sites, what kind of information can -- can we look at as a Board? But I think there's there is a lot of pushback from a lot of the worker families, of course, who are quite aged, and they're wanting to know. I mean, especially this is important for those where they filed a claim, and it's been denied or it hasn't been adjudicated yet.

DR. ULSH: Understood.

CHAIR ANDERSON: So, I mean, I'm not asking you to -- I mean, you're -- you're here to support what NIOSH put into their report and how you did it and then kind of convince us that you can do the coworker models and, you know, you start that and then it kind of goes on hiatus for the work

groups waiting to -- to see if you are now saying you can do it or not and then reviewing how it operates.

Other comments?

MEMBER BEACH: No. No, other than there -- I think some of your point is there should be some kind of a time limit, especially like with LANL when we're looking at five years, three to five years, and it's been going on for near eight years just on those last couple of years. It -- so, anyway, it's -- it's --

CHAIR ANDERSON: Yeah, --

MEMBER BEACH: -- frustrating.

CHAIR ANDERSON: -- I mean, that's what I'm saying. If we --

MEMBER BEACH: Yeah, I know exactly -- yeah.

CHAIR ANDERSON: I think we're struggling, and --

MEMBER BEACH: Yes, thank you.

CHAIR ANDERSON: -- there comes a point when we need to say enough is enough. I mean, we really want to be able to do it. Everybody would like to be able to do dose reconstruction and -- and be able to defend that -- that it's sufficiently accurate for -- you know, for the workers.

MEMBER BEACH: Yep. Agree. Thank you.

CHAIR ANDERSON: Okay. Any other questions?

SC&A PRESENTATION: SC&A COMMENTS ON NIOSH WHITE PAPER "A DISCUSSION OF COMPLETENESS IN CO-EXPPOSURE MODELS MEMO" (OCTOBER 17, 2023)

CHAIR ANDERSON: So, we can move on to the SC&A review?

MR. BARTON: Yeah. This is Bob Barton. And colored me a little bit confused, which is not --

CHAIR ANDERSON: Sorry, --

(Whereupon, multiple Board members and participants speak simultaneously.)

CHAIR ANDERSON: -- computer not working. Right. Yeah.

MR. BARTON: Well, hopefully you can all hear me. Hopefully you can't see me because I'm pretty ugly. But --

MEMBER BEACH: No, we see you.

(Whereupon, Chair Anderson, Member Beach, and an unknown participant speak simultaneously.)

CHAIR ANDERSON: Just had your haircut, I see.

MR. BARTON: Yeah. Well, a little on top, apparently, it's, you know --

CHAIR ANDERSON: Yeah.

MR. BARTON: Anyway, I'm a little confused about the order of events here today, because SC&A's mandate for this meeting was to provide our review of NIOSH's original white paper. But the presentation we just saw -- and we had received amalgam of it at the end of January, but that was a response to our review, not the original white paper. So, we had prepared to present our original review, which, if it pleases, the work group, I -- I'd still like to do.

But, you know, in my -- I think in some cases, the cart was put before the horse because at several times the NIOSH presentation responds to SC&A's review rather than presenting their original white paper. So, there -- there seems to be an order of operations confusion on my part, but I can -- I

can steam ahead with the -- what SC&A's original review said, and -- and certainly many of Brant's comments and the presentation, respond to some of those things, but I think it would still be worthwhile for the SEC issues work group to -- to hear what the original review said --

CHAIR ANDERSON: (Indiscernible) --

MR. BARTON: -- and to put it all in context, along with -- well, what Brant presented, which was very eloquent and complex, and it is a complex topic. So, I -- I guess, I'm looking for a little bit of guidance here because, again, my read on this right now is that the NIOSH presentation was really their response to our review, not necessarily their original white paper. So, if it please the work group, I'm perfectly willing to fire up my -- my slides and get going or --

CHAIR ANDERSON: Yeah.

MR. BARTON: -- there's been a lot of really good conversation already, and a lot of it might be redundant with NIOSH's presentation and the discussion that went afterwards. So, I mean, I'll try to keep it a little briefer than I had intended, but, I guess, I'm look -- just looking for direction here.

CHAIR ANDERSON: I mean, for me, I would -- I would like you to go through your -- I was hoping what we were going to do is have kind of a white paper presented and -- and your response to it, and -- and then we would move on. Now, NIOSH, I would agree, has partially responded, I don't know -- I don't think we've gotten a written response to your review from NIOSH. So, I would say let's get all of the history of the white paper and your response to the white paper up to speed, and then we'll talk about

where we go from here. So, --

MEMBER BEACH: Yeah, I -- I -- I agree with that, Andy. Also, I was thinking the exact same thing on the next section, the OTIB-75, because you haven't presented. But then I was reading his paper saying that they're wanting -- anyway, it's -- it's very interesting. Maybe our -- our eight months hiatus they did some work when we weren't meeting, so.

(Whereupon, Mr. Barton and an unidentified participant speak simultaneously.)

MR. BARTON: I'm trying to get --

MEMBER BEACH: Yes. Yeah.

MR. BARTON: -- some perspective on it.

MEMBER BEACH: Yeah.

MR. BARTON: Let me -- I'm throwing my slides here, and I'll try to be referred that I intended to be, because Brant colored -- covered a lot of that material of -- very admirably and not a lot of disagreement, as he indicated, but there is some. So, let me -- let me see if I can get my slides up here. And let's -- let's roll on.

CHAIR ANDERSON: We lost you.

MEMBER BEACH: Yes, we did. Hopefully, he's working on slides.

MR. BARTON: Oh, boy. Yes, I am. So, I had it. Oh, geez. Okay. Hold on. Let me try a different -- okay. How we doing now?

CHAIR ANDERSON: Yeah, --

MEMBER BEACH: We --

CHAIR ANDERSON: -- got it.

MEMBER BEACH: -- see it.

MR. BARTON: Okay. Excellent. Hello, everyone. Again, I'm Bob Barton. Here to present -- to present the original review of the NIOSH white paper that concerned the general topic of completeness and co-exposure modeling.

As was discussed in the prior presentation, completeness really refers to the coverage of the monitoring records you have for a given worker population. Essentially, a given site worker population, and to what extent the records may be, quote, missing. Now, that sounds more ominous than it is. Record completeness, or rather incompleteness, is just really a fact of life for the program.

If everyone who should have been monitored was, in fact, monitored, and those records are accurate and available, then we would never have a need for co-exposure models. And as Brant indicated, the records might be missing for a variety of reasons and generally not nefarious. I mean, they could have been unintentionally destroyed or -- or rendered unusable, as Brant mentioned, maybe a fire or a flood or something like that. The simple age of the record might make some illegible. I mean, I think even I grew up in public schools with those purple mimeographs. I remember those. Perfectly unreadable. Or they could just be lost.

Some situations the worker who should have been monitored wasn't. This could be a byproduct of the standards of the time, as Brant indicated, or other numerous reasons. It could be any number of things. In any case, we run up against situations at basically every site within this program where there are workers for which we don't have individual dosimetry records, and so the co-exposure models or some form of dose framework have to be

developed to appropriate -- appropriately assign dose to those unmonitored workers.

So, the question is really not is the data set complete. The question is rather is the level of incompleteness concern such that you cannot feel it can be justified to use the records that you do have to substitute for the records that you don't. So, with that, I guess, sort of preamble, I -- I'll get started and hope to move more quickly than, again, I had intended.

So, here's a bit of background. Again, a pretty standard slide for informational purposes. Again, the genesis of this paper was originally born discussions of the Sandia National Laboratory work group back in 2022. And the question was posed -- I believe it was Dr. Roessler -- is that we run up against these completeness questions that seemingly every site and is there any way that we could quantitatively set guidelines to determine whether a given data set is complete. That is quantitative, not qualitative.

And NIOSH issued a white paper discussing this issue in March of 2023. And SC&A was subsequently tasked to give it a look. So, this presentation, that is SC&A's presentation here, is essentially structured by what NIOSH had labeled as conclusions in their white paper. And then we also present SC&A's response or review response to that original white paper, which again, was to address this question of can we quantitatively set some sort of guidelines to evaluate completeness.

So, this was NIOSH's conclusion one: It essentially opines that you're not gonna have all the data for some of the reasons that I -- I had just stated, but that you don't need all of the data if you can establish the data you have is for the highest exposed workers, which is a key point in the

previous presentation by NIOSH, or at least a significant portion of them, the highest exposed workers. And then it's -- it would be appropriate for use in reconstructing doses to a worker who don't necessarily have data, but you're confident had a lower exposure potential.

So, in response, is -- SC&A basically said that we agreed, you know, in principle, I mean, it makes perfect sense. However, sometimes establishing that you've actually captured the highest exposed workers is easier said than done. You always have to ask the question, you know, if we did have all the data or if we had monitoring data for those that weren't even ever monitored, what would that data inform us about that missing exposure information? That's really the question here.

And this gets into more of a qualitative rather than a quantitative. It's a judgment, you know, what are the job titles, the work areas, and the specific duties of those workers who do and do not have data that we can use. And can we trust that what we've captured to a reasonable degree, those highest exposed workers? This is the entire concept behind this weight of evidence-type argument. And it is more of a qualitative judgment call in our view.

Conclusion two was basically that, you know, the rad programs are unlikely to be 100 percent effective, i.e. why we need co-exposure dose assignment in the first place, but that logically, the missing data that we'd like to have but don't is going to affect the lower exposure workers more than higher social workers. That -- that's me summarizing. I hate to -- to put words in NIOSH's mouth, but that -- that wasn't our read on it. I think it's mostly accurate, but they can certainly push back against that.

And SC&A agrees that an evaluation of the rad protection program, both procedurally and certainly the implementation, is an important facet that should always be explored.

Though we note that this is, again, more of a qualitative and quantitative measure in most cases. But you look at things like the interviews, any internal and external audits of the program, any other available information that can illustrate the situation we're trying to evaluate. However, I guess philosophically we don't believe that the starting point is that you assume everything ran perfectly then go looking for problems. Also importantly, and this was pointed out in the NIOSH presentation is -- as well, nor do we think they used to start with the thought that there are problems, and we need to prove that there weren't. So, it's really a position of, what I call, neutrality, which is sort of counter to the approach that Brant had just laid out.

Conclusion three: This is really very similar to the conclusion to in that a close examination of the rad protection program is necessary. What do the record keeping systems tell us about the rut -- reliability and completeness of a given data set? Again, this is a very similar line of reasoning to conclusion two. And so, we agree that such an evaluation is an important part of building, again, this, quote, weight of evidence to give the Board confidence that any derived co-exposure doses are appropriate for this -- this program.

This was sort of discussed earlier, but this one really starts with the assumption that the data you're looking at is complete. Something that I had mentioned a few slides back, but that the data set needs to be checked

against secondary sources. As an example, that some sites will have health physics reports on a periodic basis, such as, you know, monthly or even weekly sometimes or quarterly, that will say something like, you know, X number of uranium results samples collected in June. Well, then let's look at how many uranium samples we have for the same period. This helps to inform on the completeness of the data we're looking at. Sometimes sites will have programmatic performance reviews that can be referenced. These can be both internal or external audits, but they provide additional information on how the intended protection program is actually implemented in the field, not just, you know, on paper.

Also, as we'll discuss later, the use of NOCTS is a great tool to compare against any data sets you have to see how complete either one is. Do you have more data for a worker in NOCTS that doesn't appear in the -- the, quote, full data set, or do you have more data in the full data set that doesn't appear in NOCTS? So, again, it's a secondary source that can be used, and it's very useful, again, in establishing this weight of evidence sort of argument.

But I think the point is, and I would reiterate, I don't think the starting point should be that it's presumed that your data set is complete, more that it should start from, again, this neutral position of well, we really don't have an idea and then see where these various resources, when examined, inform whether it was complete. You know, again, those are the interviews, you know, periodic health physics reports, audits, and such.

Conclusion five: Recall at the outset of my little presentation here, the original question was whether we can put a number on it, a quantitative

metric, so to speak. Here NIOSH concludes, and we agree, it simply may not be feasible to have a universal number that says complete or incomplete and that the picture is always more complex. So, each individual co-exposure model necessarily should undergo appropriate subjective and qualitative evaluations like I had previously described.

Conclusion six, and this was also addressed in NIOSH's response presentation, that regulatory compliance by itself should not be used in determining completeness. I think the operative term here is by itself, and we -- or SC&A agrees. And it's just one piece of the puzzle and forms, you know, a part of the basis for, again, this weight of evidence approach in determining if your data is sufficient to use in formulating a co-exposure model that can then be used for the unmonitored worker.

Conclusion seven: This one is really stating that at least our read on it was that stratifying, which we talked about some, may not be an actual viable path. There's also been in the past the sort of illustrated statement, this is a common quote, but robbing Peter to pay Paul. But essentially, if you stratify into two groups, one group will have higher doses, which means the group in the lower dose category aren't benefiting and would have higher doses assigned if the models weren't stratified and instead, it was just one combined model. So, essentially, one group would get higher doses assigned and another group have a lower if you stratify. So, we also agree that stratification does not solve the, quote, data missingness. However, if there's qualitative information that suggests there is a strata or group of workers who appear to have a higher exposure potential but also have some form of significant data completeness issues, and the formulation of any co-

exposure model for those workers who may simply be infeasible, in our view.

A bit more on stratification straight from DCAS IG-006, which was accepted by the Board and made official in early 2020. It had been worked on for many years before that. I won't read this whole quote, but it basically lays out NIOSH's own policy concerning stratification and that if there is a reasonable belief that there is some subpopulation that had the potential for higher exposures and some of those workers were unmonitored, then stratification may be necessary to consider. Of course, the other side of that coin is if there is no reason to believe the highest exposed workers were unmonitored, then stratification would certainly not be necessary.

And a bit more from IG-006, which, again, is the guiding document on the formulation of co-exposure models. And again, it's a general document, but it lays out the philosophy that the Board had hammered out over many years. And, again, this is a rather generic statement that says the data or the available measurements need to be evaluated if found to be representative of the exposed workforce or bounding of the exposed but unmonitored workforce. This makes sense to me, but again, it has to be evaluated and proven to a reasonable degree in each of these situations.

Okay. Obviously, there are a few quotes from IG-006 here, which is intentional, but we at SC&A really feel this really gets to what is being asked when evaluating completeness for co-exposure modeling. And I think an important takeaway from this quote is the anecdote about the Nevada Test Site, which is actually included in IG-006 as part of the procedure, which NTS had a significant amount of monitoring data. However, on -- on closer

inspection, it was found that most of the data was actually for security guards and the health physics folks.

On its face, that doesn't make it a problem. But as it turns out, HP folks and security basically stayed at the checkpoint entering the rad areas. Other workers, you know, such as the miners and the drillers who had a higher exposure potential were monitored less frequently, and thus any co-exposure model based largely on security and HP folks wouldn't be appropriate for them. And this was essentially the basis for the SEC at Nevada Test Site for at least part of the period.

So, here are SC&A's overall conclusions. We agree with the overall logic and principles that if you capture the highest exposed workers, then a representative or if not bounding model can be produced. There are a little -- exceptions. Again, we don't feel it should be assumed a priori to any qualitative assessments that available data is complete. You should start from a more neutral point of view.

If the qualitative analysis indicates stratification is warranted, it should not be ignored and which I think NIOSH acknowledged in their response presentation. And that's even if it means a portion of that unmonitored workforce ultimately would be assigned to lower doses and then another portion assigned higher doses. Obviously, every state is unique and has its own idiosyncrasies, so they all need to be evaluated separately.

And we certainly agree -- that is SC&A certainly agrees a quantitative approach is likely not feasible. That is, there's no universal number or percentage or -- or what have you that can be applied across the program. And, I guess, finally, SC&A may believe that NIOSH should continue to rely

on the policies and the guidelines that were outlined in IG-006, which again spent six, seven, eight years in development between NIOSH, the Board, SC&A had a seat at the table too, and was ultimately accepted by the Board in 2020.

And here are just a few of the main references, including that Sandia work group meeting that really started this effort. Obviously, IG-006, which I quoted a few times in this presentation, and of course, the original 2023 white paper on this whole completeness discussion. So, that is all I have, and I'd love to take any questions.

WORK GROUP DISCUSSION

MEMBER ZIEMER: So, Bob, --

MEMBER BEACH: So, I have a question here --

MEMBER ZIEMER: Oh, go ahead.

MEMBER BEACH: Okay.

On your first -- on the last slide, the overall conclusions, so -- I don't know how to word this, but NIOSH has a culture, in my view, of presumption of completeness, and you -- that's an issue. How do you change that culture to be more -- and it's probably just a question for NIOSH mostly -- is how do you change that -- the perception that it's complete and then disprove that it's not -- and prove that it's not complete? I mean, that's a huge issue, in my opinion.

MEMBER ZIEMER: Well, that's the -- this is Ziemer. That's the point I was going to raise. The -- the statement of -- of a presumption is different than a hypothesis that you're trying to disprove. And that -- that was the

whole point of a Dr. Ulsh's NIOSH's presentation that it doesn't mean that you really think it is where you're presuming, you have to have a null hypothesis. You're trying to disprove that in this complete. That's the point. Because you can't disprove a negative. You have to -- you're -- you're -- you want to show that it is not complete. That's what you're trying to do. So, it's not -- it's not -- it's not a presumption. It's part of the scientific method of how.

you go about proving something. You want --

DR. ULSH: (Indiscernible) --

MEMBER ZIEMER: -- you're trying to prove that you don't have a complete data set.

DR. ULSH: And it was perhaps a poor word choice in our white paper where we said, start with the presumption that the data is complete. I can understand where that led us off the rails. And that's why I was trying to, as Paul mentioned, put it into context. But we should have maybe picked a different word instead of presumption.

Josie, if you have your pen handy, I do have some answers for you to your questions. The main guiding document for development of coworker data is Report 86, and you might also want to look at OTIB-78. And there are in fact eight sites, not six, where we're actively working on coworker data. And here they are: Hanford, internal; Santa Susanna, internal; West Valley, internal; BWXT, external; Y-12, external; Rocky Flats, internal; Grand Junction, external; and LANL, internal. There are maybe -- up to maybe 15 sites on the list, but those are the ones that are being actively worked. And thanks to the ORAU Team for promptly supplying that

information.

MEMBER BEACH: Yes. Thank you. Appreciate it.

DR. ULSH: I think the thing that I still need to follow up with you, Josie, is how far along are we on each of those, and I can't answer that yet.

MEMBER BEACH: Okay. Thank you.

DR. ULSH: Yep.

CHAIR ANDERSON: How -- how many complete and you're using the coworker models?

DR. ULSH: I think we've completed Savannah River. Was it internal or external?

MS. MARION-MOSS: Internal.

DR. ULSH: Internal. Savannah River internal is complete.

CHAIR ANDERSON: Yeah. Okay.

MR. BARTON: That's correct. And SRS was basically used as the litmus test for the --

CHAIR ANDERSON: Yeah.

MR. BARTON: -- IG-006 guidelines and how they'd be implemented in practice. And that was an extensive effort reviewed by the Board, reviewed by SC&A, discussed many times. I think we're on revision five if not six, but I think we've all come into agreement that those principles, again, in IG-006, we're adhered to in that effort. I think SC&A can agree to that part, certainly.

MEMBER ZIEMER: Andy, could I make a couple more comments?

CHAIR ANDERSON: Oh, absolutely. Yeah. Right.

MEMBER ZIEMER: Well, I -- I'm trying to think of three different kinds

of things that we need to be addressing this. This -- this part here has to do with the methodology of co-exposure models. That's a whole thing in itself.

You raised the issue of the time factors, and I think that's something that we on the Board will have to address too, if we want to impose on ourselves, I suppose, some kind of a time limit on reaching sort of the final stage of things, in a given site.

And then the third thing is the issue that we continue to face, because the sites themselves change over time. And what -- what can be a coworker model in one era may not be a good model in -- in the other era in terms of completeness and so on. But I -- I noticed that as we proceeded, and this is over really decades, that when often we find that new information becomes available even as we're considering either an SEC or some other aspect of the site that we find either a whole new trove of information or some additional input from petitioners has to be evaluated.

And unfortunately, our Board size has been pretty small lately. And it -- it's -- the ability for us to have enough work -- work group meetings to address some of these issues have stretched things out time wise. So, there's -- there's issues that sort of in themselves prolong the process, even when we're trying to bring it to a close. I -- I don't know how we handle that, but we -- we do, separate from the methodology of doing a co-exposure model, need to have some way to think about how do we limit the time when we can continue to get more and more and more information, which often is, you know, beneficial to the -- the petitioners, and we don't not -- necessarily want to limit them, but the -- the time for us to evaluate that SEC or SC&A evaluate and NIOSH evaluate takes time.

So, but somehow that -- the whole time issue, I think we have to address it in as -- as a kind of a separate from the methodology of doing co-exposure models.

CHAIR ANDERSON: Yeah, no, that's kind of the point I was trying to raise that, I mean, that's the reality. And -- and -- and -- and my sense is the reality of having more resources and more staff available in NIOSH to work on some of these is probably not very likely in -- in the short term.

MEMBER ZIEMER: Not just the NIOSH and its staff and --

CHAIR ANDERSON: Yeah.

MEMBER ZIEMER: -- it's all -- it's also DOE staff --

CHAIR ANDERSON: Oh, yeah.

MEMBER ZIEMER: -- and it's our own -- our own Board.

CHAIR ANDERSON: Yeah.

MEMBER ZIEMER: We've been shorthanded for several years now.

CHAIR ANDERSON: Yeah, yeah. No, that's -- that's kind of why I think we really need to come up with how we're going to address that, because, I mean, your issue of finding new data, you know, that's always a good thing. The bad part of it is it may take -- take time. But at some point, you have to move forward. It seems to me for the coworker model issue, it really has been -- I think all of the sites that are being worked on have SECs through their initial periods.

MEMBER ZIEMER: Yeah. Right.

CHAIR ANDERSON: And therefore, it's kind of the margins, as it were, of when -- when does the availability to bound and whatever end or, then all of a sudden, many of them are now generated the data we need and their

compliance with things is better. But it's always during part of the site time, they haven't had the data to meet dose reconstruction, which is why they'll have a SEC at the start. So, again, time begins to mount up on the -- what is the -- the kind of the gray area between when -- and this is often, you know, Tiger Team and other investigation things that sparked improvement in activities at certain sites.

So, I think we -- I mean, one thing that we, as a Board and as -- our committee, may want to get together to talk about some of these time issues, and it'd be useful to look at the very -- these sites that are under development. How many of those are actually -- have a draft that hasn't been shared or are in development because they're not high priority to do it? So, could be if we look at those, we could come up with a qualitative approach to does it make sense to expand or -- extend a SEC a couple years that's in that kind of redevelopment period and -- and close those out, because we have a lot of kind of hanging issues out there that, you know, we lose sight of until it pops up again and then we are in -- in catch up time to remember what they had going on, so.

MEMBER BEACH: Andy, that's a really good point. This is Josie again. I know for a fact that we have that same -- exact situation at LANL, and I don't know -- I mean, if -- if I'm on a work group or if I'm chairing a work group, I can say, yes, we have that issue at that site, but I don't know generally how many sites are in that same situation as LANL, where it's just three to five years. And how would we get that data together to know which sites we're in that situation with?

CHAIR ANDERSON: Yeah. I mean, it's a good start to -- to look at the

list that you just dictated to us of the sites where you're working on them.

I wonder if we, Rashaun, whether we could have SC&A take a look at that to -- because I -- I think -- I would assume all of these, the focus is on dose reconstruction after the SEC period. And -- and so, then we need to know is it based on the petition of what they identified as the end date and the decision was made to go with a shorter period. I think if we look at how many of those years we could look at what -- what the impact or how beneficial -- it's kind of a cost benefit of the -- the time cost and the staff cost and the effort to develop a coworker model for NIOSH who's developed some of these, it's how close are they to being considered secure. Then we could work with the subgroups to see where it could be -- where is it that we don't -- no longer need the coworker models.

Bob, you -- you're -- you got -- you've got information on a lot of these sites, so I --

MR. BARTON: Sure.

CHAIR ANDERSON: -- I mean, I'm trying to pass -- I know that our committee is individually not going to be able to take this out in a timely fashion. So, it's kind of -- it's -- it's practical from the standpoint of you being able to -- do you think what we're talking about is achievable?

MR. BARTON: Well, I -- I guess, the way I try to respond to what -- what you're asking is that it may not be necessarily appropriate for SC&A to take over that task. Generally, what happens, as -- as you know, is that, especially with SEC situations, NIOSH will produce an SEC report. And they -- if they determine that dose reconstruction is feasible, then it's turned over to the Board. And then the Board may or may not turn it over to our

folks at SC&A to take a look at it and see what we think about it.

As far as co-exposure models overall, beyond what the SEC discussions are, which I think are probably the most important to take care of first, now you're getting into territory of how you assign doses for sites that don't have SECs, in which those reconstruction has been determined to be feasible. And again, I don't want to step on NIOSH's toes here, but I think it's -- I think it's really their purview to prioritize which of those sites they can put staff resources towards to modify some of these things to adhere to IG-006 and some of the things we've been discussing today.

So, I -- I don't know if I can punt that over to -- to my compatriots over at NIOSH, but -- I mean, SC&A can try to compile a list of what we feel might be -- or try to, I guess, come up with some sort of ranking system, but I -- I'm not sure that gets us close --

DR. ULSH: (Indiscernible) --

MR. BARTON: -- to what you're looking for.

CHAIR ANDERSON: Okay. That's fine.

NIOSH?

MS. MARION-MOSS: Hi, Henry. This is Lori. I --

CHAIR ANDERSON: Yeah, hey, Lori.

MS. MARION-MOSS: So, --

CHAIR ANDERSON: We'll pass it up to you. Thank you.

MS. MARION-MOSS: Well, could you repeat the task? I did -- we didn't quite hear it here, what you were asking as SC&A to do here.

CHAIR ANDERSON: Well, I think it --

UNIDENTIFIED SPEAKER: Over the phone.

CHAIR ANDERSON: -- it was to -- to look at what is the status -- I mean, NIOSH has said they have, what, nine sites that they're working on doing coworker models. And kind of the question is, is that because there were -- some of the issues were contentious in the -- how many years after the -- we have a -- numbers of years that the petitioners felt needed to have an SEC. And most of these sites, I think, that are under review, the proposal and what was accepted by the Board was a shorter time frame.

So, we have a period of time where the SEC initially -- period was denied. And could be -- or you had said you could do dose reconstruction and one of the issues was you could do that if you had a -- a coworker or co-exposure model. So, we need to know what is the impact on those sites, how many years does that include, and what is the status of the work if -- if -- if the -- I mean, I'm concerned that saying it's being worked on could be you know about it, but if we were to say who is the individual that's working on that, then it becomes problematic.

Are they actually being worked on, and if so, what is -- I mean, you've -- have your models that you've used. What is the problem with completing the -- the co -- co-exposure model? And what is your highest -- which of these would you see as highest priority versus lower priority? And, again, we -- how soon would you complete these, do you think?

MS. MARION-MOSS: Okay. Well, one thing I can say, Andy -- Dr. Anderson, is that, you know, we're moving our resources around, you know, to make sure we're covering our -- our number one and number two responsibilities, and that's dose reconstructions and SEC petitions. So, but I will say -- I can give you an update here. In order of priority as it relates to

the co-exposure models that we're working on, number one is Hanford; number two is SSFL internal co-exposure. And let me back up. The Hanford internal is what I was referring to. That's the co-exposure model we're working on for that.

CHAIR ANDERSON: Okay.

MS. MARION-MOSS: Our number three is West Valley internal; our number four is BWXT external co-exposure; number five is Y-12 external co-exposure; number six is Rocky Flats internal co-exposure; and number seven, we have Grand Junction facility external co-exposure; and LANL is number eight at -- with its internal co-exposure. That's our priority.

CHAIR ANDERSON: Okay.

MEMBER BEACH: Lori, what did you say Santa Susanna, the number two was, was that internal or x?

MS. MARION-MOSS: That's internal, Josie.

MEMBER BEACH: Thank you. Thank you.

CHAIR ANDERSON: And do you have any timeline on those? I mean, what -- what are you -- in developing those, what are you looking for? I mean, what -- what are you doing?

MS. MARION-MOSS: We're finalizing the data. The -- in some cases we have new data that we received as a result of data captures. So, we're -- we're -- we're mining all that data and, you know, writing up our reports is -- is -- as to how we will -- it coincides and meet the requirements of IG-006. So, what I -- what we can do is give you a status update on all those co-exposure models. We don't have that right now in terms of where they are in the process, but we can provide this work group an update on those

specifics.

CHAIR ANDERSON: I think that would be very helpful. Other Board members, how do you feel? I think that's a good start.

MEMBER ZIEMER: Yeah, that's a good start.

And Andy, can I just ask this question? For the materials that were presented just today here, do we have any actions we have to take on these presentations? Are we just -- is there --

CHAIR ANDERSON: Oh, I -- I -- I don't --

MEMBER ZIEMER: -- anything we have to --

CHAIR ANDERSON: I don't -- I got the sense from Bob that -- I mean, do we have a -- the presentation that was made by NIOSH, had some responses to the SC&A review. Typically, when -- but I don't think we have any written -- anything like that. So, I don't know if we need a report from NIOSH or -- and -- and I think SC&A might need to reply. I don't know if there's any -- it seems to be there's a largely agreement and maybe some wording, but I -- I would maybe ask if SC&A feels other than it -- it's -- it -- NIOSH was already, in this presentation, replied to some of their conclusions. Do we need more documentation on -- on what NIOSH's disagreements with what SC&A did is -- is needed? Bob?

MR. BARTON: I'll give it a shot.

CHAIR ANDERSON: Yeah.

MR. BARTON: You know, I think the conversation today so far has been very illuminating, particularly things like the issue of the presumption of a priori completeness, which I think NIOSH clarified much to our -- well, to my satisfaction, anyway. I understand that maybe the choice of language

confused us as we were reading the original report. As far as needing an official response, I think it would be helpful in -- maybe just a short memorandum.

But again, this is such -- sort of high-level philosophical stuff that it really has to come down to the individual discussions over individual sites so that when we look at co-exposure model for site A, we can look at it and say, well, you know, you may have a problem here or everything looks kosher. And as long as we're following those steps in IG-006 in which we're looking at multiple things, not just the data set and not coming at it with everything's beautiful. And so, unless we, you know, see a fire, we're not gonna pursue it, which I don't think is at all what was intended -- but I think we just wanted to clarify that in our review of that NIOSH white paper.

And ultimately, we're in agreement that it was looking into to -- excuse me -- to get a quantitative approach where we can say, you know, at 80 percent, it's complete, 70 percent it's complete. And it's just simply not feasible for all these different sites, because at some sites, 50 percent might be complete based on all the other factors that -- that we describe, you know, the -- the interviews, the audits, all that sort of stuff, the -- the generic engineering controls. So, each site's gonna have to be a little bit different.

But I think this discussion at -- at a higher level, you know, 30,000 feet, or whatever you want to describe it as is useful as to getting everybody on the same page as to what we're all trying to accomplish here. And I think we got a lot closer to that based on these two presentations and discussion following.

DR. ULSH: This is Brant. Could I -- can I make a suggestion?

CHAIR ANDERSON: Sure.

DR. ULSH: So, we have the board review system, the BRS that is used pretty extensively by the Subcommittee on Procedures Review that Josie chairs. Perhaps we could have an entry in the BRS for this document. I guess it would be the -- the white paper. I don't know if SC&A's memorandum classified the two issues that they took issue with as findings or observations. I don't -- I don't recall if that was the case, but once the documents loaded into there, you guys at SC&A could load in your, let's just call them findings, your two findings. Then we can follow up and load in our responses, and the Board, this group, can decide what status to assign them, whether they want to keep them open or close them.

MR. BARTON: I -- I think it's absolutely appropriate to document --

CHAIR ANDERSON: Sure.

MR. BARTON: -- and through the BRS. Yeah.

CHAIR ANDERSON: Okay. Let's -- let's do that. The other thing, I think, as a Board, those on the call here, is it seems to me we want to reaffirm the IG-006 document as the basis for moving forward. Does that sound --

MEMBER BEACH: I agree.

CHAIR ANDERSON: -- reasonable?

MEMBER BEACH: Yeah, I agree with that.

CHAIR ANDERSON: I mean, kind of -- I think it started by -- by kind of going, you know, quantitative, qualitative. And we are hoping for a quantitative and, and I think after today as -- as well as the other written

things, that it's not a feasible expectation for all the sites. So, and that's really the IG-006 document. So, I haven't put that over again. And there may be things that we would disagree with in it, but that seems to be the -- the basis that NIOSH and Lori was talking about working from. And I think for various groups in SC&A referencing that. So, I think we just need to see that as a document that is -- is the core for the dose reconstructions.

MEMBER BEACH: Can I ask a follow up question on that?

CHAIR ANDERSON: Sure.

MEMBER BEACH: And I don't know offhand, I -- I'm sure at SC&A will know. The DCAS IG-006, was that -- how -- how long ago was that reviewed?

MR. BARTON: It has a very long history dating back to almost 2012 and then formally in 2014. Then 2015 was the first draft of that report. And then after subsequent meetings of the SEC issues along the SRS, it was -- it was approved in December 2019 and made official in March of 2020. So, that's that particular document's history.

MEMBER BEACH: Okay. So, there's no open findings or anything of that nature?

MR. BARTON: No, no, nothing --

MEMBER BEACH: Okay. Okay.

MR. BARTON: -- like that.

MEMBER BEACH: I didn't think so, but I wanted to make sure.

CHAIR ANDERSON: Yeah.

MEMBER BEACH: Thanks.

I -- Andy, I think that's a good start. And the BRS, I think we all need

to make sure we're on the BRS. I haven't actually sat down and done that. I've been too busy lately. So, that's my next agenda item after this meeting is to get back on to that system.

MEMBER ZIEMER: So, Andy, do you need a motion on this or what?

CHAIR ANDERSON: Yeah, let's -- let's -- if we could, do a motion.

MEMBER ZIEMER: I move that we approve DCAS IG-006 as a guiding document for evaluating completeness.

CHAIR ANDERSON: And I'll second --

MEMBER BEACH: I'll second --

CHAIR ANDERSON: -- it.

MEMBER BEACH: -- it.

MEMBER ZIEMER: And maybe I don't need to say -- just IG-006.

CHAIR ANDERSON: Yeah.

MEMBER ZIEMER: And we recommend that --

MEMBER BEACH: Any --

MEMBER ZIEMER: -- we recommend that the Board approve that.

CHAIR ANDERSON: Yes.

MEMBER ZIEMER: Okay. So moved.

CHAIR ANDERSON: Okay. We've got a second from Josie. Any discussion? Then I would say, anybody disagree with adopting that? So, that's -- that's -- we'll -- we passed it.

MEMBER BEACH: So, you'll need to do a Board presentation at the next full Board meeting on that.

CHAIR ANDERSON: Yeah, I don't -- I mean, how -- how much of the background stuff we have here to bring to the Board -- I mean, it's -- we're

just reaffirming it, I guess. I think we could -- I don't know if we need to have the full Board vote on --

MEMBER BEACH: Yeah.

CHAIR ANDERSON: -- on that.

MEMBER BEACH: Yeah, no, you're probably right. Maybe just an update.

CHAIR ANDERSON: I mean, basically there's -- there's nothing open. It was closed, and we're just looking at the co-exposure model activities that are ongoing, and we're just affirming that there's a lot of activity going on and that remains the -- the -- the active supporting document, as it were. And I think just qualitatively, BRS updated is something we need to get these documents into.

DR. ULSH: Okay. So, to clarify -- this is Brant again. We will load up our white paper into the BRS. Bob, I will let you know as soon as that's done. And then SC&A can go put in those, you know, two issues. And then we'll put in our responses, and then we'll let the working group know that that has been done. And you guys can assign whatever status you think is appropriate.

CHAIR ANDERSON: Okay. Anything else? Pretty quiet.

MEMBER BEACH: Nope, I think we're good on that issues.

CHAIR ANDERSON: I think we're -- we're --

MEMBER BEACH: Yeah.

CHAIR ANDERSON: -- we're going forward. Again, I think if NIOSH could go through, it'd be nice to get a summary on the -- the site -- the nine sites. I like order that you gave us, so we know what is likely to come first,

second, third. I assume you can't give us a timeline on completion for that for us, but it would be helpful to know what are the years in the -- oh, you said whether it's internal or external, so I'm assuming that if -- I you believe that you've got individual data to do the dose reconstructions other than for the area that you're working on for the co-exposure model, we're good to go. And if you could maybe give us a listing of how many years at each of those sites this might pertain to, or the potential number of cases, you know, what's -- what's the impact. I'm assuming you're -- Lori, your priority order is based on need of on those sites.

MS. MARION-MOSS: Can you hear me, Dr. Anderson?

CHAIR ANDERSON: Yes, yes.

MS. MARION-MOSS: In terms of what -- the basis for the priority, I have to get back to you on that. I know in some respects it's based upon some of the work groups, the work group's chair following up on what's the status. So, I can get more detail. At this point, I don't know specifically for each site and why. I just got to be honest. And then I --

CHAIR ANDERSON: Oh, yeah. I --

MS. MARION-MOSS: -- can get back to you on that.

CHAIR ANDERSON: I -- I -- I fully expect that. But I'm just saying, I think, you know, I don't -- don't want to have the Board and NIOSH and SC&A spending a lot of time on issues that are relatively short just to -- from the site perspective in -- to deal with the completeness issue. I mean, we're going to need to do some priority and -- and it's -- it's more how great is the need for the co-exposure model for a -- addressing the issues of -- of the applicants. I mean, we want to get to the workforce and being able to,

you know, answer their questions and get back to them on their -- on their cases.

MS. MARION-MOSS: Absolutely. I totally agree.

CHAIR ANDERSON: Okay. Any -- so if -- if -- NIOSH, if you can get back to us, it's very helpful to have a sense of the -- how extensive the need is, kind of the issue, because we got other issues as the Board is working on that impact the overall program as well. So, we need to keep track of things. And this would be helpful if we get a sense of it is -- how critical it is.

MEMBER BEACH: Well, that, Andy, and the -- the percentage of completion for each one.

CHAIR ANDERSON: Yeah, yeah.

MEMBER BEACH: And if it hasn't even been started yet, or like the later -- the last -- the seven or eight. So, anyway, yeah, that's all going to be helpful.

CHAIR ANDERSON: Yeah. We aren't going to take anything off the list, but it -- we may be able to, you know, look at that and see.

MEMBER BEACH: Yep.

CHAIR ANDERSON: Okay. Anything else?

MEMBER BEACH: Should we take a comfort break before the next one?

CHAIR ANDERSON: Yeah, I think so. So, let's see, I have -- on the East coast it's 1:04. So, do you want to take 15 minutes?

MEMBER BEACH: Works for me.

MEMBER ZIEMER: Sounds good.

DR. ULSH: What was the time again?

DR. ROBERTS: So, --

CHAIR ANDERSON: -- one -- 1:20 --

DR. ROBERTS: -- let's --

CHAIR ANDERSON: 1:20.

DR. ROBERTS: Okay.

CHAIR ANDERSON: Okay.

(Whereupon, a break was taken from 1:04 p.m. EST until 1:20 p.m. EST.)

DR. ROBERTS: Okay. I have 1:20 Eastern. I can go ahead and do roll call starting with Anderson.

CHAIR ANDERSON: Present.

DR. ROBERTS: Beach?

MEMBER BEACH: I'm here.

DR. ROBERTS: And Ziemer?

MEMBER ZIEMER: I'm here.

DR. ROBERTS: Okay. Great. Over to you, Andy.

ORAUT-OTIB-0075 FINDINGS

CHAIR ANDERSON: Okay. The next review here is ORAUT OTIB-0075 findings SC&A presentation. It's already up, Bob, so we can see it.

SC&A Presentation: "SC&A's Evaluation of ORAUT-OTIB-0075, Revision 01, 'Use of Claimant Datasets for Coworker Modeling'"

MR. BARTON: Yeah. Yes, Andy. Happy to proceed. Happy to

proceed.

So, again, it's -- sort of thought that this would come for the previous discussion, so a lot of those same discussion points, I'll try to sort of gloss over since we already hit them mainly. But I do think it's important that we kind of circle around and close the loop on this particular report and review.

It's an important topic, and I -- I don't think there's much contention, but I'd like to give this sort of refresher on OTIB-75, as you see on your screen, and the subsequent reviews and revisions. So, OTIB-75 was revised at least one time. However, before I -- I get started, I'd like to recognize individual authors at SC&A, which were Ron Buchanan, who was on this call, please add him to the list. Unfortunately, he wasn't able to make roll because of -- the original roll call because of phone issues, but he has been on the call since the start. He -- he texted me right after roll call ended to indicate as much. And also, for those of you who remember (indiscernible), who was our chief statistician at the time. Well, unfortunately for us, but probably fortunately for Harry, you know, like Tim and Tom LaBone, he has since retired. Hopefully he's on a beach somewhere.

Anyway, so it's been a while since this item was discussed and we're going to get into. But it's essentially an analysis to determine whether data from claimants, a/k/a coming from the NIOSH/OCAS claims tracking system, otherwise known commonly as NOCTS, can be used as a representative data set for the full population of monitored workers who may not have a usable full electronic data set for. So, again, the intent here is what data is sufficient for the creation of a co-exposure model. Again, formerly known as a coworker model.

The approach here is generally that claimant data can be used in lieu of capturing the full dataset for a given site as the claimant data is either going to be representative or possibly even biased or claimant favorable for use, which is certainly the heart of the matter that OTIB-75 is and was meant to establish. So, since it's been a while, the place to start is probably a brief recap of the timeline for this report, because it has been pretty extensive. And also, not the just the two reports, but also the two reviews performed by SC&A.

Okay. So, it all starts in May of 2009 with the initial issue of OTIB-75. SC&A produced its review of the initial revision or initial version, I guess, which one of the main areas reviewed was looking actually at construction workers at Savannah River. A discussion that is still ongoing for the SRS -- site, I might add. We'll get a little bit later. But again, it's -- it is meant to be a broad-brush view of the main topic for OTIB-75.

SC&A's original review came out in early 2010. So, it's been some time. Then revision 1 for the OTIB was issued by NIOSH in May 2016, then a bit over a year later, in October of 2017, SC&A issued its review of that revision 1.

Well, not listed on the slide, SC&A had also produced a memorandum in 2018, again, that would be subsequent to the 26 -- 2017 review that further explored the disposition of its original 2010 findings and made a number of recommendations, which we'll be discussing.

I'd also point out that this item generally was discussed at a 2021 meeting of the Advisory Board, and this -- I knew it had happened. It took me a while to find just because of, you know, the issues we've had with the

cybersecurity and whatnot and access to documents. But it had occurred during the August 2021 meeting of the Advisory Board, and it was during the Board work sessions, which was basically just a primer on what discussions had happened on this topic of using claimant data in lieu of going and coding and capturing and doing the Q/A work on what -- what are essentially hard-copy records, again, for use in eventual co-exposure modeling.

But at that 2021 meeting, there was a presentation that I gave, but it didn't really present anything new that's not considered here. It was really, again, a status report to get the Board thinking about these issues of how to use claimant data in co-exposure modeling, again, namely the use of the NOCTS data as a reasonable substitute for trying to go and capture any complete data set, which capturing the complete data set really has its own issues as well.

So, okay. So, our -- as I already sort of said at the start, the purpose is to make a quantitative evaluation of whether the claimant data set, i.e. the NOCTS data, are sufficiently reflective of what the full data set would tell us as far as co-exposure dose assignments would -- would entail. So, essentially whether the claimant datasets are representative of the full monitored population or possibly even biased high under the presumption that those that contracted an illness may actually be a higher exposed population. To be clear, SC&A does not either affirm or deny this presumption, but it has been put out there that by using claimant data, it is logically claimant favorable. Again, we do not either affirm or deny this presumption. There has not been a clear study, I don't think, that says

either way.

But this particular study took sites in which we have a full suite of data for the worker population for at least some time periods, usually in the form of a -- I believe, electronic databases, so that a direct comparison of the claimant data that NIOSH has and is usable, we could compare to the fully available dataset for again, these sites in different time periods. So, again, it was three main databases that were examined. The Y-12 site, which had urinalysis data for uranium, which was available for a pretty extensive period of the site's history, 1950 through 1988. Of course, the site operated before and after that and for a number of years, but that is a pretty substantial amount of electronic data available for comparisons.

There was the Mound Plant, which we had a pretty similarly extensive amount of plutonium analysis data from 1960 through 1990. And also, SRS, which examined tritium doses, which are really based on urinalysis. But it's fairly easy to convert tritium urinalysis to dose. So, that's why we say tritium dose. But really only this is (participant coughs) in the latter period in the 1990s and on.

So, some just clarification on the terminology used in OTIB-75. For this effort, a complete data set would refer to all available monitoring records for the site, regardless of whether the workers contained in this data set are claimants or not. So, basically, all available data and the obvious follow on is the claimant data set, which again will be just the claimant records that are available to NIOSH in their dose reconstruction process.

OTIB-75, it contains a number of table -- tables which detail how many workers and samples are contained in those two previously defined

data sets. That's the complete worker data set and the claimant only data set. And obviously, an important thing to define is the ratio of workers and the ratio of samples available in each of these evaluated data sets.

So, a pertinent question is how was each data set and -- then evaluated. Well, essentially the standard practices for evaluating data for co-exposure models were utilized in this case. These are contained Report 53 which has been reviewed by SC&A and the Board. But essentially you take the data set, either the complete or the claimant data set, and you fit them to a lognormal distribution, which is again a standard approach for evaluating monitoring data in this program. From this you get the main model parameters, which are the 50 percentile, your geometric standard deviation, and from that, you can derive the 84th percentile. And all of these parameters are utilized when deriving the main model parameters and ultimately, an intake rate for some established time period.

And by this, I mean an established time period, looking at the results, typically by year, in some cases more than a year, in some cases even by quarter -- I had at least one example I can think of I believe Fernald looked at it by quarter, that I can think of -- and finding periods which the real -- the results seem to be of reasonably close magnitude. So, you're looking for a period where workers seem to be exposed, at least reasonably the same for modeling purposes.

You know, for example, you might have an early period when pilot tests are being performed, and this might show different or lower results by magnitude to an adjacent period, which operations were at full scale. Or there might be periods when plant was in a relative shutdown status, in

which case, the results would likely show lower results than the full operational status. Again, it's by magnitude as compared to adjacent periods, that sort of thing.

So, one of the core tenets of OTIB -- the OTIB-75 analysis that was done is to establish that the claimant dataset is a random sample. That is, it's a random sample from the general population, and thus is reflective of the general population. It -- and so, if it is truly a random sample without any particular bias, positive or negative, and especially any sort of negative bias, then one could logically conclude that the claimant data is representative of what the full data set would show if you were to actually go capture and code all of it. And this is all really laid out in Section 5 of OTIB-75. That's Section 5.

Again, I'm trying to stay at the three -- 30,000-foot view as this is really, again, intended to be a refresher rather than really getting down into the weeds, which I think we did with the previous discussions. So, based on the analysis in TIB-75, NIOSH made the following conclusions -- and they just cover, again, those three sites I mentioned earlier, which was Y-12, Mound, and Savannah River.

And we found that only four of the 80 years had coworker parameters that were outside that -- or I'm sorry, NIOSH found that were outside the 95th percentile of the confidence parameters of the statistical analysis of that data. It was concluded this supports the premise that the NOCTS data, that is, the claimant data, represents a random sample, or rather at least a reasonable reflection of the full data set. So, I -- I guess really the main conclusion, essentially the analysis contained in TIB-75 supports the

assumption and provides justification on the use of claimant data sets as essentially a sur -- a surrogate or substitute or in lieu of the complete worker data, which is often not available, at least in a reasonable form. It would have to be captured, coded, all that -- all that fun stuff.

So, I guess in short form, SC&A analyzed the approach in TIB-75, Rev. 1, and did not identify any issues with the premise and the general approach employed. That's a quick slide.

As we sort of discussed earlier, essential to this effort is that criteria for the evaluation and use of coworker data sets, which again, that's IG-006, again, central to the previous discussion.

Now this slide shows the date as 2015. However, I -- I note again that discussions of this document took place over many years. And eventually resulted in the implementation guide which we've discussed, which was adopted by the Board in December of 2019 at their meeting and then formally, I guess, established in March of 2020.

The concepts are basically the same throughout the entire process from 2015 to 2020, with minor tweaks to the language. And those concepts are data adequacy, which really refers to whether the measurements which we are observing are actually reflective of the dose they're intended to measure. You know, we'll have a number, but it doesn't reflect that dose. So, that's adequacy. Completeness we've had a lot of discussion on. Again, is there a substantial portion of the data that's missing, either lost, destroyed, unavailable, or that the monitoring program itself, since we missed a proportion of the workers might really should have be monitored. That's completeness. We've heard enough on that.

A review of the monitoring program itself -- this is really a corollary to the previous two concepts in which the program is evaluated. What were the procedures in place, how were they actually implemented in practice, what controls were identified, evaluated, analyzed, and then finally stratification again. These were really talked about a lot in the previous discussion.

So, to reiterate a bit, TIB-75 used the claimant data contained in NOCTS in place of the complete data set and constructed essentially co-exposure models that they could then compare against the full data set which they had in hand. Again, the intent here is to determine if NOCTS data can be used in place of the complete data set, which is not always available, or, again, would require extensive effort to go capture hard rectors -- records, code it, and do the same co-exposure process.

And as I previously described, the main areas from IG-006 are the adequacy of the available data for assigning dose to unmonitored workers. Now, adequacy is used here because that's how it was -- it was used in the original reviews, but it's really all for those tenants; adequacy, completeness, review of the actual RRP program, and then looking at stratification, if it's necessary. You know, job titles, work areas, time periods, again, different radionuclides that are being handled.

So, the original 2010 review from SC&A had identified 13 findings. And it had concluded at that time that the NOCTS data set was not adequate for the SRS construction workers. And now, again, this has been a topic of discussion for many years and is still ongoing and not quite settled. And but as a follow on, a more complete compilation of the data for SRS construction

workers, we determined should be obtained. Again, different radionuclides that had it only been tritium at that time, so that stratification tests could be performed. Again, this is from that 2010 review.

So, there have been a number of different reports since that time. But again, this is sort of a refresher on where -- where we came from and where we are now with this particular document. Those -- those original findings you can find in Appendix A, SC&A's review of revision 1, which is the 2017 document, in case those of you that are curious on more of the backstory.

Again, I caution that since there are two reviews of TIB-75, there have been many documents issued, discussed, meetings held that obviate a lot of those original findings, so don't consider them all to be issues that need to be adjudicated today. And I'll get into more of that.

Really -- and really, the truth is, only finding six remains, from our view, in play from that original review. And that's based on the memorandum we issued in early 2018, in which we put sort of recommendations on the final disposition. Well, pretty much all of them, except for finding six.

Finding six was basically a request for additional information from NIOSH as to what additional data they had, in this case, concerning the Y-12 site, what it represented, and really the number of claims that that additional data captured. As an aside, really in today's parlance, this wouldn't really be considered a finding. It would be considered an observation rather than a finding. But again, we're talking 2010. The use of observations really wasn't as prevalent. And so, that is probably likely the reason it was originally characterized as a finding.

Some additional info on the 2017 SC&A review, that would be for the review of revision one TIB-75, which was very much like in 2010. However, it considered the increase in data obtained and applied that was analyzed in revision 1, which was claimant data. And you can see the increase is summarized on the slide. Also in revision 1, one significant change was the use of the time-weighted, one person, one statistic approach, which was an established in Report 53, which, again, I mentioned had been reviewed by the Board. That -- that term I guess used is generally referred to by its acronym, TWOPOS, T-W-O-P-O-S, time-weighted, one person, one statistic.

Essentially, what this time-weight statistic does is rather than simply throw all the data into one distribution right year or other relevant time period, regardless of how many samples might be associated with any given worker -- because this presents the potential issue of what's called data dominance, in which -- I mean, for example, maybe 100 set -- you have 100 samples for a single worker, and the other workers had one or two samples.

And -- and this would be especially problematic in situations where you might have an incident and a worker might be sampled many, many times the following it. So, what it does is, TWOPOS statistic, which, again, was reviewed and deemed to be acceptable and beneficial to the program, it gives each monitored worker essentially a singular value that also weighs it by the time between samples. So, again, this partially obviates the potential issues with repeated incident sampling as a worker involved, you know, in an incident.

It's like you'd have many samples within a short period, so those rapid-fire sampling are weighted accordingly. Aside from this, the methods

changed. The analyses are essentially the same between what was done in 2010 and what was done in 2016 and reviewed by SC&A in 2017.

So, again, with the 13 original 2010 findings, SC&A re-examined them in the 2017 review, which was looking at, again, these -- these years get jumbled around a lot. But 2017 review, they looked at revision 1, which was 2016 from NIOSH. And we looked at to what extent those findings are actually still relevant. Now, during the 2017 review, we found that the addition of the claimant data, which was one of the major additions for revision 1 of TIB-75, but their -- that additional data really affected our original findings two and six.

And, again, finding six was looking for more data or a more -- clarification on what we used, not necessarily any sort of deficiency. We concurred at this time that findings one and three were -- could be closed. But essentially, those findings one and three were just concurrence statements originally from SC&A that we agreed with NIOSH. However, looking back at the discussions, we would have findings that would often be positive, rather than some potential drawback for discussion. So, I think we were just pointing out where we agreed with the original analysis in 2010.

The remaining findings were really regarding stratification, which, again, we had discussed significantly earlier today. And they were related to the Savannah River site. And, again, as I had indicated, there was a 2018 SC&A memorandum that concluded basically only that finding six remained requesting further information from NIOSH regarding the proportion of the evaluated data requirements for claimants of the Y-12 portion of the analysis. Just a point of clarification, again, I think if we were going to do it

today or even a number of years back, this would likely have been an observation.

So, I -- I mentioned finding two and six. This slide is for finding two, which the 2017 review had found was still open. So, essentially finding two was that -- for the Mound Laboratory, we found that there were significant differences on an annual level, which was the entire purpose of the -- the exercise. However, between 2010 and revision 1 of this TIB, the additional data SC&A then reran its analysis in 2017 and found that the additional claimant data captured and coded showed that the claimant and full data sets were sufficiently similar in our view. And you can -- you can find some additional info on this 2017 analysis I just mentioned. It's in Appendix B of the 2017 SC&A review. So, that was finding two.

This is, again, about finding six, which, again, really just requested additional information specific to the claimants and the records that were added for NIOSH's rev. 1 of TIB-75. As I stated earlier, given this is really a request for a clarification, it would likely be characterized as an observation rather than a finding in today's parlance. And so, for the 2018 SC&A memo, we're simply seeking that additional clarification as to, you know, what exactly was done in rev. 1 which included that additional claimant data.

So, this is really the only issue that we see that is still likely open. And this -- this still comes straight from that 2018 memo in which we -- well, I -- I'll get to it, but we recommend closing the original findings, except for this one where we're just looking for that additional info.

There are some sort of additional concerns that may not have been sufficiently addressed. So, rev. 1 to TIB-75 did add that additional claimant

data, which logically is going to improve the statistics for the group. But we're not sure if it necessarily gets to the heart of the matter of whether claimant data is sufficiently represents the fully monitored population or fully expose -- exposed population.

We agree it does provide certainly some weight of evidence for those situations that were identified and selected. So, again, this is Mound, Y-12 tritium at SRS during that post-1990 period. If you're curious about why 1990 SRS -- it's also known as the Westinghouse period -- and this is when the site changed operating contractors from DuPont to Westinghouse. So, there was sort of a sea change somewhat during that period.

The second and third sub bullet is, again, back to finding six, which requested clarifying information on the additional claimant records, which was not clear to us at least in text of revision 1 of TIB-75. So, we noted that the issue of stratification, which, again, is an ongoing discussion, had not really been addressed from revision zero to revision 1, or the original to revision 1. So, we indicated in our 2017 review that those findings should remain open.

However, as I mentioned previously and from SC&A's 2018 memorandum which further identified the disposition of these findings, we recommended these stratification findings be closed out for this purpose. So, to summarize, the stratification issues were thought to be more appropriate -- appropriately addressed in the actual individual co-exposure models for specific sites. And so, to try to address them here was essentially beyond the purview of TIB-75 and its intended purpose. And so, we at SC&A assumed -- or that it would presumably be addressed on an as-

needed basis as these new co-exposure models are developed and looked at by the Board.

We also had to combine our observations, so we use that term somewhat. And as you see it's very simple. And observation one was simply a comment about appropriate column headings used to wit, dpm per day should appear. And observation two was kind of a strange apparent discrepancy concerning data for a single year's inclusion that was in rev. zero of TIB-75 but was not included in the same figures and tables in rev. 1. So, we -- we were looking for just some clarification on that very minor discrepancy. We don't believe this really impacts the conclusions sought, TIB-75, but it found it worth noting.

So, I guess in summary, SC&A found NIOSH's approach to be reasonable and without technical errors for the purposes that TIB-75 was intended for. This obviously includes the statistical methods that were employed. As I stated previously, I think it was slide 17 or 18, the increase in claimant records certainly improves the statistics of the analysis but may not inherently answer the question of whether it's acceptable to use claimant records as essentially a surrogate for the full data set.

However, we did note that the addition of those records did solve our concerns regarding finding two, which were again specific to that 2010 analysis in which we found significant differences. More data was coded, compared, and those issues to our satisfaction essentially went away. So, we recommended closing that one out.

And finding six, which, again, I mentioned a couple times, we just want some additional clarification, which we weren't able to tease out of

revision 1, and that our review. That seems like pretty simple -- simple issue. And, again, I don't think it affects the intent of TIB-75.

And the remaining findings regarding stratification, which I noted is likely more appropriate to each individual co-exposure model, again, on a site-specific basis and rather than really the intended scope of TIB-75, which was essentially a scoping calculation or a test to see, given the data we have on hand -- and so, the electronic data for Y-12 and Mound and what we had for SRS when, in comparison to what was on hand for the claimant data sets, and did they reasonably match up to give some level of confidence. And again, I'll use the -- the weight of evidence term that claimant data set can reasonably reflect and be representative of what would be the full data set were it to be captured and analyzed similarly.

So, that -- that's all I got on this one. Again, based on our 2018 memo, we really recommend that all these issues are either not necessarily -- or should be held to TIB-75 as they are either going to be site-specific issues, as these various co-exposure models are developed or were solved by the additional data that was presented in revision 1 of TIB-75.

So, again, of those 13 original findings, again, from way back in 2010 -- so, we had -- we had to do a bit of digging here -- only that one finding, which I would characterize as an observation these days, which requested clarification, in our mind, is all this left for this.

Now, the discussion on whether you can use NOCTS data, the claimant data, as a substitute for going and capturing the full data set, were it available or whatever is available often -- it has a lot of caveats that I'll admit to, mainly that it takes a long time. This process bore itself out with

Savannah River, in which case it was found and NIOSH determined themselves that for things like thorium and americium, they simply didn't have enough and so, actually went and captured the -- the log sheets, which are basically handwritten logs.

They coded them, did an entire quality assurance tests on them to within certain predefined bounds. And that was great. It did take a long time. I will -- I will admit to that, whereas the NOCTS data is a lot more readily available for use. So, that's sort of the offsetting argument, I suppose, in that yes, we would love to have electronic databases with all of these records. That's not always possible. However, the question before the Board is whether the claimant records by themselves can represent a suitable surrogate.

And that's -- that's really, I guess, the end of my spiel. I'm happy to accept any questions.

MEMBER ZIEMER: Bob, this is Paul. It sounded like you were officially changing the label on finding six to an observation. Is that how it will go into our Board database, as an observation?

MR. BARTON: I certainly have no problem doing that.

MEMBER BEACH: I --

MR. BARTON: I believe -- oh. Sorry?

MEMBER BEACH: I was going to say I don't see a point in changing it. It was the criteria when this came out.

MEMBER ZIEMER: Well, I'm talking --

MR. BARTON: (Indiscernible) -- about how it's --

MEMBER ZIEMER: -- about how it's --

MR. BARTON: -- (indiscernible) --

MEMBER ZIEMER: -- handled now.

MEMBER BEACH: Yeah.

MEMBER ZIEMER: Yeah. The -- the -- the correction won't be any different either way. So, I was just wondering how it would be entered into our database. The -- how do we handle the other ones which are right now findings as part of this? Do they somehow show up in a different way? In other words, you're saying it's not something we close as part of this document; it has to be -- those have to be addressed from the individual site basis, as I understand it.

MR. BARTON: Well, what I could suggest is that the original findings, again, from 2010, were a lot about the stratification discussion particular to Savannah River, which obviously, that discussion has gone on and -- and evolved since those original 2010 -- what I would say is that I don't think keeping these findings open as part of this document is worthwhile.

I don't -- I don't think it's worthwhile keeping them open because I think that, in effect, even if maybe not officially, they have been transferred to that Savannah River and SEC issues work group when we had those joint meetings, and those issues which we had brought up back then have been discussed or are still under discussion in that work group, which I think is the appropriate venue. Whereas, I don't think they need to be kept open specific to TIB-75, which I think accomplished its purpose, which was to look at these limited sites and limited time periods and just see what it -- it -- it told the Board and NIOSH about the use of NOCTS. So, I don't -- I don't think it's -- it's appropriate to open in this venue. And, again, the ones that

we're recommending closing were either taken care of by rev. 1 or were specific to Savannah River and really just fall under the purview of that work group. And I believe those topics are being adequately discussed often under that SRS work group, if that makes sense.

CHAIR ANDERSON: You're --

MEMBER BEACH: (Indiscernible) yeah.

CHAIR ANDERSON: Yeah, there you go. Yeah.

MEMBER ZIEMER: Sorry, I thought -- so, rather than we don't want to show them closed here, maybe we just transfer those to the Savannah River Site, in terms of the Board record that goes --

CHAIR ANDERSON: Yeah.

MEMBER ZIEMER: -- into the Board database.

MR. BARTON: As far as documentation, that does make some sense. But my -- my read on them is that they've either already been taken care of or are already being discussed. A lot of them were illustrative of why we felt, especially at the time, that stratification, in particular for the construction workers at Savannah River, was necessary. Now, obviously, that discussion has gone a long way since then in the last, you know, 15 years or so.

So, for documentation purposes, absolutely. We could transfer them to -- to -- to the SRS. I think that the result would be the same in that they are closed under that work group and under discussions that have already happened in the years since those original, you know, ten or so or nine findings were made in 2010. I mean, I think they're essentially moot at this point, but official closure is probably appropriate and warranted.

CHAIR ANDERSON: I guess we could -- yeah, we could do -- I'd like to pass it over to the individual sites to consider as they're going through their review is this -- I mean, this is really a committee that looks at broader policy issues that then get implemented through the site-specific reviews. And so, I don't know if we need to formally -- it's kind of how is it -- how it -- is the 075 going to be tracked in the existing document tracking system?

MR. BARTON: Well, I -- I think we're still looking for additional information on that finding six.

CHAIR ANDERSON: Okay.

MR. BARTON: But as for the rest of them, we can transfer them to the SRS work group. And I'll tell you that I think you -- probably close them on rapid fire in that work group.

CHAIR ANDERSON: Yeah.

MR. BARTON: That's preferred to -- to do it that way. That's fine. But I just don't think it's appropriate to keep them open under this discussion for TIB-75.

MS. MARION-MOSS: This is Lori. I'm looking at the BRS right now, and the original review for rev. 1 of OTIB-75 is under the SEC issues work group. There's a total of 13 findings. There's no documentation of the review of the rev. 1 version of that document. So, we might want to bring BRS up to -- up to date on that. And of course, if the work decides to transfer this review of rev. zero and -- and rev. 1, we -- we can most certainly help with that if you need us to transfer those -- that review over to the SRS work group.

CHAIR ANDERSON: NIOSH --

MEMBER BEACH: So, to be -- oh. Sorry, Henry. I got a question. To be clear, you're recommending transferring everything over except for six?

MR. BARTON: I -- I believe six is still open under TIB-75. I think the other ones were very specific and illustrative to Savannah River, which --

MEMBER BEACH: Right.

MR. BARTON: -- then became many of the SEC discussions for that site. And so -- and I believe they'll all close, but they haven't been officially done yet. Again, there is 2018 memo from SC&A that does recommend closure of these issues under the auspices it's been taken up already by the Savannah River work group.

MEMBER BEACH: Okay. So, and then that's something that SC&A can do is to upload that into the BRS and then -- where it originated, and then you can document that it was transferred and then uploaded into S -- Savannah River; is that correct?

MR. BARTON: I'm sure we can clear up the -- the pathway and the documentation to that and -- yes.

MEMBER BEACH: Do you need tasking for that or -- or is it just part of this?

MR. BARTON: I would -- I would like the assurance.

MEMBER BEACH: Yeah.

CHAIR ANDERSON: Well, --

MEMBER ZIEMER: Well, Lori, I -- I was thinking that there might be some way just to transfer the -- those particular findings without transferring the whole review. Because I think the review still stands for this work group, does it not?

CHAIR ANDERSON: Yeah. I mean, it's foundational now. Yeah.

MS. MARION-MOSS: I --

MEMBER ZIEMER: I'm not sure --

MS. MARION-MOSS: -- you're absolutely right about --

MEMBER ZIEMER: -- about how that --

MS. MARION-MOSS: -- you're absolutely --

MEMBER ZIEMER: -- records.

MS. MARION-MOSS: You're absolutely right, Dr. Ziemer. We can transfer the specific findings electronically without uploading anything into -- additional into the BRS. So, I can work with -- we can work with SC&A to identify those particular findings that we can transfer -- that need to be transferred over to SRS work group and keep the remaining ones under the auspices of this specific work group.

CHAIR ANDERSON: Sounds good to me, I think.

Bob, you okay with working with -- yeah?

MR. BARTON: Yeah, no. I -- I think that's perfectly reasonable. Like I said, back in 2018 -- again, there's a whole bunch of years flying around, around here -- but I mean, in 2018, we essentially recommended to this work group that the items be closed under the auspices that they'd already been taken up by the individual work group, in this case, Savannah River. So, we already recommend that they be closed. But I think the -- again, the foundational paperwork and the history of the discussions and what --

CHAIR ANDERSON: Yeah.

MR. BARTON: -- and where and how we got there, I think is also important, which I think is what Dr. Ziemer was getting at.

CHAIR ANDERSON: Board members, for the -- any other --

MEMBER BEACH: Yeah, I mean --

CHAIR ANDERSON: -- comments? Yeah?

MEMBER BEACH: No, I'm for that as long as it can be done timely and SC&A and NIOSH can work together on that, as Lori stated.

MEMBER ZIEMER: Yeah, I agree with that.

CHAIR ANDERSON: Yeah.

MEMBER ZIEMER: Yeah, that's good.

CHAIR ANDERSON: So, kind of a broader conclusion is that the NOCS (sic) database can be utilized in certain circumstances is what --

MEMBER BEACH: Well, and I have a question. I had the question on that too, the NOCS database, but we hadn't gotten to that yet.

CHAIR ANDERSON: Okay.

MEMBER BEACH: Is it appropriate to ask that now?

CHAIR ANDERSON: Yeah, I would ask. I mean, that seemed to me to is -- one of the --

MEMBER BEACH: So, --

CHAIR ANDERSON: -- kind of inciting events to --

MEMBER BEACH: Yeah.

CHAIR ANDERSON: -- this (indiscernible) to do dose reconstruction. And my follow up would be has NIOSH done that, which is what --

MEMBER BEACH: Yeah, and my -- my question is close to that, Henry is --

CHAIR ANDERSON: Go ahead.

MEMBER BEACH: -- or how often are they doing it or -- or --

CHAIR ANDERSON: Yeah.

MEMBER BEACH: -- is it actually being done? Yeah.

CHAIR ANDERSON: When it started, it seemed to me that this is, you know, in reserve database rather than --

MR. BARTON: So, --

CHAIR ANDERSON: -- the first choice. We -- we work with that, again, if it's there's enough data in it for a specific site. And then we get to the stratification issue and there may not be enough cases in there to use the stratification approach.

DR. ULSH: Yes. So, Josie, was your question, are there any sites where we're developing a coworker data set using NOCTS data?

MEMBER BEACH: No, I -- I --

CHAIR ANDERSON: Yes.

MEMBER BEACH: -- yes. I guess that is the premise of my question is SC&A said that it should be used as a comparison. And I was going to ask, are you doing that? And if so, which sites have you done that?

DR. ULSH: I'm looking around the table, and we're all kind of scratching our heads. So, I'm going to have to put that down as a get-back-to-you-item.

CHAIR ANDERSON: Okay. Great. Yeah, I didn't think it had, but again it's -- it's -- it's a tool that potentially is there if -- if you needed it --

MR. BARTON: Well, they could be used --

(Whereupon, multiple participants speak simultaneously.)

CHAIR ANDERSON: -- as a secondary -- secondary source.

MR. BARTON: I think our -- our main caution or message really was

that what TIB-75 set out to do and -- analyze the data and we agree with how they went about it and we agree with the results. But that we were hesitant to have it accepted as sort of a universal --

CHAIR ANDERSON: Yeah.

MR. BARTON: -- application across the program, and that you couldn't just say well, we've looked at these three examples and so we can use it all the time, and that it sort of has to be evaluated.

Again, it has very useful applications in that NIOSH already has the data in hand and it's been coded for the dosage reconstructions, which is very useful. At the same time, to make a blanket, universal statement and claimant population will always represent the monitored population as a whole is -- well, it's -- that's a judgment call. That's beyond my pay grade.

CHAIR ANDERSON: Yeah. Okay. Other questions? So, as far as moving forward we -- we've got it's going to be moved over into the data tracking system. And number six is still open. We're going to leave that open. So, anything else on OTIB-75?

MEMBER BEACH: Is there any --

CHAIR ANDERSON: (Indiscernible) NIOSH response. Do you --

MEMBER BEACH: Is there any plans to rework that, or are you not messing with that, 075?

DR. ULSH: I think probably the next step is for us to provide a response to the finding six. I don't think we have plans right now to revise OTIB-75. So, I think that probably the next step is for us to provide responses to those findings.

CHAIR ANDERSON: Okay. We've got --

MS. MARION-MOSS: Dr. Anderson, -- Dr. Anderson, I just wanted to clarify. Finding six will remain with this particular work group is my understanding. But my question today is it's in an open status with that status change to in progress?

CHAIR ANDERSON: Yeah, I think we could say that. I don't know what more we're doing on that, but it --

MS. MARION-MOSS: Well, what we would do is provide a response to that particular --

CHAIR ANDERSON: Yeah.

MS. MARION-MOSS: -- finding and then --

CHAIR ANDERSON: Okay. That's --

MS. MARION-MOSS: -- bring it back to this --

CHAIR ANDERSON: Yeah, --

MS. MARION-MOSS: -- bring it back to this work group.

CHAIR ANDERSON: That's -- that's right. That's a -- so, it is in progress then.

MR. BARTON: Yeah, I think that's correct. I mean, open is that it's not even been discussed really yet. And it has been discussed as it happened just now. And there's a path forward. It hasn't been necessarily agreed upon what the response is, but in progress, I think, is the correct term to use here.

MS. MARION-MOSS: Thank you.

CHAIR ANDERSON: Okay. Thank you.

Any other comments on this particular discussion?

MEMBER BEACH: None here.

CHAIR ANDERSON: Paul?

MEMBER ZIEMER: I have no comments.

WORK GROUP DISCUSSION AND PATH FORWARD

Okay. So, is there anything else for a path forward for the work group? I will report on the 19th about our meeting. And we'll wait for the -- several things to come back.

And any other things coming up for the Board for this committee? I mean, that was part of the problem with -- with this is, you know, it kind of sat there for quite a while. We haven't had that many issues on the SEC side coming up.

MEMBER BEACH: What about what we talked about earlier, the tracking of different sites? Are we going to just do that individually within the work groups, or is there any plan to come back together for this work group?

CHAIR ANDERSON: Well, that's -- that's what I'm wondering. Do -- do --

MEMBER BEACH: Yeah.

CHAIR ANDERSON: -- we want to, you know, plan to get back together? Do we need to discuss -- we, as a group, need to discuss this more? I think some of these issues will actually come -- you know, come up in the various individual sites. I mean, I think as a Board, the co-exposure models have come into play quite a bit in individual sites. So, I mean, this began early enough that it was really almost just validating is a coworker or co-exposure model an appropriate tool to use in the absence of other data.

And so, we -- it's kind of with -- with some caveats and -- and the need to, on a case-by-case basis, look at it as a -- as a tool that could be used, but not just universally assume that it will be appropriate.

MEMBER ZIEMER: And -- and Andy, this is Paul again. Maybe when we take a look at those eight or nine sites and maybe ourselves, look at the priorities or maybe do that as a work group, --

CHAIR ANDERSON: Yeah.

MEMBER ZIEMER: -- maybe we could also start to float some preliminary ideas of how we might address the issue of timeliness in terms of how long things take and so on.

CHAIR ANDERSON: Yeah.

MEMBER ZIEMER: I -- I -- I think it's one thing just to say, well, there's -- we should put some time limits on it, but we need to think about are there some criteria that would make sense in terms of how those kinds of things are handled. And I don't think that will be an easy discussion, but we --

CHAIR ANDERSON: Yeah.

MEMBER ZIEMER: -- we can maybe spend -- focus on that as a -- as an issue to be considered.

CHAIR ANDERSON: Yeah, I would agree with that. I think we could begin -- I think ultimately, unless we develop a document, a discussion with just three of us...

CHAIR ANDERSON: Well, I think we need to be thinking about it.

CHAIR ANDERSON: Yeah.

MEMBER ZIEMER: You know, it's -- it's difficult to do that in the full

Board unless they have a starting point. It --

CHAIR ANDERSON: Well, that's -- yeah.

MEMBER ZIEMER: -- if only to come up with a strawman, kind of here's some ideas that might be workable --

CHAIR ANDERSON: Yeah.

MEMBER ZIEMER: -- and that would be sensible, and that would still allow for a fair handling of information that may come in from the petitioners or from data base -- you know, more documents being uncovered. And so, a lot of factors on that timing.

CHAIR ANDERSON: Yeah. Yeah, I think if we could kind of come up with a strawman or a set of issues that -- what you've just identified, some of them, on how do we handle -- I mean, part of it would be are we still doing data searches? I have the -- you know, claimants submitted more information that we want -- we have in the past delayed taking action in order to be able to review and incorporate what's been turned in. But we need to think about when has that been exhausted.

MEMBER ZIEMER: Yeah.

CHAIR ANDERSON: And it -- you know, has -- has the data search --

MEMBER ZIEMER: Yeah.

CHAIR ANDERSON: -- I mean, our ability to look for new data is --

MEMBER ZIEMER: Right.

CHAIR ANDERSON: -- has gotten better than it was in the past. I think --

MEMBER ZIEMER: Right.

CHAIR ANDERSON: -- a lot of the repositories have been identified

at --

MEMBER ZIEMER: Yeah. Well, we don't (indiscernible) --

CHAIR ANDERSON: -- we're closer to being --

MEMBER ZIEMER: -- here. Yeah, but those are the kinds of things I'm saying we need to spend some time on it probably.

CHAIR ANDERSON: Yeah.

MEMBER ZIEMER: Yeah.

MEMBER BEACH: Well, and I think when we get the information from NIOSH on the coworker models that are currently the number eights, you know, what their -- what their timeline is, that'll influence some of this discussion also, perhaps.

MEMBER ZIEMER: Exactly. Exactly. That's -- that would be a good starting point. Yeah.

CHAIR ANDERSON: Good.

MEMBER BEACH: Maybe to see what's in the pike after those. I mean, that's going to really inform us when we find out if -- if LANL's ten years out, then what's -- you know what I mean? It's going to be important to know.

CHAIR ANDERSON: Yeah. Kind of what more can we expect? Right.

MEMBER BEACH: Yeah.

CHAIR ANDERSON: Okay.

MEMBER BEACH: Is there anything we're missing, Bob, that we need to think about that you -- you're close to this?

MR. BARTON: I -- I guess the only thing I'd ask is if -- Andy, you had mentioned you were going to report out in -- in a week at the Advisory

Board telecon. Is there something we need to look towards for April, even as far as, like, an update report or something to that end, regarding these completeness discussions, just to keep the Board abreast or even to -- for some of the newer members, maybe even initiate them to this discussion, which has been ongoing for a number of years, and they may not be up to date on it. So, I don't -- I don't know if that's something that we should consider, but --

MEMBER BEACH: I think --

MR. BARTON: -- doing something --

MEMBER BEACH: -- that's a good idea. Yeah.

CHAIR ANDERSON: Yeah. I mean, the other is a question of when will NIOSH be able to give us any information on the nine sites and kind of this additional information so we got a sense of the extent of importance of the issue and the ongoing activities. I mean, is April timing enough to get that together?

DR. ULSH: I'm pretty sure we can do that for you.

CHAIR ANDERSON: Okay. That's good. That's -- that's -- that's what I wanted to hear. I don't want to -- I mean, there's lots of things you're working on, and -- yeah.

MEMBER BEACH: Does that require a tasking to ask SC&A to come up with some -- a presentation or work with you on that, Andy, for April?

CHAIR ANDERSON: Probably.

I mean, Rashaun?

DR. ROBERTS: Yeah, that sounds like a fine tasking.

CHAIR ANDERSON: Okay. Bob, you understand what we need?

MR. BARTON: Yeah, I -- I think so. I may need --

CHAIR ANDERSON: Yeah.

MR. BARTON: -- some clarification down the line, but --

CHAIR ANDERSON: Yeah. Okay.

MR. BARTON: -- I think I know where we're going with this. Yeah.

CHAIR ANDERSON: Okay. Sounds good.

MEMBER BEACH: Well, I -- and I agree, I think it's important to keep the Board members abreast of what's happening here and inform new members of the overarching issues that we're looking at and where we are. So, that's a great suggestion.

CHAIR ANDERSON: Yeah. Okay.

Other issues? Other comments?

MR. BARTON: If I might make one more, let me just say that I think both Brant's presentation and the one I gave really spawned some really good conversations and might get those Board members who aren't on this call to start thinking about these issues, which they may not be considering because they're just not in their purview. So, maybe even beyond the schedule for upcoming co-exposure models that are under development, it might be good just to have our, you know, usual sort of update presentation that mirrors what we talked about this morning. So, I think that might be beneficial to consider.

CHAIR ANDERSON: Okay. You can put that into your review paper for the planned presentation, put that in there as well.

MEMBER BEACH: This is -- what do they call it? NIOSH, you guys call it the 30,000-foot presentation?

MR. BARTON: I think I was the one guilty I was using that term, but --

MEMBER BEACH: Yeah, oh, you did.

MR. BARTON: That's what --

(Whereupon, Member Beach and Mr. Barton speak simultaneously.)

MEMBER BEACH: I thought they did too on the -- on the last LANL meeting. Okay. So, perfect. Yeah. The 30,000-foot...

CHAIR ANDERSON: Okay. I thought we had a -- had a good discussion. We got caught up on a lot of things. I think we have a way to go on some of these. But we'll -- we're making progress.

So, are there other -- I don't know what other -- does NIOSH have any other issues that they think are coming up that would be important for this committee to work on? Well, we'll keep on top of these and the co-exposure is going to be a continuing need. And I think that the -- home with this group is a good place to keep it. Just remind all of the various site committees if this comes up with them to pass along what their thoughts are.

MEMBER BEACH: Sounds good Andy.

CHAIR ANDERSON: So, we got our list of follow up pretty well? Bob?

MR. BARTON: I believe so. Hold on, watch my hair grow.

CHAIR ANDERSON: Yeah. Yeah.

MR. BARTON: There it is.

CHAIR ANDERSON: That's -- that's your IT in the background. AI -- AI is giving him --

(Whereupon, Chair Anderson and Member Beach speak

simultaneously.)

CHAIR ANDERSON: -- picture.

MEMBER BEACH: That's your fake screen. That's why I --

CHAIR ANDERSON: Yeah.

MEMBER BEACH: -- it looks really weird. I mean, not that you look weird.

MR. BARTON: Well, me and Dr. Ziemer are in the same room.

MEMBER BEACH: I know you are. Dr. Ziemer's always in the same room with somebody.

CHAIR ANDERSON: Yeah. Yeah.

MEMBER BEACH: Usually it's Steve, though.

CHAIR ANDERSON: But Paul doesn't move his head as much as you do, Bob.

MR. BARTON: (Indiscernible) --

CHAIR ANDERSON: -- this generally doesn't come up, or he's --

MEMBER ZIEMER: (Indiscernible) --

CHAIR ANDERSON: -- got a higher machine. I don't know which it is or a better experience.

Okay. So, --

MEMBER ZIEMER: I'm done.

CHAIR ANDERSON: Are we ready to adjourn?

MEMBER BEACH: I --

MEMBER ZIEMER: So moved.

MEMBER BEACH: -- recommend --

CHAIR ANDERSON: Okay.

MEMBER BEACH: Second.

CHAIR ANDERSON: Since there's only three of us, so we're -- we're good to go. Thanks a lot, everybody.

(Whereupon, the meeting was adjourned at 2:19 p.m. EST.)