CENTERS FOR DISEASE CONTROL AND PREVENTION

NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH

ADVISORY BOARD ON RADIATION AND WORKER HEALTH

SAVANNAH RIVER SITE (SRS) MEETING

WEDNESDAY, MARCH 22, 2023

The meeting convened at 11:00 A.M.

EDT via video teleconference,

Brad Clawson, Chair, presiding.

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Members Present:

Brad Clawson, Chair

Lockey, James, Member

Pompa, David, Member

Ziemer, Paul, Member

Registered Participants:

Roberts, Rashaun, DFO

Adams, Nancy, NIOSH contractor

Barton, Bob, SC&A

Buchanan, Ron, SC&A

Calhoun, Grady, DCAS

Cardarelli, John, NIOSH

Chalmers, Nancy, ORAU TEAM

Fitzgerald, Joe, SC&A

Gogliotti, Rose, SC&A

Habighurst, Ashton, HHS

Nelson, Chuck, DCAS

Robinson, Sallie

Sharfi, Mutty, ORAU

Taulbee, Tim, DCAS

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PROCEEDINGS

(11:00 a.m.)

Welcome and Roll Call

DR. ROBERTS: Good morning, everyone. Welcome to the Advisory Board on Radiation and Worker Health's meeting of the Savannah River Site Work Group. My name's Rashaun Roberts, and I'm the DFO for the Board.

The agenda, presentations, and other materials and information for today can be found on the NIOSH website under scheduled meetings for March of 2023.

So, with that brief welcome and orientation, I'll go ahead and move into our roll call. Since Board Members who have conflicts with regard to this site can't sit on this work group, there are no conflicts of interest for the work group members; however, as I go through the roll call, other staff do need to state any relevant conflicts.

So let's go ahead and start with the work group chair, Clawson.

CHAIR CLAWSON: Sorry, had to unmute there. I had the sun in my eyes. Yes, I'm here.

DR. ROBERTS: Okay, great. Lockey?

MEMBER LOCKEY: Yes, I'm here.

DR. ROBERTS: Pompa? Okay, is Ziemer here?

MEMBER ZIEMER: Yes.

DR. ROBERTS: Let's go on to NIOSH/DCAS and ORAUT.

MR. CALHOUN: Hi, this is Grady Calhoun. I have no conflicts here.

DR. TAULBEE: This is Tim Taulbee. I have no conflicts at Savannah

River.

MR. NELSON: This is Chuck Nelson. I have no conflict at Savannah River.

DR. ROBERTS: Anyone else for DCAS/ORAUT?

DR. CARDARELLI: Yes, I'm sorry, I was on mute, and I have no conflicts.

DR. CHALMERS: Nancy Chalmers, ORAU Team, no conflicts at Savannah River.

DR. ROBERTS: Anyone else, D --

MR. MAHATHY: Mike Mahathy -- Mike Mahathy, ORAU Team, no conflicts Savannah River.

DR. ROBERTS: Thank you. Okay. Hearing no more from NIOSH/ORAUT, let's move on to SC&A.

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

DR. BUCHANAN: Ron Buchanan, no conflicts.

MR. FITZGERALD: Joe Fitzgerald, SC&A, no conflicts.

MS. GOGLIOTTI: Rose Gogliotti, SC&A, no conflict.

DR. ROBERTS: Anyone else from SC&A? Hearing none, let's move on to HHS and contractors.

MS. HABIGHURST: Ashton Habighurst, HHS, no conflict.

MS. ADAMS: Nancy Adams, NIOSH contractor, no conflict.

DR. ROBERTS: Okay. Is there anyone here from DOL or DOE? Hearing none, let me ask if there any members of the public who would like to register their attendance of this meeting.

Well, thank you, and again, welcome to you all. I need to go over a

couple of items before I give the floor over to Brad Clawson who chairs this group. In order to keep everything running smoothly and so that everyone speaking can be clearly understood, please, everyone mute your Zoom or your phone when you're not muting -- when you're not speaking. The mute button for Zoom is in the lower left-hand side of your screen. If you're attending this meeting via telephone, press star six to mute if you don't have a mute button. If you need to take yourself off mute, press star six again.

Again, the agenda, presentations, and background documents that are relevant to today's meeting can be found on the NIOSH and DCAS website and all of the materials were sent to Board Members and to staff prior to this meeting.

Before I turn over to you, Brad, let me check one more time and see if Pompa has joined us. I don't hear him, but we do have a quorum so we can go ahead and proceed. Brad, over to you.

CHAIR CLAWSON: Thank you, Rashaun. Good to see everybody or at least hear their voices and everything else. It's been a long time since we did this.

Background

CHAIR CLAWSON: Rashaun wanted me to give a little bit of a background on Savannah River and how we've gotten to where we're at and everything else. Tim, you'll probably have to help me on this, but I think this whole thing with Savannah River almost started almost 14 or 15 years ago. Is that -- is that not correct, or has it been even longer?

DR. TAULBEE: We received the petition in December of 2007 and

really got -- I don't think we qualified it until 2008, so yeah, it's been about -- about 14 years, 13-14 years, somewhere in there.

CHAIR CLAWSON: Okay. So, we've been -- we've been working on -- thank you, by the way. We've been working on this for a long time, and we've -- we've come to a point where we're getting near the end of these parts. So on July 12, 2001, the Board recommended an SEC for subcontractors from '72 to '90. This was October 12, 2021, it was registered on the federal registry for that date.

Also, on April 22, 2022, SC&A issued a focused review of ORAUT-0092, Rev. 0 and the remaining petition of the SEC-103 evaluation report for '91 -- 1991 to 2007. It was kind of my understanding what we're looking at, at this point is where does the data completeness come and where can we make the cutoff in these later years. We've tried to make it as easy as possible in the early -- to -- to have a defined cutoff, but there was several other things, so that's why we went with 1990.

On November 22, 2022 -- on June 5th we received NIOSH's response to SC&A's focused review of 0092, and this is where we're at to date. And we're going to review this now and go on. Is there any questions of, kind of, how we got here and what -- any questions that anybody has?

Okay, with that being said, we're going to let NIOSH start out, Mr. Cardarelli, John, to start into their presentation and explain their review to us. And with that, I'll turn it over to you, John.

NIOSH Presentation: Response to SC&A's Focused Review

DR. CARDARELLI: Okay, thank you Mr. Clawson. I'm going to share

my screen. I'll pull that off screen. I'm kind of -- I think, everyone, I'm going to be working from the PDF file that was downloadable off of the internet off of our website. So before we get started on this, this a little unusual, because I'm actually going to be presenting our response to SC&A's focused review, which has yet to be presented to the workforce -- or to the work group. But so I'm going to ask that SC&A be prepared to provide additional background or context if there's any confusion associated with the material I'm presenting here because I -- we drafted this presentation, kind of to be a situation where we're responding, so we didn't include all the details in the background as we would have done had we known we'd gone first. But that said, I think we're going to be fine.

This is a co-presentation with myself and Dr. Chalmers, who's the ORAUT statistician who did a lot of the statistical work in the sampling plan that we're going to be talking about, with regard to our responses to their review.

MEMBER ZIEMER: Brad, this is Paul. Could I ask a question before John continues? Is there a reason --

CHAIR CLAWSON: Sure.

MEMBER ZIEMER: -- we're not having SC&A's presentation first?

CHAIR CLAWSON: No, I -- I -- I -- I kind of felt that, because SC&A had not got their final revision put in, they're still in evaluation mode, so I thought that it was better that NIOSH goes first on this, because -- so this was kind of my thing, and I'm sorry if this created a problem, John, or whatever. But my -- so I had Rashaun update the agenda, and that should have been sent out yesterday.

But I do have a question for you, John. So, do you want us to stop you, or do you want us to allow you to go through the presentation and then come back and review these things?

DR. CARDARELLI: Well, I'm open. I think that if we have an open exchange, stop when there's clarification or questions, because there may be those times as we go through this. So I'm very comfortable if -- if folks have questions to stop during the talk.

CHAIR CLAWSON: Okay. Because, you know, I was going to suggest that we can do that because I believe there's 38 or 40 pages on this and then to be able to come back and review, go back through it all, I think it'd probably be better to be able to step through these, go from there, if that's all right with you, but I also don't want to put you off path either.

DR. CARDARELLI: No, no, it's good. Thanks, Mr. Clawson, I appreciate that.

MEMBER LOCKEY: Hey, John and Brad, Jim -- Jim Lockey. I agree. I -- I have a -- I went through with questions on each page or every other page or so that I just need some clarification for my own edification. So, I -- I think it'd be -- I agree, better to go through it as -- questions as the presentation is being made. I think that to be more educational, particularly to new Board Members in may be listening about how this process works.

DR. CARDARELLI: Excellent, thank you Dr. Lockey. Okay. All right. So, the presentation is going to be a brief introduction. I think Mr. Clawson did a good job of summarizing that, and then we will also get into the five conclusions that were derived from the SC&A's focused review of our report 92, and then our overall conclusion, which is a single slide.

So the introduction is really based upon the report 19 -- 92, which is entitled "The Evaluation of Bioassay Data for Subcontractor Construction Trade Workers at the Savannah River Site." The original purpose was to use the radiation work permits sampling plan, a sampling plan for those -- to determine whether or not subcontractor construction trade workers were sufficiently monitored by bioassay such that their radiation doses could be reconstructed with sufficient accuracy. That was the purpose of the site focused on subcontractor construction trade workers.

I won't go through this in great detail, but it just gives a demonstration of the time line. This is a multi-year effort. It started in 2018, of which NIOSH worked with SC&A, and we had many technical calls to come up with what we call a final sampling plan, which was to look at radiation work permits that were available on site. We executed that plan in mid-2018. And we eventually received that data near the end of 2018.

Shortly after that, in 2019, NIOSH produced a report, that was report 92, of which the first round of comments were received later that year. And then we had a response paper to SC&A at that point, and then they had another review around -- a review on that particular response paper. And then between that and now, the Board added the SEC class up through 1990, from 1990 -- 1972 to 1990 for subcontractor construction trade workers for all radionuclides. So we're really going to start focusing now on the period after 1990, which is kind of what their focused review is looking at, that time period, post 1990. And then this presentation is our response to that focused review.

So, in summary, really, the SC&A conclusions were, basically, five.

The first one was they concluded that the sampling premise was not sufficiently grounded in historical Savannah River site practices. The second one was results for direct and effective monitoring may be overstated. The third was the generalized matching is not sufficient. And the fourth was radiation work permits specified job-specific bioassay data are incomplete. And the fifth conclusion was the feasibility of a coexposure model needs to balance radiation work permit implementation with completeness of coworker data. And I really want to stress here that the focus has shifted from the feasibility of developing -- or feasibility of dose reconstruction to whether or not there's feasibility for developing a coexposure model, okay?

CHAIR CLAWSON: Hey, John. John, let me -- let me -- let me interrupt you on -- on that one.

DR. CARDARELLI: Sure.

CHAIR CLAWSON: I want you to -- I want you to explain that a little bit more to me because I -- I --

DR. CARDARELLI: Okay.

CHAIR CLAWSON: I -- I have not -- I -- I have not seen anything that we're changing from completeness and everything else going to a feasibility of a coexposure model. That's -- that kind of got me lost a little bit there, so if you could explain that a little bit more in detail, I'd appreciate it.

DR. CARDARELLI: No problem. Obviously, in the past, we've concluded in our presentations that we could do dose reconstruction for subcontractor construction trade workers. The Advisory Board voted to make it an SEC class. Part of a dose reconstruction effort is developing what we call coexposure models, and they help us fill in doses to workers who

may not have been monitored but were exposed or believed to be exposed.

So, part of a dose reconstruction is -- and to be claimant favorable, we want to develop these coexposure models to provide dose estimates to workers who may have been exposed but were unmonitored. If it is determined that a coexposure model cannot be developed, then we would not be able to add doses to those workers, which would lead to less claimant favorable adjudication process because we couldn't add those doses to a worker potentially exposed who may have not been monitored.

And the big picture of the dose reconstruction is we want to estimate what their potential doses are in a claimant favorable manner. So, we need to make sure that we do our due diligence to create coexposure models to be claimant favorable as part of the overall dose reconstruction process.

Does that answer your question, Brad?

CHAIR CLAWSON: Not -- not really, because I -- I really haven't run into this before because I -- I think before you can even do this coexposure modeling, we still have to answer the question of the data according to I-GO -- IG-006, we still have to do a completeness. And this is why -- this is why this one really kind of put me aside here.

I'm trying to figure out -- because we -- I don't think that we've ever really got into this coexposure stuff before with any of these SECs. This is -- this is the first time that this has really came to us, and this is why I was -- I'm kind of baffled by this.

So, I see Bob that you're -- you're there, so I'll -- I'll let you ask the pertinent questions, I guess.

MR. BARTON: Yeah, thanks, Brad. I -- I -- I guess, maybe our

question is what's the distinction between feasibility of dose reconstruction and feasibility of coexposure modeling if you can't fill in the gaps for exposed -- exposed workers who are unmonitored. But, I guess, what's the difference between these two? I -- I don't -- I don't get how the focus has shifted or how these are how these two aren't actually tied at the hip.

DR. CARDARELLI: Well, in essence, they are tied very closely together. If a worker -- by the way, we believe that there is plenty of data to develop a coexposure model to provide a dose estimate to a worker who may have been exposed but was unmonitored, okay. That's the whole purpose of the coexposure model. That helps us in our dose reconstruction effort, and it's also very much claimant favorable.

So, when you shift the focus away from doing a dose reconstruction because you think that the data is incomplete, does that prevent us from developing a coexposure model? The answer is no; we can still develop a coexposure model because data completeness is a different issue for dose reconstruction than it is for coexposure modeling. Oftentimes we use a little bits of data. Sometimes it could be source data, air monitoring data, it could be production data, all to give us an indication of what the potential exposures might be.

So, completeness of a bioassay program, it would be one part of a dose reconstruction process, but we could develop a coexposure model to estimate intakes using air monitoring data or source data. So coexposure models can be developed using a variety of different data to help us with a dose reconstruction effort. So, completeness is a separate issue on coexposure models.

MEMBER LOCKEY: So, John, this --

CHAIR CLAWSON: Brad. The -- oh, I'm sorry, Jim, go ahead.

MEMBER LOCKEY: Thanks, Brad.

So, if I -- I hear what you're saying -- correct me if I'm wrong -- you can do a -- you can look at whether you have a coexposure modeling, and if you can't do coexposure modeling, then you probably could not do dose reconstruction, correct?

DR. CARDARELLI: Likely, yes.

MEMBER LOCKEY: Okay, but you could -- you could have -- you could -- it's feasible to do coexposure modeling, but you still may not have enough to do -- to determine if it's feasible to do dose reconstruction. That's also then correct, right?

DR. CARDARELLI: Yeah, for individuals, correct.

MEMBER LOCKEY: Okay. So I think I understand what you're saying. Okay.

CHAIR CLAWSON: Okay. Now, I need to get a little bit of clarification here. Because you're telling me that feasibility of coworker exposure model has nothing to do -- that just has to do with dose reconstruction, that does not have to do with completeness of the data and the ability to be able to, basically, do dose reconstruction. This is where I'm lost in this, because we still have not concluded of when we have sufficient data and completeness. And so this is why now you're throwing in this feasibility of a coexposure model when we haven't even completed that. Now -- now, if this is something you guys do in your dose reconstruction part of it, that's all well and fine. But as the work group here, we still haven't -- we still haven't

done the completeness.

DR. CARDARELLI: Well, --

CHAIR CLAWSON: If we don't have completeness, we can't do dose reconstruction. That's where an SEC comes in on this.

DR. CARDARELLI: In it's simple --

CHAIR CLAWSON: And so --

DR. CARDARELLI: Sorry. Sorry, go ahead.

CHAIR CLAWSON: I'm sorry. I -- I -- I'm trying to grasp -- my head around what you've been saying.

DR. CARDARELLI: And we will talk a little bit about this later in the presentation, but I would say, as an extreme example, extreme example here, if we knew that we had the most highly exposed person who was exposed at that site at that time, and we only had one bioassay sample from them because we know that they were the most highly exposed -- that's one person, one example -- it's just a very extreme example -- but that could be a bounding source if we knew that that person was the truly most highly exposed person. We could use that one person's exposure to represent potential exposures for everyone else at the site and have it be bounding.

In other words, it's -- no one else is going to have a higher exposure than that one individual. So in essence, that could be a coexposure model where we've taken it from one individual and applied it to everyone else at the site knowing that that one individual was the highest exposed person.

So that's what we mean by coexposure model as opposed to being able to apply completeness to the entire site. And we do this already with some of our other sites where we apply generic correction factors. Those

are, in essence, a coexposure model by applying a fixed factor to a potential intake.

Here we're using bioassay data because there's so much of it that we can develop a better exposure model, one that is more accurate, more sufficiently accurate, than relying on a single number or a single air sample.

Most of the ambient air sampling that we do, where we provide doses to workers, that's simply a coexposure model based upon ambient air samples at the site where workers work. So here, we just want to develop a coexposure model to subcontractor constraint work -- subcontractor construction trade workers who have been monitored for various radionuclides, and the data's there, and we can produce that.

CHAIR CLAWSON: But that's -- that's not what IG-00 (audio interruption) -- this is where this is throwing me off, because (audio interruption) is even before your time when we started to pull in the information for this, your -- NIOSH's whole sole case was that they had all of the RWPs, they had every -- we went -- they went on such a -- we're getting all of this data, we have 300 boxes over here, we have 200 boxes over here. We -- we went on a data capture for years, because the process -- and I'm just going to -- John, understand, I'm trying to wrap my head around this.

So if I say something that isn't -- it seems like to me that we've been going off RWPs and everything else like that and the data collection and complying OG -- OGC -- this -- this is totally shifting from what we were doing to something different now is what it appears to me.

DR. CARDARELLI: This --

CHAIR CLAWSON: Now I can be wrong. I'm just telling you that this

whole thing is -- is -- we've been -- we've been going this way, and now all of a sudden, we want to go this way.

DR. CARDARELLI: I --

CHAIR CLAWSON: That's what I --

DR. CARDARELLI: Mr. Clawson, I would agree with you. And I think that, really, our interpretation -- again, this is from the SC&A's review where they have shifted this focus, not NIOSH. So, what we're responding to it --

CHAIR CLAWSON: No, no, no, no.

DR. CARDARELLI: -- in that context.

CHAIR CLAWSON: I -- where -- where does that -- where does that come in? Where -- where do you --

DR. CARDARELLI: I'll have to bring up their document and -- and show you, but I think if we ask SC&A to define that, that would be fine. But that was our response to them is we believe that you are shifting the focus from dose reconstruction to whether or not we could even create a coexposure model. We believe we can create a coexposure model. And using the IG, the Implementation Guide, for dose reconstruction and applying the coexposure model may not be appropriate or adequate. But I see that Dr. Taulbee just came on board here. Tim?

DR. TAULBEE: Yeah. Brad, if I can kind of paraphrase some of this of where we see -- how we felt that there was a shift here is that there's a lot of focus on the completeness of the coexposure model. In the example that John gave of just one person if you know that they're the highest exposed could be used to bound the dose reconstructions is that shift that we are -- that we seem to be seeing here. And, you know, the data completeness

associated with IG-6 is something that, you know, has been asked by the Board for us to clarify, and we're working on a white paper from that standpoint that goes through some of these examples. And John, later in his presentation, will be giving more details about that, give examples of where this completeness focus isn't really as critical as SC&A seems to have portrayed it in this most recent focused review.

So, if I could make a recommendation here. If we get -- if you could -- if we could move on from this one and move to later on, there's another slide that I believe John has that will go into three different examples about this completeness that will, hopefully -- hopefully, explain this a little better to you. Does that make sense, sir?

CHAIR CLAWSON: Yes, it does. I -- I have no problem with this because we can always come back, and we can go to this. And this is one of the things I was worried about was -- because I'll tell you what, I do have a lot of questions throughout your whole presentation.

But we'll -- I'll let you continue on there but -- but I -- I do want to ask SC&A, because I will be honest with you on this, I have gone back I've pulled the transcripts from our last three meetings on this, and I have never ever come up with at any point that we ever questioned into this coexposure model.

Now, there's been things that have popped up where we have talked that we couldn't -- coexposure models are great, but we could not do anything with them until we got the completeness done. So, that -- that's -- because I will be honest, since I've got your -- I have be combing through a lot of transcripts, and I haven't run across anything.

So SC&A, maybe I'm wrong on that. Maybe you can just keep in the back of your mind. We'll -- we'll let John continue on, and we'll -- we'll raise other issues that come up. But I would like to be able to have that addressed because I can't -- I could not find anything in my searches for that. But -- but that doesn't mean it isn't out there. There's awful lot of data out there that I went through.

So, you have any problems with that, Bob?

MR. BARTON: No, I have -- I actually agree with Dr. Taulbee that we might be getting ahead of ourselves here and we need to move on.

MEMBER ZIEMER: And Brad, could -- Brad, this is Paul. Could I add one other comment? Perhaps --

CHAIR CLAWSON: Sure.

MEMBER ZIEMER: Perhaps the use of the word "shifted" is unfortunate because ultimately, we still are doing dose reconstructions. That's the whole point. And, you know, if you had complete data from one -- on a claimant, you can do a dose reconstruction. If you lack data on that claimant, then you look at whether or not you can do it -- do dose reconstruction through the coexposure model. But ultimately, we're not moving away -- I don't think we're moving away from dose reconstruction; we're just right now having to focus on whether we have an adequate coexposure model that will allow dose reconstruction in those cases where the data is not sufficient.

CHAIR CLAWSON: Well, you know what, Paul, I greatly appreciate that. That's, as usual, you're -- you're very well versed, and I appreciate that input. So, John, I apologize. Maybe we got sidetracked there. I'll let you continue on with this and -- and -- maybe things will become a little

clearer --

DR. CARDARELLI: Okay. All right.

CHAIR CLAWSON: -- to me. Thank you.

DR. CARDARELLI: Thanks. And, you know, I'm glad we're having these -- this discussion. I think it will make for further slides to be a little bit more efficient -- or further discussions on those, so.

All right. I wanted to jump right into the -- our response to their conclusion number one, which was based on the sampling premise was not sufficiently grounded in historical SRS practices. So, what -- what is -- exactly is being said here. And this particular table shows the monitoring percentages from the years 1991 through 1998, which is that sub area of focus that the SC&A did their review on, and it's for five radionuclides, the plutonium, the strontium fission, americium, uranium, and neptunium.

And they're -- for plutonium, you can see it's 0 percent were monitored that were based upon on a review of 16 radiation work permits that were collected through that statistical sampling plan that was discussed in 2018.

So we want to understand why 0 percent would show in 1991 and then eventually rise to 78 percent in 1994 and 100 percent in 1995. And as you can see, for all five these radionuclides, the number of radiation work permits that are associated with estimating these monitoring percentages. So I will focus on plutonium because it's where we have a lot of data, and it kind of demonstrates how the conclusion came about.

So, for the 78 percent of plutonium that was monitored in 1994, that came from 32 radiation work permits, or 25 of them, they were sampled

from 1994 and they have plutonium marked -- this is the key thing. Plutonium was marked on the radiation work permit by which we could make that determination. We're assuming that the other 22 percent, or the seven remaining that couldn't find any information on, required plutonium bioassay. So, this rise or a perceived trend in the monitoring percentages from 0 percent in 1991 to 78 percent 1994 to 100 percent in 1995 really is driven by a procedure of the bioassay program, not by the radiation work permit because the radiation permits were substantially different in those time periods.

So, it's not a reflection of monitoring percentages; it's a reflection that the actual radiation work permits were different. In the early '90s, those forms did not indicate which radionuclides should be included in the bioassay. By the middle to late 1990s, those forms did have that information.

And that is kind of shown here on this particular slide where I provide examples of radiation work permits. And the one on the left is a radiation work permit in 1992. It talks about the time and exposures, but you'll notice the one on the right, which is a radiation or permit in 1997, it specifically has boxes, checkmarks, associated with what they've called job-specific bioassay requirements. So, in 1992, there was no indication of which radionuclides would be needed because by procedure they knew the location. And by the procedures at the time, they would be on a routine monitoring program and that area that they're working in would have identified which radionuclide be done. But the RWP doesn't contain that specifics. The specifics are in the procedures. 1997, the procedures get

modified slightly and now they include very specific radionuclides. So, 0 percent is understandable in 1992 because there's nothing on the RWP to suggest it. In 1997, 78 percent or 1998, 100 percent when they have that information.

So that's -- that's really what we're trying to point out here is this rise and trend is really driven by RWP format not by the practices at the site. And that's pointed out in this slide here. So, the purpose of the radiation sampling plan, or radiation worker permit sampling plan, we were targeting to estimate the percentage of the monitored subcontractor construction trade workers to within 5 percent with a 95 percent confidence. So it was a -- it was a very complex statistical sampling model that Dr. Chalmers had to develop in combination with reviews with SC&A before we implemented that strategy.

So the uncertainty in the percentages of monitored subcontractor construction trade workers, we wanted to calculate that. So uncertainty in anything else, we cannot because we didn't collect the data and we didn't design the sampling plan to do that. What we did was the year in which things were inventoried, but we didn't look specifically and design a sampling plan by the specific radionuclide. So, the uncertainties in the SC&A table two, which was presented a few slides earlier, frankly are unknowable because it wasn't designed to answer that question. The sampling plan wasn't designed to answer that question.

So our conclusion in response to SC&A's conclusion, which was the sampling premise is not sufficiently grounded in historical SRS practices, well, it's based upon change from the procedure or a change in the different

types of RWPs versus a monitoring practice. Any conclusion drawn from comparing the statistics with unknowables -- uncertainties is certainly suspect. And the presence of bioassay requirements on all the RWPs is not necessary for coexposure modeling.

And what's really interesting, and it's worth noting at this point is, if we did not have a single RWP, if the site would have destroyed them, if they would have been lost in a fire, I'm talking about RWPs, we could still do a dose reconstruction because we have the bioassay data. And a RWP is not required to do a coexposure model. An RWP is not required to do a proper dose reconstruction with sufficient accuracy. The bioassay data would be helpful in developing a coexposure model, and individual bioassay data is certainly necessary to do a dose reconstruction. So, we're putting a lot of weight on the availability of the RWPs as if -- if there's any incompleteness or concern with them, we couldn't move forward. I think the message is you don't need a single RWP; we can still do dose reconstruction.

CHAIR CLAWSON: Well, how -- and John, how do you explain in -- in 1997 -- this -- this is when -- this is when –- I understand what you're saying in that, but guess what, you could not have all the RWPs, that's all wonderful, but then you only have so much data. And what is to tell me that you really have the most exposed person.

DR. CARDARELLI: That would have to --

CHAIR CLAWSON: That's -- that's a shot in the dark. We've got into this before. They had 79 -- 79 percent was missing in 1997.

DR. CARDARELLI: I will address that when we get to that particular point.

CHAIR CLAWSON: Okay. Because -- because you keep throwing out this coexposure model and everything else like this, and this is what's really throwing me in the whole process. Because to me, it kind of seems like you're trying to rewrite IG-006. And I --

DR. CARDARELLI: No.

CHAIR CLAWSON: I -- I've got issues there, so. Because -- because completeness has always been -- that was one of the biggest issues in this whole process when we even started to write this. So, I'll -- I'll sit back. But what I -- I -- I understand what you're saying, but you're leaving the whole door of do you really have the information or not wide open. So I'll just -- I'll let -- I'll let you go on from there unless there's somebody else that has something else that they wanted to bring up.

MEMBER LOCKEY: Yeah. Hi, Jim Lockey. Can you go back to your slide number eight table, please? So, my -- my question is, after reading through this a number of times, if I looked at the 19 -- say, 1992 data, there were 23 RWPs, and none of those RWPs indicated that a bioassay should be done for, say, plutonium, right? But am I -- am I to assume that --

DR. CARDARELLI: No, no, I would not say that those RWPs that you do not have to do it for plutonium. I think the -- what needs to be said there is that there's no indication on the RWP that plutonium had to be monitored because there's no --

MEMBER LOCKEY: -- indicate --

DR. CARDARELLI: -- indication of it. They may have been monitored for plutonium because of the other procedures in place.

MEMBER LOCKEY: That was -- that was my next question. All right.

So, of those 23 RWPs, is -- does -- is there -- data exist that, in fact, they were monitored in some manner?

DR. CARDARELLI: Yes, they would have been monitored through the routine practices at the time, which the procedures would have called for workers most likely exposed would have been monitored through the routine monitoring practice. So, workers aren't -- it's just not willy-nilly. They had to identify areas where the potential for exposure was highest and identify those workers, and then they would be put on a routine monitoring program. And that's how they were monitored at the time.

MEMBER LOCKEY: Right, and your -- and your slides in the future, you address that by your direct -- direct data; is that correct?

DR. CARDARELLI: Correct. The direct monitoring versus effective monitoring.

MEMBER LOCKEY: Right. So, what we're saying is that there was a -- there was a procedural change from '91 to '98, where they instituted the RWPs and then started to stipulate which bioassays had to be included in those RWPs where prior to that, presumably they recovered through other ways of monitoring on an ongoing basis. Am I -- is that what -- is --

DR. CARDARELLI: That's correct.

MEMBER LOCKEY: Okay. All right.

CHAIR CLAWSON: But John, this is also what opened up the whole mess.

MEMBER LOCKEY: Zero -- excuse me, Brad. So the 0 percent doesn't mean they weren't monitored; it just means they were monitored, most likely by another methodology?

DR. CARDARELLI: Correct. We're putting too much emphasis on -- on an RWP, and there are different RWPs, which result in the different monitoring percentages that we see here. It's not an indication of a trend of monitoring practices.

CHAIR CLAWSON: And if I asked you for the numbers of the 16, how many were monitored for plutonium, you could give me that?

DR. CARDARELLI: I could. I don't have that handy. I don't have that right now prepared, but I will -- I will look for that information.

CHAIR CLAWSON: Well, do you think it was nearly one to one or was it 50 percent? What was that data?

DR. CARDARELLI: I -- I can't speak to that -- that detail at this point. I don't know if Dr. Taulbee or Nancy could -- could chime in to answer that question.

DR. CHALMERS: John, I'll chime in for a second. Those 16 RWPs, so that could be 16 workers, it could be 100 workers. So it'd be worker by worker were they monitored or not directly or effectively or -- or whatever, however you have it there. And so just speaking for the analysis that I did, ultimately when we came up with the confidence interval for monitoring percentage, I would not have broken it down by nuclide. It was just one overall number for the 600 and however many sub CTWs we looked at in total, because, as John mentioned before, we did not inventory nuclides and so we could break it down by nuclide. But in terms of putting an uncertainty on that monitoring percentage, there's no way to do that given the way things were inventoried. But we could get you that number, the point estimate.

MEMBER LOCKEY: I mean, that's -- that point estimate to me is important because it gives me an idea of okay, there were -- the RWPs didn't stipulate plutonium had to be monitored, but, in fact, how many workers in those RWPs, in fact, were monitored. That gives me --

DR. CHALMERS: And I think it may actually be in report 92 in one of those tables. I'm not --

DR. TAULBEE: Yes.

DR. CHALMERS: -- sure.

DR. TAULBEE: This is Tim Taulbee. This is Tim. If I could interject, it's in table 4-6 of report 92, and that's on page 40. And if you look for 1991 in that table, there's a -- it says that there were 17 RWPs, there were 82 bioassays required for plutonium, meaning that there was a total of 82 workers. 72 -- or 78 of the subcontractor construction trades workers were monitored for plutonium. And so, the direct monitoring percentage for that 1991 is 95 percent, --

MEMBER LOCKEY: Okay.

DR. TAULBEE: -- if that gives some context. It's all there in, again, table 4-6 on page 40.

MEMBER LOCKEY: Thank you. I appreciate that.

DR. CARDARELLI: Okay. Are we okay to move forward? Any other follow-up questions?

CHAIR CLAWSON: Well, we -- we do, but you're going to get into the crutch of this whole issue here coming up with the important --

DR. CARDARELLI: Sure.

CHAIR CLAWSON: -- because that's -- that's where the crutch of this

whole thing kind of came into my -- myself. I think it's personally being skated past, but go ahead and we'll -- we'll continue on and address it when we get there.

DR. CARDARELLI: Okay. And -- and just so folks know, I actually have that report up and could show those -- those tables from report 92, if necessary. That's what I was looking off to the right for. All right. Let's start --

DR. TAULBEE: Well, that might be helpful for -- just so Dr. Lockey can see what it is it he's looking at or --

DR. CARDARELLI: Okay. Here's --

DR. TAULBEE: -- looking for at that point.

DR. CARDARELLI: -- page 40 of 188 on report 92. I'll go ahead and maximize this table 4.6, 1991 number of bioassays were required, the number of RWPs at the time was 17. Subcontractors monitored by bioassay was 78, and they had 95 percent were bioassayed. Three of them were subcontractor that were matched to coworker.

So, Tim, I'll let you explain this table further if -- if there's any questions.

DR. TAULBEE: I guess I'll just open it up. Does anybody have any questions on this? This is -- this is where we're trying to emphasize that just, you know, the RWP is not mentioning plutonium or not having plutonium for those first few years. It was done by procedure. And here when you go and you look at those RWPs and you look at subcontractors on those RWPs, were they monitor for plutonium based upon the area; yes, they were, and here's the monitoring data that we were able to find on those

RWPs or identify who was monitored, and then we went and looked at their bioassay.

Does that answer your question Dr. Lockey?

MEMBER LOCKEY: Yes, Tim. Thank you very much. Appreciate it.

DR. CARDARELLI: Okay. I'll move that off. If there's other points that we need to bring that report back up, I'll have it ready.

Okay. So, for SC&A conclusion number two with the results for direct and effective monitoring may be overstated, I think this one is not going to be too much of a controversy here. SC&A stated in their focused review that we did not address all the radionuclides listed in the RWPs. The final draft sampling plan that was drafted in 2018 did call for all radionuclides be listed on the RWP other than tritium. In report 92, however, there's confusion because section 2.1 and section 4.2 have different statements, and I've underlined them here.

Section 2.1 calls for all radionuclides listed on the RWP other than tritium, and then section 4.2, it's changed to at least one required bioassay. SC&A correctly identified that -- that confusion, and we went back and reevaluated the data to account for all radionuclides, which is now going to be the next slide.

The monitoring types are whether or not your directly monitored. You worked in a location and you left your own bioassay sample, and that is associated with you as an individual. Effectively monitored would be you went into the location with another worker. It doesn't have to be the same job title as you -- as you and were signed in on the exact same RWP, you went to those locations, and you performed your -- your individual work. By

essence, or by definition, the assumption is that you're in the environment with a similar exposure potential. That's one of the key criterions for developing a coexposure model. So, NIOSH -- we recalculated the direct effective monitoring percentages where the monitored means all required nuclides on the RWP, not just one.

Remember the RWP sampling plan was to estimate the percentage of the monitored subcontractor construction trade workers within 5 percent with that 95 percent confidence. So, it's a very specific question that we're trying to answer. So, when we look at uncertainty percentages, we can talk about that with regard to the monitored subcontractor -- sub construction trade workers -- subcontractor construction trade workers. All right.

Uncertainty and anything else cannot be calculated because we didn't design the sampling plan to answer those other questions, unless it was truly inventoried in March of 2018 and the areas that we did inventory was year and area. So, we can calculate things for the year and the area in which these workers worked. And we did that. The results really didn't show a significant difference for the effective monitoring.

This table here on the left column shows the monitoring type, whether you're a direct monitored or if you have been effectively monitored. In other words, you've been assigned a dose or a bioassay result consistent with your coworker or someone who was in the same exposure potential environment because you were on the same RWP as them at the time the work was required, and the bioassay sample was collected.

The middle column is the weighted point estimate that was determined. And the direct method, we had 95 percent that were properly

monitored -- or monitored. The 95 percent confidence level was very high, 87 to about 99 percent. So, most of the people on the RWPs were directly monitored with at least one radionuclide.

Now, we changed it to all. Did you -- were you -- did you have a bioassay result for all three radionuclides if the radiation work permit called for that? That number naturally dropped from 95 percent to 75 percent with the confidence interval from about 68 to about 81 percent. But if you were effectively monitored, in other words, you're going to be in the same group as someone who was monitored with at least one radionuclide, that was 98 -- 97 1/2 percent with a very high confidence interval of 88 to about 100 percent.

But now, if we incorporate all radionuclides, that last row, it doesn't drop significantly. It only dropped to about 88 percent would have been monitored effectively using all radionuclides with a confidence interval of 80 to about 94 percent.

So, the effective intervals overlap. What I mean by when I say they overlap, the 88 percent confidence interval is 80 to 93.74, and that overlaps with the 97.5. The direct do not necessarily overlap. But the change here is insignificant statistically speaking because of the way that we did the sampling.

So, they're correct. We should have maybe looked at it that way, and it was confusing. We've run -- rerun the analysis, and we asked ourselves effectively is there any difference; the answer is no.

So, the SC&A section 5.4 in their 2002 focused review suggested that a monitoring threshold be established to determine completeness or imply

completeness not to determine. So, they make the statement SC&A's selection of compliance values less than, say, 80 percent was arbitrary, but it was a reasonable value below which the rate of compliance certainly would be questionable. Compliance and completeness are two separate issues. We'll get into those later.

But our argument would be any suggestion of a monitoring threshold is -- is completely arbitrary, of which examples will be provided in a minute. Every interval on the previous slide is above or contains the arbitrary SC&A value of 80 percent. And what I mean by that is, you look at the upper 95 percent confidence interval, every one of these is above 80 percent. So, using that arbitrary value, even with these changes, with the confidence intervals, we would meet that arbitrary value.

However, again, there are alternatives to the monitoring threshold that is worth discussion. We need to --

CHAIR CLAWSON: John, let me go -- let me go back to slide 18 there, because I think -- I think I'm not really agreeing with that because NIOSH and SC&A agree that these are merely benchmarks. Such values for comparison only have been continuously used for the past six years. I would point out that NIOSH -- and I think it was Tim -- because in looking at the transcripts, that suggested value of, I believe, was 50 percent acceptable, and this is on page 80 through 83 in December 6, 2019, work group procedures. These -- these are just benchmarks that we were using and stuff like this. I think -- I -- I think that you're misusing what that was really for.

DR. TAULBEE: This is Tim. I understand what you're saying there

Brad, that these were initial thoughts, and you want to call them benchmarks, okay, but what John is going to be presenting here shortly is where some of these numbers begin to play a role from that standpoint. We shouldn't be looking at a single value from that standpoint. We certainly shouldn't be looking at the single value without the uncertainty associated with it. Those are the two takeaways that, you know, we're trying to get to at this point. But I'll -- I really want John to get on to the next -- I think it's a next slide, isn't it, John? The -- of where you give the examples?

DR. CARDARELLI: Yes.

DR. TAULBEE: I think this one might help, Brad.

DR. CARDARELLI: Thanks, Tim.

So, instead of looking at a particular metric of 80 percent or 50 percent, it's not just that metric with regard to completeness. You have to understand the exposure potential and the data that's been collected under that exposure potential and especially for unmonitored workers.

Here's one example. If an unmonitored subcontractor construction trade worker represents a small fraction of the highest exposed group, then we could still construct a coexposure model and do dose reconstructions. Okay.

On -- on the other side of this is 90 percent of the subcontractor construction trade workers were not monitored, 90 percent of them, but a large fraction of the highest exposed workers within the entire population, that would be everybody, and if they were monitored, then we could use the highest exposed population as a bounding coexposure model and assign it to those 90 percent of subcontractor construction trade workers who were not

monitored. So, the question then becomes -- is were those 90 percent among the most highest exposed and not monitored. And that would be not likely given the protocols and procedures that were put in place for the bioassay monitoring throughout the history of the site. There would be no reason to purposely exclude someone who is perceived to be the highest exposed.

So, and the -- and if we had to take this to the extreme, if -- again, if we have one person who we knew to be the highest exposed, we could use that highest exposed as a bounding for everybody else at the site. And that's -- that's kind of -- it's a very claimant favorable approach. We've applied it to other sites, and it allows us to sufficiently -- with sufficient accuracy to calculate dose estimates for people who are not monitored.

CHAIR CLAWSON: And I under -- I understand what you're saying there. So, how are you going to tell me and how are you going to assure that I have the highest exposed person.

DR. CARDARELLI: Well, the good thing that we have --

CHAIR CLAWSON: That's -- that's -- that's where -- that's where data completeness comes in. That's where all of this -- and this is what the whole I thing we've been dealing with on this -- to me, it's appearing to me that you are trying to say well, we've got -- we've got this many people that have been out here. We do -- don't have all of the data. We don't have all the bioassays either, because they are lacking too.

You are not going to be able to prove to us that you have the highest exposed person. You really can't because you have no -- you have no -- the whole thing of data completeness. This is -- this is why we have 006. This

was one of the criteria.

It looks like to me that you're trying to sidestep the issue of data completeness and just say well, yeah, out of these 1000 people, this person's the highest one, so we're going to give it to everybody, and that's -- that's -- that's not right. And I just want to let you know that I do not agree with that, but I will allow you to continue on.

But this is what it is appearing to me, and I do not agree with it. And I think that you've missed what the whole thing was all about. I -- I think your whole -- you're shifting the whole premises to be able to go away from data completeness to -- because it is too difficult for you to be able to do. So, now we're coming back to this coexposure, and this is -- this is -- I -- I -- I really have a hard time with it.

But I just wanted to mention this. Because you're telling me this. You're telling me you're going to get the highest exposed person and everything else like that, and I can tell you right now I can shoot holes through it all day long, because you cannot guarantee me that because the data is not complete. You do not really know you have the highest person. You've got the highest monitored one, but you do not know that you have data for --

MEMBER ZIEMER: Now, could I add a comment here, Brad?

CHAIR CLAWSON: Sure.

MEMBER ZIEMER: Sorry, my grandfather clock behind me is chiming, so I hope it doesn't interfere. So, you know, but we never know for certain that we have the highest exposed person on any site, and that's the reason we have modeling where we -- we develop a model and then we -- we don't

really use the average exposure or even the highest exposure number that we have, we use a distribution, which takes it out to the high end tail that -- that confidence level at the high end tail, which always -- you -- you could always argue that there could be one person or two or a few that are beyond that highest tail. But that's -- that's the nature of the modeling in every case.

I know that by using the data that we have, which includes a large fraction of the people with a distribution of exposures, and then statistically taking that up to the high-end tail, we -- we have -- we -- we kind of meet the criteria that says most of the time we'll get it right. Occasionally we might not get it right. We're always -- we're always dealing with this statistics on it. And even where we have full information on a single person, we -- that -- that distribution always -- the uncertainty, we always take the high end of the uncertainty and use that number when we calculate probability and causation.

So, I -- I -- I assume, John, that you're using the example of a single high dose bounding, yeah, conceptually, that would work, but we never do know that, so that's why we use uncertainty and use that -- that distribution, typically a log normal and the tail goes way on out there. But I -- I -- I don't think anybody's trying to say that we -- we really know that most of those persons on any site.

CHAIR CLAWSON: Oh, and -- and well, Paul, I agree with you to a point, but we're sitting here with 79 percent is missing, and we have no idea. This is what the whole problem came into. You have no idea what was missing out there. Now, you've got the highest exposed person of the

information that you do have, but not the 79 percent that was missing in '97. And I'm going to --

DR. TAULBEE: Brad, I mean, if we could go back. I mean, you keep bringing up the 79 percent missing. It's actually not missing, sir. If you go through, the site went back and resampled everyone in that time period, okay. And so they found that no one received an intake in that 1997 where you're talking about 79 percent missing. They were not missing, sir, okay. So, --

CHAIR CLAWSON: No, no, they were. That's why they were fined. Now, they were given an opportunity to be able to come back. Now, would they have done that if they would not have been fined? No, they would not. So,

yes, --

DR. TAULBEE: Yeah, but from a coexposure --

CHAIR CLAWSON: This is -- this is becoming a coexposure.

DR. TAULBEE: From a coexposure standpoint, sir, we have all the data, 100 percent because they went back and resampled in 1979 -- or 1997, I'm sorry, okay. So, from a coexposure standpoint, there is no missing data in that particular year. They looked at 1996. And they did an evaluation in that time period and found that the people who did not leave the samples in that time period did not need to be monitored, meaning their exposures were less than 100 millirem in a year.

CHAIR CLAWSON: So, you're telling me before '97, we had 100 percent; it was just that one year --

DR. TAULBEE: No, sir. No, sir, I'm not saying that. What I'm saying

is, is that when you look at all of the data we looked at, in doing this RWP sampling, and we found direct monitoring for the vast majority of the subcontractor construction trades workers. And these subcontractor construction trades workers that were not monitored, were working alongside workers who were monitored, thus, a coexposure model would be applicable to them. That is what we're trying to say here, okay. We recognize that not everybody was monitored. But if you look at the sampling of RWPs that we looked at, and you look at who was monitored and who wasn't, we see that there is sufficient data to develop this coexposure model, because a large number of the subcontractors were, in fact, monitored on this random sample of RWPs.

One of the things that was -- has been glossed over -- I shouldn't say glossed, that's the wrong term, I apologize -- is that we focused this review and report 92 on the actinide exposures that delivered large dose. We discarded or did not look at any of the tritium doses. Okay. And that's from the sampling plan. That was agreed to with the work group here, that we were not going to look at the tritium side, we're going to focus on the actinides, because that's where the larger doses would be. Tritium doesn't deliver much dose. Some of that -- that 79 percent that keeps getting brought up and so forth is coming from some of those tritium facilities.

When you look at these actinide facilities, and you look at what we did in report 92, you'll see that the vast majority of these people were, in fact, monitored. That's what I'm saying, sir.

CHAIR CLAWSON: Well, and here's what you're telling me is that none of the data for '97, because they were punished and they went back per the

requirements of DOE, and they had to sample everybody -- but you cannot tell me what the previous years were, because they -- you couldn't have because they weren't monitoring right.

DR. TAULBEE: We looked at these RWPs.

CHAIR CLAWSON: You know, let me tell you something about what -- what you've been telling me here and let me -- let me go back into my life. You're telling me that a person that was on the RWP that was going in and, say, pulling film bags in that area is going to be getting the same data as the pipefitter that spent two weeks in that same area. You have a whole different draft of people that are going to be able to go in there.

But I -- I guess -- I guess maybe what I need to -- what do you see 0092 as actually what it was requested to do. I guess that's -- I guess that's my biggest question, John. Because to me, this has become a coexposure model. This is -- this to say that we don't have to -- we don't have to worry about data completeness, because we've got these coexposures that we can do, and so we don't need to worry about --

DR. TAULBEE: As I recall -- as I recall, report 92, from the discussions that initiated this report, and we started talking about the sampling plan and going forward was that SC&A was questioning whether the subcontractors who were not monitored were working alongside workers -- subcontractors who were monitored. That was the initial goal of this report 92 was could we demonstrate that were they working alongside and if that was the case, then the coexposure model would be valid.

And Bob, I saw you that your hand's up, and I'm hoping you will chime in on this particular point.

MR. BARTON: Well, I agree with your characterization there. It would be the same exposure environment, call it. But I wanted to -- I rose my hand because I wanted to go back. You know, the -- the 79 percent in 1997, yeah, they went back and resampled all those folks. That's -- but you also mentioned that they resampled the 1996 folks. That was sort of a -- caught me off guard.

DR. TAULBEE: No, they did not. They evaluated everybody who was not monitored in 1996. And they determined that none of them needed to be monitored.

MR. BARTON: I see.

DR. TAULBEE: And that's in the records, in the filings with DOE.

DR. CARDARELLI: I do discuss a little bit of this in the following slides.

MR. BARTON: Well, then let's John, get back to it. I don't know.

MEMBER LOCKEY: John, before you do that, let me -- I'm going to follow up on one -- one of the Brad's questions, which I have a little heartache about also is that, in the -- in the coexposure model looking at subcontractors, how can you reassure me that in that particular situation you have a craft person, an electrician, doing their work and on the other side of the room there's a plumber doing their work and that your exposure modeling takes that under advisement, either by --

DR. CARDARELLI: That -- yeah, that will certainly come into play, too, later in this, but that's a great question. And I would say that the -- remember these folks who signed in on these RWPs -- I don't care if it's '90s, '80s, or even the late '90s, they're under a routine monitoring program, which means that if you signed the RWP, you have to go leave a

routine bioassay sample. So that -- and what -- what really are these bioassay samples intended to do? They're basically there as a last resort to verify that the engineering controls and the personal protective equipment that is required before they even go into the potentially exposed environment are adequately working, that the workers are being properly protected.

So if any of those things fail, we're still going to do a routine monitoring as a last resort because something might go undetected, maybe there might be an issue with the PPE. So, we want to monitor you as a routine. Now, if -- that's -- that's what we call the routine monitoring.

Say, for example, you have a subcontractor or someone else who's temporary who might come in who isn't always employed there, and they have to go into the same work environment. Well, they're not read into that routine program. They -- they fall under what they call a job specific. They're going in as if -- they're going in the same environment to do a specific job, and they're going to have to leave a bioassay just like a routine person would to verify that the engineering controls and the personal protective equipment all did their jobs. So that's the multiple layers of protection that we provide in that kind of procedural bioassay program.

Now here's how I could give you better confidence that the coexposure model will work, and it's going to come up later in this talk. Say, for example, something fails. An alarm goes off, a pipe breaks, someone cuts their PPE and -- or their respirator falls off and then they get inhalation, that then becomes what we call a special bioassay. It's because the person has been believed to have been involved in something that would have resulted

in an intake. All the other bioassays are done because there's no evidence that you had any intake whatsoever. It's a routine or you're in there for that specific job. We don't expect anything. But if something fails, now you are a specific case that's a special sample that can then verify did you really get exposed. Those results are also included in the coexposure model.

So we have these people who are truly believed -- because of some other failing in the protection process, they're going -- their results will be included in this coexposure model, which makes it closer towards bounding model that we have no evidence to suggest that exposures could ever be higher than this because the environment was monitored, the engineering controls were in place, the PPE was properly used, and we followed up with routine just in case any of those failed and we -- we missed. But if any of those did fail, we're going to collect a special, and then we're going to verify was there any intake even though a pipe burst or your PPE failed. All of that information, those highest exposed people, the people with specials, are going to be in this coexposure model.

MEMBER LOCKEY: From my simplistic way of asking -- asking this question again, let me go back to my concern and perhaps Brad has this -- if I have a pipefitter and electrician and they're in the same work environment, by nature their jobs are going to a create a situation whether it's a difference in potential exposures, but you'll pick -- that'll be picked up through when they leave the bioassay surveys. Is that what you're talking about?

DR. CARDARELLI: In a routine situation, there would have been no indication that anything abnormal occurred, they leave a routine sample,

even though you're an electrician, even though you're a pipefitter, nothing occurred which would have resulted in substantial potential for an intake that would have resulted in this special, so yes. I'm trying to explain that here.

MEMBER LOCKEY: They're going to be covered. Well, I'm not saying that the plumber would under -- I mean the pipefitter would understand that he had an accidental exposure. I'm just saying that unknowingly, they're both going to get bioassays; is that correct?

DR. CARDARELLI: That's correct.

MEMBER LOCKEY: And if the pipefitter has an externally high bioassay level, then you will use that data in your coexposure model?

DR. CARDARELLI: Correct, because they were in the same work environment with the same potential. One happened to have been exposed through their routine bioassays, the other did not. And that would be -- all of that go together in a coexposure model to be applied to people who didn't leave routine but went into the same environment.

MEMBER POMPA: This is David Pompa. Do you mind if I ask a question?

DR. CARDARELLI: Please do.

MEMBER POMPA: We -- just a couple of them. Is the amount of plutonium taken in effect on the data without an exposure bioassay? We talk a lot about plutonium but is the amount -- one gram of plutonium is different from a 10 grams of plutonium when it comes to exposure. Is that taken in effect?

DR. CARDARELLI: Yes, it is. I think through the dose reconstruction

process and our technical basis documents, we use claimant favorable assumptions that the plutonium itself is like 10 or 12 years aged, so you have a higher americium build up into that. So, we do try to account for not only the age of the plutonium but also the isotope if it's specific to 238 versus 239-type situations.

MEMBER POMPA: Okay. And the bioassay, how -- when the potential exposure happens, how soon after that exposure -- because your body will excrete whatever potential you might have inhaled. Your body will excrete it normally. So how often or how soon do you do the bioassay?

DR. CARDARELLI: Well, typically it would be very soon after, but because plutonium typically at this site would remain in the body for years if not decades, whether or not you do it 24 hours or two months or two years afterwards, you would still be capturing that potential intake because it would reside in the body longer. Now in our process, we make claimant favorable assumptions that not only is that type of plutonium, what we call, a super S, which would stay in very long time which results in a higher dose to particular organs when it may, in fact, be a type M which would maybe stay in the body for months or type S for years versus decades. So, we try to account for all of these, what we call, clearance rates for the different isotopes that these workers are being exposed to.

We're talking plutonium because that happens to be the example that's most likely where we do a lot of bioassays at the site. But you've got uranium, neptunium, americium. They all clear from the body at different rates, and we try to account for that in how quickly they do the monitoring, so.

MEMBER POMPA: Okay. One more, the -- we talk a lot about a coexposure model. Does the coexposure modeling reflective time factor at the source by the employee or the closeness to the source, because the (indiscernible) or even the time factor will reflect on the data?

DR. CARDARELLI: Yeah, I wouldn't call something a source, because that kind of implies that it's like a point source or it's like in a particular part of the room. A lot of this could be the -- you're going into a building or a large area where the source is the product that's going through pipes and things of that nature. So, the RWP would be trying to characterize that overall environment, and if you say you go into this environment, you need this level PPE and upon exit, at some point shortly after that, you'll need to leave a routine bioassay sample, and it could be days to weeks after they made that entry because maybe they made multiple entries, that doesn't mean they need to leave multiple bioassays every time they go into the RWP. And that's really driven by how quickly that radioisotope would clear from the body.

Tritium would clear very quickly, so it's more frequent. Plutonium doesn't clear very quickly, so once a month, once a quarter, maybe once every two years would be driven by kind of like the environment that they go in and the type of work that they do.

MEMBER POMPA: You know, I work with RWPs. I just -- my mind was clicking when you mentioned a respirator when the employee or the worker removes their respirator and potentially the respirator could be contaminated, are they cleaning the respirator before they doff so that --

DR. CARDARELLI: I would -- well, I would imagine that through the

radiation worker training and that they're properly trained don and doff, or take on put -- put on and take off, the respirator, the PPE equipment. And yes, you know, they would not necessarily recycle something that's been used and known to be contaminated. I'm sure that they probably went through some level of decontamination prior to recycling that respirator.

MEMBER POMPA: Okay. That's all my questions at this time. Thank you.

DR. CARDARELLI: Okay. Thank you.

CHAIR CLAWSON: I do have a clarification I want to take, because John, you're telling me about an RWP. We have -- we have 12 RWPs for Savannah River. That's pretty big site. When they write these RWPs, and I'm talking about the general RWPs because this is what you're using, that could cover all of, like, 825 -- what -- what -- any of the facilities. You take one RWP. A hundred people can sign on to that RWP, so they can go in and work in normal conditions.

Now you're saying if the pipe broke or anything else like that, that then they'd have a special one and everything else like that. In my life no, that is not true. That's -- that's part of their normal to be able to do basic work. But inside that RWP and inside that facility, there are areas that you do not go into that are not normally entered. So, when you have to do that, you have to have a special RWP, which you are going to be monitoring for different isotopes and different things. That to me is a special RWP.

And you come down onto a normal, you may have a bioassay that is once a year with a normal routine. It just depends.

DR. CARDARELLI: Well, I --

CHAIR CLAWSON: You're getting -- you're generalizing this RWP, and

it's a lot more in depth.

DR. CARDARELLI: Mr. Clawson, you bring up good point and then Tim, I'll -- let me -- I'll just add something here. One thing that I wanted to be clear about with report 92 is we focused on RWPs specific for subcontractor construction trade workers, not the general. There are multiple types of RWPs, which you've correctly noted. Ones that they would call standing or -- standing RWPs, which would cover that routine type of activity you just mentioned. We did not focus on those because we knew that that would not be focusing on the people doing these very specific jobs with perhaps a different exposure potential. Report 92 focused on those special RWPs that you're talking about. So, we did exclude standing RWPs and focused on those that had specific jobs associated with it.

So, Tim, did you want to add any clarity to that?

DR. TAULBEE: No. That's exactly what I was going to say. I mean, I understand what -- what Mr. Clawson was saying.

DR. CARDARELLI: Yeah, I did too. Yeah.

DR. TAULBEE: The general RWPs. In report 92, we specifically excluded those, and so that we were not evaluating those. We are only evaluating the special, the specific job-task RWPs, yes.

CHAIR CLAWSON: Well, and -- but -- and see, this is -- this is where I'm having a problem because you're telling me that everybody's going in and working under these RWPs. No, that --

DR. TAULBEE: Not everybody, sir. We focused on the subcontractor construction trades workers. If we --

CHAIR CLAWSON: Okay.

DR. TAULBEE: -- opened up one of these specific RWPs and we did not see any subcontractor construction trades, we threw it back into the pile, if you will, and resampled. We were only looking for RWPs that had subcontractor construction trades workers doing specific tasks. That's what the focus of report 92 is.

CHAIR CLAWSON: Okay. Because the way it was being spoken about, it was that this was general stuff and that is -- that is not -- I'm glad that you clarified that, because there -- there's a lot more into it than this, and there's a lot more into the RWPs that is a lot more important. That's -- that's -- that -- that's why DOE has written a lot of their procedures and so forth to be able to govern so that the people are monitored correctly. So go ahead, John.

DR. CARDARELLI: Okay. Well, yeah, I'm glad we're having these discussions, and it's good to get the --

MEMBER LOCKEY: John, I'm sorry. John, Jim Lockey.

DR. CARDARELLI: Oh, sure.

MEMBER LOCKEY: Brad forgot to tell me to charge my computer this morning, so I -- I was able to get it back online.

DR. CARDARELLI: Did you have a question?

MEMBER LOCKEY: No, I just -- I got -- we cut out a moment.

DR. CARDARELLI: Okay.

MEMBER LOCKEY: My computer went -- went when you were answering my question.

DR. CARDARELLI: Well, I --

CHAIR CLAWSON: I -- I'm sorry, Jim. I -- I've taken to babysitting

you for so long, I totally forgot. I apologize.

MEMBER LOCKEY: You know, it wasn't --

CHAIR CLAWSON: -- try to get the sheets written up so I can cover all these things when we do this.

MEMBER LOCKEY: I was waiting all night for you to send me a note to charge my computer.

CHAIR CLAWSON: I -- I -- I forgot. Sorry.

MEMBER LOCKEY: Anyway, could you repeat the answer to my question for me? I'm sorry. I don't know if you can -- able to do that or not or maybe we just move on.

DR. CARDARELLI: It's been a while. Do you want to repeat the question?

MEMBER LOCKEY: That's all right, go on. I think my question was if you had a pipefitter and an electrician, you would -- and they both get bioassays performed, you would, of course, take the highest level in your -- in your dose reconstruction modeling, correct?

DR. CARDARELLI: We would use them all, yes.

MEMBER LOCKEY: Yeah, that's right. All right. Thank you.

DR. CARDARELLI: Okay. So, to wrap up the response, our response to SC&A's conclusion number two for the direct and effective monitoring that -- the fact that they may be overstated, we agree that we did not address all the radionuclides when tallying the results. We updated them here, and we conclude that really there's no significant change and that we can still create a coexposure model using the data that we have.

Now moving on to response to SC&A's conclusion number three, which

talked about the generalized matching is not sufficient. So, really, what does that mean? It constitutes what is a coworker. And I know that we've talked about this before, and it's mentioned in the slide. So, for effective monitoring, what constitutes a coworker. Is it the same person in the same position, or is it the same people working in the same environment but with different job titles?

The final draft sampling plan in 2018, the term coworker was used that was on the same RWP, which we had discussions, and it can be implied that a coworker is two electricians working together, not an electrician and a pipefitter. In effect, what we're really saying is you're in the same exposure potential environment, maybe doing slightly different work, but you signed in on that RWP which described that exposure potential. So, there's a coexposure potential that's being applied. Subcontractor construction trade worker is implied since that was the sole focus of that particular statistical analysis and review of these, and I'll call them now, special RWPs, not the standing RWPs.

So, the report 92 in 2019 really looked at subcontractor construction trade workers who were on the same RWP on the same date and the same time with no more than 15 minutes derivation. So, remember, some of these RWPs might last for a week or two, but we were interested in people who went in within the 15-minute time window for it. Because, frankly, over the course of that week, maybe those environmental conditions changed in there. So, we really wanted to nail down the specific time, date, and the same environment that they were in within about 15 minutes. Very specific. And any job type but laborer could be used for another craft.

So, SC&A suggested in their focused review for -- the focused review, again, being anything after 1990 to 1998-ish time period, that's the focus -- they were implying that the same craft also needed to be part of that coexposure development. Here we would argue rarely do you have two of the exact same craft going in. What we're interested in is they're going into the same exposure potential environment, they're all are being monitored or should be monitored, and they're all leaving bioassay samples, and if they're not, the bioassay samples that were collected of the people who were in the same environment are going to be applied in a coexposure model to give it to those people who either didn't leave a bioassay or were unmonitored. So, we're going to still give them exposure based upon the work environment that they went in with, what we've called, coworkers back then, it's a coexposure today.

So, we believe that the criteria for coworker matching are more restrictive than necessary for developing coexposure models. So, coworker versus coexposure is a misconception. I kind of discuss that briefly here. It was discussed in great detail in 2019. And as a result of those two meetings, the SRS and the SES issues, work group meetings, and the Advisory Board, I think everyone came to an agreement that the term "coexposure" would be more appropriate and less confusing than using terms "coworker." So, we have moved our narrative to be coexposures and coexposure modeling versus coworker model. And, again, all based upon the similar exposure potentials, not necessarily the exact same craft that worked right alongside them.

So, the matching criteria for coexposure models, there's no

requirement that the monitored person worked closely with the unmonitored person. What I mean by "closely" is right next to him. Remember the radiation work permit could be for a larger area, and they're doing a variety of activities of different things for different purposes because they have different jobs to do. But they're in that environment at the same time. The model's representative was bounding, which is very claimant favorable for unmonitored workers if they had the same or higher potential for exposure. And then the sampling plan focused on these subs again. But if any monitored worker, that could have been a primary construction trade worker, another subcontractor construction trade worker, a nonconstruction trade worker with the same or higher potential was monitored, that model would be representing or bounding.

So, this gets to Dr. Lockey's previous concept of if anybody's in there and they use monitoring data from that, is that going to go into the coexposure model? The answer is yes, and it would be representative or bounding. So, our conclusion to that is generalized matching -- or actually, SC&A's conclusion was that generalized matching is not sufficient. We would challenge that and argue that coexposure modeling coworkers used for effective monitoring matches need only have the same or higher exposure potential. So, SC&A's criteria for the same radiation work permit on the same date, the same time, and having the same exact craft are far too restrictive for us developing a coexposure model. And I would also argue if you get down to that level of -- it may not be as claimant favorable because then we would be excluding potential exposures for people more highly exposed who may have had a different craft.

I'm on to conclusion number four of --

CHAIR CLAWSON: John, John, --

DR. CARDARELLI: -- SC&A's if there's any comments.

CHAIR CLAWSON: John, just before you go on.

DR. CARDARELLI: Sure.

CHAIR CLAWSON: These 19 RWPs that you have, how long did these RWPs run for?

DR. CARDARELLI: I would -- I don't know the particular answers for those 19 or 20 or 30 that were selected, but they would vary, I would imagine, by their job. Tim, I see that you came online, so can you answer that?

DR. TAULBEE: Which 19 RWPs are you talking about, --

CHAIR CLAWSON: You -- your --

DR. TAULBEE: -- Mr. Clawson?

CHAIR CLAWSON: Well, let's just -- let's just take '96.

DR. CARDARELLI: It'd be a few days, I would imagine.

CHAIR CLAWSON: You what?

DR. CARDARELLI: Some could last for a few days.

CHAIR CLAWSON: Okay, I --

DR. TAULBEE: Well, -- go ahead.

CHAIR CLAWSON: What I'm trying to get to on this is how many in '96 or '97 or whatever, how many RWPs did you -- did you have, because there was the chart just a little bit before, okay. So, let's take -- let's take '94. You have 32 RWPs. What was the time that those RWPs ran for? Was it a week? Was it a year? What was it?

DR. TAULBEE: No, we --

CHAIR CLAWSON: Do you have any idea?

DR. TAULBEE: It was a -- I don't recall any that ran for a year. I don't recall many that ran more than a week or a month. Most of them were very short term, as I recall, when we were doing the sampling.

Perhaps others could chime in on that. But when we were doing the matching, and -- and I think Mike Mahathy can correct me if I'm wrong on this -- we were live looking, as John pointed out, within that time window of two people signing in, in that same time period. So, if the RWP went for a week, it wasn't somebody went in on a Monday and we matched him with somebody on a Friday; it was both of them had to be on a Monday type of scenario. They had to be there at the same time.

So the RWP may have gone longer, but when we were doing the matching, we were looking at the exposure potential at that particular time. And what we were doing was we were looking at all the subcontractor construction trades workers. So, we were going through the RWP and identifying all of the subcontractor CTWs.

CHAIR CLAWSON: Okay. Because I want -- I want to get the -- the -- what I was trying to get to. Because some of the RWPs that I looked at when I was at Savannah River there were for the project for the subcontract workers coming in and working on the waste transfer system that they had to go into. That RWP ran for over seven months. And it had electricians, it had pipefitters, it had everything else like that. Matter of fact, I believe that it had over 85 to 100 people signed in on that. And see, that ran for a long time, but under that, that was not classified as a normal RWP.

And -- and I've dealt with the special ones my entire life, because each one of our fuels is a special RWP. But we had our generals that we signed on for a year. The other ones we signed on to -- and we only had to sign once for it -- is for an extended period too.

I would like to know that some of these -- you know, a better understanding of how this RWP was run. But I just -- I just wanted to just ask that off the top of my head right there. I'll -- I'll -- we'll bring this up at a later time or whatever, but I was just wondering if you had that. So, I'll just turn it back to you, John, and we'll -- we'll address this a little bit later and go from there.

DR. CARDARELLI: Okay. All right. Let's get down to conclusion four. Getting close to the end. This one was: RWP-specified, job-specific bioassay data are incomplete. This gets to the discussion we had earlier about completeness.

And here are two slides that come from the SC&A focused review response, and, again, it's for the period 1991 to -- through 1998. And we've split this -- or SC&A split this -- into two categories, '91 to '94 and '95 to 1998 in looking at what they considered to be noncompliant monitoring.

Again, the noncompliant was perceived because something might have and 0 percent when, in fact, the RWP didn't even mention it. So, on the left-hand column here, it's the fraction of compliance, so a high number here would be a bad thing. That would show a lot of noncompliance. So, for put -- this is for five radionuclides that we talked about earlier; the plutonium, the uranium, the americium, strontium and fission products, and neptunium. So the 1991 to '94 noncompliance was around 25 percent for plutonium.

And then in the later years, it was understood to being something less than that, like around 18 or 19 percent.

One thing that will come into play later, you'll notice there's no uncertainty bars around this to determine whether or not these are significant or have a real problem with them. Uranium had the same trend where in the later years the noncompliance factor drops, which implies that things were being more compliant. And then, of course, americium has a higher noncompliance rate, but it certainly reduces in the latter part of the '90s.

For the right column, these are strontium and fission products, and they have a reverse kind of a trend where the noncompliance is actually lower in the earlier time periods than in the later time periods in the 1990s. So, they're just demonstrating the two. I will point out that americium and neptunium were not as voluminous in how many -- how often they were done because they weren't always on that routine bioassay. They would have been what we call job specific or something of this nature.

So, these could be higher because the numbers are lower. For example, I will say the neptunium, although that looks very scary and bad, I believe this was based on three radiation work permits on 11 workers. So, the numbers here are very small. And when you have very small numbers you can have great levels of uncertainty, but nonetheless it gives a perception that there's a real problem here; when you look at it in total, it may not be. But americium and neptunium are really kind of different. The plutonium, uranium, and fission products were certainly part of a more routine bioassay program, more numbers. We don't have the numbers

associated precisely with these -- on these particular graphs because I pulled them straight from the -- SC&A's report.

So that's where we get to the uncertainties. So, you know, if we inventory by year, we did not inventory again by nuclide. So, if you don't design the study, which is what we did, and we excluded nuclide, we can't really identify the uncertainty associated with the bars in these charts. So, we don't have an up and down here. So, it's very difficult to make a comment about whether or not something is statistically higher or statistically significant or they -- are they essentially the same. Without knowing those uncertainties, without understanding how this bar and uncertainty would be, these may very much overlap. These certainly might overlap. These could. So, we just need to be careful about how we interpret a particular metric without knowing its uncertainty.

But one --

CHAIR CLAWSON: John.

DR. CARDARELLI: Yeah?

CHAIR CLAWSON: Let's go back. Let's go back to that.

DR. CARDARELLI: Sure.

CHAIR CLAWSON: Because that -- I just want to point out something. You know, you're saying SC&A's uses these phrase -- phrases. You do realize that that was for data completeness, and we did get that from your report 92 because you guys used this same one. So, to tell them by using this -- you guys are using the same ones. I just wanted to point that out to you, because that kind of struck me a little bit odd. So, go ahead and go on.

DR. CARDARELLI: Okay.

MEMBER LOCKEY: John, this is Dr. Lockey. When I -- when I was looking at this table the last couple of days, you know, maybe it's because of the background I come from and I deal with databases, this type of table wasn't helpful for me. If you don't have numbers and (indiscernible) in the rows, you can't -- it -- it -- it is very difficult to interpret. So, why would a table, I guess, be -- why would you present me this table without the data, that information?

DR. CARDARELLI: I think that might be a question you might want to ask SC&A, because this is -- we're simply responding into a table that they presented to us.

MEMBER LOCKEY: Oh, this an SC&A table. I'm sorry. I shouldn't have asked that question, maybe. Okay. Just in a general overall, I mean, when I see a table like this, you need (indiscernible) and rows. You need the numbers to interpret the data or it -- it's uninterpretable. It really is.

DR. CARDARELLI: And that -- that was part of our statement here. So, and that that answers part of that conclusion in our response in conclusion four.

Now we're going to get into what we spent a lot of time talking about, this 79 percent issue with -- with compliance and completeness that was brought up. And I think that the key measure or the key statement is -- really the topic of this slide, is noncompliance with a program does not prevent us from developing a coexposure model and doing dose reconstructions. So, what we call the other half of conclusion four deals with, what we call, the job-specific sampling, which are routine samples but are specific to a particular job. They're not specials because nothing

happened in the environment which would have caused a special event where we think you have been exposed. But so, we looked at job specifics, the audits, the 1990 Tiger Team finding, and then the 1997 and 1998 Westinghouse Savannah River Company actions as a result of the Tiger Team finding, which we discussed earlier. And it was discussed in previous Board Meetings and work group meetings, I believe.

So, in report 102, and report 102 is not with the Savannah River site. Report 102 is an analysis of the plutonium bioassay program at the Los Alamos National Lab. And in that report, it states clearly that compliance with the regulations in place at the time of the radiological work was performed is not required in order to perform dose reconstructions or develop a coexposure model. So that's kind of the key message. We're applying the same logic to Savannah River that has been applied at Los Alamos. Dr. Ziemer made a very similar statement to this during an Advisory Board meeting in April of 2021. So, the audits, the Tiger Team findings, all the company actions to address this -- this perceived noncompliance -- or not perceived -- the noncompliance on a procedural violation does not affect our ability to create a coexposure model that's claimant favorable to give doses to people who were potentially exposed but not monitored.

Getting a little bit more detailed in what is a job-specific sample definition and why there's been some confusion. Totally understandable, because in the SRS procedures, the 5Q1.1-506 -- I won't read this slide to you, but I will point out the two areas that I have underlined in these two different definitions at different points where they talk about routine

program and the quote/unquote, underlined, nonroutine, job-specific program.

So when you follow it up with the way that is, it certainly implies that a job-specific bioassay would not be part of the routine program. That's frankly just poor writing, and it's not how it was practiced in the field. The second paragraph says something very similar, nonroutine job-specific bioassay programs. In effect, they were all part of a routine program. It just determined whether or not something was specific to a job and you were not on an already routine program. So, the key point here is job-specific samples are not special samples. Those are the samples when you have a failure in PPE or the engineering controls where an intake is likely suspected. The specials are going to be the most highly -- the highest likely bioassay results. And we want those in this coexposure model to make it more bounding and claimant favorable.

So, yes, this contradicts a 2017 interview with a former site internal dosimetrist where job-specific bioassay is a program prescribed in response to a specific event, but it's not a special bioassay. So, we're mixing up different meanings, and -- and even the site protocols give the wrong impression.

This gets down to the DOE notice of violation that Mr. Clawson has brought up. And I just wanted to point out that the notice of violation was changed from a health and safety violation to one of a procedure because DOE agreed that job-specific samples or routine samples were not the same as special samples, which was implied that they were not doing proper bioassay samples. And so it became -- and it's a big difference whether or

not you have a health and safety violation or a simple procedural violation.

I will say that the special bioassays, the ones where workers were likely involved with a potential intake of greater than 100 millirem because something unusual happened, they are prescribed by RadCon prior to 1991, but the areas after 1991, we would get a phone call and the internal dosimetrist would be asked this happened in the environment, should this worker leave a bioassay sample, and what should they leave it for. And that information was tracked, which is something that we've recently learned. And I'll get to that at the end --

CHAIR CLAWSON: Yeah, but John, --

DR. CARDARELLI: -- of the slide.

CHAIR CLAWSON: John, I -- I just want to -- you are correct. A health and safety violation is different than a procedure. Do not ever say that a procedure violation is small. The world I come from, you violate procedure, I see many people go down the road because of it. It is mandatory, DOE compliance is, period.

And for this comment, despite what the procedure said, job-specific samples were part of a routine program and were not specific samples according to the site procedure. You're stating to me right there that -- and this is why they were fined -- that they were not complying to DOE procedures, period. There's -- there's no question of that.

DR. CARDARELLI: Well, yeah, there's no --

CHAIR CLAWSON: And -- and this is --

DR. CARDARELLI: -- question.

CHAIR CLAWSON: And this is the same thing -- this is the same thing

that this individual went to DOE, and he fought the same way and everything else, and they told him that they had a good -- they had a good normal routine bioassay program, but they were not complying to their procedures. And that's why they were fined. And they found people that had fallen through the cracks.

DR. CARDARELLI: Correct.

CHAIR CLAWSON: That's the issue.

DR. CARDARELLI: Yep, my apologies. I don't mean to imply that any violation of anything is less. Certainly, if the procedures called for it, it hadn't happened, they did get fined for that. So, thank you for that clarification.

So, coexposure models that we are planning to develop or are developing, they will include these specials, which is -- makes it a bounding coexposure model because the most highly exposed workers are part of the data set. And why are they the most highly exposed workers? Because they have been called out because they've been involved in an incident where the engineering or personal protective equipment and controls have failed, and we feel that they have been exposed outside the routine environment. Their bioassay datas will be included. So, if the samples collected were suspected intakes, which they are because their specials, are part of the data set, a bounding coexposure model can be constructed regardless of what the job-specific sampling and radiation work permit states.

So, we did a follow-up question on the internal -- from the internal dosimetrist recently, in October of 2022, to get some clarification because

we wanted to verify whether or not these special examples -- or special bioassays can be included. And we've learned that during the time period starting around in 1991, anytime someone had a special that the internal dosimetrist had to approve a request, that went into a separate database. A database that is just called TRACK.

So, they were tracking people who had this highest potential exposure. Okay. So, the response on conclusion number four, which was the RWP specified job-specific bioassay data are incomplete. That would be an SC&A conclusion. Our response is if the samples prescribed by the site internal dosimetrist when a suspected intake occurred, the samples that are in this new TRACK database are part of NIOSH's coexposure database, this is evidence that a bounding model could be constructed despite what this conclusion shows.

I can say that we have already made a request, a formal request, to the site to get a copy of this TRACK database. The most recent feedback that we received is we are expected to receive this TRACK database sometime in May. Obviously, after we receive it, we will verify whether or not the information in that TRACK database is included in our coexposure models to validate and verify this conclusion.

Any comments on that one?

CHAIR CLAWSON: Well, it -- it's interesting because that individual has been a part of your program for so long and that now we're just hearing about this. I do have a problem with that.

But I do just -- you know, going back to this procedure violation, I want to make sure that everybody is clear on what that procedure violation

was for. It was for not -- not collecting required bioassays. That's what the procedure violation was for. These people did not collect those.

Now, I -- I -- I -- I'm -- it'll be interesting to see this TRACKs. I can't talk to that. It's interesting that we've gone this far and now all of a sudden, we find this. But it'll be interesting to see, because how do you -- how do you track something that the information really got into that? So, we'll -- we'll see what comes up with that.

And I'm good with -- and we can just continue on.

DR. CARDARELLI: Okay. Just one -- one point --

CHAIR CLAWSON: All right. All right.

MEMBER LOCKEY: Brad, I -- hold on a second. Brad, I didn't understand your -- your last statement. I -- about --

CHAIR CLAWSON: What part of it?

MEMBER LOCKEY: Just the very last piece, Brad.

CHAIR CLAWSON: You talked -- have you heard of TRACKs? Have you heard of TRACKs yet?

MEMBER LOCKEY: I've heard of TRACK, what they're talking about here. So, what I was trying to say is that if they -- if there is TRACK data available, they can run an analysis to see if their current database contains that or not. If it doesn't, then that's a problem. If it does, that's reassuring, I guess. That's how I interpret that. I wasn't sure where you're going with it. That's all.

CHAIR CLAWSON: What I looked at is what they are -- to me, what they are saying is that all these special RWP requests were done by contacting the health physicist and him evaluating if they needed to be

sampled or not. So, how do you know -- are you -- is this TRACK, is it saying was contacted on June 1, that this person has this kind of a RWP, but I don't feel that they need to be on a special bioassay?

Is it -- is it set up in that way or is it saying that each one of them has gone through there and that each one of there, you know, the -- the whole thing is -- is -- you know, it's just -- it comes back to a computer, Jim. Garbage in, garbage out. If you don't have a way of being able to track the information that went into this and what was accepted and what was not, how -- how do you say that was good?

That -- but -- but I can't really speak about that, Jim, because I -- I'm -- until I see it, until I evaluate it, I really can't. I can just speculate at this time, and that's -- that's why I was kind of big on it, and I apologize. Next time I'll try to bring better crayons for you.

MEMBER LOCKEY: No, Brad, this -- this -- you know, dose reconstruction and looking at databases this size is not an easy task. It's not easy. Anybody says it's easy hasn't done it. But what I was trying to understand -- maybe John can answer this -- when you talked about TRACK data, you're talking about samples that were special samples, meaning that it wasn't unusual, or it was something that happened. Is that what a TRACK sample is?

DR. CARDARELLI: Yeah, my understanding of the TRACK database is it doesn't contain any of the routine or job-specific results; those are more routine. The TRACK is really a separate database that keeps a counting of all of the specials, and the specials are representative of something that went abnormal in the environment or a known potential intake. So, these

would be the highest potentially exposed people as a result of some abnormality in the work environment.

MEMBER LOCKEY: Okay. So, I guess, what I'm asking then, John, is if I was an independent investigator and I wanted to look at my database and I found out that these were available, I would look at those results and compare them to my current results and see, if fact, I do have the highest exposures in my database. Is that what you're...?

DR. CARDARELLI: Yes. You broke up a little bit, but I believe that's exactly our next step is to get a copy of the database and then compare it to our existing coexposure models to verify the all the data in TRACK is included in the models.

MEMBER LOCKEY: And would your hypothesis be that TRACK data most represents the highest quartile?

DR. CARDARELLI: That would be -- yes, that would be expected, because there was something unusual which caused them to have a special bioassay taken.

MEMBER LOCKEY: And if you don't -- if you don't control your hypothesis, then that's going to make you think double about your current database, I take it, right?

DR. CARDARELLI: You want to repeat that? You want to say that again, Dr. --

CHAIR CLAWSON: (Indiscernible.)

MEMBER LOCKEY: I'm saying -- what I'm saying is if you look at this TRACK -- you have a hypothesis that in theory the TRACK special exposures, and by nature that's accidental exposures or unanticipated exposures, I

would expect that that data from an exposure perspective should be in your top quartile, okay?

DR. CARDARELLI: Yes.

MEMBER LOCKEY: Okay. So, if that's -- perhaps that's your hypothesis, and now you're going to test your hypothesis, correct?

DR. CARDARELLI: Yes, but I will put this little qualifier. These are taken because of the suspected uptake because of something abnormal. It doesn't mean that they're all going to be high. You could have a zero or nondetect in the specials because the person didn't have an intake, but they were involved in an incident that potentially resulted in an intake.

MEMBER LOCKEY: And I -- and so that's an uncertainty, but I just -- from a logic perspective, you would think at least some of these would represent the highest exposure levels.

DR. CARDARELLI: Yes, that's a fair assessment.

MEMBER LOCKEY: Oh, okay.

CHAIR CLAWSON: You know, I guess, part of your terminology of a special RWP and so forth like that, we -- we dealt with them when we went into any area that was a nonroutine area that had different radionuclides than what was on our normal RWP that we were being monitored for. But also, too, when we were doing a job and all of a sudden an air sample went wrong and we were getting something that we did not expect, then we were given a special -- they had to provide a special RWP, but it also put us in the process of if we have to, you know -- if we had nasal smears or whatever and we showed up something, then all of a sudden we had a special bioassay that we had to do.

Some of the terminology -- and I'll be quite honest with you, John -- on special RWPs and so forth like that is -- is a little bit different than -- than what I -- I've dealt with. So, sometimes if -- if I'm questioning things, it's because it's -- it's different than what I've dealt with in DOE, and I know DOE's compliance of two procedures, and I thought they were all kind of the same. But I think we're talking past each other a little bit on some of these special RWPs.

DR. CARDARELLI: Yeah, yeah, a little bit, but I agree with you that the terminology, while important, can be confusing. And here I'm talking about special bioassay samples versus RWPs, just for clarity. And Dr. Lockey and Mr. Clawson, you guys bring up excellent points. We would be -- I would certainly be interested once we do get this TRACK database, it has the date, we could be looking at additional information to get a better understanding of why it was called a special. Because, as we have seen in the past, workers do get nasal swabs or there's a surface contamination measurement or there's an air sample that's also available that could be part of an incident report that would help give us a better understanding. And a worker may have a very large nasal smear, but the bioassay be nondetectable. Those are types of situations that can occur, and that goes to a little bit of what Mr. Pompa talked about was, when you take that sample, because it may take time from the time they inhale it for it to actually show up in the -- in the urine, and that could be weeks, months, or much later than the actual day of the exposure. So that's -- we -- we put all of this information together to try to understand the workers' potential exposure, so...

CHAIR CLAWSON: Now I've got a question for you. So, my understanding in this and -- and in reading the enforcement action on this, I never read anything about TRACK in that. And so, I -- I'm sure that being the health physicists at this facility that DOE had already looked at this TRACKs before issuing the procedure noncompliance. So, I -- I -- I want us to keep that in mind too, that this -- this -- this has already been seen by DOE.

MEMBER LOCKEY: Brad, can I ask you --

CHAIR CLAWSON: (Indiscernible.)

MEMBER LOCKEY: Brad, can I ask, maybe, you or Paul a question or both of you? I'm not knowledgeable on -- I'm certainly knowledgeable in health and safety issues and procedures involving railroads, and it's very clear cut. There are certain violations at a railroad you lose your job and other violations, you're -- you're -- you're given a warning.

What's -- what's root -- what is the difference between health and safety violation and a procedure violation? What -- what is that? What's the difference? Is there an administrative difference? Is there a definition that breaks those two out?

CHAIR CLAWSON: Well, I'll let -- Paul was part of DOE and in that section, I'll let him answer it better. But my understanding, if it's a health and safety one and an individual can be actually hurt like this, it is very, very serious. And one of the reasons why DOE in their report as they put this -- of the notice of violation, they did say that Savannah River did have a normal -- they did a good job on their normal routine bioassay, but they were not in compliance with their procedure where there was 79 percent

that were not collected. In the procedure, it says that you will collect these bioassays. That is why afterwards, they had to go back and do 100 percent checking.

Now, in my world, when I have a procedure violation, it is different than a RadCon, because mine are tied to criticality, to national security, and to a lot of different things like that. And those are usually -- we usually -- if you willingly violate a procedure, you're fired, period. No ifs, ands, or buts. But --

MEMBER LOCKEY: They shifted you -- your -- your procedures are more of a national security issue, I take it, right?

CHAIR CLAWSON: Well, criticality, too.

MEMBER LOCKEY: Gotcha.

CHAIR CLAWSON: Or -- or it actually comes into a health and safety issue because if we violate a criticality control, we can actually endanger the life and safety of other people around us and the surrounding community.

MEMBER LOCKEY: Gotcha.

CHAIR CLAWSON: So, but -- but, Paul -- Paul was in the situation where -- where he was actually in the health and safety of DOE, so I'd let him, if he's online, address that if I've done it correctly or not.

MEMBER ZIEMER: Yes, I'll -- I'll answer that in part and indicate this would be true of DOE and also of the regulatory commission, that some -- there are some procedural things that don't rise to the level of having to report them up the line that are taken care of internally. These would be rather minor things that you would take care of with the administration of a particular site. But there are other things that I -- in the type that Brad's

talking about that are serious enough that they go all the way up to the top of the pyramid, as it -- as it were.

And, for example, for a Nuclear Regulatory Commission facility, there are things that it's mandatory to report to the commission because they violate certain requirements of a license or of a regulation. And same is true in DOE where facilities have to report things up to the -- the DOE. The other part of this and the -- the issue of whether it's a violation or whether -- well, let's say a violation precludes dose reconstruction, you could have a violation, and we have, where a bioassays weren't being done, and, in fact, that's one of the reasons why you go to a coexposure model, because you have those -- those violations that cause a lapse in the data available for a worker. So, you can do dose reconstruction, regardless of the violation is -- is one of the points. But, yeah, if you're working with critic -- a critical -- potentially critical mass materials, you got some very strict -- some very strict procedures that would automatically up -- up the chain if they were violated.

MEMBER LOCKEY: Jim Lockey again. When I read this bullet point, 1997 NOV was changed from health and safety violation to procedure violations because the DOE agreed that the job-specific samples are not --

MEMBER ZIEMER: Because what?

MEMBER LOCKEY: Just reading that bullet point on page 32. The middle bullet point. I guess I just don't understand why did -- why did DOE change to a procedure violation?

MEMBER ZIEMER: Well, 1997, I wasn't around the DOE at that time. So, I can't -- I can't speak to that specifically.

CHAIR CLAWSON: But well, it -- it calls it out in the notice of violation, and correct me if I'm wrong, Tim or John, but the reason why they changed it from a health and safety -- because that is a much higher issue. When you have one of those violations, that is a lot more serious -- to a procedural one because they still did have a normal bioassay routine process that they were doing, but they were not complying with the collection of the samples. I believe that's the way that it was state -- stated in the notice of violation, and that's why they dropped it down. And -- and that was actually at the request of Savannah River because a health and safety violation is a very serious one, because they're saying that you've actually put people's lives in jeopardy. But they also said because of the normal bioassay process that Savannah River had, their normal bioassay routines -- routine sampling, they did drop it down to a procedure violation because that -- that was not -- it is not as serious in DOE's world.

MEMBER LOCKEY: Okay, thanks, Brad. I just -- I mean, I kept reading that and I -- I can relate to my own environment where I work, and I understand what it meant, but I didn't -- did not know what it meant at a DOE facility. Okay.

CHAIR CLAWSON: And am I correct in that assumption, John?

DR. CARDARELLI: I believe so. Tim?

CHAIR CLAWSON: Right.

DR. TAULBEE: Yes.

CHAIR CLAWSON: Because -- because it call -- it calls it right out in the notice of violation. And I believe it even states in there that at the request of Savannah River that da-da-da-da, and they justify why they

dropped it down because of the normal bioassay program that they had in place. The violation came from -- from noncompliance to the procedure, DOE's CFR -- I can't -- can't remember what the whole thing was on that.

DR. TAULBEE: I believe --

CHAIR CLAWSON: -- and that's -- that's why they dropped it down.

MEMBER LOCKEY: Appreciate it. Thank you.

DR. CARDARELLI: Okay. I just wanted to kind of summarize that up, that Dr. Ziemer mentioned, that just because something was not compliant doesn't mean we can't do a coexposure model. In fact, that's why we want to do coexposure models that -- so we can give exposure to people who may have been unmonitored but should have been. So, that part's good.

The other thing that you will see in the next presentation -- because I'm coming close to the end of mine -- is this 79 percent compliance factor, and that's very -- frankly, that's a very misleading number. It gives the perception that there's 79 percent noncompliance. What that really represents is a 5 percent of the total. So, it's 79 percent of the 5 percent that were not compliant. And then of those, everyone was retested, and not a single one of them came back with an intake with exception of two people who had left the site. So that's where you get the 100 percent were not exposed. So, when you see 79 percent, think of it being -- it's 79 percent of 5 percent of the people monitored. So, that would be a more accurate or complete definition for that.

CHAIR CLAWSON: Okay. And John -- and I understand what you're saying on that. That being said, that 5 percent -- now, you're talking the whole total overall, the 79 percent were special RWPs, basically, correct?

DR. CARDARELLI: No, I think that they were special bioassay, not special --

CHAIR CLAWSON: They are --

DR. CARDARELLI: -- RWPs.

CHAIR CLAWSON: -- special bioassays. Now --

DR. TAULBEE: They were the job-specific bioassays. They were the job-specific bioassays.

DR. CARDARELLI: Job specific.

CHAIR CLAWSON: (Indiscernible.)

DR. CARDARELLI: I'm sorry. You're right. Job specific.

CHAIR CLAWSON: Which -- which you're -- we're using terminology that are kind of crossing over one another. Now, if when they did that 100 percent -- and this comes out in the notice, too -- if when they did that 100 percent violate -- or the monitoring over the next year, and if they would have found one person that had had an update, they wouldn't have been able to drop that from a health and safety down to a procedure.

DR. TAULBEE: That is correct.

CHAIR CLAWSON: But so, that's where luck was on their side. It's -- it's -- it's -- I want people to realize that that was very fortunate.

DR. TAULBEE: Well, it's also, I think -- there's another slight -- a different interpretation from that standpoint in that the site was potentially over monitoring the number of people that they needed to be monitoring, and so, the overall population that was being monitored was larger than the potential that had to -- of people that had a potential for exposure to exceed 100 millirem is another interpretation of that, not that they necessarily got

lucky, that they had a larger coverage --

CHAIR CLAWSON: Well, and --

DR. CARDARELLI: -- than was necessary.

CHAIR CLAWSON: And I understand what you're saying, but, you know, even in today's world in DOE, we -- we still have the problem because we are at this -- this '91-'97 time period here, this is when we're changing. Before, when this was all DuPont, they were paid X amount of dollars for doing the process. Now all of a sudden the monitoring of the workforce, the monitoring of everything, comes under the contractor that is having to foot the bill for it.

So, that 100 millirem, that was a thing that they kind of came to if you're -- if you don't have the exposure or ability to be able to go over 100 millirem, you don't have to be monitored. And this is still a battle that they're fighting today because of the term "potential." Now, I deal with items that far outweigh the potential for 100 millirem, in a heartbeat I could be done. But because of my safety factors and everything else like that, the company still can say well, nope, he's not going to get that. They monitor me up to 100 millirem. I have to get a special letter to go past it, so forth, everything else like that.

This -- this isn't a time change here. This '90 time period is when the CFR is starting to come out and things are starting to change. And also, the contracts are starting to change. So this was -- this is part of the issues of where these changes start to happen a little bit different, and they're still dealing with them today.

DR. CARDARELLI: Okay. I think this is my final slide. Conclusion

number five -- or actually, it's not. It's the second to final. It's the -- the conclusion -- SC&A's conclusion was that the feasibility of a coexposure model needs to balance an RWP implementation with completeness and coworker data. And go -- bring us back -- back to early on in our discussion, this is where the concept of feasibility of developing a coexposure model became part of our narrative with regard to the shift in the focus because of this particular conclusion. SC&A's conclusion, where they're using the words feasibility of needs to balance. So, that might explain how that -- how we came to that interpretation.

But I wrote an email to get clarity of exactly what they meant by that particular statement and asked if we address all of the concerns that they've mentioned in conclusions one through four, would SC&A consider our conclusion valid that would support the development of a coexposure model, and they wrote back and said yes, our interpretation is correct on that generalized statement. So, we don't believe that there's any detailed response necessary other than the fact that we have asked, they have answered, and we believe that we've met their expectations.

So to wrap this up, there were five conclusions or five responses to SC&A's conclusions. The first one is absence of a bioassay requirements on RWPs in the early '90s is irrelevant because bioassay programs were prescribed by procedure. If you're exposed, you go on a routine program. The RWP in the early '90s did not specify which radionuclide. It was done by procedure. That was later changed in the mid '90s where they included it on the RWPs.

Number two: Changing the definition of "monitored" had the expected

effect, but the new summary statistics do not prevent creating a coexposure model.

Number three: SC&A's coworker matching criteria are far too restrictive because coexposure -- for coexposure models, the only necessary criteria is that the monitored worker has the same or higher exposure potential than the unmonitored worker, and we went so far as to look at them who signed in on the same date, same time, within a 15-minute time period.

Number four: Regardless of the issues that SC&A pointed out, if the samples from the most highly exposed workers -- and these would now be considered the people in the TRACK database -- if they're part of the coexposure database, this is evidence that a coexposure model could be constructed, be representative, and probably bounded.

And the final one is NIOSH has addressed all of the SC&A previous issues from a focused review, and we maintain that coexposure models can be developed for subcontractor construction trade workers, that we can apply those numbers to unmonitored workers for dose reconstruction purposes. So, that concludes my presentation. It didn't -- I didn't expect it to take almost two hours -- two and a half, but we had good discussions.

CHAIR CLAWSON: That being said, is anybody willing to have a 10-minute comfort break? Rashaun?

DR. ROBERTS: I think that's probably in order. So, do people want to come back -- could we say 1:35 Eastern?

CHAIR CLAWSON: Yeah, that'd be fine with me. Lockey, are you going to be able to take care of that? Will that be okay for you, or do you

need more time?

MEMBER LOCKEY: Well, I was going to take a break and go skiing if that's okay with you, but I'll stay around.

CHAIR CLAWSON: Okay, sounds good. Okay, we'll see you guys in 10 minutes.

(Whereupon, a break was taken from 1:22 p.m. until 1:35 p.m.)

DR. ROBERTS: I'm going to do a quick roll. Clawson?

CHAIR CLAWSON: Here.

DR. ROBERTS: Lockey?

MEMBER LOCKEY: Here.

DR. ROBERTS: Pompa?

MEMBER POMPA: Yes, ma'am.

DR. ROBERTS: And Ziemer? Okay. I don't hear Ziemer, but Brad, I'll defer to you. We do have the quorum. Do you want to go ahead and get started or see if Paul signs on in a couple of minutes?

CHAIR CLAWSON: Let's go ahead. We can -- we can start into this. It'll take us a few minutes to be able to get started anyway. So, I -- we did -- if it's all right, Rashaun, go ahead and proceed then.

DR. ROBERTS: Sure.

CHAIR CLAWSON: Okay. Well, I'd like to thank John for his presentation and so forth like that. I would like to ask if there's any Board Members that had any more questions for John. I know that we kind of came to an end. But with the discussion, I thought that a comfort break was a lot more important at that time. So, I'll open it up to any other Board Members that have any questions. If not, then you're off the hook, John.

Boy, that's -- that's pretty doggone easy. I think we took advantage of it on the way through, so.

DR. CARDARELLI: Thank you, Brad.

SC&A Presentation: Focused Review of ORAUT-RPRT-0092, Revision 00, and Remaining Petition SEC-00103 Evaluation Report Period 1971-2007

CHAIR CLAWSON: I'm going to turn it over to SC&A with their presentation now, and we'll go from there.

MR. FITZGERALD: Yeah, thank -- thank you, Brad. This is a Joe Fitzgerald, and I am looking to you, Bob, to -- I think Bob's about ready to share the screen. Thanks.

I have -- I can report I have 18 slides. So, this is definitely going to be a little shorter, I think. And I'm going to just walk through these, sort of, introductory ones pretty quickly. Next slide, Bob.

Yeah, just -- just a little bit of milestones here. The reason we're, you know -- we're kind of giving you an initial reaction or response to NIOSH's report is -- we did get this in January, and we've been going through references and actually looking at some of the data. Again, we will be preparing a report, but we're not quite ready to give any formal -- you know, formal responses. And, John, thank you. I think this was actually very helpful to us as we're trying to interpret and understand the NIOSH response. So, I think this was very a helpful -- you know, has been a very helpful discussion.

Next one, please.

Okay. I'm not going to go through this, but just to, again, reflect on

the milestone that the Advisory Board did provide a recommendation for the SEC for '72 through '90 for subcontractor construction trade employees. And this is certainly a continuation of the review that led to that particular SEC. And what I want to do is provide some context for the tasking that we received. And our tasking, basically, was to continue the review for the work group for the successive years, you know, '91 to 2007, review report 92, which was, of course, the -- the basis for the discussion that has taken place over the last several years. So we -- this is a continuation -- from our standpoint, it's a continuation of that review.

Next slide please.

And this is more specific on the basis for the -- the SEC class that was defined and recommended. And, basically, subcontractor construction trade workers, CTWs, conducting a broad range of work activities. And I want to emphasize that this class is a relatively special class in that they may have worked in high contamination, high airborne reactivity areas, and the work is -- was typical -- and Savannah River is not that much different from other sites -- it's typically intermittent, often short-term high exposure work tasks.

And particularly in the early '90s, subcontractors at Savannah River were relatively transient given the restart activities on the reactor, and also with the cleanup in DND that was going on. So a lot of subcontractor workers coming and going, intermittently tasked, moving from facility to facility, often doing the hot jobs, that the -- you know, the permanent employees were not used for. And -- and often, because they were intermittent, did not receive termination bioassays.

So, you know, certainly the -- the problem is one of trying to capture

any intakes that they may have received. And I want to emphasize this particular work category, this worker category, because I think, in John's presentation we were talking about, you know, that one could, I wouldn't say overlook, but one could still proceed perhaps to coexposure model even with this kind of data missing if you judge that the routinely monitored worker population was large enough or perhaps you judge that because of radiological controls and management that the most highly exposed individuals are somehow reflected in that population.

And I think you just -- and again, this is from our review -- can't assume that this particular subset, the subcontractor construction trade workers, and the type of work they did and the type of exposures they were exposed to can necessarily be a subset like that and judged not significant enough to be -- to be treated that way. So, I just wanted to make sure that was clear.

Next slide, please.

And, again, on the -- this is the final, sort of, backdrop, in terms of the SEC, finding. The Board found in their -- in its recommendation -- and this was the basis for the designation for the prior SEC class for subcontractors that there was insufficient information, including a lack of job-specific bioassay monitoring data for subcontractor construction trade workers. And also, insufficient assurance that the workplace monitoring and source term data was being collected. So, it was -- it was a combination of -- of -- of incomplete data, lack of data, and inadequate assurance that the -- that the bioassay or the data itself was being collected.

And this is essentially our starting point in terms of, what I would call,

our focus, since that word is being used a lot. Our focus for '91 to 2007 is squarely on these issues, the completeness of job-specific bioassay data and whether that can be tied to some demonstrable evidence of program insurance -- assurance, and implementation to collect those bioassays. So, sort of a two-way thing. And no, we have not shifted from that focus. That is our focus, it has been our focus for the last three or four years.

Next one, please. Yeah.

And so, the question that guided us is when did the information become sufficient, since that's the key word that was used in the SEC basis, to enabled dose construction with sufficient accuracy? And, again, our context is report 92. That's the scope of what we're operating with and the -- essentially the understanding and the data that we're working with. So, we did not shift from that focus or that context.

And quite frankly, we're not -- we're not privy -- and I've been listening very intently to John's presentation. It's been very helpful to me, because I was a little confused with the response, the written response, that we received. We're not privy to NIOSH's -- and I think this was mentioned by Tim -- you know, privy to NIOSH's emerging -- I don't know, what is it, new policy or new approach on coexposure model development. But, you know, we, given tasking and given the history on this review, are pretty much confined to reviewing report 92 as the means to sample for completeness, and to extend that into these successive years to see whether those conditions may have shifted for the positive or in terms of more completeness and more program ensures -- assurance to enable dose reconstruction with sufficient accuracy.

So that's kind of where -- that is the context and the focus of what we're doing. And in that review -- and I think John's covered this fairly well, but let me just, kind of, stop on this a bit -- is from a programmatic standpoint, you know, we're looking at the WRP (sic) and the job-specific bioassays policies, procedures, and practices, and more importantly, to what extent there's evidence that they were implemented in the workplace at Savannah River. And we're -- and we're linking that with another review and, of course, we had conducted something very similar in the last three or four years in that -- in our review of Savannah River to look at the data that has come out of report 92 on RWPs and the extent to which one can match those with corresponding bioassays and to see what we can see for the early '90s in terms of data completeness and to the degree which those bioassays were submitted.

Now, generally -- and we've said this in the past -- the -- certainly, the perspective of RWP implementation and job-specific bioassays much -- were much different in the Westinghouse era than in the preceding DuPont era. In the DuPont era, as report 92 and that review and follow up found, you know, we had job plans. We didn't have RWPs so much. And those job plans did not have any firm linkage to job-specific bioassay. So, trying to arrive at, you know, good conclusions facility by facility or site-wide just didn't prove to be feasible. I think it was only one facility, if I remember, for which RWPs had been done, you know, for any length of time.

So, with RWP implementation during the Westinghouse era, certainly report 92 does provide some (indiscernible) for review, and that's how we focused on it, to take what data we had in report 92 and to kind of focus on

how one could apply that data. And, again, I guess, I have a little bit of an issue with trying to dress it up in terms of a lot of statistical precision because, again, I think given the way the data is collected -- I mean, it was all available RWPs, and if people recall, we had a -- we had some good fortune to uncover, I guess, it was 40 or 80 boxes of RWPs at the eleventh hour which added to the complement. But it's proven to be -- it had proven to be a much bigger issue to actually come up with what was available, and it wasn't necessarily complete by time or facilities in a lot of cases. So, we always appreciated that in doing this sampling, it would be probability more of an indicator basis in terms of -- of a -- an opportunity to look at what completeness -- what one could conclude on completeness but realizing that it would probably fall short of what would be useful in a coexposure model. So, this, again, and it's strictly in the context of data completeness, and strictly from the standpoint of looking for some indication of completeness that we could use to illuminate the question of when did the circumstances at Savannah River change for the better in terms of data completeness such -- such that a coexposure model would be feasible later.

MEMBER LOCKEY: Hey, Joe, this is --

MR. FITZGERALD: Next slide, please.

MEMBER LOCKEY: -- Dr. Lockey. Now I'm going to interrupt you --

MR. FITZGERALD: Yeah.

MEMBER LOCKEY: Back in the '40s, '50s, '60s, maybe '70s, you know, when I was initially involved with looking at K-25 and Y-12 in relationship to whether they could reconstruct exposures back in the early '90s, we determined they couldn't, especially back in the '50s and '60s. Our

databases now are much more comprehensive, much more complete, more extensive. And I really have trouble with you when you use the term "dress it up in statistics." I know you're knowledgeable in statistics. I know you come from a great background. You can't possibly look at this type of database with this many samples, with this redundancy, and not do a (indiscernible) statistical analysis to see if it's about a database. I mean, (indiscernible) statistics -- I mean, to me that's an offensive remark.

MR. FITZGERALD: Well, I'm sorry that you took it that way. I think my perspective was the original sampling plan that was developed was -- was applied to what was available in terms of the RWPs that could be found. And I think it was discovered early on that the RWPs that could be found were quite desperate, were -- were not as complete or nearly as -- perhaps as useful as was envisioned.

And -- and the number of RWPs for the specific facility in years are essentially your -- your denominator if you're looking at the fraction of those RWPs that were, -- in fact, could be linked to required bioassays. So, when we were looking at the, you know, completeness, we recognize that, you know, that's is the source of the information that we're -- we're starting with and the -- you know, maybe the best we could hope for is to get some indication of, you know, relative completeness from the standpoint of the RWPs we have for the specific facilities and times and workers. The -- this would be the fraction that happened to show that bioassays were collected.

So, we recognize that was more of an indicator, one that -- for which we certainly did not know the completeness of the RWPs that we even started with. And when we were -- I think NIOSH was finding boxes at the

very end that were quickly added to the complement that was being evaluated. So, I think the -- from the -- from the very beginning, we recognize that from a standpoint of doing a completeness review, this would be one that would give us a good indication but one that may not necessarily be as statistically sound as we would like to have it, just simply because of the information that we're dealing with.

We just -- you know, if you think of it as a deck of cards, it would be great and statistically sound if we had all 52 cards in the deck, but we are operating with maybe half a deck at any given time in terms of the analysis. So, I -- I just wanted to make sure that certainly that perspective of how we were trying to do matching and how matching was done in a lot -- you know, certainly in parts of '92 that, you know, we always recognized that this was the best one could do with the information that was available.

MEMBER LOCKEY: I appreciate that, Joe, and I appreciate all the time and effort you guys put on this. I just -- I don't know. I guess I had to go back to where do you -- when you analyze it, it was my impression SC&A and NIOSH were working on the statistical approaches to look at -- look at this database to see if it's complete or not complete and can answer the pertinent questions. Are you agreeing with that approach, or do you think that's not proper approach?

MR. FITZGERALD: No. We actually -- and I think you were very much involved. We very much reviewed the sampling plan that was developed based on -- which -- from which 92 was developed from. And that sampling plan, I think, walked through the whole -- you know, the whole process of how one would match -- what would be considered a match of a -- of

bioassay being done for an RWP. And I think it was recognized at that point that that was just a one-for-one simple matching exercise.

I think there was definitely some statistical analysis that was done, and that was around the -- some of the uncertainties for some of the coworker or coexposure matches. And I don't think we had any problems with that either. So, I think there's aspects of this that were treated in terms a statistical analysis. I think -- I don't have any dispute on the uncertainties that were worked. I think in a more overall sense, we also recognized, and I have to believe NIOSH recognized, that we weren't dealing with a complete set of information or data in terms of the RWPs and missing those for -- you know, for certain facilities, certain dates, you know, -- clearly, you know, it's a completeness view with a bit of an asterisk. But it was the best that one could do with the information that was available. So, I -- we agreed with the sampling plan, and we agreed that report 92, even though we've had some -- have had some issues and interpretation with it, was the best product or best assessment of the question that was raised back in 2017 in terms of would this data gap that was identified in 1997, what can one say about the completeness of job-specific bioassays for the preceding years. And this is going back to '72, but now we're talking going back to '91. What can -- what can one say, and is there any way to demonstrate completeness in the face of that information.

And I'd like to add that, you know, much has been made that this is simply a compliance issue and therefore should not factor into a consideration of whether a coexposure model was -- is feasible or not. You know, I'd like to, you know, again, remind the work group it is the

implication of missing 79 percent of job-specific bioassays for subcontractors that drove this issue originally and raised the question of, you know, can you, in fact, establish completeness such that a coexposure model would be -- would be feasible according to your own guidelines, which is I -- you know, we've said IG-O6, and -- and -- and that's what we've been working at now for several years. So, this is just an extension of that same question and saying that okay, is there any way we can establish a point, a time frame, where we can feel confident that between looking at data completeness, ala report 92, and looking at the program assurance provided by procedures and policies and the Westinghouse Radiological Improvement Program, which was put in place when they became the contractor, is there any way we can actually establish a time frame when that was -- that that had -- that changed? And that -- that -- that, you know, we get into this question of how conclusion five was worded. And that's exactly where that comes from. It's taking data completeness and also these programmatic assurance measures and deciding as a weight of evidence -- call it what you want, balancing, weight of evidence --- when the combination of that gives you, you know, the confidence that -- you know, that, in fact, you had completeness and job-specific bioassays such that that information can represent subcontractor exposures in a coexposure model. If you don't have representativeness reflected in the coexposure model for a whole category of workers, I would contend that you don't have a -- an acceptable coexposure model according to the NIOSH's own procedures in IG-O6. That's been the impetus for the last four or five years for the work group's pursuit of -- of looking at this completeness issue.

So, anyway, sorry about that. I think I got carried away there. Anything else on that? Okay.

MEMBER LOCKEY: Hey, Joe. I'm sorry, I was on mute. I appreciate your -- your insight and I appreciate what you're doing. I just -- I just think that it -- it -- okay, you said 79 percent of 5 percent. And I think I heard John say -- or you said 79 percent. I think John said 79 percent of 5 percent. I mean, maybe you too can reconcile that for me, so I understand the difference.

MR. FITZGERALD: Oh, no, no it's 79 percent of subcontractors on RWP required job-specific bioassays. That's 5 percent of the entire Savannah River, I think it was the, bioassay program that came to -- I don't remember the number. Maybe John does.

It was like 290 workers, something in that ballpark. And it's true that under the -- you know, with the concern over what intakes could have taken place, Westinghouse did the responsible thing. They went back and actually resampled every one of those workers and did not find any -- any measurable intakes, which I think is -- it -- it -- it was good and it was a diligent thing to do.

And as Tim also commented, the -- we're thinking about '96 and did examine those workers and it was not necessary to go back and monitor those. So, again, whether it's 300 -- whether it's 300 workers or, I guess, a grand total of 3000, the question is whether this cohort of workers represents a class of workers for which high -- you know, of which the higher exposed workers, the most highly exposed workers, may reside and can you be sure. And -- and -- and I think given the class of workers, and I

think it's defined in the previous SEC, subcontractor CTWs who, because of their -- the nature of their work and intermittent style of their work and the fact that, again, they came and went and did some of the hot work, I think given this particular category of workers, I don't think one can conclude that the most highly exposed individuals would not necessarily be in that category. And I think one has to be careful about moving to a judgment call to make that -- make a decision on the size of the worker category, numbers of the workers in that worker category, to decide if -- you know, if one wants to go ahead and include the workers in the broader coexposure model or not.

But, again, I am not familiar with -- I think what Tim was commenting on earlier, which seems to be a new or emerging NIOSH policy or approach on coexposure models, which may exercise such judgment. I -- you know, so that's something for the Advisory Board to address when the time comes. But for -- for SC&A, we can only focus on report 92 and the techniques and the approaches that the work group and NIOSH agreed to several years ago. And that's the context of how we're looking at this issue right now. So anyway.

MEMBER LOCKEY: Thanks, Joe.

MR. FITZGERALD: Yeah. If I can go to conclusion one. Okay. Our first conclusion is sampling premise is not sufficiently grounded in historical SRS practices. And what we mean by that is that there were certainly many policy changes and practices that were shifting in the -- in the '91-'98-time frame.

I -- I -- I, you know, just looking at the documentation in history, I

can't imagine -- and this probably isn't exclusive of the Savannah River. It probably was the case at most DOE sites. But you couldn't imagine a more, you know, changing time, frantic time -- time frame as 1989 to about the mid '90s at Savannah River.

Again, you had a change of contractors. You had a major Radiological Improvement Program which introduced new policies, procedures, and practices in rad protection. You -- you had a major influx of subcontractor workers to support the DND program, to support the restart of the K reactor, and to do many other things on-site. This was much different than DuPont.

And you definitely had the advent of the DOE enforcement program in the mid '90s, which prompted even more re-examinations and what have you. So, and this is not even all of it. You had a facility evaluation board, that was actually the first entity -- institutional entity that identified a number of these issues in terms of submission of bioassays and even the local DOE Savannah River office was identifying this particular issue in 1995.

So, and to answer an earlier question, you know, one of the reasons, certainly, that Savannah River was cited or Westinghouse was cited under Price Anderson for a 830 violation rather than 835 was the fact that the -- you know, the nonsubmission of bioassay samples was identified quite early, actually back in '95. And a number of corrective actions were -- were supposedly taken, but effectively, none of them seemed to be effective and the actual performance was declining by the time that the self-assessment showed 79 percent nonsubmittal. So, it was a recognition both that there was a procedural noncompliance but also that corrective actions that were taken were not effective and not -- not showing any improvement. So, at

any rate.

Let me go through conclusion one. So measured against this review criteria we felt that the -- again, the sampling premise was not sufficiently grounded in national policy, procedures, and practices. NIOSH's response was -- and I think John covered this already -- was that there was a transition between the operating contractors, as I indicated, that led to increasing RWP job-specific bioassays more due, in NIOSH's view, to the reliance on procedures versus the actual RWP forms and that the use of the RWP forms, of course, lagged the procedure-based bioassay collections.

Now, this is certainly different than what was addressed in report 92. This wasn't something that we -- that had been surfaced or discussed. So, we certainly are looking at that particular issue de novo. And, of course, the other conclusion was even quite apart from RWPs, it -- if -- if the bioassay requirements don't show up on the RWPs, that's not even relevant to the discussion that we're having.

Okay. Next one please.

Okay. So, in -- you know, certainly in our original response, we -- we indicated that -- that, you know, RWPs at the -- in terms of Westinghouse's procedures weren't implemented till '92. Now, what I would also add to this is that -- that the 1990 Tiger Team assessment had -- you know, had already found that, you know, there was a DuPont procedure on the books. It was the dipsal (ph) procedure for RWPs, but they weren't implementing it, okay. So, and they -- and -- and -- and DOE made a finding. One of their key findings was that, not only were RWPs not being implemented at Savannah River, but they had a specific procedure on the books that was

being ignored by DuPont and then following DuPont, Westinghouse. So, Westinghouse had had an action plan for the Tiger Team, as they all did, that required that RWPs would be implemented in all Savannah River facilities by 1991, by the first quarter of 1991.

So, beyond the fact that, you know, there was sort of a procedural motivation to perhaps doing RWPs, there was actually a mandate that RWPs would be fully implemented in all Savannah River facilities as a response to the Tiger Team finding by the first quarter of '91. It would be a facility-by-facility rollout. And, of course, that would be verified by the DOE local office as well as DOE headquarters. So, I just want to add that I know it may not change the status of the RWP form itself -- I think John had put some of those up on the screen -- but it might give some more perspective of -- of the implementation of the RWP program at Savannah River in that early '90s standpoint. So, there was another driver that was taking place at that time to certainly make sure that RWPs were, in fact, being implemented across the board.

And, I guess, my perspective on -- on -- on this question of -- of RWPs is it's a continuum of development. I mean, it's not that you had a complete or perfect RWP by year one. Certainly, the -- the expectations and the requirements themselves, the forms, it was a -- an evolution over that time frame. And in terms of the -- and that includes the specification job-specific bioassays. I mean, as late as 1999 there's documentation that shows that -- that Westinghouse Savannah River was going back and reviewing the implementation of these processes and implements in the procedures and still finding deficiencies that needed correction. So, you know, certainly, I

don't want to leave the perspective that, you know, we think RWPs sort of became the product they needed to be at any specific time, but certainly, they were shifting and being improved by experience over that length of time. So, however --

DR. TAULBEE: Joe, could I --

MR. FITZGERALD: -- you know, again -- I'm sorry?

DR. TAULBEE: Joe, this is Tim. I'm sorry, if -- if I could just make a point along with what you're saying there. You know, when you mentioned about the implementation in 1991 from -- you know, that Westinghouse was supposed to do that, if you go to report 92, table 2-2, this is the inventory that we conducted, and this is excluding the standing radiation work permits. This is just the kind of job-specific RWPs. You see a massive jump in 1991 across the facilities. You know, looking at F area, for example, there's, you know, roughly 15 pages in 1990, and there were over 3000 in 1991. In H area there were -- we didn't find any because they hadn't implemented them yet, but in 1991 there were 751 pages of RWPs. So, there was a very massive jump when they did this implementation and yes, it improved over time. But there was a very definitive jump there 1990 to 1991, and I just wanted to make the Board Members or work group members aware of that, if you look at tables one 2-1, 2-2, and 2-3 in report 92. Thank you, sir.

MR. FITZGERALD: Yeah, thank you, Tim. And actually, that that kind of was my point. Because of the action plan -- if you look at the action plan, it was pretty clear they were going to roll it out facility by facility and be done with it by '91. So, from that standpoint, I agree. I think you're looking

at a step function in terms of the number of RWPs that would -- would have been implemented by that time frame.

At the same time -- and I suspect this was also NIOSH's point in its presentation -- you know, the -- the forms that were being used and the -- the tie in of job-specific bioassays, that -- that was in transition almost throughout the '90s. It -- it -- certainly, you know, improvements were made and the form got better, the follow up got better.

The only fly in the ointment is, you know, clearly the -- the accountability and process to ensure submission of bioassays was a big problem. And that was a problem with the tritium program in the earlier '90s. It was a problem in just job specifics starting in '90 -- well, certainly, first identified by the Savannah River field office in '95. The facility evaluation board made a finding in '96, and all that led to self-assessments which -- which certainly uncovered the -- the famous 79 percent finding in '97.

So, you know, the -- the -- the RWP program and the process of that program was definitely put in place and jumpstarted by Westinghouse if -- if only because it was identified as a procedure that was being ignored by -- this was from the Tiger Team review -- and so they made a very deliberate decision, you know, that they would certainly impose -- implement it site wide within a year, and they did, by '91. So I think Tim is quite correct that we're looking at a lot of RWPs, but we're still left with the question whether the process to -- you know, to do the -- submit the job specifics, when did that become more effective? So, that's kind of the essence of what we're looking for.

And just to finish this slide, yeah, we were looking for -- for ways to evaluate this question of completeness for job specifics. I mean, and yes, we -- we kind of looked at 92, and that was the sampling and the data that we have. And -- and that's pretty much the -- the reasoning for why we did do the samples and did do the fractional rates. I think it's an indicator, but it's one of the few objective indicators of that particular question. And, of course, that's why the original sampling regime was agreed to, because if you're looking for a sampling regime that illuminates this question that was raised in this 1997 finding of inadequate submissions of bioassays, I think report 92 is as close as you're going to get.

Okay. Conclusion two: I'm going to have Ron Buchanan -- Ron, are you there? I think --

DR. BUCHANAN: Yes.

MR. FITZGERALD: -- the next two, conclusion two and three, Ron did quite a bit of work on, and I think -- I think he can cover those well.

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

UNIDENTIFIED SPEAKER: Yes, we can.

DR. BUCHANAN: Okay. This is Ron Buchanan with SC&A, and as Joe said, I'll be covering conclusion two and three. And NIOSH already done a pretty good job of summarizing it and, of course, we just received this response short time ago, so I'll just kind of go over where we stand at this time. And conclusion two was results were direct and affective monitoring may be overstated. And in our 2022 review, we found that NIOSH did not address all the nuclides -- radionuclides on the RWPs and that if you addressed all of them, it would change, of course, your percentage indicator.

And NIOSH responded that they agreed that that was true and that they went ahead and re-tallied and came in -- as they discussed earlier in this meeting.

So, next slide.

So, our initial response to that is that NIOSH's 2022 response provided a summary of their analysis of their updated tallies and weighted point estimates and summarized in table 5. Now, if you compare table 5 with our table 3 and 4 percentages as indicators, you'll see that they're very close. They're within about 1 or 2 percentage points in agreement. And so, of course, we haven't seen their re-tally update entirely, just the results of them, but we don't really have any qualms with that.

Now, conclusion three more was concerned with whether -- it's mainly concerned whether -- the coworker matching and that's generalized matching is not sufficient. Now, when we investigated report 99 or 92, we went in to look at the granular details, such as a -- a sub construction trade worker and whether they was monitored, which was obvious (indiscernible) bioassayed or not, and then if they weren't, then why was the coworker substitution for them that you could apply. And so, we went in to each as NIOSH did in report 92 and such as table C3 through 37 that covered the different isotopes and looked at each individual worker -- I think there was like over 600 over them -- and see if they matched on an RWP and included reasonable criteria such as being on the same RWP, if they were there the same day, same time, and same craft. Now, we looked at the craft because we wanted to see if they matched up to potential exposure. Now, this has been the biggest debate is on the craft.

Now, we did find some discrepancy on the date and time, and that is, again, not as clear as you might sound because some RWPs do increase. And so on one entry, they might match up on time, on the next entry, they didn't match up on time, so how do you categorize that? Or some might be on the same date and a few were not on the same date, but the first RWP they were, second wasn't, or vice versa. And so, it isn't quite as clear as it looks, but the percentages were indicators not to be used in some coworker model or something just to indicate of where we stood. And so, you if you don't use craft, then you get a higher percent of compliance, such as like 66 percent instead of 45 percent. And so NIOSH's recent response was that it does not have to be the same craft, just the same exposure and so that our criteria was too restrictive.

And so, the next slide.

Okay. Now, when we did review the report 92 as it now stands, or as it was printed, we did find some dates and times criterions not met and that laborers were used as coexposure in some cases. And so, that aside, NIOSH quality assurance review may have corrected some of these conditions. Like I said, we haven't seen the details of it. And to -- we agree that if you use coworker data that has potentially the same and higher exposure, then that can be his coworker instead of -- for an unmonitored worker. However, in this case, it does open up some subjectivity. Because if you say an electrician went in and another electrician went in and wasn't monitored, then you have just about as fine as you can cut it, to find out if they had potentially the same exposure. And then when you -- but if you go and say, okay, electrician went in and sheet-metal worker went in, and worked the

same time, did they have the same exposure? Well, maybe so. You would have to look at the details. And this becomes subjective and a -- the -- a value judgment, whether they would have the same.

And so, in our analysis, we wanted to look at the hard numbers and just look at the RWP date, time, and craft. And so, if you don't want the crafts to be the same, like I said, you left that out, and you come up with like 60 or 70 percent instead of 45 percent. It's in our report. It's broken down. It's the same with RWP, the same, the same time, and same craft. So, don't really have an argument against that, other than it can lead to problems if you're not sure if the potential was high or the same.

Now, I would like to mention here that when we was looking at report 92, we was looking at the granularity of individual workers. When you do a coworker model, which was part of our -- our 92 charter, then yes, you can't look and make sure everybody's the same craft, same time, same date, and we know that in all the coworker models. And so when you're setting up a coworker model, completely different than what we was trying to do and what NIOSH was trying to do in report 92. So, that concludes my summary of conclusion two and three.

Any questions?

Discussion

MEMBER LOCKEY: Hi, Jim Lockey. I have a couple of questions. One is that NIOSH used -- I thought -- and John or Tim, you can correct me. Did you-all say you used 15 minutes arrived at this work site were the same -- within the same fit man -- 15-minute time frame or not?

DR. CARDARELLI: Yeah, that's my -- yes.

DR. TAULBEE: Yes, I believe that is correct. Mike Mahathy, can you verify that, if you're online? Okay. Mike may not --

MR. MAHATHY: Yeah, yeah, sorry I was on mute.

DR. TAULBEE: Okay. So, then that was a general criteria. And when you look at these RWPs, Dr. Lockey, what you'll see is that nobody really has the exact same time because they're all signing in as they're dressing out.

MEMBER LOCKEY: Right. I understand.

DR. TAULBEE: And so there is a time window typically.

MEMBER LOCKEY: Did SC&A -- did you use this 15-minute time window, because I didn't see that mentioned?

DR. BUCHANAN: No. We -- this wasn't in the -- I don't believe this is in report 92. We looked at overlapping times, so we gave a little more leeway. If they signed in -- obviously, the date was obvious unless they signed in two different RWPs, two different dates. One might match up and others might not, which like I say, that's so hard to judge then. What do you put down, yes or no? But the time frame we looked at maybe was -- especially if it was morning or afternoon, we figured that was -- or if the times didn't overlap, at least half time overlapping. We didn't stick to 15 minutes, which I think is more restrictive than probably what we looked at.

MEMBER LOCKEY: All right. That -- the other question I wanted to address, previously I asked a question about the pipefitter and an electrician, and what I heard NIOSH saying is that it didn't -- either one when they had bio -- bioassay analysis, the highest value would have been taken no matter what the craft. Is that -- am I -- is that correct -- my

correct interpretation of I heard this morning?

DR. CARDARELLI: That is not a -- yes, it is true that the -- the highest examples would be in the coexposure model, okay. When we were doing this evaluation, we were simply looking to see whether they were monitored, yes or no. We weren't looking at the results as to whether one was higher or the other from that standpoint. We were -- we were simply looking at who was monitored, who wasn't, from this RWP.

MEMBER LOCKEY: Okay. And so --

DR. BUCHANAN: That's the way we did it, too.

MEMBER LOCKEY: My question is, if you had a pipefitter and electrician on an RWP, do you have an example where two different trades came out and one had a higher bioassay sample than another or the -- or they -- were they -- were -- and/or were they both monitored, and we have the results?

DR. TAULBEE: We have multiple instances where they were both monitored. We have instances where there -- only one of them was monitored, but the vast majority of this data is nondetect. About the only way I think we could answer the question that you're asking is if there was an upset condition or an incident from that standpoint that then you could compare. But as Ron was mentioning a minute ago of, you know, an electrician working in an area and then a sheet-metal worker, you know, these are generally -- generally these are fairly small areas that they would be working in but, you know, which one has the higher exposure potential, it really depends upon the job. If the electrician is working, you know, on the -- right around the -- the gloves of a glove box and the sheet-metal worker

is working on, you know, a different area, they're you know replacing a vent type of thing, to me, the electrician probably has the higher exposure potential. So this varies. But the bottom line is, in the coexposure model, what we're looking at is all of the -- all of the doses, all of the intakes across all time -- well, not all time, but one year, effectively, and what we look at then is we got somebody who's not monitored in the case of one of the subcontractor construction trades, we would typically assign the 95th percentile of that distribution of all of the monitored workers. So that's where we feel that this is bounding from that standpoint. Does that help Dr Lockey?

MEMBER LOCKEY: Yeah, I just -- I was just trying to figure out why SC&A -- do they think the electrician -- electrician coexposure monitoring is more valid than -- than electrician and pipefitter? It sounds like the end result is whatever the data is, it's entered into the database.

DR. TAULBEE: That is correct, sir.

MEMBER LOCKEY: All right.

MR. CLAWSON: But -- but --

MR. MAHATHY: Yes, --

CHAIR CLAWSON: I got yes -- so but that being said -- go ahead Mike. Let you -- this is Brad. Go ahead Mike. I'll let you go ahead.

MR. MAHATHY: I just wanted to add that when we -- the RWPs in the latter years were broken down by path, so when we compared an electrician to a pipefitter, for instance, we would look to take that we're doing the same task. If they were doing two discrete (sic) different tasks, then will not be matched. And -- and the last thing is we did not do a random -- we did not

base sample on crafts, so, you know, there's not uniformity in the -- in the craft, so it's all (indiscernible) now.

MEMBER LOCKEY: Okay, thank you.

CHAIR CLAWSON: And that -- and that being said, Jim, this is one of my issues that I come up with, because you understand the same way that I do on this, you know, we're just -- we're just taking people that possibly were in there and -- and you know as well as I do that each -- every -- every person has a (indiscernible) potential for exposure. And this is where I -- I feel that I -- I see flaws in this from this aspect, but to me it still comes back to is -- if you don't have the data, if you don't have the sufficient data, and that you can categorize it as sufficient, I still don't see how you can really do it. But this will be for us to be able to address and go down because this is a much larger picture. But I do have -- I do have a problem with just the fact of what you were saying Jim, so I'll turn it back to SC&A.

DR. BUCHANAN: Okay, Joe, you going to take it?

MR. FITZGERALD: Yeah, if there's no more questions for Ron, yeah let me -- let me continue with conclusion four. Let me -- let me explain this a little bit, because I think this is easy to misinterpret. What we're saying here is that given the findings in '97 in terms of the large incompleteness of job-specific bioassays and evidence from facility evaluation reviews and DOE Savannah River's review in late '95, not to mention, you know, Tiger Team findings earlier, you know, the -- the lack of submission of bioassays were in large, and more specifically the lack of submission of job-specific bioassays, you know, we -- it -- it -- it -- without a controvert on evidence, we have to

assume it's incomplete. Now, incomplete in the early '90s unless one can demonstrate that this information's collected otherwise.

And I was listening with -- with interest in terms of some of the data, this -- discussions on data that's being collected quite apart from RWPs, but I think, you know, the fact that there was 100 percent resampling of -- of the data in '97 and that data is available for a coexposure model, for example, doesn't address the issue that we're after, which is a question of data completeness from the standpoint of whether job-specific gaps existed in that early '90s time frame. So, again, our process is to look for the means to establish that, in fact, that information was collected and there was a -- programs and procedures in place that would have entailed that -- that that would happen. And I think NIOSH's response --

CHAIR CLAWSON: Well, Joe --

MR. FITZGERALD: NIOSH's response was to disagree that the -- that the self-assessment in '98 indicated that the monitoring was incomplete from a statistical standpoint or that, you know, somehow this kind of a -- a bioassay program inadequacy was relevant to a coexposure model. Well, again, the context of our review isn't addressing the fees -- you know, addressing the -- the construct of a coexposure model. We're looking at data completeness as we have for report 92 all along. And, again, we think the -- the original finding of this substantial incompleteness of 79 percent in -- of 5 percent, if you want to go that way, but it's about several hundred workers back in -- in the 1997 standpoint is significant, and that needs to be addressed in terms of whether the data is going to be complete and representative enough that the subcontractors can be subsumed into a

coexposure model for the routine exposed workers at Savannah River.

The second bullet of NIOSH's response -- and I -- I know we've summarized this, and I think we got most of it -- was this question of a TRACK database and whether that information could be constructed and used and would certainly obviate the need for job-specific bioassay data to be included. I guess, again, our response is this is not a new question. Actually, in the report 92 review and discussions, this has come up before about the inclusion of special bioassays and how they could be used. And I think there was agreement within the work group that from the standpoint of data completeness, the -- the procedures and process by which a for-cause bioassay -- in other words, an incident- or exposure-based bioassay, was much more driven by procedure, protocol, and management attention. So, you know, using that as a basis for looking at data completeness of job specifics was deemed as -- it -- it -- it just wasn't consistent to be used that way. Now, granted, we also said that if you're looking at strictly a coexposure model, special bioassays have a role, have a place to provide more data. So, again, I think it's important to make the distinction between how you're using the bioassay information. Is it to establish data completeness, or is to inform and to add to a coexposure model construction, because those are two different things in terms of how one uses information like that.

And in that context if you go to the next slide of the response, --

MEMBER LOCKEY: Well, Joe, --

MR. FITZGERALD: Yeah?

MEMBER LOCKEY: -- Jim Lockey. I'm sorry, I just want to ask

questions as you go along. I think you were very precise and very right on just what you said. I -- I think that -- that really what we're down to here is not -- I think we can do dose reconstruction. I think the database is great, but is -- is data completeness there, is there data missing?

We looked at the '97 data. There was a lot of data missing. 79 percent of 5 percent is, what, 300 people. When they went back and looked, they didn't find anything. No bioassays were -- were (indiscernible), so it probably didn't represent a health hazard. But certain data was not complete. So, I think you are very correct in what you're -- what you're saying here. This is really now at a point that it's not so much that we're looking at are we missing the exposure information or is our point estimates at exposures incorrect. They probably are correct. It really comes down to is -- is the data incompleteness even though it may not be any significant bioassay results that are significant and the data that's missing, are we just going to look at the data completeness? I think that's what you're saying. I -- I just --

MR. FITZGERALD: Yes, but I don't think it's --

MEMBER LOCKEY: I suspect an estimate's when this data reconstruction are great and if -- and as -- as a researcher, I would look at NIOSH's database they put together, I would look to TRACK data, and I would put a hypothesis together and say this is my hypothesis. It doesn't fit, there's something wrong with my database, and then I would reconsider.

But I disagree with you in the latter aspect. I think that TRACK database is very, very important because it's going to either confirm or not confirm the -- the robustness of what NIOSH has done. And they're great at

what they do. That's what they do. They do dose reconstructions for multiple states across multiple industries, and they know how to do it. And so I would use it as a test.

But the question for this board is, is the data complete based on the '97 review? Probably not. The data is not complete. It may be negative data, but it's not complete.

MR. FITZGERALD: Yeah, I --

CHAIR CLAWSON: Yeah, so Jim, this -- this is -- this is Brad. So, I understand what you're saying. You know what, it's never been a question if NIOSH can -- does a good job at dose reconstruction or whatever, but if you have insufficient data, you have insufficient co-models. You -- everything is off. It all depends -- this is what we said so many times is --

MEMBER ZIEMER: Brad? Brad, can I make a comment?

CHAIR CLAWSON: Sure.

MEMBER ZIEMER: Yeah. Real quick because I have to leave the -- the call here, which I mentioned to Rashaun that I have to -- I have another commitment. But and I will say that I look forward to getting the TRACK data so that we can have a look at that. But you're never going to have a hundred percent complete data, so the issue always come down to what's sufficient data. It doesn't have to be a hundred percent. In fact, it'd be surprising if it ever was. That's why we have coworker data.

So, but I have to leave the call. I assume we're going to give SC&A to look in more detail since they just got the report from -- from NIOSH and also we need to have a look at that TRACK data and see what that shows us.

CHAIR CLAWSON: Yep. Yep, you're --

MEMBER ZIEMER: With that I'll -- I'll sign off at this point. Thanks.

CHAIR CLAWSON: Take care, Paul. I appreciate that Paul, and I agree with you a hundred percent. We're never going to have a hundred percent, but also, too, there comes a turning point one way or the other of do you have sufficient data. That's -- that's always been the question. This has always been the question from the very get-go of this.

And -- and -- and Jim, I understand what you're saying from a statistical point of view but remember what the statistics are doing for you. I have no problem with throwing numbers to be able to grab this and everything else, but bottom line is, this is a compensation program, too. And you've got to look at that in your statistics too. This is not just to -- to be able to see how much they went here or went there. And that's -- I -- we're -- we -- and without the TRACK data, you know what, we're just -- we're just going at windmills right now. So, we're going to have to be able to look at that, be able to evaluate it, and once we have everything down in writing of where everybody is -- stands at, it'll be able to be able to -- be easier to distinguish this.

So, I'll turn it back to you, Joe.

MR. FITZGERALD: Thanks, again. I think, actually, in that discussion we pretty much covered most of what I have in the response piece. Again, I think we -- I don't disagree. I think the TRACK database will be useful, as I say, and relevant to the coexposure model and -- and -- and certainly demonstrating it's either robust or one could add that information to the database. But in terms of this -- of this prerequisite question of completeness, it's not going to do anything -- it's not going to be relevant

for that. And, again, I think we have dealt with the special bioassays in that context that, yes, they are valuable for coworker models, but they don't help us on the completeness issue.

And going back to '91-'96, we are trying our best to find any markers, any measures of -- of data completeness from a programmatic standpoint or from a comparison standpoint with RWPs. Just to -- just to establish prior to '96, say, where it's pretty clear that Westinghouse understood and was responding to the deficiency, you know, whether or not that circumstance pre-existed that time frame, it would be a problem from a completeness standpoint. So, we're looking for any evidence and -- and, again, we'll work through some of the data that -- that NIOSH has discussed today. Because, again, we're trying to be very open about looking at that time period and trying to figure out despite 1997, is there any evidence that job-specific bioassay information or data suitable to be used for dose reconstruction was, in fact, being collected or not. And that would certainly inform the work group's decision that it has to make in terms of where one might draw that line.

So anyway, conclusion five. Okay. This one -- I'll take responsibility for this one. All I wanted to say there was basically from a SC&A standpoint, we have three findings essentially on data completeness -- that relate to data completeness or measures, metrics. And we have one finding that addresses the programmatic aspect of it. And perhaps I should have used weight of evidence.

But taking those four issue areas, if one could satisfy the concerns raised, whether it's data completeness or the -- whether it's where the

program stood in terms of ensuring job-specific bioassays were being performed -- required, performed, and implemented, then I think a -- a coexposure model would be feasible. You, in fact, could construct one and be confident that the data was complete and representative of subcontractors. And I don't think we're at that point yet. I think we're looking for that time frame in the '90s where, you know, that comes together. But certainly -- maybe I've said this too many times, but it doesn't represent at all a shift in our focus as far as what the issue is relative to data completeness and our understanding of the coexposure model guidelines where data completeness and representativeness are prerequisites before one constructs a coexposure model. So, we don't see any inconsistency. In fact, we -- we -- we believe this is consistent with how we have looked at this issue starting in 2018. So, I'll just reiterate that.

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And we -- we basically say that. Again, those are considerations that have to be addressed and satisfied. And, again, we don't think a coexposure model under the current guidelines -- I can't speak to anything that's, you know, being considered, a new approach or a different interpretation -- but under the current guidelines, we don't believe a coexposure model for subcontractor CTWs can be shown to feasible unless and until the data completeness and representativeness are demonstrated. And we feel that the two -- two aspects of that demonstration are the RWP-related bioassay performance and the -- you know, the programmatic aspect, which is the procedural implementation. And, again, as we -- we introduced -- introduced earlier, both of those were explicitly cited in the Advisory Board's

recommendation for the SEC for '72 to '90 for the subcontractors, so there's a consistency in doing it that way.

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This is -- this is a -- a -- a formative time line. You know, again, we're developing our formal response, but we wanted to share this because, again, we're looking at this time frame from '91 up to '96, and I think even '96, as -- as Tim alluded to, that's even debatable given the fact -- and I don't disagree -- that Westinghouse did take a look at '96 and looked at the subcontractor bioassays and felt they were not likely to exceed 100 millirems, so they decided it wasn't worth the cost to go through and resample those. So certainly, there's some confidence from that standpoint. But, again, looking at the programmatic as well as the data completeness indicators, and I'll again emphasize indicators, we see these time frames that come up.

And I wanted to keep an open mind on the TRACK system, although from what little I know of it, it does sound like special bioassays, which probably would not be as relevant for this particular milestone in 1991. But I know also at the same time agree -- and I think Tim and I agree on this -- that '91 was a step function in a number of RWPs that were implemented at west -- at Savannah River by Westinghouse, whether it was driven by procedures or driven by an action plan for the Tiger Team, certainly the RWPs became much more plentiful starting in '91. Now, the question is when the job-specific bioassays were, in fact, collected and became complete enough. And that's why -- and that's the -- that's the central issue to all this.

And, again, one could make an argument -- and really the decision is, obviously, the working group's decision as to what evidence points to what time frame. We can ease -- we can easily accept the bookends to this -- to this time line, but as far as in between, I think there's an -- there's arguments both ways. And I think that's probably the fruit of all these discussions and the work that we have, maybe, ahead is just to try to illuminate as much as possible, you know, what was happening and to what extent there's confidence this information is complete.

But I -- I would quickly add though, unfortunately, on this thing is that the one statistical certainly is there was 79 percent incomplete of the subcontractors that had job-specific bioassays in '97. Everything else is a derivative metric, but that one is a 100 percent sampling by the operating contractor at that time, so that's a high confidence level of the -- of that value. So that's the one we have to work back from and decide if there's any evidence that would over -- overrule that finding in order to set a date that would be earlier than, say, '96 or '97. So that -- that's kind of the -- the broad perspective, you know, of what we know and what we don't know. Next slide.

Yeah, our -- our review is maybe midway. You know, there's a fair number of references that we're interested in, and we certainly would like additional information on the basis for the LaBone and Headlock interview statements, because I think that's pretty important. The 5Q1.1 Westinghouse procedure, we felt was pretty explicit, and actually, there's several other Westinghouse documents that basically state the very same in terms of the characterization of the nonroutine job-specific bioassays and

how the implementation would be done in the field. So we're going to be very interested in anything else that perhaps John and his staff can provide in the way of corroborating those statements because we have several data points that support exactly what the procedure states. So I -- I -- I want to be careful about disputing the written procedure unless we have, you know, sort of a very good basis for doing so. And also, certainly, any other additional information on the TRACK database and some of the other pieces of perspective and information that was in the NIOSH response we'd be interested in hearing more about that so we can respond.

In any case, we -- I've said this before, but, you know, we're looking at this from a weight of evidence standpoint, meaning that the latter years, we think, need to be from a -- from a standpoint of dose reconstructability needs to be defined based on the sufficiency of the -- of the bioassays in terms of completeness and also in terms of program adequacy. And we provide some perspectives in our review and I think NIOSH has as well. And I think we need to equip the work group with as much information and data as we can to inform their judgment on this. It's going to be a weight of evidence judgment in my view, whether there's any -- any compelling information that would permit you to pick a year, for example, prior to '96 or '97 despite those findings in those particular years on data completeness. So, I think that's where we're at.

That's all I have. Does anyone have any questions for any of us? Again, this is sort of a midway -- midway status review of where we are, and I'll be the first to admit, we've learned a lot from John's presentation, and it'll, perhaps, make our response, again, more comprehensive and -- and to

the point. So anyway.

CHAIR CLAWSON: Anybody have any questions for SC&A?

MEMBER LOCKEY: Yeah, Brad, I do. Sorry, about that.

CHAIR CLAWSON: No problem.

MEMBER LOCKEY: Joe, Jim Lockey. So, in relationship to '97, data certainly was incomplete for that 5 percent of whatever, but when Westinghouse went back and looked, there was no -- none of the bioassays samples were of significance. What I'd like to have you do, if you can, is go back to previous years and demonstrate data that would indicate to me that the Westinghouse findings from 1996 won't be applicable in previous years. In other words, do you have any objective monitoring data in subcontractors, either project oriented or for unusual circumstances that indicate that the point estimates established by NIOSH aren't encompassed -- don't encompass that addition -- additional data. I understand the lack of data, but we've demonstrated in '96 that that would -- the lack of those bioassays was not a significant factor, at least in ninety -- '97, and most likely in '96 under 100 millirem, there's no biological plausibility whether they would be significant.

So, from '95 on back, do you have any objective data that indicates that there's something there that is going to throw off the point estimates that NIOSH has? That's what I'm looking for from you guys. And I understand you -- you list administrative prerogatives and things along those lines, but what I'm looking at here is modern-time exposures, relatively modern time, biological plausibilities. Is there anything here that indicates that NIOSH doesn't have the proper point estimates objectively,

not -- not lack of -- you know, what happened in '97. I want to know from '94, '93, '92, is there any data that indicates that NIOSH is off base? That's all I'm looking for.

MR. FITZGERALD: And from, you say, point estimates, I guess, I would -- I would throw it to Tim. Is this your bounding coexposure value or something? I don't know what the point estimate would mean in this context.

DR. TAULBEE: I believe that what Dr. Lockey's referring to would be a coexposure model. I would point out that we have not finalized that development yet, but we could do so relatively quickly -- well, I believe relatively quickly, or at least get something on paper.

MEMBER LOCKEY: That's what I'm referring to. I mean, I -- I -- I'm referring to that and indicate that I would -- I would be looking at is there something that we're missing from '94, '93, '92 in the existing data that indicates that we can't trust the Westinghouse eval -- evaluation for previous years that was found in 1997? Is there something there? That's what I'm looking for.

DR. TAULBEE: Yeah, I --

CHAIR CLAWSON: Well, Jim -- Jim, maybe I can ask. Maybe I -- let me -- I'm trying to understand what you're trying to get to here. So, one of the things that I have an issue with is -- so they were not doing procedure compliance in '97. What evidence do we have that they were doing procedure compliance before that?

Now, it's already been told to us by the subject-matter expert that they don't agree with that procedure. So, what evidence do we have that

they were complying to it before that year? Maybe that matter -- maybe that ought to be the question that you ask.

MEMBER LOCKEY: Well, what surrogate data were they using to indicate that they were complying?

CHAIR CLAWSON: Well, yeah, that -- that's -- that's -- that's part of the issue that I -- I'm getting to. What are you using to be able to measure this where they were not doing procedure compliance in '97. I really doubt that they were doing procedure compliance in '96 or '94 or '95, especially when the subject-matter expert is saying they don't agree with that procedure.

MEMBER LOCKEY: Brad, what I hear is the -- the -- based on the '97 data, they probably weren't doing it based on what the procedure said, but they might have been covering it through other mechanisms, okay. And they -- their coverage through other mechanisms was so good that when they went back and looked at the 1997 cohort where they didn't have analysis, when they went back and looked at it, there was nothing there. So that would indicate to me that their prior -- prior monitoring was good monitoring -- it was a good monitoring program. I guess what I'm asking SC&A is, is there any indication in the previous years that that is not, indeed, the case, not just based on the lack of data recording, but other objective data. That's what I'm looking for. Actual measurements, actual bios -- bioassay measurements, etc.

CHAIR CLAWSON: Well, if you -- if you read in the notice of violation, if I'm correct on this, the reason why they were still fined on this was because they did find an individual that was missed by their normal bioassay

monitoring system.

MEMBER LOCKEY: Right, right, but in '97 --

CHAIR CLAWSON: So, that -- that's telling me that it was not -- they weren't catching everything with their normal routine.

DR. TAULBEE: Actually, that's not completely factual there, sir.

CHAIR CLAWSON: Okay. What -- what was it then?

DR. TAULBEE: Okay. In the previous years, there wasn't a -- a -- an incident that occurred that was not caught -- and the individual was identified via the routine bioassay program, so it's actually the inverse right then. That was an operations worker, that was not a subcontractor construction trades worker. But the person was caught on the routine bioassay. That was, I believe, a 1995 incident.

CHAIR CLAWSON: So, your -- you -- what -- what you're saying, Jim, is that the program was so good that they didn't need any of these other --

MEMBER LOCKEY: No, I'm not saying --

CHAIR CLAWSON: That -- that's kind of -- it's kind of hard for me to understand how you would do this, because you're -- you're asking them to prove a negative with -- with -- without the sufficient information.

MEMBER LOCKEY: I'm not saying the program was so good. I guess, what I'm -- or not good. I'm not qualifying about the comment on that one way or the other. I guess what I'm saying is that -- is, Brad, in -- in 1997, they recognized they were missing ninety -- 79 percent. When they went back and resampled those people, there was nothing there. There was nothing there, Brad. So, is there any indication that wouldn't have been the same back in '95, '96, '94', '93, '92, '91? Is there any indication that that

wouldn't have been the same back then, because they did have in place a bioassay program? People were monitored in the bioassay program, and they had this TRACK program, which remains to be looked at, to hopefully take outsiders from accidental or unusual exposures.

What I'm just trying to get a handle on, why isn't the '97 data representative of previous data? Why isn't it?

CHAIR CLAWSON: Well, I'll --

MEMBER LOCKEY: I don't know the answer.

CHAIR CLAWSON: I'll be honest with you, Jim, what you're expecting them to be able to prove is an unknown.

MEMBER LOCKEY: Right.

CHAIR CLAWSON: That -- that -- that's our issue. That's our issue right there. You're expecting them to take the information that we have and prove an unknown.

MEMBER LOCKEY: I agree with you, Brad, and that's why --

CHAIR CLAWSON: Well, that's -- that's where I'm --

MEMBER LOCKEY: -- getting back to my original comment is -- that's why I get back to my comment I made a few minutes ago. I really think that the dose reconstruction here is very rigorous, but if our decision is going to made purely based on bio -- data completeness, I don't think we can go any further. That's what I'm saying.

CHAIR CLAWSON: I understand, but, you know, we need to IG-006 and because our requirement's on that, too. And one of the big things in there is data completeness, period. This -- this is where the whole thing comes into.

But I -- I do have a question for Tim or Joe because it's been ringing in the back of my head, and I bet you there won't -- I don't think there'll be any debate on this. When was DOE allowed access to DuPont's Savannah River site? I remember a plaque at the DOE site, an agreement between Savannah River and DuPont to be able to have DOE access to that site. What year was that?

Because if you remember, before DOE really had no position in there. They -- DuPont was a contractor that built so many widgets for DOE, but they had no oversight. What year was it that DOE gained the access to Savannah River?

DR. TAULBEE: I believe DOE's had access since the beginning. I'm not exactly sure what you're asking.

CHAIR CLAWSON: No, there -- there --

DR. TAULBEE: They --

CHAIR CLAWSON: There was -- DOE -- there's a big -- there's a big plaque there on Savannah River of a -- an agreement between DuPont and DOE because at the very beginning of DuPont, DuPont had a contract with the DOE to build so many widgets, but they had no oversight really over them. And then when the compliances started coming in and the reactor compliance and everything else started, this changed. And I was just trying to remember the year that that actually took effect, because before that, DOE really never had oversight. They -- they had oversight over a contract, but not over a facility. And I was just wondering if -- it just stuck in the back of my head, and I was trying to remember what year that was.

DR. TAULBEE: I'd have to refer to Paul or Joe on that. I have no idea,

sir.

MR. FITZGERALD: Yeah. I -- you know, the only comment I would make, Brad, is that the local field office, the DOE local office, certainly had access going back quite a ways, I would think, into the '70s at least. I think very clearly DOE headquarters didn't have that kind of access until the early '80s. So, you know, I think there was this distinction then. But no, I don't remember the plaque, and I can't tell you specifically --

CHAIR CLAWSON: I'll -- I'll see --

MR. FITZGERALD: -- what they considered the date.

CHAIR CLAWSON: I appreciate that. I'll see if I can find that, because that was kind of something interesting to me that I've never understood. And this is one of the reasons why Savannah River is such a different site of the way that it was --

MR. FITZGERALD: Yeah, I --

CHAIR CLAWSON: -- original years.

MR. FITZGERALD: I -- I have a comment, I guess, on Dr. Lockey's request and, you know, certainly we can -- we can look at that. But I would comment that, you know, given the existing guidelines, and I'm talking IG-006, and it kind of puts that on its head, meaning that we're sort of starting with the coexposure model and then, you know, using that to contrast a specific worker category as to whether or not it would be below that level. And certainly, the guidelines as they now exist to, you know, ensure a representative coexposure model that accommodates that particular worker category, you want the -- you want those exposures to be reflected.

Now, your comment is that for the resampling, they -- you know, they

happen to have shown no -- no intakes. And for the previous years, if we again assume that -- that -- that situation, meaning that they weren't collecting bioassays, that existed, there would be missing data that we would not be able to characterize at all. I mean, it's missing. So, in terms of, you know, whether or not there were exposures that could have approached or exceeded whatever the coexposure value is, and I'm sure, you know, one could derive value, it would be unknowing. We would not know if anything did or not.

What we could do is we could programmatically look at subcontractors in terms of, you know, what -- you know, what exposures did take place and what the history has been and all that. But that would be sort of a qualitative characterization. That wouldn't be a specific, you know, one for one, you know, here's the data or for, you know -- for those years, and here's the coexposure model. So I'm just cautioning, I guess, that I'm not sure we would be able to give you, I think, specifically what you're looking for because the -- the -- the potentially high exposures, most highly exposed individuals that may have been in that class, may be missing, may just not have been collected, they may have left the site because their subcontractors never left a termination bioassay and couldn't have a, you know, intake that represents an internal dose that nobody's going to know about, because they -- you know, they weren't -- they weren't bioassayed, either during the operation or when they left the site. So, I think subcontractors as a category is a difficult category because they're intermittent. They don't, you know, often the termination bioassays and they often do these hot jobs.

And the other thing is, Savannah River did not control access to facilities. Meaning that in those -- in that time frame, there was no way to place a worker in a particular facility at a particular time. So, you know, in terms of even tracking those kinds of things, you don't have that. So, we can certainly size it up, but I'm afraid we're not going to be able to answer the specific question of would there have been a likely high exposure that would exceed whatever coexposure model value that Tim can come up with at some point, and work backwards and see whether or not the -- the subcontractors fit under it. I don't -- I don't know if that's going to really be responsive. I think I appreciate where you're coming from because of the -- the fact that the resampling did show no intakes, but I don't -- I don't think that's going to -- to help on the preceding years, because we don't know the circumstances and the actual exposures of those that are missing from that database. Just a comment.

MEMBER LOCKEY: I appreciate the comment. Sorry. I was on mute. I mean, from my own simplistic way of looking at this, what you're -- what you're suggesting or maybe throwing out there is that how would I approach it. Maybe I would go back and look at subcontractors, short-term subcontractors by duration of work and year where there is bioassay data available and compare that to the overall cohort and see how it differs. If it sort of falls in the same range, or it's in the confidence intervals, then I'm reassured. If it represents the most highest exposed, then that becomes a little more problematic for me. But look at the subcontractors where you have data short-term and do it by time, short term and by year and compare it to the overall database and see -- and see where they fall. I

think you've probably already done that, and I missed it, but.

MR. FITZGERALD: Well, I think there's been some data collected, but certainly, we'll go back. If the work group wants us to, we'll go back and include that data in our review. Now, I guess the only question is the second comparison, I guess, you could do that sequentially, meaning that we don't need a coexposure metric from Tim, from NIOSH, to start crunching that information. That could be something that the work group could consider later. So, you know, with those qualifications, yeah, I'll certainly be glad to take a look at that and see what we come up with.

CHAIR CLAWSON: Well, you know, Joe, I under -- I understand what Lockey is getting to, but I -- I -- I -- I think that we really need to take a look and let's take a look at tasking and what we need to be able to accomplish here, especially with this TRACKs coming into it, and maybe we could look at doing this down the road. Because to me, this is looking like there's a lot more -- a lot more to it than what really meets the eye. It's not as easy -- and I -- and I where -- I have a hard time with where we have all of these subcontractors that have left the site and never did a bioassay, they're not going to be in the -- we're not going to be able to track them in any way. This is where I come up with that we're -- we're trying to prove a negative here that we have no information on.

MR. FITZGERALD: But my -- that's the -- that -- that -- that's the point I was trying to raise, is that, you know, given the nature of this particular worker category, you're going to be, by definition, missing most of the data. They're intermittent. They leave the site without giving termination bioassays. They do hot jobs, but there's not a good record of

what jobs they do. They move from facility to facility, there's no records of what facility they work in. So, you know, trying to establish exactly what the bounds of their exposure is, is extremely difficult. And I don't know in the end, whether it would -- it would be useful for any kind of a comparison because the qualifications that you would make, the qualifiers you would have to, you know, indicate would be pretty significant. So --

MEMBER LOCKEY: Hey, Joe -- Joe --

MR. FITZGERALD: -- that's -- that's the only comment I would make.

MEMBER LOCKEY: Joe, Jim Lockey. I mean, I don't think that's true. When I did -- when I did -- when I do fertility studies, my -- I start out -- I don't -- I don't look at sperm count or -- or number of ovum present, well, we can't do that. But I don't do sperm count doing fertility (indiscernible). The first thing I do is -- is -- is -- is birth outcomes, family birth outcomes. That's what I look for first. That's the first indication. And if there's a problem with that, then I go back and do fertility -- then look at specific indicators of fertility, sperm count, whatever, aging, conception, etc., as an example.

But the first thing I look at is -- is a live birth or pregnancies, okay, and then I work my way backwards.

Here, I guess, what I'm suggesting is roughly -- simple, I think. Look at those subcontractors that were -- where we have bioassays data, how long -- time frame, how long -- are they short term, long term, and their work, and look at their bioassay data and compare that to the whole population and see where it falls. If it falls in the middle, that's reassuring to me that, you know, more likely than not they represent the population. If

they fall into the top 5 percent, then that's a problem for me, okay, because that indicates that more likely that, as you say, these were the highest exposures, we probably are missing people and there may be exposures even higher who never got bioassay data.

So, your end point here is the bioassay data. I don't care if they're electricians or pipefitters or whatever. I just want to know what their bioassay data was as a short-term subcontractor. And I think we do have some of that data.

MR. FITZGERALD: Yeah. Yeah. And I -- I guess I'll defer to the work group as a whole as to how you want to task us on that. We can also develop a proposal to send back to the work group, and the work group can either modify, approve, you know, or turn down, I mean, whatever you want to do. So, we could also do that just to frame this, perhaps, a little better.

MEMBER LOCKEY: Or if it costs money, have NIOSH do it, and you guys do it together. I don't care. I don't either way.

MR. FITZGERALD: All right. Well, you know, again, why don't we give you a proposal and if that's -- if that works, and it's acceptable, you know, we'll have to look at the data that would be needed and maybe, in fact, we would need NIOSH to do something, but maybe we ought to frame that up and provide that to the work group, and you all can decide, you know, decide if that's what you're looking for.

MEMBER LOCKEY: Frame it up with Tim, and present it as a joint --

CHAIR CLAWSON: Actually, no, Jim, this comes down to us. That's doesn't come down to Tim. This comes down to us as a work group. I think what we really ought to do is have SC&A look at this, maybe Ron with --

with his calculations or whatever, and kind of framework this, what Joe was saying, and if it is going to satisfy what you as the work group member needs, and what it is going to take because, I think, it's just like a lot of the rest of this, when we get into it, there's a -- it's a lot more difficult than what we think. Would that be -- would that be all right?

MEMBER LOCKEY: That be all right me as long as there -- (indiscernible) TRACK data, and that would be very useful to me, I think.

CHAIR CLAWSON: Yeah, we're going to -- we're going to go into the TRACK data, and I guess -- I guess we're kind of get into the end of where we're trying to firm up everything on this, and so Rashaun, it's okay with me. I guess, what I'd like to be able to do is make sure that we have a clear reference on each side of what we are requesting them to be able to do. Would that be all right to do at this time, or is there other Members of the Board that would like to ask some questions before we get into that?

Without -- without -- without hearing any other -- other Board Members, Rashaun, would it be all right to be able to go and kind of lay our path forward with NIOSH and SC&A?

DR. ROBERTS: Yes.

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CHAIR CLAWSON: Okay. Well, that -- that being said, so NIOSH, my understanding is we -- we have SC&A owes you a written compliant -- or reply to 0092. This was kind of a brief form here. But from what you owe us is we need to be able to gain access to this TRACK data. Is this -- is this your understanding, too, John?

DR. CARDARELLI: Yes. And we are expected to get that sometime in May.

CHAIR CLAWSON: Okay. Is there any other thing we owe you as SC&A or as a work group?

DR. CARDARELLI: Not that -- not that I have on the --

CHAIR CLAWSON: (Indiscernible.)

DR. CARDARELLI: -- tip of my mind right now.

MR. FITZGERALD: Brad, I just --

CHAIR CLAWSON: Okay. Something's going to --

MR. FITZGERALD: -- (indiscernible) --

CHAIR CLAWSON: Joe, you're --

MR. FITZGERALD: Just -- just --

CHAIR CLAWSON: -- breaking up.

MR. FITZGERALD: Oh. Can you hear me now? Hello?

CHAIR CLAWSON: We can hear you now.

MR. FITZGERALD: Okay. Again, on the -- that one slide and one bullet that refers to the commentary on 5Q1.1, you know, some of those clarifications and corroborations by John and his staff would be helpful to us, because, again, it was, I think, as I recall, an interview comment by Dr. LaBone or an interview comment by Dennis Headlock. And, you know, we have documentation which says otherwise. So, it would be useful to get maybe additional corroboration or review by -- by NIOSH just to establish the -- the comment or the finding that was made on that. Because that's -- to us that's pretty substantial because we certainly have had that as a -- you know, as a basis of our review for quite a while now, so.

CHAIR CLAWSON: So did you understand that, John, that -- it's in their conclusion, in the very last slide there, seeking further corroboration for the Labone's interview statements?

DR. CARDARELLI: Yes, we can interview a few other people to corroborate that statement.

CHAIR CLAWSON: Okay.

MR. FITZGERALD: Thank you.

CHAIR CLAWSON: Well, let's -- not -- not just interview people, but let's have some proof that this was actually the case. You know, it -- I learned a long time ago, and Grady helped me with this one, was that people can say everything they want, but if you don't have any corroborating evidence to be able to back it up, it's -- it's just hearsay. So, please, get the information that we need to be able to have that to corroborate -- corroborate with that. So, that being tasked with NIOSH, I guess, I'll -- I'll turn to SC&A and you owe NIOSH a response to 0092, a written response.

And we're going to frame work up something for Dr. Lockey and the work group to be able to look at as far as for the earlier years. And I -- I'm really worried that this is going to get into a heck of a lot more than what it really is going to buy us, so --

MEMBER LOCKEY: Brad, I -- Brad, Jim. I don't think -- the data should be there. That's why I suggested that SC&A and NIOSH work together and make sure they can retrieve that database. All we're asking for is, you know, what their bioassay samples are, and -- and the years they were collected and if there's a way to put a time frame on them. I don't

think that's a lot to ask. I think their databases already have that.

CHAIR CLAWSON: Okay, well, we'll evaluate it. Bob, your face just popped up. Go ahead.

MR. BARTON: Yeah, I want to reiterate what Joe said that we can certainly try to come up with something, but -- and I understand what you're looking for Dr. Lockey, but I'm not sure we will ever be able to deliver what you're asking for. And any attempt to tease out what the missing data might have told us -- and it's not missing data, it's data that was never actually collected. It's --

MEMBER LOCKEY: No, that --

MR. BARTON: -- and I'm not sure it gets us closer or gives you the information that you'd need to be able to say either way.

MEMBER LOCKEY: I'm not looking for data that's missing. I'm looking for the short-term worker data that exists in the database. It's already there. That's what I'm looking for.

MR. BARTON: Which is incomplete to an unknown extent, though. I mean...

MEMBER LOCKEY: I understand that. That's not the point. The point is, I don't know if there's 100 data points in the base. I don't know if there's 1000. I don't know there's 2000. It may be 90 percent incomplete, but I want to look at the actual short-term worker database that exists in relationship to bioassay data and see where that falls. What kind of distribution does it have? I'm not looking for missing data. I'm looking for data already -- it's in the database, as far as I know. Isn't that right, Tim? Tim?

DR. TAULBEE: Yes. Yeah, yes, it's in the Hapara database.

MEMBER LOCKEY: Okay, that's what I'm looking for.

DR. TAULBEE: Or I'm sorry, Pro Rad (sic). I'm mixing up the databases, but yes.

MEMBER LOCKEY: I am not looking for missing data. And I agree with you, looking for missing data is not going to be helpful. But looking for the existing data of short-term workers that's already in a database should not be problematic unless the database is not user friendly or you don't have the people on board, the programmers that are able to pull that out.

CHAIR CLAWSON: So -- so, Jim, if they do this, what -- I guess I'm trying to understand what -- what you want to be able to see, of how many points we have?

MEMBER LOCKEY: No, Brad. Let me -- suppose you look at the bioassay data of these short-term workers where data does exist. And the -- and the point estimate and distribution is way out of hand of what the overall cohort is. That tells me something. If it falls right in the middle, that also tells me something. The question is -- that Joe keeps raising, which I completely understand -- that short-term workers could have been brought in to do the most hazardous jobs, the most abysmal -- under the most abysmal working situations, and they were never -- never monitored. I can't be sure that the ones that were monitored reflect that worst-case situation, but at least I can look at the data, the bioassay data, and see where it falls, how representative it is of the cohort as a whole.

CHAIR CLAWSON: Okay, well, Bob and Joe and Rose and all you guys, I guess, what -- we'll look into that, but -- but and Jim, tell me if this is

okay. I would like them to be able to take a look at what -- what is available and -- and to make sure that we're getting what you need, I guess. And I'd like this to come to the whole work group, be able to see what, you know, the path forward may -- because I -- I -- I'm still a little bit confused on it, but they'll -- they can -- they can do this and go from there.

Bob, do you -- do you have a -- do you understand what he's -- what he's requesting?

MR. BARTON: I absolutely understand the question. I'm just not sure there's a way to sufficiently answer it, I guess, is...

CHAIR CLAWSON: Right. Well, so am I, but we'll -- let's take a look at that. We need to be able to provide them with a written response to 0092. Is there -- is there anything else that SC&A or NIOSH needs from either side that we haven't covered?

MR. BARTON: Well, that may come up as we look into Dr. Lockey's question and how best to approach it, so there may be --

CHAIR CLAWSON: Well, I --

MR. BARTON: -- a call needed.

MEMBER LOCKEY: Bob? Hey, Bob, Jim Lockey, you know, I was just -- I would -- you and Tim sit down and say is -- is the database -- is the database structured in a way that this question can be answered. If he says no or it's going to take days and days and months of work, then -- you know, then we need to know about that. But if it's a rather simple process, then that's a different -- different perspective. I have a different perspective on it.

MR. BARTON: And I simply don't know at this point.

MEMBER LOCKEY: Yeah, I don't either. And I think that's a conversation you and Tim can have.

CHAIR CLAWSON: Well, Bob you'll -- you'll get back with the work group on this and give us a layout of what -- what it looks like for you with the assistance of NIOSH and stuff, because I also don't know because of the security issues that we're having and everything else like that, to be right honest, I think it may be a little bit harder than what we know. But does that sound okay, John, with -- with -- with you? Have we met the requirements of both sides need and what is responsible?

DR. CARDARELLI: Yes, sir.

CHAIR CLAWSON: Okay. I think that really wraps up this work group to this point. Is there any other Board Members or any members of SC&A or NIOSH that want to have any last words?

DR. ROBERTS: Brad, I had a question for you. We have a --

CHAIR CLAWSON: Sure.

DR. ROBERTS: -- full Board Meeting coming up in April, and a report on this work group was tentatively put on that agenda. Is that something that we want to keep on the agenda and if so, how long?

CHAIR CLAWSON: John, -- yeah. I'm going to -- I'm going to tell you, I'm going to have to refer to SC&A on -- on the white paper. We may -- we may -- we may just have to give a brief update of what our path forward is as this work group and discuss some of the issues that we're having and -- and how we're trying to settle them. So I'd still leave it on there, but we

may not be able to give the full update that -- that we were hoping. Would that -- is that okay, Rashaun? How much time do we have allocated for us?

DR. ROBERTS: I think it's a -- it's a fair bit, but -- but what would be appropriate? You said brief. Maybe --

CHAIR CLAWSON: Well, --

DR. ROBERTS: -- an hour? half hour --

CHAIR CLAWSON: I'm going to --

DR. ROBERTS: -- to an hour?

CHAIR CLAWSON: To me personally and SC&A or NIOSH, you can -- you can correct me on this, to me, it's looking like if -- if -- I think we're just getting (indiscernible) able to do an update (indiscernible) NIOSH, and they won't have an opportunity to have really evaluated it. So, I think an hour time period would be enough for us to be able to give a brief (indiscernible) this is where we're at with this period.

DR. ROBERTS: Okay. Did you --

CHAIR CLAWSON: Do you agree with Bob?

DR. TAULBEE: Did you say an hour or a half an hour, Brad?

CHAIR CLAWSON: Well, I -- I'm just wondering if some of the other Board Members have any other questions. I was giving a little bit of extra time. I think that we can bring them up to date and a half an hour, but I was giving the other Board Members that are not on this work group an opportunity to maybe have some of their questions answered.

MEMBER LOCKEY: I think an hour is a good time, Bob.

CHAIR CLAWSON: Okay.

DR. ROBERTS: Okay. There's one --

MEMBER LOCKEY: I think Brad and I are in agreement that we're not going to let this one go 10 years out, right, Brad?

CHAIR CLAWSON: I haven't wanted to go down this long as it is, buddy. So go ahead, Rashaun, I'm sorry, he was just digging me.

DR. ROBERTS: This is the consideration perhaps for the next meeting. But, you know, perhaps the work group wants to discuss the prime contractor employees, perhaps, on the next work group agenda somewhere. You know, and discuss whether or not dose construct -- dose reconstruction is feasible, etc. So I just -- that's something that's sort of a topic that had -- I don't think we've closed the loop on.

CHAIR CLAWSON: Right. Rashaun, you know, I will be brutally honest with you, I -- the whole reason that we took and separated out the subcontractors like this -- because this was the low hanging fruit. This was (indiscernible) we saw issue with, we saw everything (indiscernible) help. And you are truly correct in that standpoint. I -- I really don't think that we can go on to the prime contractor until we get this one taken care of because there's still so many questions of -- of -- of the path forward that we could go with this. Yes, we do have to look at the prime contractor for the exact same reasons because if they weren't being monitored, the same as what the subcontractors were, you know, we have an issue there. I think -- I think this is something we need to bring up, but I was -- I was trying to get to an end with -- with this small piece of it.

DR. ROBERTS: Okay. Yeah, I just --

CHAIR CLAWSON: But we have -- we have to --

DR. ROBERTS: -- make sure we didn't forget. That's all.

CHAIR CLAWSON: And I appreciate that, and no, I haven't forgotten about that.

DR. ROBERTS: Okay.

CHAIR CLAWSON: I just -- I will be honest, I thought that we were going to come to a lot better consensus on where we're at right now.

DR. ROBERTS: Okay.

CHAIR CLAWSON: What were you going to say, Lockey?

MEMBER LOCKEY: Rashaun? Hey, Rashaun, I wasn't at the last phone conference because of another conflict. We're not meeting in person, right? Is that right? Is that correct?

DR. ROBERTS: For April, it's going to be virtual.

MEMBER LOCKEY: Why is that? Can I ask I just for my own...?

DR. ROBERTS: Yeah, we weren't able to find conference space for the meeting.

CHAIR CLAWSON: It's called the -- it's called The Masters. That's exactly it.

MEMBER LOCKEY: I understand.

DR. ROBERTS: All right.

CHAIR CLAWSON: I tried to bring that up. I -- I want you guys to always know that you're always welcome in Idaho. We're a very friendly group out here.

But thank you, Rashaun, and no, I haven't forgot about it. I just -- I've tried to separate this out because this is a very difficult and complex site, and we have had these issues and these dealings for a long time. We are going to have to, and I have not forgot about the prime contractors.

We've got to make these evaluations and -- and -- and go from there. But a lot of -- kind of bring this to an end and, but I do appreciate you bringing that up to me.

DR. ROBERTS: Sure.

CHAIR CLAWSON: With -- with Bob, do you have any questions of your path forward in your tasking?

MR. BARTON: Just specifically to the Board Meeting, are we doing an SC&A presentation only or SC&A and NIOSH presentation, or how do you want to work that just so -- what I -- what I'd envision is basically a modified version of what Joe and Ron had presented with the updates from the discussion in this meeting and the updates and as far as path forward. And we can certainly do that. It is a quick turnaround time, but we can certainly do that.

CHAIR CLAWSON: I --

MR. BARTON: -- if NIOSH desires to also present the material that John put forth today also.

CHAIR CLAWSON: Well, that's -- that's 40 slides. If they could do it in six slides or less, yeah, we could probably do that. What -- what's your feelings on that, John? I want to make sure that NIOSH has their due diligence.

DR. CARDARELLI: Well, we can certainly reduce the number of slides and probably, you know, stick with our conclusions. So yes, we --

CHAIR CLAWSON: Well, you don't -- I'm not looking -- I'm not looking at so much the conclusions or anything else like this. What I would like to -- what I envision from -- from this is that we kind of just give a brief synopsis

of where we're at on this. These are the issues just boom, boom, boom, these are what we're trying to address. I -- I -- I would like to be able to try to have some information for Lockey of our path forward, if we're going to be able to do it or not. And maybe if -- if why -- why we couldn't. What -- does that sound right? I -- I -- I think that SC&A and NIOSH needs an opportunity to be able to just give a quick this -- you know, these are the things that we're looking at, this is what we're doing. We don't need to get into the -- the nitty gritty part of it that the work group has to go into, but just to give people an idea of where they're at now. Now -- now, it may come up that we have other Board Members that want to dig a little bit deeper into why this is an issue or whatever, and we just need to be able to address it from there.

Tim, you popped up, so...

DR. TAULBEE: I agree with you 100 percent there Brad. I think a short synopsis that you just went through and the path forward is really all that's needed. And so to me, one presentation would cover it.

CHAIR CLAWSON: Okay. Okay, when you say one presentation, one presentation from NIOSH and SC&A or just one presentation?

DR. TAULBEE: I would think one total, and if SC&A wants to give it, that's fine, you know, from our standpoint, or if you want us to, we can, either way.

CHAIR CLAWSON: Okay, I -- yeah, where -- it's kind of a response back from SC&A on this 0092. I think, Bob, if we could just have you kind of go a path forward of this as far as what we're looking at, these are kind of the issues, and we'll just -- we'll just go with yours and go from there.

There may come up some stuff that NIOSH may have to address, but I think we can deal with it from there.

MR. BARTON: Very good.

CHAIR CLAWSON: Okay. Anything else that needs to be taken care of at this time?

MEMBER LOCKEY: I have one request.

CHAIR CLAWSON: Oh, no.

MEMBER LOCKEY: Yeah, I do. I had --

CHAIR CLAWSON: (Indiscernible) --

MEMBER LOCKEY: I have four feet of snow on my roof, and I need volunteers to come out here and shovel it off.

CHAIR CLAWSON: I'm not going to show you guys my front yard, so --

UNIDENTIFIED SPEAKER: That's incredible.

CHAIR CLAWSON: -- so that -- that's the way it is. You're going to have to take that broken hip of yours, get up there, and get stuff taken care of.

MEMBER LOCKEY: I'm sending my --

CHAIR CLAWSON: In other words, --

MEMBER LOCKEY: I'm sending my wife.

CHAIR CLAWSON: Okay, in other words, cowboy up.

So, Rashaun, that being said, I believe that we're done with this -- this work group. I will -- I will turn it over to you to be able to end, but I also want to make sure that you have the information you need to be able to proceed forward.

DR. ROBERTS: Brad, I'm all set. Do you want to make -- go ahead and have and -- and have the work group make a motion and to -- to --

CHAIR CLAWSON: Yeah. Let's -- let's --

DR. ROBERTS: -- adjourn?

CHAIR CLAWSON: If -- if you have everything. I know that we've kind of cut you out of this. I apologize. I just want to make sure as the DFO that -- that -- that it's clear for you what -- what our path forward was.

MEMBER LOCKEY: I move we -- we adjourn.

CHAIR CLAWSON: I second it. It's been moved and seconded. The we can adjourn. I appreciate everybody's input. I know that we have a long road ahead of us, but I appreciate everything that everybody does.

Lockey, get up and start shoveling.

Thank you, everybody. We'll see you later.

(Whereupon, the meeting was adjourned at 3:45 p.m. EST.)