CENTERS FOR DISEASE CONTROL AND PREVENTION

NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH (NIOSH)

ADVISORY BOARD ON RADIATION AND WORKER HEALTH (ABRWH)

LOS ALAMOS NATIONAL LABORATORY (LANL) WORK GROUP MEETING

WEDNESDAY, MAY 6, 2026

The meeting convened at 11:00 A.M. Eastern Daylight Time (EDT)

M. Josie Beach, Chair, presiding.

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Members Present:

Beach, M. Josie, Chair

Clawson, Bradley, Member

Lockey, James, Member

Martinez, Nicole, Member

Schmoldt, Michael, Member

Registered and/or Public Comment Participants:

Rashaun Roberts, Designated Federal Officer (DFO)

Nancy Adams, NIOSH Contractor

Nick Altic, Oak Ridge Associated Universities (ORAU)

Bob Barton, SC&A

Kathy Behling, SC&A

John Cardarelli, NIOSH

Joe Fitzgerald, SC&A

Rose Gogliotti, SC&A

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

Lori Marion-Moss, NIOSH

Pat McCloskey, ORAU

Charles Nelson, NIOSH

Steve Ostrow, SC&A

Lavon Rutherford, NIOSH

Dan Stempfley, ORAU

Brant Ulsh, NIOSH

Registered and/or Public Comment Participants continued:

Andrew Evaskovich

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PROCEEDINGS

(11:00 a.m. EDT)

WELCOME AND ROLL CALL

DR. ROBERTS: So, I just got my chime that it is 11:00 a.m. Eastern. So, I want to wish everyone a good morning. This is the Advisory Board on Radiation and Workers Health meeting of the Los Alamos National Lab, or LANL, Work Group. I'm Rashaun Roberts, I'm the Designated Federal Officer for the Board.

Let's get started with the meeting. There is an agenda. There are other meeting materials available today. You can find everything on the NIOSH website under meetings for May of 2026. Since Board members who have conflicts with regard to the site can't sit on this work group, there are really no conflict of interests for the work group members. So, as I do roll call, I don't need the work group members to state conflicts of interest, but other staff do need to state any relevant conflicts as I go through the roll call. So, I'm going to start with the Chair, Beach?

CHAIR BEACH: I'm there.

DR. ROBERTS: Clawson.

MEMBER CLAWSON: I'm here.

DR. ROBERTS: Lockey?

MEMBER LOCKEY: I'm here.

DR. ROBERTS: Martinez?

MEMBER MARTINEZ: I'm here.

DR. ROBERTS: Schmoldt?

MEMBER SCHMOLDT: I am here.

DR. ROBERTS: Great. We have a full house, so we can proceed. Let's go on to NIOSH, DCAS, ORAU.

MS. MARION-MOSS: Lori Marion-Moss, NIOSH, conflicted with Mound.

MR. RUTHERFORD: LaVon Rutherford, NIOSH, and I'm conflicted with Fernald.

DR. ULSH: Yeah, this is Brant Ulsh with NIOSH, conflicted at Fernald and Argonne East.

DR. NELSON: This is Charles Nelson with NIOSH. I'm conflicted with Fernald.

DR. CARDARELLI: This is John Cardarelli at NIOSH. I am conflicted with Fernald.

MR. MCCLOSKEY: This is Pat McCloskey with O-R-A-U, and I have no conflicts with Los Alamos National Laboratory.

MR. STEMPFLEY: This is Dan Stempfley with O-R-A-U, conflicts with Fernald, Oak Ridge Hospital, ORISE, and Rocky Flats, but none with LANL.

MR. ALTIC: Nick Altic, O-R-A-U. I have no conflicts at LANL.

DR. ROBERTS: Anyone else for DCAS-ORAU? Let's move on to SC&A.

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

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

MS. GOGLIOTTI: Rose Gogliotti, no conflict.

DR. ROBERTS: Okay. Any --

DR. OSTROW: Steve -- Steve Ostrow, no conflicts.

DR. ROBERTS: Anyone else for SC&A?

MR. BARTON: I believe Joe Fitzgerald is trying to join, but he might be a

minute late.

DR. ROBERTS: Okay. Thanks, Bob. Okay. Let's move on to HHS and contractors.

MS. HOLZBERGER: Melia Holzberger, HHS/OGC, no conflicts.

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

DR. ROBERTS: Any others with HHS or contractors? Okay. Then any of the departments DOL, DOE, other departments present? Okay. Are there any members of the public who like to register their attendance at this at this time?

MR. EVASKOVICH: Andrew Evaskovich.

DR. ROBERTS: Okay. Thank you. Welcome. Anyone else? Hearing none, we can go ahead and move on.

So, again welcome to everybody. Just need to go over a couple of the usual items before I give the floor over to Josie. In order to keep everything running smoothly and so that everyone can be heard clearly, please make sure you keep your phone or Teams on mute when you're not speaking. If you're attending via telephone only, you will need to press star six to mute if you don't have a mute button, and press star six again to take yourself off mute. As I said before, the agendas, the presentations, background documents that are relevant to today's meeting can be found on the NIOSH-DCAS website. If you're on Teams, you should be able to see the presentations and follow along that way. If you're participating by telephone, you can download them from the website and follow along.

All of the materials were sent to the Board members and to staff prior to this meeting. So, with that, over to you, Josie.

CHAIR BEACH: All right. Thank you. And before I start, Andrew, I'm

delighted to hear that you're on the call. Are you planning to make any comments at the end of our meeting today?

MR. EVASKOVICH: Yeah, I noticed a couple of things that we need to talk about. So, yeah.

CHAIR BEACH: Okay. I slotted you -- probably we'll have you between 4:00 and 5:00. So, I've got some comments to make towards the end, and then I'll bring you in right after, wherever that ends up falling. So, thank you. I'm glad you were able to join us. I wasn't sure if your schedule would allow it, so great. Welcome.

MR. EVASKOVICH: Yeah, thank you.

CHAIR BEACH: Okay. Thanks. Sorry for that.

DR. ROBERTS: I'm -- I'm sorry. Josie, I just --

CHAIR BEACH: Yes?

DR. ROBERTS: -- want to be clear that there is no public comment period built into this, just to clarify.

CHAIR BEACH: Correct.

DR. ROBERTS: Okay.

CHAIR BEACH: So, just the petitioner. And that's -- that's okay, correct?

DR. ROBERTS: Yeah, I think that's okay.

CHAIR BEACH: Okay. Normally we have it on there, but we didn't so I wanted to clarify if he had some comments. Okay. Thank you. So, no public comment.

CHAIR/SC&A INTRODUCTION AND BACKGROUND: OVERVIEW AND STATUS OF LANL SPECIAL EXPOSURE COHORT (SEC) DISCUSSIONS

CHAIR BEACH: So, welcome everyone. We -- I think that Bob is going to start us off with just an overview, I believe. But before I turn this over to Bob, I just want to say we have been at this for nine years. A lot of documents have come through. I was slightly disappointed that our NIOSH documents dropped on Monday mid-morning rather late. It would have been nice to have had those a little bit in advance. It's rather difficult to get through them all and to digest the information when you get them a day and a half before the meeting, but that's -- that's my only complaint there.

So, Bob, were you going to start us off with just an overview of where we've been? I know we did that in December, but.

MR. BARTON: Yeah. I'll try to kick us off here.

CHAIR BEACH: Okay.

MR. BARTON: It's been --

CHAIR BEACH: I appreciate that.

MR. BARTON: Yeah. I mean, it -- it's been a bit even though it was back in December, which relatively isn't that far, but it's been a bit since we all met, and the amount of technical material is daunting. What I'm going to try to do is distill it down so that we can reasonably talk about what the -- the key aspects here are.

And as you mentioned, it's been many years that this site has been under discussion. As far as I can tell, it actually started way back in 2010. So, it's more like 16 years, but maybe not the SEC in that sense.

CHAIR BEACH: Correct.

MR. BARTON: And as recently as 2024, definitely -- and the key here is -- and I'm going to try to summarize it -- there is a SEC already established up

through the end of '95. So, like the recent discussions regarding Savannah River, which you probably -- is probably recent in your -- your memories, it is 1995 -- the end of 1995, is this the appropriate stopping point for any SEC recommendation, or should it be extended to some later date? Also, recall that the original SEC, up through 1995 -- to the end of 1995 was specific to what is coined the exotic radionuclides. And this is really anything non-plutonium related in a general sense.

It has been defined a number of ways with different contaminants included. But again, what we're really interested in is those possible exposure pathways, source terms other than the plutonium. Plutonium is really the -- the -- the primary source term at LANL. And we were -- or SC&A agrees that the monitoring for those operations were pretty robust regarding specifically plutonium. So, these other contaminants that are of real interest today, those are going to be mixed activation products, your mixed fission products, things of that nature that were, in a sense, dwarfed by the plutonium operations, but still constitute a potential source term and an exposure potential of interest to this program.

With I -- with that, I think time is probably best served to just dive into the presentation, so I will, per the agenda, cede control over to my colleagues at NIOSH, and they can get going on the Report-103, which SC&A will also discuss subsequent to NIOSH's presentation.

CHAIR BEACH: So, that's my next question. NIOSH will report and then you'll follow up with your report, and then we'll move through that way?

MR. BARTON: Well, it's sort of a strange and choppy approach to it. What happened is --

CHAIR BEACH: Yeah, yeah.

MR. BARTON: -- that 101, 102 and 103 sort of came out, obviously, in succession. And so, SC&A reviewed all three in a singular document. So, we do have two presentations. But I mean, we can skip right to 103 after NIOSH's, or we could try to do all three in -- in one sprint. I guess it's really your preference.

CHAIR BEACH: Yeah. NIOSH, do you have any opinions on how you'd like to present since you have four -- I think two --

DR. CARDARELLI: This is John.

CHAIR BEACH: -- (indiscernible).

DR. CARDARELLI: This John Cardarelli.

CHAIR BEACH: Hi, John.

DR. CARDARELLI: Hi. I -- I think the way -- why we're presenting the 103 right now is because it has not been yet presented to the working group. 101 and 102 have been, and we do have responses from SC&A for 101, 102, and 103. So, really this is -- this 103 presentation is just to get it officially in the administrative record, and then we can go forward with SC&A giving responses to all three of those, and then we have a response to -- to that. So, --

CHAIR BEACH: Okay.

DR. CARDARELLI: -- that was our understanding, if you're okay with that.

CHAIR BEACH: Yeah. I just wasn't clear when there was three or four reports coming up. So, no, I'm fine with that as long as SC&A agrees. So, perfect.

DR. CARDARELLI: Yeah.

CHAIR BEACH: Go for it.

DR. CARDARELLI: One last --

MR. BARTON: Works for us.

DR. CARDARELLI: Sorry. One last thing is that we do still -- if time is permitted, we have Report-107 we have yet to present and the weight of evidence, which will be discussed after these three are resolved or discussed by the work group. So, that's it.

CHAIR BEACH: Okay. Sounds good. Thank you.

NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH (NIOSH)/DIVISION OF COMPENSATION ANALYSIS AND SUPPORT (DCAS) PRESENTATION: ORAUT-RPRT-103

DR. CARDARELLI: I think we are going to be turning the presentation over to Dan Stempfley. I'm assuming, Dan, you've been trying to -- you sound like you might be on mute. Are you available?

MR. STEMPFLEY: I am here and --

DR. CARDARELLI: Okay.

MR. STEMPFLEY: -- Pat McCloskey is going to be running the slides. I'll be going over the slides. As mentioned, my name is Dan Stempfley. I'm with the Oak Ridge Associated Universities Team, and I'm here to present the review of potential exposures to exotic radionuclides using radiological work permit data at Los Alamos National Lab. This is known as Report-103.

Next slide.

First, I'd like to acknowledge some of the ORAU Team members who helped pull this presentation together. That includes Tim Adler, Rich Merrill,

Nick Altic, Melissa Adler, Angie Palau, Pat McCloskey, and Judith Ryan. And I'm very thankful for their assistance on this.

For this presentation, I'll be referring to this report as "Report-103," and it's just an overview of the information contained in the report. The full report is available on NIOSH's website. And like we mentioned, this is just to get it into the admin record. So, I'm sure some of the questions that may come up during this will -- will be discussed and addressed in the next presentations.

A little history on this one: The original draft of Report-101 included an RWP analysis. That was pulled out to allow us to complete the Report-101 in a timely manner. The RWP information was subsequently developed into its own report being presented here as Report-103, and it supports the conclusions of Report-101. This -- this slide is just an outline of the presentation, why we created Report-103, what we examined, which radiological work permits were reviewed for the associated technical areas, which are TA-3, 48, and 53, then there are some conclusions. And also, this report has a list of references for the presentation and some key terms and acronyms.

Next slide.

All right. The background and overview: The NIOSH conclusions presented in the last revision of SEC-109, the evaluation report, were that, as we discussed, dose reconstruction is not feasible for all employees at Los Alamos National Lab from 1976 to 1995. This is because of exposures to exotic radionuclides, mixed fission products, and mixed activation products. And that evaluation report also concluded that dose reconstruction is likely feasible at Los Alamos starting in 1996. And this is when 10 CFR 835 took effect.

A little history here is, in November of 2018, there was some

disagreement with the position that exotic radionuclide exposures could be bound in '96. So, we proceeded with the development of Report-101 and subsequently Report-103 and a response to the exotic radionuclide issues. And as included in this presentation, a definition of exotics, it includes all radionuclides other than Uranium-234, -235, and -238 -- Plutonium-238 and -239, tritium, Americium-241, and Cesium-137. This presentation, Report-103, include mixed fission products and activation products in the term "exotics."

Okay. Report-101, going over this first, propose the following to evaluate exotics. First, identify the radionuclides of concern and then determine the air and surface contamination data required for an individual to receive 100-millirem committed effective dose for exotics and identify the work area where exotics exposures could occur, then a plan would be to review the available air sample and surface contamination data from those areas, and identify the areas of greatest concern based on that data. And a note here is that the data that was reviewed for Report-101 was routine data from these areas.

And then finally, the plan was to compare the actual data to the calculator-determined amounts required for an individual to receive a 100-millirem committed effective dose. A quick definition of "committed effective dose" here is it's the sum of the effective doses, various tissues, or organs in the body, each multiplied by the appropriate tissue weighting factor and committed for a 50-year period following an acute intake or the onset of a chronic intake. It does not include the contributions from external dose, and this was the internal dose measurement LANL used to decide if a worker needed routine bioassay monitoring.

Next slide.

Okay. On to Report-103. And as mentioned, Report-103 followed Report-101 as a supplement to Report-101. The RWP documentation that was available was reviewed and assembled into the report to demonstrate how work was monitored in the cases represented in the selected RWPs. This was a qualitative -- or there were qualitative conclusions presented in Report-103 that support the conclusions in Report-101 that LANL monitored appropriately under 10 CFR 835.402(c)(1). And this identified CFR section requires internal dosimetry monitoring for radiological workers who, under typical conditions, are likely to receive a committed effective dose of 100 millirem or more from all occupational radio -- radionuclide intakes in a year. Okay. The TA, technical areas, represented in these RWPs, will be discussed next, but it's worth noting here that the RWPs selected for this review and this report were considered samples of convenience.

All right. On to the monitoring practices. Next slide.

For the period from 1996 to two thousand -- 2005, which is the remainder of the period being evaluated for SEC-109, the evaluation report, routine bioassay monitoring was performed for those workers with the potential to receive more than 100-millirem committed effective dose in a year. And the monitoring decisions were based on job-specific information and using health physics checklists.

Routine internal dosimetry monitoring focused on the radionuclides with the greatest exposure potential at Los Alamos. So, the routine included plutonium, americium, uranium, and tritium, the for-cause bioassay that was initiated when the field indicators or surveys indicated it -- indicated unusual or upset conditions, and the monitoring for exotic radionuclides was performed if

needed. LANL did provide some information regarding dosimetry thresholds for Actinium-227, Curium-224, Neptunium-237, Protactinium-231, and Strontium-90.

Next slide.

Based on the reviews for this report, the role of the RWPs set monitoring and protective requirements for non-routine work and require worker briefings and training before they started the work. The briefings covered all the RWP requirements, held personnel accountable to the requirements on the RWP, required individuals to verify their enrollment in the required dosimetry program, and required a signature to confirm their awareness of the RWP requirements.

And it's kind of important to note here that just because someone signed on an RWP, that only indicates that they attended the briefing. A worker could sign on to an RWP and never perform work under that RWP.

Next slide.

Okay. We see a term here "hot jobs." This is a LANL term for non-routine higher-hazard radiological work. And based on the reviews for Report-103, LANL planned and prepared for non-routine hot jobs by conducting pre-job surveys to characterize the as-is conditions and assess how the planned work could affect the existing radiological conditions.

A quick note here is, as discussed in the Report-103, pre-job surveys are not always measured at the time of the work. There is some evidence in some cases that LANL used existing radiological surveys as pre-job surveys. LANL also planned for hot jobs by establishing area boundaries, hold points, and alarm settings, and the alarm settings were for electronic dosimeters.

They established maximum expected radiological levels and conditions and ensured that the radiological control technicians were present and monitoring the conditions during the in-process work against the limits. Another note here before we continue on, is that in-process hot-job surveys were not always documented or included in the RWP record. Report-103 has an explanation for that, including specific safe -- safety and exposure reduction reasons, but they're not always included in the record.

And then lastly, after completion of the work, LANL performed post-job surveys, which may include a second post-job survey if they had to decontaminate the area.

Next slide.

For the RWPs review in Report-103, ORAUT selected RWPs during the period from 1996 to 2005 for Technical Area 3, 48, and 53, which are the technical areas assessed in Report-101. The work on these RWPs included exotic -- or involved exotic radionuclides other than plutonium, americium, and uranium, and likely contain pre-job, post-job surveys, pre-job RWP briefing logs, and may -- may contain some in-process surveys.

(Whereupon, there was an audio interruption by an attendee speaking unmuted.)

MR. STEMPFLEY: Next slide.

DR. ROBERTS: I'm sorry, someone seems to be off mute. Please check your phone.

MR. STEMPFLEY: Okay. We'll go into the technical area RWP summaries. So, the first one here is report -- or and this report was for TA-3, and as will be the case for the reviews of all three technical areas. Before going over the

RWPs, there was a quick review of the technical area of operations.

So, for TA-3, they conducted a mix of operations and activities and Technical Area-3 contained many of the major facilities providing physical and site support such as utilities and maintenance. Much like a university campus, TA-3 research facilities were scattered throughout the area. The facilities ranged from small laboratories with bench-scale operations to activities involving materials in the chemistry and metallurgy -- metallurgy research facility in Building 29. The LANL staff in TA-3 working on the assessed RWPs had the potentials for exposures to alpha-emitting radionuclides, as well as exotic radionuclides, primarily fission products.

Next slide.

All right. These next two slides list the eight RWPs by RWP number, effective date of the RWP, and the description of the work covered by the RWP. All of these eight for Technical Area-3 relate to work in Building 29. But there is a much more detailed review of these RWPs provided in the report, but we're just listing these on Slide 15 and 16 associated with TA-3 review.

On the next slide.

The next area that we reviewed RWPs for was for Technical Area 48, RA-48, known as the radio -- radiochemistry site, supported nuclear research and development as well as radiochemistry work. Some of the radioactivity or radioactive material measurements were taken in hot cells equipped with remote handling equipment. Although the radiochemical operations were conducted primarily in Buildings 1, 8, 28, 25, and 107, Building 1 contained the most significant radio -- radiological hazards.

Next slide.

Okay. Again, these are -- the next two slides list the eight Technical Area-48 RWPs by RWP number, the effective date of the RWP, and a description of the work or the task covered by the RWP. All of them mostly, I think, six of the eight, relate to an area RC-1 with the other two for Building 1 and Building 311. Report-103, again, provides much more detail on these, and also describes the activities performed in RC-1. We'll go over them here. So, that's Slide 18, 19, on to Slide 20.

The last technical area RWPs that were reviewed were associated with Technical Area-53. TA-53 house -- housed the Los Alamos Neutron Science Center, known as LANSCE, and had approximately 400 buildings and structures within the area during the period of this evaluation. The work at TA-53 primarily involved accelerator operations and produced short-lived activation and spallation products. The workers on these assessed RWPs were potentially exposed to alpha-emitting radionuclides and exotics, primarily in the form of activation and spallation products. There were various worker protections identified in these RWPs that were reviewed for Technical Area-53.

Next two slides.

Not unexpectedly, these next few slides are the eight Technical Area-53 identified by RWP number, effective date, and the description of work. These RWPs cover several areas and work activities in Technical Area-53, and again, go to Report-103 to see the detailed description of these reviews. Next slide.

Conclusions. All right. This is Attachment 1 from Report-103. It might be a little smaller and hard to read, but it lists all 24 RWPs listed by RWP number; TA number; radionuclides of concern; number of signatures on the RWP that signed after the briefing, whether or not there were nasal smears associated

with the RWP, and if so, how many, the level of prescribed RCT coverage, and the number of radiological surveys associated with RWP. I don't know if we need to pause here for people to look at it or wait until we're done. But if somebody needs to look at, I'll hold up. Otherwise, I will continue on.

CHAIR BEACH: Yeah, Dan, I would continue. I would assume that everybody had a chance to at least look at these. And if not, they're available online.

MR. STEMPFLEY: Okay.

All right. The conclusion here. Based on NIOSH and ORAUT's review of RWPs presented in Report-103, the conclusion is that LANL provided radiological monitoring for the jobs covered by the RWPs and that Los Alamos radiological control technicians reacted and responded to changing radiological conditions for the purpose of worker safety. The report also concluded that Los Alamos National Lab maintained a capacity to perform bioassay for exotic radionuclides, if required or necessary, based on the exposure potential. And I'll add that LANL maintained the capacity means that they could either develop a bioassay technique or send a sample off -- a sample offsite for analysis.

One specific instance of this is mentioned in Report-103 regarding a 2012 Technecium-99 event. However, this event occurred outside of the period of evaluation.

The overall conclusion is that LANL monitored the nonroutine radiological jobs in a manner that supports the conclusion from Report-101. And that conclusion is that those workers with the potential to receive exotic radionuclide intakes greater than 100 millirem per year committed effective dose were monitored for those exposures.

Next slide.

As I mentioned, this is just the references for this presentation. And that should end this. The final slides, again, are a list of key terms that were discussed in this presentation. I won't go over them here. But that ends this presentation.

CHAIR BEACH: That's great. Thank you, Dan. Appreciate that. Any questions regarding this presentation, work group members?

MEMBER MARTINEZ: Hi, Josie. This is Nicole. I have just a quick question.

CHAIR BEACH: Sure, go ahead, Nicole.

MEMBER MARTINEZ: So, on --

CHAIR BEACH: Yeah, go ahead, Nicole.

MEMBER MARTINEZ: So, on the -- it was a discussion of, I think, TA-3, and it said experimental sciences. And I think you said that that was basically benchtop work. So, like, is that like wet chemistry? I'm sorry, I didn't -- I forget what slide it was. It was towards the middle --

MEMBER MARTINEZ: It was basically --

CHAIR BEACH: -- I think.

MEMBER MARTINEZ: -- just a list of activities, maybe --

MR. STEMPFLEY: Okay. I --

MEMBER MARTINEZ: -- maybe 14, Slide 14.

MR. STEMPFLEY: I'd have to pull open the report and --

MEMBER MARTINEZ: Yeah, experimental science.

MR. STEMPFLEY: I'd have to pull open that report again and take a look at it, but I could do that.

MEMBER MARTINEZ: No, I -- I can absolutely do it. Just if you remembered it offhand, that would save me some time. But I'm happy to -- to look for that. Thank you.

MR. STEMPFLEY: Okay.

CHAIR BEACH: All right. Thanks, Nicole. Anything else? Any other questions?

MEMBER LOCKEY: I'm good, Josie.

CHAIR BEACH: All right. Thanks, Jim.

MEMBER CLAWSON: I'm good.

CHAIR BEACH: All right. And Mike, new work group member, do you have anything, Mike, that you want answered?

MEMBER SCHMOLDT: No further questions. But I did have one thing I was curious about when you were talking about the surveys for surface contamination, did they model resuspension for -- in the RWP for predicted dose? And if so, how did they model that? Maybe that's getting outside the scope of this but just let me know if that's not appropriate at this time.

MR. STEMPFLEY: Again, I'd have to look into that.

DR. CARDARELLI: Yeah. This is John Cardarelli. I do believe that they -- they have to, obviously, do some resuspension because it was an estimate. And I think that might be covered in Report-101 of how they determined what radionuclide would result in a dose of 100 millirem over a period of 50 years that they apply in the year of intake. So, I believe that that would be the case. But Report-101 and 103 would have those type of details and resuspension factors. They kind of vary one in 1,000,000 to one in 10,000 to one in 100,000. And I don't know which particular resuspension factor that would have been

applied for that calculation.

MEMBER SCHMOLDT: I'm always suspicious of Brodsky's magic number for that, but it sounds like --

DR. CARDARELLI: Yep.

MEMBER SCHMOLDT: -- they also did a monitoring for air contamination levels to verify those assumptions. So, it sounds like there was a check in there too.

DR. CARDARELLI: Yep.

MEMBER SCHMOLDT: Okay. Thank you.

DR. CARDARELLI: Thank you.

MR. RUTHERFORD: Now, let me add something to that. This is LaVon Rutherford. They -- they actually had derived air concentration limits for each radionuclide of concern, and they would determine the appropriate air concentration value based on that or the limit that they would do. And then they would do the monitoring, the air monitoring, to ensure that they weren't exceeding those limits.

MEMBER SCHMOLDT: Thank you.

MEMBER CLAWSON: Hey, Josie, I do have one question with this magic kind of millirem level, that's what triggered bioassay, right? So, if you were under that 100 millirem, you weren't a part of the bioassay; is that correct?

MR. RUTHERFORD: I can answer that. The idea is the 100-millirem that you take a look at the jobs and the work that's being performed, and if you believe based on the air concentrations, you're anticipating that the individuals will not exceed 100 millirem, then bioassay would not be necessary. They would continue to do the air monitoring to ensure that they weren't exceeding that --

those air concentration limits. But the -- the -- the requirement is if you anticipate that a worker could exceed 100 millirem, then they would be put on the appropriate program, whether that be bioassay for internal exposure or something, or -- you know, personal monitoring, TLD for external exposure.

MEMBER CLAWSON: Who -- Lavon, who made that decision? This sounds like a kind of a pretty big programmatic thing. I was just -- who's one -- who is the person that makes that decision on the 100 millirem?

MR. RUTHERFORD: Well, I think it's a combination. It's -- I mean, especially with the discussions we had with Los Alamos when we were out there. It's involved -- you have involvement of not only the radiological control technicians, you have the rad engineers, the -- the internal dosimetry is involved in that process. So, it's -- it's a group effort there. The description of the work, whether it comes from the actual people that are doing the work and the work package and pre -- looking at previous jobs to see how they were handled, what kind of concentrations were associated with them. All of those things go into that idea of -- of making that determination.

MEMBER CLAWSON: Okay. Thank you, --

MEMBER LOCKEY: LaVon?

MEMBER CLAWSON: -- LaVon.

MEMBER LOCKEY: LaVon, Jim Lockey. Let me follow up with that question. Was that done in a preplanning meeting? Is that how that was handled?

MR. RUTHERFORD: Early on -- I -- I can't verify -- I can -- I can verify that when we discussed with them out there, actually, it was Joe Fitzgerald and I. It was with their RADCON manager and a couple other people, and I can't tell

you the dates that they specifically started because I can't remember from those interviews. Joe may remember that; I don't. But they actually had an integrated team that was developed later on that they did it in an electronic fashion. I think that was like '99 or so, I can't remember specifically, so don't quote me on that. But prior to that, it was all done, you know, as -- as a group effort.

It looks like Brant's got his hand raised.

CHAIR BEACH: Yeah, Brant's got his hand up. But I also wanted to ask Joe if he had any follow ups on that -- on this discussion.

MR. FITZGERALD: Yeah. I can't find the camera on this. Can you hear --

CHAIR BEACH: You had it on earlier. Yeah.

MR. FITZGERALD: Yeah, I know.

CHAIR BEACH: Thanks, Joe.

MR. FITZGERALD: Anyway, --

CHAIR BEACH: Oh, you're on camera.

MR. FITZGERALD: Oh. Okay. Just to follow up on LaVon's comment, yeah, I -- they -- LANL did come up with -- and this was part of the up -- program upgrades following the NC ID 484 self-assessment. You know, again, that self-assessment found some major shortcomings and deficiencies in how they were implementing not only the monitoring program, but just the tracking and characterization and tracking of -- of internal -- the internal monitoring. And they did come up with a much more automated, integrated system. I think it was actually implemented, maybe, 2001. It was in that time frame. The self-assessment was '99. So, it took a couple years to kind of refine all that.

But Josie, what was your comment? I'm sorry, question?

CHAIR BEACH: No, it was Brad, I think. No, actually it was LaVon. He was bringing stuff up, but he couldn't remember. So, LaVon, can you --

MR. RUTHERFORD: Yeah. I just wanted --

CHAIR BEACH: -- rephrase that?

MR. RUTHERFORD: Yeah, I -- I think Joe's probably correct with the electronic portion of that, but the actual work packages were being done before that, and I can't remember the year on that. I know that the electronic that -- that Joe mentioned, he is correct. I think that was 2000-2001 time frame. But -- but they were putting together work packages prior to that, and I don't know the specific year.

MR. FITZGERALD: Yeah, I think that was done relatively soon. They had a pretty good checklist of actions that began right after the self-assessment. I think by 2000, they had work packages pretty much in hand with the automated system following a little bit after that. So, it was sort of an intense period of putting some new procedures, the work packages, and then finally the tracking system was all put in place.

MEMBER LOCKEY: LaVon, Jim Lockey, let me follow up on that. So, you had mentioned that if it was anticipated that the exposure limits would be exceeded, would they automatically even -- even if the monitoring -- area monitoring said it didn't occur, would they still do the bioassay?

MR. RUTHERFORD: Once they were put on the program, they did the bioassay, yes. If they --

MEMBER LOCKEY: So, if there's ant -- if there was anticipation that exposure levels were going to be exceeded, they would --

MR. RUTHERFORD: Yeah.

MEMBER LOCKEY: -- automatically plan for bioassay in that -- in that -- in that work group?

MR. RUTHERFORD: Yeah. If -- if the work -- if they called out for bioassay sampling because they anticipated needing bioassay sampling, then they would do the bioassay sampling, yes.

MEMBER LOCKEY: Okay. Thank you.

MR. RUTHERFORD: Brant?

DR. ULSH: Yeah. So, two things, Brad mentioned the 100 millirem monitoring threshold. Keep in mind that that's 100 millirem committed. So, that's over the next 50 years. That's not 100 millirem per year. And secondly, I think to -- in response to Joe -- Jim's question about bioassay, if there was any indication during the job from the air monitoring or any of the other indicators, they can always -- I mean, any indication that there was contamination or an uncontrolled release, they can always go back and -- and collect those bioassay samples. That's the whole point of -- of that defense in-depth-type approach.

CHAIR BEACH: Okay.

MEMBER CLAWSON: Well, I -- you know, this -- I -- I've worked in this program. It really sounds good, but I know that there's a lot of flaws. Now, I -- I did have a question for Joe. You're saying around 1999 they had a self-assessment and stuff. That's the one that Tom LaBone was on, that he headed up?

MR. FITZGERALD: No. Well, --

MEMBER CLAWSON: Was that --

MR. FITZGERALD: -- Los Alamos, like a number of the other sites in that time frame, and that's including Mound and Savannah River, there was certainly

issues revolving around -- and -- and those that have been working the SEC are familiar with this question of whether job-specific bioassays were being collected or -- or provided or not. And certainly, that was -- that figured in the Savannah River in terms of a gap in the collection of those bioassays, but also an issue with Mound. And as DOE enforcement, which was certainly looking for the implementation of 835 and whether that was being effective, and this is roughly the same time frame that was the implementation of 835 that had been promulgated.

There was concern about whether that was happening the way it should -- and at sites that traditionally may not have had that expectation and also procedure. And so, when they found the issue at two or three sites, they developed an enforcement letter to all of the DOE sites putting everybody on notice that this was an issue with 835 implementation.

And Los Alamos responded very well, I thought, and organized a comprehensive self-assessment of that particular issue and brought in outside expertise, including Tom LaBone from Savannah River and Liz Brackett --

(Whereupon, there was an audio interruption when an attendee speaks while unmuted.)

MR. FITZGERALD: I think she was at -- she was at Mound, but they brought outsiders in to look at that program. And Los Alamos wasn't known for, you know, really outside review. So, this was an independent self-assessment of the implementation of their monitoring requirements under 835. And that review was conducted in 1999.

And I think we've talked about it quite a bit in this work group, so I'm not going to get into that. But really, the key findings were that the -- some key

shortcomings were identified in how checklists were being put together, and checklists were the instrument by which the Los Alamos identified, you know, what bioassays might be needed, including job-specific bioassays. When they looked at the construction subcontractor, which was Johnson Controls, they found some incompleteness in how workers were being enrolled in bioassays. So, and then, of course, the fact that a very small sampling -- it was, I think, only five plutonium workers in terms of RWP-directed bioassays. They found five -- two of the five had not provided those bioassays. So, that -- that kind of was the result of that. And I think this work group has spent a lot of time responding to that.

And I think, again, a lot of the NIOSH reviews are certainly directed at looking at the program descriptions and procedures in that time frame as to whether or not those programs were comprehensive. But what we're, I think, trying to get at within the work group is given the results of that review, which actually looks at, not the procedures or the program descriptions or all that, but simply looks at whether the lab did what they said they were doing. In other words, executing against their procedures and against 835 effectively. And that's what we've been trying to look at since. It was the only comprehensive assessment of whether or not 835 and the 100 millirem threshold was being executed effectively or not. And so, I think the weight of evidence review that we've been hearing about is just trying to get to that question. You know, was -- were the programmatic steps being taken by Los Alamos in that time frame sufficient to answer the concerns that came out of that review in 1999.

CHAIR BEACH: Thanks, Joe.

MEMBER CLAWSON: (Indiscernible) appreciate --

CHAIR BEACH: Go ahead.

MEMBER CLAWSON: Oh, I just wanted to say thanks. I just -- I was thinking back to this same time period throughout all of the DOE complexes, and one of the big issues with having these self-assessments were making sure that everybody was implementing 850 the -- the same way, and that there was quite a bit of differences. I just -- I was just wondering about that. Thanks.

CHAIR BEACH: All right. Thanks. Are we ready to move on, or are there other questions? I think, Bob, are you going to go ahead and tee up your Report-103 response? Is that appropriate at this point?

MR. BARTON: Sure. I hadn't -- I -- I wasn't sure if we wanted to go 101, 102, 103 in order or since we --

CHAIR BEACH: I think we --

MR. BARTON: -- just have 103.

CHAIR BEACH: Yeah.

MR. BARTON: But the previous presentation also referred to 101 quite a few times, not --

CHAIR BEACH: It really did.

MR. BARTON: -- (indiscernible).

CHAIR BEACH: And I'm okay with doing that. And then that way get NIOSH's presentations over through 101, 103, 102, and then move into your presentation. That's -- that's absolutely fine. I just noticed yours were labeled 103 and then the other one was 101, 102, so.

MR. BARTON: And that was really just --

MEMBER LOCKEY: Josie, is there any problem with having him respond to 103 now? My camera's not working. I don't know why. I have to go figure it

out. But is it -- because 103 is -- if he could respond to 103 now, it's sort of back to back, because this is a complex site. That would be helpful for me.

CHAIR BEACH: Yeah. I'm okay either way, if you don't mind just jumping into your review, Bob.

MR. BARTON: Sure.

CHAIR BEACH: Based on --

MR. BARTON: We'll start with 103, then backtrack to 101.

CHAIR BEACH: Then backtrack to 10 -- yes. This is a good history lesson for all of us. I mean, we have been dealing with this for a long time. That -- the 484 report came out in 2019. So, it was nice to refresh everybody's memories. And we'll let Bob tee that up. This -- this -- if you don't have it in front of you, it's also on the NIOSH website if you want to follow along on your own. All right. Bob, thank you. Thanks for being flexible.

SC&A PRESENTATION: "SC&A REVIEW OF LOS ALAMOS NATIONAL LABORATORY INTERNAL DOSE TOPICS (RPRT-103)

MR. BARTON: No problem at all, Josie. I live to serve. All right.

So, we just discussed 103. Again, 101, 102, 103, they're pretty much tied at the hip, so it's no problem doing this one seemingly out of order, but it -- it's not really.

So, again this presentation is specific to the third report of the -- of the trilogy. You know, Revenge of the Jedi, so to speak. So, let me get to it.

Okay. So, again, as I just said, these reports are essentially (audio distortion) and SC&A was not really originally convinced that 101 in combination with 103 solves the -- the job-specific bioassay program issue, or -- or the RWP-

directed program specifically for exotic radionuclides or that the 100 millirems suggested as a dose framework instead of your traditional co-exposure models is appropriate.

And, again, I'm like a skipping record today, what's the basis here? And it's -- it's NC ID 484. That's really the impetus of this entire issue. Now, 484 -- again, there's a lot of numbers being thrown around, but this is the -- the audit report. It does, I guess, in our opinion, supports the idea of the routine program for plutonium. But it also identified some deficiencies that would apply for exotics. And again, that's basically the nonplutonium exposure sources. Again, it's been defined a few various ways. Not just plutonium, but maybe americium or even uranium. But again, plutonium was the major player out of Los Alamos.

And, I guess, in essence, to use this 100 millirems concept, you have to show that, A, RWP-driven program is sufficiently complete and representative. And these are obviously buzzwords related to modeling doses for unmonitored workers. And I guess, B, which is really a follow on, on the actual enrollments in the RWP program, were they sufficiently implemented in the field. And again, this is, again, very similar to Savannah River, which was just discussed a few weeks ago. This is a matter of professional judgment, which examines the concept of the weight-of-evidence argument, and which is presented in these three reports. Again, we're starting at 103, and then we'll go back to 101 and 102.

And so, this is -- this is finding eight, which is why -- why we started Finding 8 because, again, SC&A's review approach was to combine all three reports into a single document so that you didn't have to jump around. Maybe

not the greatest decision since the we ended up with, like, 103 pages or something like that. But -- but what will be discussed in Report-102 presented a lot of analytical evaluation specific to the plutonium monitoring program. But the question is whether you can transfer those conclusions to the potential exposures to exotic radionuclides at the site.

Once again, and agree to the presumption of compliance with 835, which was mentioned earlier, really should not be assumed to be adequately implemented by 1996, which again, is the first year we're talking about for possible extension of the SEC. That self-assessment Joe mentioned in 1999 showed there were deficiencies in the bioassay program, which included workers not being assigned to correct programs. And work with exotics, I mean, again, is certainly dwarfed at least in magnitude to the plutonium work going on, on the site. It was likely commonly lab work, which Dr. Martinez mentioned, bench-scale-type stuff, but also may involve maintenance activities by Johnson Controls, or -- which was mentioned earlier as well, or other maintenance contractors, which we'll be discussing down the line here.

We had three observations related to Report-103. First, specific to nonplutonium work, or rather specific to tritium-related RWPs, we found that 73 percent were appropriately monitored, 5 percent had some form of partial monitoring, and 22 percent were unmonitored. So, that was Observation 7.

Observation 8. We also found one uranium RWP that was captured. Five of the ten workers did not appear to be monitored. Four were monitored, but only, again, for plutonium, not the uranium job they were on. And that last worker is really sort of unclear. They had -- they had some chest count data, but the date was somewhat ambiguous based on the record we had, so we

really couldn't tell.

And the last observation here, in reviewing the RWPs, we found that 24 individual workers actually had positive nasal contamination swab results. However, this gets muddied a bit when trying to figure out if follow-up monitoring occurred because, again, uncertain dates of potentially follow-up monitoring or also the nasal swabs may have been decided to be invalid by the site. For example, contaminated from a source that doesn't actually reflect an actual uptake. So, it's -- it's difficult to tell, but this is what we observed.

So, some -- some final comments and conclusions. There was the 1999 self-assessment submitted to DOE, which had been run (indiscernible) its numerous times in previous meetings. This went to the proper enrollments, which Joe mentioned, and potential gaps in that RWP-directed bioassay program. There's also a 2001 assessment that concluded, quote, the majority of line managers interviewed had not performed the annual review of personnel in the routine bioassay program as required by LANL's monitoring procedures.

Then in 2002, there was even still some software problems that resulted in about a quarter or 25 percent of those sampled workers identified, and I guess less conservative coverage than those required by 835. And so, this is the weight of evidence conclusion from Report-101. So, again, we're kind of jumping around a little bit. But -- and you -- you can read it, or I'll read it out -- out loud for the record.

(Reading): In this report, the ORAU, Oak Ridge Associated Universities, Team has discussed the LANL radiological control program and demonstrated that contamination was well controlled TA-3, TA-48, and TA-53, which were discussed in the previous presentation by -- by NIOSH. Data evaluated in

Section 3.0 shows that LANL controls routine contamination that could lead to doses greater than 100 millirems at all three technical areas. While data used in the report are not the total set of data collected by LANL, the weight of evidence supports that premise. The ORAU Team has shown that LANL operated a radiation protection program and control program that included the use of portal monitors to identify and remediate workplace radiological contamination when health physics responded to even small levels of contamination. So, again, this is in essence this -- the weight of evidence portion of this.

In 103, -- one second here. SC&A agrees there was a routine contamination control and monitored its workers for specific work, but which was mainly plutonium, and the -- overwhelmingly plutonium. We don't -- that is, SC&A doesn't necessarily agree that this obviates the concerns that were raised in the NC ID 484 audit report, in particular, as it relates to exotic radionuclides. For data analysis, the limited sampling identified in NC ID 484, again, in 1999, does it reflects a broader problem with the bioassay program, especially for exotics for this period of interest that we're talking about today?

Programmatically, were line managers appropriately evaluating and enrolling the workers under their purview on the right monitoring programs and/or where those bioassays being provided and implemented? I mean, basically, you can -- you can write down a policy, but the question is also always going to be implementation.

So, I'll try to wrap this up. Weight of evidence can also be stated as professional judgment by the Board. And we feel the following considerations should be taken into account: Validation of the actual implementation of LANL's operational practice against its written procedures. The data should be

established to be representative of the exposed population, such as work location and job tasks, especially any irregular-type activities they may have. And unusual exposure situations, we can't really know much about. I mean, the -- the illustrative examples that are provided are helpful and should be judged against the uncertainty of what we don't actually know. And the actual audits of the radiological control program and its findings should be considered, obviously.

And so, I guess in summation here, in evaluating the 100 millirem premise for unmonitored workers, we find -- SC&A finds that there is significant uncertainty until the end of about year 2000. So, it may not be appropriate as a means to reconstruct unmonitored worker exposure to, again, the nonplutonium contaminants or, to wit, the exotics.

And that's the end of 103.

CHAIR BEACH: Thanks. Thanks, Bob. I -- I know that is difficult because 101 and 102 is interjected and they're -- they mirror so closely together. But we do know 103 came after. So, questions for Bob? All right. I hear none, so let's go --

MR. BARTON: That makes me --

CHAIR BEACH: That's okay.

MR. BARTON: -- happy.

CHAIR BEACH: That's okay. Because it -- I'm assuming after we get through 101 and 102, we'll jump back into those questions. So, --

MEMBER LOCKEY: Josie, --

CHAIR BEACH: Yeah, go ahead.

MEMBER LOCKEY: I do have one question. In your conclusion, you said

there were major deficiencies and they didn't end -- to end -- to around 2000. Is that -- was I seeing that -- that's what I read -- I saw. Did you mean from an administrative perspective, it was a -- major deficiencies in the administration of the program and record keeping, or did you find objective evidence of deficiencies other than an administrative perspective?

MR. BARTON: Well, I think the major place to point is that 1999 audit that identified a number of them. Perhaps Joe can enumerate on those a bit better than I can. However, I think that's where that 2000 number comes from in that, they realized there was an issue, and then it just takes a little while to -- to change the culture and make sure that even if you have a procedure written down, that it's actually being implemented. And so, I think that's where that date comes from.

MEMBER LOCKEY: Yeah, I think -- I think that's -- that's what I sort of infer from your slide that they -- they were doing a review of -- of the information of the program, and they found administrative deficiencies. But what I -- what I was asking is you did find any other evidence of actual data that indicates that things were being missed, that there -- there were bioassays that were out of range or people weren't being monitored, weren't being picked up by the routine biomonitoring program during that time period? Or look, was just an administrative exercise, which is always great to do because it brings people right up to snuff with what they should be doing, and I understand that, but was there anything beyond that?

MR. BARTON: Well, again, this -- this becomes the whole weight of evidence where there's certainly some --

MEMBER LOCKEY: I know about weight of evidence. I'm asking, was

there any objective data beyond this was an administrative exercise? That's what I'm asking.

MR. BARTON: You're sort of asking --

CHAIR BEACH: I -- hey, Paul (sic) -- yeah. Can I -- I don't believe NIOSH or LANL went back and looked to see if there was any other data that was missing. And Joe can probably speak to that better, but that's --

MR. RUTHERFORD: Well, I -- I can --

CHAIR BEACH: -- my understanding.

MR. RUTHERFORD: -- speak to it. I would like to speak to it.

CHAIR BEACH: LaVon, sure.

MR. RUTHERFORD: Yeah. I mean, if you look at --

CHAIR BEACH: Go ahead.

MR. RUTHERFORD: -- the -- the whole idea of Reports 101, 102, and 103 was to try to look at the data to try to find out if there were holes that -- yes. I mean, if you look at NC ID 484, as Joe pointed out, there was one RWP that had five Johnson Control workers on it, that two of them didn't leave their bioassay. That brought up the issue was, okay, how many people aren't leaving their bioassay. So, yes, we used plutonium in Report-101 to look at that just because we felt like we had the most data available to us to look at how many people weren't leaving their bioassays. And we did not find a major issue there.

We looked at report that -- and then we followed on, and we wanted to look at surface contamination data, air sampling data, and look at it against the limits associated with those areas to see if we potentially had individuals that could exceed 100 millirem from their exposures in those exotic area -- areas where exotics were most significantly used on site. And -- and so, we looked at

that, and we could not find any indication where individuals were exceeding those.

So, there was specific data looked at in comparison. I don't disagree at all with what Bob has said. There were deficiencies that were identified and -- and what Joe said. But the question is we went back, we looked at the data, and we couldn't find any data that supported that these deficiencies prevented us from doing dose reconstruction.

MEMBER LOCKEY: Okay. Thank you.

CHAIR BEACH: And Bob -- Joe, I know you're talking. You're on mute.

MR. FITZGERALD: Excuse me on that. Yeah. If I can add -- can you hear me?

CHAIR BEACH: Yes.

MR. FITZGERALD: I'm sorry. Okay. The -- you know, I think again, just to contrast -- because we've had the same conversation with Savannah River, and that was recent. So, just a contrast to some extent, there we were talking about a circumstance where you had a gap in the -- the bioassays that were being provided in the job specifics to be exact. Los Alamos is -- is certainly that, but it's even more than that. The three key findings that were determined by that review -- and this was not a -- simply an administrative paper review.

This was probably the first time and only time that the laboratory actually looked at how they were executing against the new 835 regulations. And this was under the aegis of a potential enforcement action. So, they had a lot of motivation to get this right, because in DOE land, if you self-reported deficiencies, you certainly mitigated any future enforcement penalty. So, it was to their benefit to get to the bottom of whether or not they were executing --

actually executing against the 835 requirements for bioassay monitoring adequately and went so far as to bring in an expert from Mound, an expert from Savannah River, the two sites that had been given notices by DOE enforcement. So, they were seriously looking at whether they were, in fact, doing what they should have been doing and getting the results they should have been getting. This was not looking at whether the procedures were in place or the programs were in place, but in fact, looking at whether or not the implementation was effective.

And so, they did look at the checklist. These checklists, bioassay checklists, were in fact the method -- the -- the way they identified which workers should have gotten bioassays and for what radionuclides. So, this was really a critical first step to, you know, identifying somebody who should be getting bioassayed and to ensure that person was enrolled. Certainly, the second issue was the enrollment program, whether, in fact, workers are being enrolled or not, given these checklists and other processes. And finally, whether or not the workers were providing the bioassays as required, particularly job specifics, in terms of providing those back. And this is where that was somewhat similar to Savannah River.

On the first two accounts, if you didn't do the checklist adequately, workers were not going to be enrolled as they should be in terms of bioassays. And if you didn't do the enrollment process adequately, they would not even show up as far as the RWP bioassay requirements. So, the concern that came out of the 1999 self-assessment, the NC -- so-called NC ID 484 was the fact that, unlike Savannah River, there were apparently workers -- a fair number of workers who may not have been either identified for bioassays through the

checklist that Los Alamos used -- used, or were not in fact enrolled in -- in terms of the bioassay program, because that system did not carry them forward into -- into the bioassays.

And the three deficiencies that figured in that review that Los Alamos did were that the checklists were flawed, that the enrollments were not done adequately, and that workers were not providing bioassays as they should. So, the first two give me pause, and I think we identified that in our reviews, because in those cases, the individual workers who would have been handling, say, bench-scale exotics or whatever, in this case plutonium source terms, would not have even shown up on the bioassay list, would not have been bioassayed at all. So, you know, that data would have been missing, and you would not have been able to review that data in any subsequent follow-up review or looking at the program or looking at the data. They just would not be in the data.

And so, that's -- to me, that's a big difference with Savannah River, because that's not a simple case of just not returning a bioassay. It's a case of not even showing up as requiring -- as requiring a bioassay. So, I just want to make sure that's clarified because certainly that factored in with Los Alamos. And of concern, I think this was mentioned, when we interviewed the Los Alamos health physics staff on this particular issue, they were unable to, frankly, validate whether or not this particular issue was wider than that particular sampling. And there was no follow up after these findings were identified in terms of the consequences or implications or, you know -- you know, what the -- what people -- workers may have never been monitored, as should have been. None of that happened.

What happened was a corrective action program that commenced in '99 and completed in 2000, which revamped all these programs. You know, there's a new checklist program put in place, a tighter enrollment program, the automated follow-up tracking system that I think LaVon mentioned earlier. So, there was probably seven or eight upgrades to the monitoring program that were put in place to demonstrate compliance with 835. And that was acknowledged by DOE as a response to NC ID 484.

So, that's the -- you know, that's kind of the grist of that particular issue and why we have some difficulty in sort of historic programmatic reviews of -- of sorts as -- as -- as responding to that issue, because there's no way to really know how wide the issue might have been in that time frame because it was not looked at. And there's no way to know what you don't know, because if the information -- if the people were not enrolled or identified, we don't know what the extent of the shortcoming might have been.

CHAIR BEACH: Thanks, Joe. So, we do know that the report came out in '99, and it did trigger a huge response from LANL. And LANL put in several changes, so that -- that's something we do know. Any follow-up questions for Joe before I turn it over? Brant's got his hand up. Yeah. Mike, go ahead. You're on mute, Mike.

MEMBER SCHMOLDT: Joe, you mentioned you had interviews with the HP staff that were involved in the three technical areas. How many people were involved at that time? I'm assuming they got a large program. And are we talking one, three, or 50 or 100 HP staff?

MR. FITZGERALD: I'm thinking it was maybe eight, nine, ten core staff. I mean, Los Alamos had a pretty strong health physics staff. We talked to, I think

-- and Lavon, maybe -- it's been a while -- maybe the two or three key people in the monitoring program, internal dosimetry program, that may, I think, had some recollection of that time period. I mean, we interviewed, I think, 2011. And so, we were reaching back almost 12 or 13 years. I think there may have been one or two that had been back then, but that -- that's kind of what I recollect.

MEMBER SCHMOLDT: Okay.

MR. RUTHERFORD: Yeah, they --

MEMBER SCHMOLDT: (Indiscernible) in-depth experience many years there?

MR. FITZGERALD: I'm sorry?

MEMBER SCHMOLDT: Did they have a lot of turnover in the health physics group, or were they all people that really understood those processes based on a large number of years of experience?

MR. FITZGERALD: I think there had been a turnover. I think a -- a -- a Mr. Lawrence, I can't remember his first name, was the key person at Los Alamos in internal dosimetry. He was gone by then. And, you know, certainly, obviously, in -- in the 2000s, you had a whole new generation of health physicists. So, there was certainly a transition. (Indiscernible) like that --

MR. RUTHERFORD: We didn't have --

(Whereupon, Mr. Rutherford and Mr. Fitzgerald speak simultaneously.)

MR. FITZGERALD: Yeah.

MR. RUTHERFORD: Joe? Joe, we didn't have --

MR. FITZGERALD: Yeah. I'm sorry?

MR. RUTHERFORD: The RADCON manager that we talked to was there

during -- prior to 1996 and another individual was at a -- at a -- well, was part of internal dosimetry, but was a new, more junior person when -- when the events occurred. So, there was some knowledge base there from when the events occurred, especially, --

MR. FITZGERALD: Yeah.

MR. RUTHERFORD: -- I mean the transition into the 835 era.

CHAIR BEACH: Thanks, a lot. Mike, anything else? Any follow ups, or are you good?

MEMBER SCHMOLDT: No, I'm good. That kind of gets to my understanding of the weight of evidence and the experience of the people making those exposure judgments.

CHAIR BEACH: Okay. Thanks, Mike. And Brant, you had a comment?

DR. ULSH: Yeah. Thanks, Josie. I just wanted to pull you all back to last week during the full Board meeting where I gave a presentation on data completeness in co-exposure models. And one of the points that I made in that presentation was that a data set does not have to be complete if it's bounding, and it doesn't have to be bounding if it's complete.

What I'm hearing here is in response to that NC ID audit report, is that there were some people who were not monitored who probably should have been, but I haven't heard any argument that they are the most exposed workers, and therefore we can't bound the doses with all of the other thousands of data points that we have. In -- in particular, I think I heard SC&A agree, maybe I'm overspeaking, I hope not, that plutonium was the most significant source of exposure, and no one's really arguing that we can't do that. Yet, the real concern is for the exotics, and I haven't heard anyone try to make the case

that workers exposed to exotics were the most exposed workers on site. So, I don't see how we can't bring to bear a co-exposure model. And, you know, I don't see how this is -- really compromises our ability to bound doses.

CHAIR BEACH: Joe or Bob, do you want to follow up on that?

MR. BARTON: Well, you just mentioned co-exposure model, but what's being proposed is the 100-millirem threshold that would be applied to the unmonitored worker. And I think one of the things we'll get to, hopefully, is that, yes, we agree that they had a pretty good handle on plutonium, but that doesn't reflect the exposure to any of these rare, exotic materials. And that's the question, whether that 100 millirem can be applied for these exposures to, again, nonplutonium-type materials.

So, I mean, I -- I agree with -- with Dr. Ulsh that -- at least I personally agree that the thousands and thousands of bioassay that you have for plutonium will be adequate to reconstruct doses to plutonium. But does that really answer the mail about some of these other things that were at the site? And again, rare compared to plutonium operations, but still represents an exposure source.

And I -- I think what is being discussed is that to the data we have for those exotic radionuclides, does that constitute sufficient data to reconstruct doses for those unmonitored workers? And again, what's being put forth is the 100 millirem, not necessarily your traditional co-exposure model where you take in vivo results or bioassay results and do the traditional methods for unmonitored workers. So, I think that's sort of a -- I guess, hopefully clarifying point that I wanted to put forth.

CHAIR BEACH: It does. Thank you, Bob.

Okay. Joe, anything -- closing before we move on to the next --

MR. FITZGERALD: No. That's fine. Thank you.

CHAIR BEACH: All right. Great. Thank you. Good discussion. Any other work group members have any last questions?

And I'm assuming NIOSH, you're going to tee up your large report? Yep, there it is. Oh, nope. That's not the one I expected. Okay. Great.

Oh, so, Bob, are you going to go ahead?

MR. BARTON: Yeah, I thought I was up, but maybe I'm not.

CHAIR BEACH: Well, and that's my question. Are you up or is NIOSH going to present? I'm okay with either order.

UNIDENTIFIED SPEAKER: What's the -- I can't even remember what the agenda is.

CHAIR BEACH: Well, the agenda is -- it's a little -- it's a little messy. So, we had Report-103 and then ORAUT, the Report-101, 102, 103. And then SC&A presented. So, I think SC&A, you were actually up on this and then NIOSH was going to come in. So, let's -- let's go ahead and -- go ahead and put that back up, Bob, and go through it. And then we'll take a comfort break, and then we'll move into NIOSH's 63-slide presentation. And then NIOSH will have two others. So, if everybody's in agreement, go ahead, Bob. Thank you.

SC&A REVIEW OF LOS ALAMOS NATIONAL LABORATORY INTERNAL DOSE TOPICS (RPRT-101 AND 102) (MAY 6, 2026)

MR. BARTON: Okay. Again, this is a little out of order, certainly. We just discussed 103, but there's also two other reports that SC&A is presenting its review of, that's 101 bounding intakes of exotic radionuclides at Los Alamos

National Lab, and 102 assessment of Los Alamos National Laboratory plutonium bioassay programs, 1996 to 2001. And as I mentioned earlier, all three of these reports are really tied at the hip. So, that's why our review approach had sort of consolidated them into a single SC&A document to address all three. I mentioned 101, 102, 103.

I'd be remiss not to also mention there's also 107. Lots of reports. And 107 specifically looks at LANSCE. That's the Los Alamos Neutron Science Center. And SC&A had been tasked at the most recent discussions to take a look at it purely under the guise of a sort of focused look to see if it changed anything really, from our perspective, really trust that the discussion today would be materially altered. We -- we don't believe so at this time, but we probably need to formally document that. I -- I imagine via a pretty brief memorandum, but also allow NIOSH to present their work, which I hope I'm not mistaken, but I don't believe has been formally presented to the work group. So, that's -- that one's certainly on the -- I guess I'd call it, the back burner.

Anyway, to our original review, and it is pretty lengthy, something like, again, 100 -- I think it might be 103 pages, and I will post a link in the chat in case you all don't have it after I finished presenting -- or attempt to post it anyway, so hopefully you can all find it. But that -- that again, is under the website under the LANL site-specific page. But again, I'll -- I'll try to post it in the chat so you all can more easily access it.

And, you know, since it's been such a protracted discussion, I'm going to try not to dive too deep into the weeds for this because, again, 100 pages of technical evaluation discussion is a long way to go. So, I guess it's a sort of, like, a baselining for this meeting or restart of the work group after, you know,

lengthy halftime, possibly moving it toward Board action, if warranted. That's really up to you all.

So, again, we're sort of out of order here. So, this slide is sort of -- it's supposed to be at the beginning. But just to quickly revisit some of the background, SEC-109 has the end date of 1995. This is based on the assumed effective implementation of 10 CFR 835, which mandates any worker with the potential for 100 millirems of dose be monitored accordingly. And again, this is really the main premise that is under discussion, essentially encompassing all the material contained in each of these three reports and SC&A's review.

But anyway, I -- back to LANL, not -- not the report timeline of -- of 103, 102, and 101, but prior to 1995 -- really, 1996, there wasn't enough confidence that 835 had been implemented, as you can see here, to quote, inability to bound unmonitored intakes of exotic alpha-emitters, fission products, and activation products. So, the previously established SEC up through 1995, that is to the end of 1995, found that the evidence was lacking to say that dose reconstruction is feasible to these specific source terms. However, it has been posited that the programmatic controls, you know, things like the air samplers, contamination controls, and other, what I'll call, indirect monitoring, such as regular surveys, you know, swiping, the rad protection folks roving around with an external monitor, self-monitoring situations, which definitely occurred at LANL, that would give us confidence that exceeding that 100 millirem and not being monitored for any significant internal uptakes is unlikely.

And I guess the second facet is the abundance of data available. And this is a common story. And this results in a conclusion that there is a paradigm shift that was based on 835 and after 1995, to assure that doses can be feasibly

reconstructed. As stated on the previous slide, the conclusion of the ER for the post-1995 period is that one can use 100 millirem. Again, this is the framework that is being proposed currently. I don't know if that's intended to change, but it's 100 millirem was proposed as a bounding approach for the unmonitored or partially monitored worker. That is, if you have some years missing, you can use the 100 millirem to sort of fill the gap.

Again, a little bit more in background. The genesis of the SC&A and work group's initial concerns is that simply having a lot of bioassay data doesn't necessarily mean that 835 was effective. Clearly, there are unmonitored workers, otherwise there wouldn't be any need to assign this dose framework. It's, you know, same old song and dance, which isn't a nefarious or necessarily a bad thing. It's just necessarily a part of the program, you know, and it's appropriate, but it requires, you know, the necessary questions to be asked and answered.

And again, this comes back to entity NC ID 484 back in 1999 that identified a potential problem with data completeness, that is, you know, data gaps for enrollment and also radiation work permit-specified, RWP-specified bioassay. And this would generally be considered the nonroutine bioassay sampling based on job-specific bioassay, you know, such as maybe removing a glove box or modifications to the process areas, that sort of thing. NIOSH did agree that follow up was needed with the site to see how extensive any potential issues with the internal monitoring program, especially this non-routine facet, might affect the ability to reconstruct dose.

You know, let's talk a little bit about the interview results. They concluded there was no real process to assess if individuals were leaving the required

bioassay. The adequacy of the RWP checklists prescribing bioassay was done going forward and not looking backwards. And this is sort of key.

As has been mentioned, you are all probably familiar with the similar situation at Savannah River where they did -- they did actually retroactively sample for at least the previous year, but that doesn't appear to have happened at LANL. Similar to that situation, the path forward -- again, the situation at SRS, those discussions, the path forward was to sample the RWPs. Again, these are radiation work permits. And this was to see if we can match them up with available bioassay. So, where -- where an RWP specified something should have happened, did it happen? I note that it was originally going to be a straight statistical sampling. However, eventually, it was decided to just grab everything that could be found by -- by NIOSH and ORAUT via available RWP records and, you know, see what the story tells.

So, again, these are two of the three reports that I made mention of earlier. So, these are the references for informative purposes. And you should have them in hand. But, again, I can send -- I can send you all the links to make easy -- more easily accessible. You know, just reach out, and we can make it happen.

SC&A (indiscernible) was tasked -- so it was just in March of 2022 -- to assess the RWPs that were captured, again, in the context of job-specific bioassays and in particular, the radionuclides, which are loosely defined as -- or I loosely define them as "other than plutonium." And as I mentioned, one of these evaluated reports was 103, which we already got to on the agenda today, and had some very fruitful discussion, in my mind.

Just some comments on how SC&A approached this, our review approach.

And again, in a -- in a general sense, we examine how this trio of reports are complete and representative. As you know, these are the key components of -- of NIOSH's own guidelines for co-exposure modeling. And this comes out of IG-006. Again, just reach out and I can send you a link. But these are all available online for the public, but IG-006 is the outline essentially of how you construct a co-exposure model.

And also included was a review of the programmatic documentation, which is important. And it's essentially how effectively were the radiation protection policies, your procedures and such implemented in the field. Specifically in this case, obviously, by 1996 and on, which is the period we're -- we're concerned with.

Okay. Moving on to SC&A's findings and observations for the first of the three reports, which is 101. Technically, it's the second one today. I realize this is a long loop to get around to the first report but hang with me.

And so, to wit, Finding 1, basically pointing out that the evaluation of survey data, you know, smears and air sampling, are not a random sample, but were meant to illustrate the program in place. So, again, not random nor necessarily representative. To repeat, intended to be illustrative, which I think is something that should be considered in these discussions, because there was a lot of good work done.

But we have to understand not only what the data is telling us, but what the data actually represents from the site. Obviously, it's very difficult to gather all of it, so you want some illustrative examples. But it's not -- it does not have any real statistical basis. Again, illustrative.

Twenty-two is sort of a corollary to finding one in that we really don't

know how complete the data set evaluated actually is. There's currently no known way to compare the data collected to how much should really exist. And this would be things like comparing to periodic health physics reports and such things, saying something like, you know, first quarter of 1996, we took X measurements in Y area. We don't have that currently. That -- that is something that if you listen to my SEC issues presentation at the full Board was something to consider, certainly.

Finding 3 -- and keeping in mind that the purpose of Report-101 was meant to be illustrative, not quantitative. However, many -- many of the examples put forth were mostly put into effect in the year 2000. Examples were given of documented incidents of contamination detected with a -- fixed-monitoring stations. However, the ones at the start of this period of interest were associated with, again, that main plutonium facility. And plutonium, again, is really not the area of concern here, as plutonium was the main purpose for LANL. So, it -- it's reasonable to assume they -- they concentrated their rad protection on those areas.

SC&A had -- SC&A had three observations for 101 specifically. And again, these -- these may actually be beyond the scope of what was intended for Report-101, but there's no actual designation on which unmonitored workers would receive the 100-millirem assignment. Like, so how -- how would we actually use this dose reconstruction approach if it is approved? Is it all workers? Is there a way to delineate exposed and non-exposed workers? But, I mean, this -- again, this may be something to ultimately hammer out if the 100-millirem framework is acceptable.

Observation 2 simply notes that there were duplicate entries included in

the database we looked at, but it was a -- it was -- it was a small percentage and not likely to affect the analytical results. So, it's important to note for the record, but we don't feel it really affects the SEC discussion, which is why it's -- ultimate -- ultimately an observation.

Observation 3 notes that in Technical Area-53, there are a couple of years in the earlier period of interest that would indicate conditions that may result in doses greater than 100 millirem. We -- we designated this an observation, not a finding but worth noting in our review, just to give a fuller picture of -- of what's going on at the site and what we're talking about today.

All right. Conclusions for Report-101. The report posits that the weight of evidence supports the premise that unmonitored doses can be bounded by 100 millirem. SC&A's conclusions from its review -- I guess, first, it's not a complete data set captured from the site, either by year or location. And so, completeness is sort of unknown to us. And when we talk about the programmatic documentation, it's largely dated much later in the period of interest. But -- and by that, I mean, like, the year 2000 or later. And that --the radiological controls, such as the use of portal monitors is certainly useful, but the real question is dose and doesn't answer the mail as far as actual internal monitoring. And this goes back to the weight of evidence again, which is ultimately a professional judgment call for the Board.

So, that was the Report-101. And, again, like I said, all -- all three of these reports are essentially intertwined. But before I move on to 102, maybe give a chance for any questions or we can -- we can go through 102 and then address all three reports together.

CHAIR BEACH: Unless there's a burning question -- I -- I think LaVon has

his hand up. Did you want to speak now, LaVon, or?

MR. RUTHERFORD: I -- it's not a burning question. I just wanted to point one minor thing out. It's just that there were over 100,000 air samples and smear surveys that were taken as the illustrative examples that Bob pointed out. I just wanted to make sure, because it -- it kind of -- I wanted to make sure people realize there were a lot of samples.

CHAIR BEACH: And those were mostly plutonium in nature?

MR. RUTHERFORD: No, those were all in areas associated with the exotics.

CHAIR BEACH: Okay. Thank you. Any questions before Bob moves on? Bob, I think you can go -- oh, go ahead.

MEMBER LOCKEY: Josie, this --

CHAIR BEACH: Hey, Jim.

MEMBER LOCKEY: Yes, Jim. It's Jim Lockey. When NIOSH did the -- the radiation work group analysis, it was a qualitative analysis. Do you know how they -- what was the criteria they used to pick the ones they picked? Do you know?

CHAIR BEACH: Is that a --

MEMBER LOCKEY: (Indiscernible) --

CHAIR BEACH: -- something you can answer?

MEMBER LOCKEY: -- I'm not sure who -- who can address that.

MR. RUTHERFORD: I think the -- I can't remember the exact name, so I'm not going to say, but I'll let Dan Stempfley or Pat respond if they remember the exact criteria.

MR. STEMPFLEY: Can you repeat the question?

MEMBER LOCKEY: What's the -- the -- in the presentation, it -- it was said that NIOSH picked illustrative examples of the radiation --

MR. STEMPFLEY: Talking about samples of convenience?

MEMBER LOCKEY: Yeah. No, no. How did you pick those illustrative examples or RWP examples? How were they picked?

MR. STEMPFLEY: It wasn't random. It wasn't statistics. We just selected eight from different -- the three different areas. There was no criteria. We just picked eight that met those -- the conditions for the report, which was pre, post-survey data. We had some criteria that we were looking for, sign-in sheets, and maybe some in-process surveys. And from that criteria, we picked eight. The nontechnical term for samples of convenience is cherry picked.

MEMBER LOCKEY: Yeah. Cherry picked, so you just --

MR. STEMPFLEY: We just selected eight. Yeah.

MEMBER LOCKEY: Gotcha. That's what I wanted to know. Thank you.

MR. ALTIC: Hey -- hey, Dan, this is Nick.

MR. STEMPFLEY: Yeah, no.

MR. ALTIC: If I could, just add on to that.

MR. STEMPFLEY: Go ahead, Nick.

MR. ALTIC: Regarding -- regarding the technical areas that were selected for analysis of the contamination surveys, we -- we asked Los Alamos staff, you know, where would you expect to find, you know, the most significant exotic radionuclide usage, and that's how we landed on Technical Areas-3, 48, and 53.

MEMBER LOCKEY: All right. So, that's what I was trying to get at. So, you -- you -- you went, you tried to select the most -- where you would get the most potential yield, I take it, or the most outliers? Is that right or not?

MR. RUTHERFORD: Where you had the --

MR. ALTIC: That's correct.

MR. RUTHERFORD: Yeah. Where you had the greatest potential for an individual to potentially exceed 100 millirem in an exotic area. That's how we picked the three areas. Bob's present -- or discussion was talking -- the illustrative examples he was talking about was air sampling and the smear surveys that were used in support of that report. The RWP sampling, we pulled all of the RWPs that we could get for those specific areas, and then we used all of them, but we -- we pulled the most significant ones that we thought met the most criteria in order to look at that.

MEMBER LOCKEY: Okay.

MR. FITZGERALD: I guess -- I guess, I would just add -- this is Joe -- Joe Fitzgerald -- that back in the 1990s, whatever specific operations or bench-scale experimentation with exotics that might have been going on in different parts of the lab, that probably would not have been the same as identified in -- in this review. There's no easy way to -- to do that, but I'm just -- just pointing out that, you know, in a -- in a laboratory like Los Alamos, a multidisciplinary laboratory with lots of different experimentation and bench work going on, what is being handled is intermittent changes by the week, month, and happens in different locations. Particularly historically, whatever was happening in the '90s would have been different, I think, than later. Just a comment.

MR. RUTHERFORD: Well, I -- I disagree with part of that. I --

MEMBER LOCKEY: (Indiscernible) --

MR. RUTHERFORD: -- the part I disagree with is we asked the health physicist what would be the most appropriate areas during that time period to

sample for exotics. And -- and they gave us the areas that they felt had the highest potential during that period for people to be exposed to exotics. I agree with Joe that there could be other areas that -- that bench-top work occurred, but the ones that was identified to us had the most significant probability of exposure potential were those -- based on those facilities.

MEMBER CLAWSON: LaVon, this is Brad. Why were the facilities -- what -- what stood out? Why -- why are you -- why are you saying that that's --

MR. RUTHERFORD: It was --

MEMBER CLAWSON: -- what was --

MR. RUTHERFORD: -- again, it was -- it was the work -- it was the health physicists that had worked in that area or worked during that period, helped us identify the areas that they felt would have the highest potential for potential exposure to the exotics.

MEMBER CLAWSON: Okay.

MR. RUTHERFORD: Obviously, LANSCE because you're going to get mixed fission and activation products, all kinds of that, plus they dealt with multiple different isotopes. So -- so, that -- that kind of made sense, you know, and then the other areas they threw out because of the bench-top work that occurred in those areas during that period.

MEMBER CLAWSON: Yeah. And I -- I -- I understand LANSCE. Me and Pat toured that.

MR. RUTHERFORD: Actually, I toured (indiscernible) --

MEMBER CLAWSON: -- yep.

MEMBER LOCKEY: LaVon, Jim Lockey. Thanks for answering the question. I just know from when I've done dose reconstructions of past, the

approach you took is the exact same approach I would take. Anybody who's done scientific studies and tried to recreate doses, it takes that exact approach. You go to the most knowledgeable people and ask for the worst-case situation, and then that's where you go. Yeah, I agree with that approach.

MR. BARTON: Well, this is Bob, and I just want to --

MEMBER CLAWSON: Well, --

MR. BARTON: -- clarify a bit. I didn't come up with the adjectives illustrative or, you know, not having a statistical basis. That's actually straight out of NIOSH's report. So, that's not me opining. That's --

UNIDENTIFIED SPEAKER: I -- I'm sorry, --

MR. BARTON: -- which I think is very transparent, to be honest.

MR. RUTHERFORD: Yeah, I -- I have -- I didn't mean to throw anything at you on that. My point was I didn't want people to think illustrative only meant like five or six examples. I wanted to point out that there were over 100,000 samples, so.

CHAIR BEACH: Brad, did you have some --

MEMBER SCHMOLDT: -- number of samples is really impressive in terms of the weight of evidence. Even if it's not representative, it's certainly a strong basis for judgment.

MEMBER CLAWSON: Well, the -- the problem that I have is if you take every one of these sites throughout the whole thing, every one of them was interpreting the RADCON program a little bit different, and they were doing it a little bit different because each one of them had a different process that they were trying to complete. And I -- I'm sitting here looking at what you guys are calling out for 835, and we were doing it totally different. And that's -- that's --

that's kind of what brings -- why I'm sitting here looking at it a little bit strange.

CHAIR BEACH: All right. Anything else? I'm still stumbling over that 100,000 number, but I'll get back to that when NIOSH is presenting. Bob, I guess you can move on if you're ready.

MR. BARTON: Okay. Always ready. This one will be, I think, fairly quick. So, moving on to Report 102. Here's Finding 4. Again, the numbering may seem counterintuitive, but again, all three reports were combined into a single SC&A review, which is why the findings and ob -- observations are -- seem out of order for this meeting, but that's how they appear in the actual review report, so.

But anyway, Finding 4. This is how workers were considered compliant with the RWP-assigned bioassay. And in Report-102 workers were considered compliant if any of the RWP-required bioassay were fulfilled during the year. And, again, this is, again, primarily plutonium-related work in these RWPs. The air sampling may be different. So, one question is what if the worker left the site, and we -- we -- that is, SC&A -- don't feel this actually completely demonstrates a compliant RWP program. So, there are nuances here that are worth considering.

Finding 5, again, this relates to the criteria used in evaluating the RWP-directed bioassay. Specifically, if the bioassay was submitted the end of the year after the year, does that really illustrate whether the RWP program was functioning appropriately? SC&A feels it should be within at least one year of the end of the job-specific related work. Also, if a worker submitted bioassay during the work but not after the work, does that actually demonstrate a functional RWP-directed bioassay program? So, again, are those potential

exposures actually being captured?

Finding 6, one of the concepts in this analysis in 102 was that if a worker signed the same RWP, then they had the same exposure potential. And so, it doesn't really matter if they were monitored because their coworkers, which would feed into the co-exposure model, that is, their monitored coworkers that would feed into the co-exposure -- co-exposure model may have been monitored.

This concept was sort of born out of the Savannah River discussions, and it's known as effective monitoring in this program. It's essentially the side-by-side concept. If a monitored worker is doing the same job as the unmonitored worker, the unmonitored worker is represented in any resulting co-exposure model.

Now, again, we're talking about 100-millirem concept here, not necessarily your traditional co-exposure model, so this may actually be a moot point. And again, this concept really came to light during the Savannah River discussions when we were trying to establish whether this -- the side-by-side concept was -- was viable. And that was not accepted by the Board, for Savannah River at least.

Some observations for Report-102. We have Observation 4. We noted that the lowest observed compliance was for a maintenance contractor mentioned before, as Johnson Controls. We saw 45 percent compliance in 2001. Though it is worth noting that another maintenance contractor, KSO Services, had the highest compliance overall at about 89 percent. So, I don't know where you can take that. We'd logically be worried about those maintenance workers because of the RWP process. One looks good, the other not so much.

Observation 5, there was the -- or a contention put forth that it was a positive that the majority of unfulfilled bioassays were for legitimate reasons. We understand that is -- SC&A understands and acknowledges that there are understandable reasons that bioassays went unfulfilled. However, the -- the question is whether the exposures or exposure potential was properly monitored. In other words, it doesn't matter why the bioassay wasn't submitted, whether it was appropriate or inappropriate, only to what extent it -- it actually wasn't submitted.

Observation 6, one part of the analysis considers what is termed "the open window," which that's not to be confused with an open window dosimeter measurement where you're trying to catch both gamma and beta, but rather the time frame for which the analyst considered a worker to be appropriately monitored based on the RWP. Now, for -- for these long-lived radionuclides, I really mean biologically long lived, such as plutonium, which the body has a very difficult time excreting. And you can measure that exposure many, many years after the actual intake or exposure occurred.

We agree -- SC&A agrees with this concept for an individual, but when you actually create a co-exposure model, it is very time dependent. In other words, a sample taken in 2000 might reflect that worker's exposure in 1996, but would only in actuality, or rather in practice, apply to unmonitored workers in 2000, when used in a -- in a co-exposure model situation.

So, I'm almost done here. In conclusion, weight of evidence supports the idea that the highest exposed workers were included in the bioassay program. Thus, a claimant favorable and exposure model is ostensibly thought possible. SC&A tacitly agrees, but since there isn't a co-exposure model yet developed,

it's difficult to say whether it covers the exposures we're talking about today. That is, the -- the exotic radionuclide exposures. And again, to add to that, NC ID 484 (sic) raised the questions regarding bioassay completeness and representation. And, again, I don't want to use this word again, but I will anyway. There are certainly illustrative and weight-of-evidence-type arguments, but the actual weight of those arguments is ultimately a matter of professional judgment, and that's -- that's for the Board. I think that is -- yeah, that's all I have.

CHAIR BEACH: Thank you, Bob. I know that was difficult going back and forth.

Any questions for Bob?

MEMBER LOCKEY: Hey, Bob. Jim Lockey. Can you go back to Observation 5? I just -- I have a question about it, because I just didn't understand it when I read it. I probably asked the question before, but I'm not sure I remember what the answer was. So, when I read this, it said SC&A does not agree with NIOSH's contention that the large majority of unfulfilled bioassay requests -- so, there were 1,613 unfulfilled of 1,981; is that how -- is that correct? Is that -- what that one thousand --

MR. BARTON: I'm gonna have to -- I'm gonna have to trust the slide.

MEMBER LOCKEY: Okay.

MR. BARTON: I can verify it for you, certainly. But again, this was -- when looking into why we might have missing bioassays, it was posited that well, you know, they were on vacation or, you know, there's some --

MEMBER LOCKEY: Oh, I understand that. I just -- I don't understand the -- I don't understand the numbers. The 1,613 is the unfulfilled bioassays of a

total of 1,981; is that right?

MR. RUTHERFORD: That's not correct. I -- I think it's -- correct me if I'm wrong, Bob. It's 1,613 had legitimate reasons for being unfulfilled of the 1,900 of the one -- of the 1,981 that were actually unfulfilled. So, you have a total of 1,981 bioassays that were not filled, were not given. And of that 1,981, 1,613 had a legitimate reason. Correct, --

MEMBER LOCKEY: (Indiscernible) --

MR. BARTON: If -- if I might just try to comment on this a little bit more. I think our point here with Observation 5 was that it doesn't matter why they weren't fulfilled, just the fact that they were not fulfilled. I mean, this is not an indictment on the health physics staff over at LANL or the way they were necessarily missing those, however many percent of the bioassays. That to -- to my mind, doesn't matter. It just matters that they weren't actually submitted. And thus, when we try to retrospectively go back and evaluate the potential doses, that's -- that's a somewhat confounding factor. I think that's what we're trying to get at here. Again, not an indictment on why they were unfulfilled, just simply that they were.

MEMBER LOCKEY: I gotcha.

CHAIR BEACH: Right. While -- and which is why it's an observation.

MEMBER LOCKEY: Right, I --

MR. BARTON: That's correct.

MEMBER LOCKEY: -- was just trying to understand, and I understand. All right. Thank you.

MEMBER CLAWSON: Jim, you could think about it as the dog -- the dog ate their bioassay, you know, it's accused, but.

MEMBER LOCKEY: That must be -- that must be -- that must be an Idaho thing up there. I don't know, but.

MEMBER CLAWSON: Well, the old dog ate the homework and stuff.

CHAIR BEACH: All right. Any more questions? Rashaun, let's take a poll. Are people ready for a comfort break? We've been at -- been at it for a little over two hours. I guess my question would be, do you need lunch or is a 15-minute comfort break enough?

MEMBER LOCKEY: I -- I'm --

MEMBER CLAWSON: I'm good.

MEMBER LOCKEY: Jim Lockey. I'm up for a break.

CHAIR BEACH: Comfort break enough, 15 minutes, or you need lunch?

MEMBER LOCKEY: Fifteen --

CHAIR BEACH: Need longer? --

MEMBER LOCKEY: -- minutes.

CHAIR BEACH: Fifteen? Everybody agree with that?

MEMBER CLAWSON: I'm good with 15.

MEMBER MARTINEZ: Yep.

CHAIR BEACH: Okay.

MEMBER MARTINEZ: I'm good with 15.

CHAIR BEACH: All right. So, Rashaun?

DR. ROBERTS: Do we want to say 1:30?

CHAIR BEACH: Yeah, let's do that. That gives us a little -- almost 20 minutes. And keep your computers on, keep your lines open.

DR. ROBERTS: Yes, yes.

CHAIR BEACH: That makes it easier.

DR. ROBERTS: Thanks.

(Whereupon, a break was taken from 1:13 p.m. EDT until 1:30 p.m. EDT.)

DR. ROBERTS: Okay. I have 1:30 on my clock, so let me go ahead and take roles again before we get started. Let's start with Beach?

CHAIR BEACH: I'm here.

DR. ROBERTS: Clawson?

MEMBER CLAWSON: Sorry, I was on mute. I'm here.

DR. ROBERTS: Okay, great. Lockey?

MEMBER LOCKEY: I'm here.

DR. ROBERTS: Martinez?

MEMBER MARTINEZ: Here.

DR. ROBERTS: And Schmoldt?

MEMBER SCHMOLDT: Here.

DR. ROBERTS: Okay. Very good. Over to you, Josie.

CHAIR BEACH: All right. I believe NIOSH, you're up next. Are you going to put the 101, 102, the 162-page slide up? Is that where you're starting, or are you going to do some of your others?

NIOSH/DCAS PRESENTATION: "NIOSH RESPONSE TO SC&A'S REVIEW OF REMAINING LANL SEC-00109 INTERNAL DOSE ISSUES FOR 1996-2005" (APRIL 2025)

MR. ALTIC: Hello? Before I get started, let me just ask can you hear me, and can you see my --

CHAIR BEACH: Yes.

MR. ALTIC: -- presentation?

CHAIR BEACH: Yes, yes, Tim (sic), we see your presentation, and we can hear you or at least I can.

MR. ALTIC: Okay, perfect. Well, hello, everyone. My name is -- is Nick Altic, and I'm with the Oak Ridge Associated Universities Team. I'm filling in for my colleague Tim Adler, who was unable to attend today's meeting. So, I'll be giving this presentation that summarizes NIOSH's response to SC&A's review of Reports-101, 102, and 103. Just let me -- let me check. Can you see the -- the presentation in its entirety? Are you seeing --

CHAIR BEACH: We're seeing this -- the left-hand side slides as well. If you could put that full screen, that'd probably be helpful.

MR. ALTIC: Okay. I'm going to stop sharing and try this again.

CHAIR BEACH: It looks the same for my vantage point.

MR. RUTHERFORD: Nick, can you hit slide show and then from beginning, or are you -- is it just not doing that?

MR. ALTIC: It's going to be on this side. Okay.

DR. OSTROW: The task bar at the top says "slide show." Hit that button, please. Just above you -- yeah, that's it. Yep. You'll press it twice. Double click it.

MR. ALTIC: Okay.

DR. OSTROW: Yeah, double click slide show.

CHAIR BEACH: You have to double click it.

MR. ALTIC: Click anywhere...

MR. RUTHERFORD: Get rid of that, yeah, that enable editing.

MR. ALTIC: Okay. Is that better?

CHAIR BEACH: No. You totally went off.

DR. OSTROW: You lost it.

MR. MCCLOSKEY: You stopped sharing.

MR. ALTIC: Yeah, Pat if you could -- which one is this?

(Whereupon, Mr. McCloskey, Mr. Altic, and Mr. Rutherford speak simultaneously.)

MR. ALTIC: All right. We're going to try -- we're going to try something different. Pat's going to share the presentation for me. Apologies for this -- this technical difficulty.

DR. ULSH: Yeah. This is Brant. Having been there. This is like my worst absolute nightmare.

MEMBER CLAWSON: Well, you know, I'm starting to hear a joke in this. I think it's how many health physicists does it take -- just joking. Just joking.

DR. ULSH: Yeah, that's a pretty good one. That's a pretty good one.

MEMBER CLAWSON: At least we got some --

MR. ALTIC: Believe it or not, we -- we tested this.

MEMBER CLAWSON: It -- it always works until you have to do it.

CHAIR BEACH: Yeah, that's for sure. All right, Nick, you got it. And it is full page.

MR. ALTIC: Okay, perfect. So, we'll work from -- from this one, if that's all right.

CHAIR BEACH: Terrific. Thank you.

MR. ALTIC: All right. Well, before I get started, this presentation, first, I'd like to acknowledge several of my colleagues that had a heavy hand in developing this presentation. No particular order. Tim Adler, Rich Merrill, Dr. Nancy Chalmers, Dr. Tom LaBone, Angie Palau, Melissa Adler, Judith Ryan, Dan

Stempfley, and Pat McCloskey. Many thanks to them for -- for helping pull this material together.

Next slide, please.

So, this presentation is going to summarize NIOSH's response to SC&A's review of Reports-101 through 103. This slide simply gives a reference to NIOSH's response report and SC&A's report, which both can be found in their entirety on the NIOSH website.

Next slide, please.

So, the topic of today is NIOSH response report, which addresses each of the eight findings and nine observations resulting from a review of Reports-101 through-103. Here we're just providing reference of the titles of the three reports on this slide. These reports are also available in their entirety on NIOSH's website. So, before we get to the responses, I'm just going to provide a very brief recap of the three reports. We've already had some great discussion about these, so I'm going to try to keep things moving along where I can.

Next slide, please.

Okay. Quickly reviewing Report-101, the highest level review of this report would be to say this has the ability to bound doses from exotic radionuclides at 100 millirem per year committed effective dose, or CED, during the 1996 to 2005 evaluation period. Report-101 focused on examining workplace controls, workplace monitoring, and worker self-monitoring in Technical Areas 3, 48, and 53 as these areas of the site were known to have exotic radionuclide involvement during the evaluation period. The workplace monitoring that was examined included surface and personnel contamination

survey data, air monitoring data, and source term inventories.

So, also as part of Report-101, the report derived conservative removable surface activity and air concentrations that correspond to the 100 millirem per year committed effective dose monitoring threshold and compared routine radiological protection data to these derived limits. The report concluded that the analysis further strengthened the weight of evidence that doses to unmonitored workers can be bound at 100 millirem per year CED.

Next slide please.

Just a quick recap of Report-102. This report was an assessment of plutonium monitoring program portion of LANL's radiological protection program. It analyzed available data and searched for evidence that the most highly exposed LANL workers were not monitored. Bioassay data complement was assessed by examining the six health physics data sets listed under that second bullet Report-102 concluded that plutonium bioassay data were collected from a significant portion of the most highly exposed workers, and that the data are adequate to construct a co-exposure model for plutonium.

Next slide, please.

And a very quick summary of Report-103, which was, you know, we saw the full presentation on earlier today. So, as you recall -- recall, this report did a fairly deep dive into eight -- 80 radiological work permits, or RWPs, each from the three Technical Areas-3, 48, and 53, the same technical areas that were assessed in Report-101. Report-103 adds to the evidence presented in Report-101. And again, NIOSH concluded that LANL appropriately monitored its workforce.

Next slide, please.

So, now we'll move on to discussing SC&A's findings and observations and the associated response to each. Because these findings and observations have all been covered in SC&A's presentation, I'm hoping they'll become at least somewhat familiar, so we'll present them verbatim on the following slides. But I'm hoping I'm going to keep things moving along and reduce redundancy by attempting to paraphrase.

Next slide, please.

Okay. Starting with Report-101, you see SC&A's first finding verbatim on the right-hand side. Basically, this finding questions the representativeness of the contamination survey and air sampling data that NIOSH examined as part of the Report-101 analysis. The representativeness portion of the finding applies to the three chosen technical areas, as well as other areas of the site that are not specifically evaluated.

Next slide please.

All right. Moving on to the response, NIOSH agrees that the data used in Report-101 analysis should not be considered a statistically representative sample, and as a result, we can't make inferences about contamination level throughout all areas of the site. The report is not intended to be a stand-alone defense of the proposed bounding dose but rather adds to the weight of evidence that the proposed annual dose is bounding. NIOSH agrees that the analysis presented in Report-101 doesn't represent all --

(Whereupon, an unmuted attendee's telephone rings.)

MR. ALTIC: -- LANL facilities, nor is it a statistically significant representation of the three targeted areas. The assessments did, however, target technical areas known for their use --

UNIDENTIFIED SPEAKER: Hello?

MR. ALTIC: -- of exotic radionuclides.

DR. OSTROW: Wait, let me -- let me mute the telephone.

MR. ALTIC: Oh. Sorry, I think we have someone that's not on mute. Thank you.

So, the results do provide additional evidence that LANL implemented the necessary administrative and engineering controls to determine when and what type of internal dose monitoring was required to comply with the monitoring threshold. Okay. So, that's Finding 1.

Next slide, please.

So, SC&A's second finding notes that contamination survey and air sampling data sets evaluated in Report-101 are incomplete.

Next slide, please.

NIOSH agrees with this finding with regards to quantifying the data set completeness. Nevertheless, NIOSH's position is that approximately 106,000 contamination survey and air sampling results that were captured from the site indicate that LANL actively managed exposures, further strengthening the weight of evidence that the proposed dose is bounding. And also, just another comment on this. This 106,000 sample figure, you know, the breakdown of, you know, what's composed of those samples, you know, from which TAs they were -- they represent and from what year can be found in Report-101. But I will just mention briefly that approximately 60 percent of the 106,000 were represented by air samples and the balance were contamination smears.

Okay. So, as presented in the response to Finding 1, while the report does not support making inferences regarding areas of the site not within the

scope of the report, we also can't conclude that they are biased towards, you know, much cleaner areas of the site.

Next slide, please.

SC&A's third finding notes that captured routine monitoring instructions for the most part, don't encompass the first four years of the evaluation period, and also that the report included an example of a fixed monitoring station incident within TA-55 that may not be representative of other areas where exotics were handled. Okay.

Next slide, please. Next slide, please. Oh, there we go.

Okay. Similar to the response for Findings 1 and 2, NIOSH agrees that there are time and location gaps in the captured routine monitoring instructions. The radiation monitoring instructions that have been captured were done during general wide-scope on-site data collection activities, and also via more targeted data capture requests associated with Technical Area-53. Though not presented on this slide, it is noteworthy that NIOSH has captured documentation demonstrating routine monitoring instruction use as early as 1978. Also noteworthy is that NIOSH has found no evidence that survey requirements specified in routine monitoring instructions were not typically performed, routinely ignored, compromised, or applied differently to any individual TAs or work activities during the evaluation period.

Additionally, NIOSH also agrees that some incident reports are associated with Technical Area-55. However, the incident reports for the three primary areas of -- of Report-101, which were TAs-3, 48, and 53 are also provided in the report. And as stated in response to SC&A's Findings 1 and 2, available data were evaluated semi-quantitatively as part of a weight-of-evidence-based

assessment of LANL's radiation protection program relative to the proposed bounding dose.

Next slide, please.

In addition to the three findings, SC&A's review also generated three observations for Report-101. The first observation states their belief that worker job types and covered radionuclides are not clearly specified. Additionally, within the text of SC&A's review paper, they observe that Report-101 applies a different definition of what constitutes exotic radionuclides than that presented in the evaluation report.

Next slide for the response.

Okay. First, regarding the definition of exotics, Report-101 did not intend to redefine what was meant by an exotic radionuclide or stray from the original 2012 evaluation report definition, which was that all radionuclides other than uranium, plutonium, tritium, americium, and cesium were considered exotic. Varying references to exotic radionuclides were used in Report-101 were only intended to better reflect some of the differences in the radionuclides' activities and exposure scenarios associated with the different technical areas evaluated.

Regarding worker types covered by the proposed boundary dose and co-exposure model development for unmonitored workers, NIOSH's position is that when reconstructing doses, determinations are evaluated on a case-by-case basis by dose reconstructors. They utilize guidance from site-specific technical basis documents, claimant interviews, and available claimant records. As such, this portion of the observation is a technical basis document issue, not an SEC issue, and guidance on application of the 100 millirem bounding dose will be added as needed to the LANL technical basis document.

Next slide, please.

SC&A's second observation on Report-101 notes duplicate entries in the data set. It additionally notes that their deletion would likely have minimal impacts on results. This is a pretty easy one.

Next slide, please.

We issued Revision 1 of Report-101, which corrected the duplicate entry issue and thus addresses this observation.

So, moving on to the third observation on the next slide, please.

SC&A's third observation notes the air sampling results from Technical Area-53 in 1996 and 1997 were more frequently above the 100 millirem ORAU Team derived limit than those from other years and other technical areas.

Next slide.

NIOSH agrees with this observation, and as mentioned previously, the Report-101 survey data analysis was not intended to assess temporal or spatial trends.

Next slide.

So, with that said, during interviews conducted in 2023, LANL staff stated that alpha activity reported on air sample filters was due to naturally occurring radioactive materials such as radon, thoron, and the associated decay progeny. There was short-term work with Plutonium-242 in Technical Area-53. However, according to LANL staff, this isotope was never identified in any of the collected air samples. Furthermore, the dose-based ORAU Team air concentration limit is based on the most conservative radionuclide, which was Actinium-227, and this radionuclide was not identified on any RWP or incident report used in the analysis. As a result of the conservative nature of the limit, survey results

greater than the limit due to naturally occurring radioactive material was not unsurprisingly -- unsurprising.

Next slide, please.

Okay. That takes care of Report-101. Next, we will summarize SC&A's Report-102 finding and observations and the corresponding NIOSH response. For Report-102 SC&A's review generated an additional three findings and three observations. Because NIOSH's response paper addresses Finding 4 and 5 together, we'll do that in this presentation as well.

So, SC&A's fourth finding, in essence, is that bioassay sample submission seemingly associated with one radiological work permit does not satisfy other RWP requirements during a given year.

Okay. Next slide for the response.

Okay. So, oh, no, sorry. We're going to talk -- we're going to present Finding 5 first. So, as you may recall, Finding 5 asserts that Report-102's assumption for the bioassay sample submission time window is inappropriately broad and that the only appropriate window should be one year after expiration of the RWP. Now we'll get to the response.

Next slide, please.

So, NIOSH's initial response to both of these findings is to provide some clarification of RWP purposes and the relationship to plutonium bioassays. There were several pages in Report-102 dedicated to this topic, and descriptions of how bioassay samples are coded. But briefly, it's initially important to remember that the Report-102 evaluation is focused squarely on LANL's plutonium monitoring program, and this was done because plutonium posed the greatest radiological hazard to workers during the evaluation period.

So, with this in mind, it's also important to note that there is no direct relationship between the timing of plutonium bioassay sample submission and the start and/or stop dates on RWPs. If an RWP noted that work was going to involve plutonium above a certain threshold, a plutonium access list requirement was checked. This meant that the involved workers would need to be on the list prior to performing the work. In other words, the worker needed to be on a routine program for plutonium. That's how you got on the list, by participating in a routine monitoring program.

Furthermore, it's worth noting that while LANL's RWP did list potential radiological exposure hazards, they didn't drive bioassay sample collection. In other words, LANL did not collect job-specific bioassays, which is a term that will show up later in Findings 7 and 8. If there was a suspected intake during execution of work covered by a given RWP, a bioassay sample may be collected. And these samples were coded as special or prompt action, depending on the magnitude of the suspected intake. So, in essence, we have routine samples being collected to demonstrate that workplace controls were effective and special samples collected to evaluate unexpected -- unexpected conditions or suspected intakes.

Next slide, please.

Okay. Dialing in on Finding 4 a bit more, and remembering that Report-102's focus was on the plutonium monitoring program, NIOSH notes that because workers were required to sign an RWP acknowledgment log indicating they understood the routine monitoring and personal protective equipment requirements, NIOSH considers a worker to be compliant if any of the RWPs were, quote/unquote, acknowledged by that worker during the year or have an

associated plutonium bioassay sample. So, if you're on the plutonium monitoring program for one RWP, you're already on the program for all other RWPs.

Next slide, please.

Regarding SC&A's Finding 5 in which they correct -- questioned the appropriateness of the bioassay submission time window, NIOSH notes that though various compliance windows were evaluated and others could reasonably be considered, all such windows are somewhat arbitrary and wouldn't change the evaluation's conclusion. The clearest metric is the total samples requested and received each year, which is independent of RWP dates.

Okay. Next slide for Finding 6.

The concern here with Finding 6 is that the assumption of similar exposure potentials between workers signing the same RWP acknowledgment form is questionable, especially for long duration RWPs covering multiple tasks. The idea being that an RWP with a long duration may potentially cover workers of different crafts and thus exposure potentials.

Next slide, please.

So, the response to this finding is to initially note that when examining acknowledgment logs for individual RWPs, the evaluation examines how frequently RWP acknowledgment logs contained no or very few monitored workers. So, because that happened very infrequently, NIOSH's conclusion is that it is highly -- highly likely that workers who are exposed to plutonium and were not monitored have potentially exposed coworkers who were monitored. Also, as the report notes, and as we discussed previously, if workers were going to be working with plutonium above a certain threshold, they had to be on the

plutonium access list. This is how LANL ensured that workers with the highest exposure potential for plutonium were monitored, which suggests that a bounding co-exposure model can be made.

So, as a result, NIOSH concludes that -- this excerpt is taken straight from Report-102 -- the preponderance of evidence supports the conclusion that a plutonium bioassay data reported by LANL in the 1996 to 2001 study period includes a significant portion of the most highly exposed workers and therefore are adequate to construct a co-exposure model for plutonium.

Next slide, please.

And we'll get into the observations for Report-102. So, this first one, Observation 4 points out that bioassay compliance rates differ between two maintenance contractors.

Next slide.

Okay. NIOSH agrees with this observation, but notes that the difference doesn't create any specific problems for co-exposure modeling. NIOSH is confident that the highest exposed individuals were monitored.

Next slide.

So, observation -- SC&A's Observation 5 is that they disagree with NIOSH's contention that the majority of unfulfilled bioassay requests during the report study period had legitimate reasons for going unfulfilled. SC&A's position is that the only legitimate reason for an unfulfilled request would be for a worker not to be exposed to plutonium during the intended monitoring period.

Next slide, please.

So, whether or not a missed sample is -- is, quote/unquote, acceptable is a regulatory issue, not a co-exposure modeling issue. LANL kept track of the

reasons of unfulfilled sample requests, you know, specifically for this -- this regulatory reason. From a co-exposure modeling standpoint, what matters is the portion of requested samples that received, which was 86 percent from the study period, and whether the site monitored the workers with the highest exposure potential. So, given that there is no evidence that unfulfilled requests were concentrated among the most highly exposed workers, the unfulfilled requests do not impact NIOSH's ability to construct a co-exposure model.

Next slide, please.

Okay. Observation stick -- 6 states that a sample taken well after an intake period, possibly even multiple years later, may not actually be associated with the exposure period in the formulation of a co-exposure model.

Next slide, please.

So, the response Observation stick -- 6 starts with noting that an external co-exposure model models the doses received in each year. An analogous internal co-exposure model would be to model radionuclide intakes in each year. So, this isn't feasible for plutonium and other long-retained radionuclides. The subsequent bioassay samples are not independent. For these long-retained radionuclides, a urine sample contains activity from all previous intakes, regardless of which year they occurred. As such, all internal dosimetry co-exposure models are based on the year the bioassay was performed, regardless of the last intake date or dates of any previous intakes.

Okay. Next slide, please.

Okay. Now we'll discuss SC&A's review of Report-103, for which they made three observations.

Next slide for Observation 7.

So, this observation notes that 34 RWPs from the evaluation period listed tritium as a potential hazard. Of the workers associated with those RWPs, 5 percent of those were partially monitored for tritium, and 22 percent were unmonitored.

Next slide, please.

Recall from the response to Finding 4 that, that workers were required to sign an RWP acknowledgment sheet indicating they understood the job hazards and work requirements. The acknowledgment sheet was not a work sign-in sheet. So, you can have scenarios where workers could sign the acknowledgment sheet during a briefing but never actually perform the work. So as such, it's not surprising if the number of submitted tritium bioassays don't match the number of RWP acknowledgment signature receipts.

Additionally, it's not stated on this slide, but it's also worth noting that a captured LANL internal dosimetry technical basis document outlines the criteria for routine tritium monitoring program enrollment. I don't think it's necessary to go into the details here. They're laid out in NIOSH's formal response paper but know that sample submission frequency is dependent on the quantity of tritium in its chemical form that's handled during work activities. So, we see this with other -- with other radio -- with other routine radionuclides as well, that monitoring requirements are dependent on the quantity and chemical form of material worked with.

Next slide, please.

Okay. Observation 8 describes a single RWP listing ten workers and asserts that a portion of them were under-monitored.

Next slide for the response.

Though this RWP in question was not included in the Report-103 evaluation, this RWP specified uranium monitoring in addition to plutonium. Again, worker signatures on an RWP acknowledgment sheet only indicate an understanding of RWP requirements, not that the signatory actually performed the work. So, I'll also note here on the slide uses the term RWP monitoring requirements. So, this is -- this is maybe perhaps a little unfortunate wording. But the main takeaway is this -- this statement should not be interpreted in any way to mean job-specific bioassays, which is not something LANL collected.

The main point is that the worker acknowledges the RWPs, which may include monitoring requirements, such as being on the plutonium access list, use of external monitoring, continuous RCT coverage, PPE requirements, and the like. Regardless, NIOSH reviewed the RWP in question and determined that it contained nothing that would alter NIOSH's Report-103 conclusions.

Okay. Next slide.

Finally, we get to Observation 9 that notes the positive nasal smears did not always lead to follow-up bioassays.

Next slide.

NIOSH's response is that the number of nasal swipes and follow-up bioassays being equal is not surprising or unexpected. Follow-up bioassays were only required when nasal swipe activity exceeded certain thresholds. Some samples of those -- of those thresholds are given on the slide, and additional details on this topic are provided in NIOSH's response paper.

A second reason for differences is that even though an RWP lists nasal smear requirements, LANL radiological control technicians and/or line management had the discretion to relax the requirement if conditions warranted

doing so.

Also, additionally, NIOSH noted some differences between the number of workers potentially needing nasal swipes relative to what SC&A identified. However, we didn't continue to pull the thread on this as the observation doesn't alter NIOSH's conclusion.

Next slide, please.

Okay. So, this brings us to the final two findings, which are Findings 7 and 8, that SC&A has characterized as overall programmatic considerations for internal dosimetry at LANL.

Next slide, please.

Finding 7 asserts that Reports 101 and 103 don't demonstrate that potential operational exposure to exotics were adequately evaluated for monitoring needs, nor did they demonstrate that LANL's monitoring programs were implemented such that unmonitored workers would receive less than 100 millirem per year committed effective dose.

Next slide.

We'll talk about this -- this response to Finding 7 over the next four slides. First, let's start by noting that NIOSH has systematically gathered a large volume of information from LANL, specifically aimed at learning how the 100 millirem per year monitoring requirement was implemented during this evaluation period. Data capture efforts are summarized in an attachment to the full NIOSH response paper. These efforts captured data related to monitoring procedures, monitoring data, health physics checklists, area and task assessments, and staff interviews.

Extensive review of these materials have consistently indicated that LANL

assessed and controlled workplace hazards and maintained robust field monitoring programs capable of identifying situations where non-routine bioassays would have been required. So, these non-routine bioassay samples are the special or prompt action samples that were collected, you know, we'll say for cause that was mentioned earlier in the presentation.

Next slide, please.

NIOSH's position is therefore that capturing little to no routine bioassay data for exotics is consistent with a low exposure potential, not a monitoring gap. Site -- site personnel have confirmed this view. Because extensive bioassay data for exotic radionuclides are not available, NIOSH has used a weight-of-evidence approach to assess the quality and effectiveness of LANL's radiological protection program and also monitoring programs. Taken together, Reports 101 and 103 further support NIOSH's conclusion that a 100 millirem committed effective dose is a valid upper bound for unmonitored workers at LANL due to exotics during the evaluation period.

Next slide, please.

So, regarding the 1999 site assessment that resulted in noncompliance report NC ID 484, NIOSH has previously done an assessment of this non-concurrence report and documented the results in a 2019 paper. So, this paper is also available on the NIOSH website. And in this paper, NIOSH's assessment noted that NC ID 484 addressed a specific contractor issue for plutonium monitoring, and there was no evidence that the observed issue was generalizable to exotic radionuclides, and there was also no evidence that worker exposures exceeded the monitoring threshold of 100 millirem. In other words, LANL expected that the exposure potential to exotics was low such that

monitoring was not required, and we didn't identify anything in this NC ID 484 that would contradict that. So, as such, the identification of this specific deficiency does not contradict the conclusion that unmonitored worker exposure would be bounded at 100 millirem per year committed effective dose.

Okay. Next slide, please.

This response points on this last Finding 7 slide are presented as a reminder of why an SEC class for years 1976 to 1995 was designated. The class was not created because of evidence-documented disparities in radiation program coverage or hazard assessment between the site's primary radionuclides of concern and the less common exotic radionuclides. The class was recommended because of concerns that a potential disparity might exist. As such, it was decided to further -- further investigation was warranted. The 1995 SEC class cutoff point was -- was selected as the most defensible choice based on 10 CFR 835 implementation.

Okay. Last one. Next -- next slide, please for -- for Finding 8.

SC&A's Finding 8 states that the results presented in Report-102 for routine plutonium monitoring are not transferable to non-routine job-specific sampling for exotics. Monitoring for these was much more discretionary and based on individual line management or radiological control technicians' judgment regarding job-related exposure potential.

Next slide for the response.

NIOSH agrees with this finding and has previously stated as much during a 2012 work group meeting. A chronic co-exposure model for plutonium is certainly not appropriate to bound potential short-term exposure to exotics. So, that being said, Report-102's positive assessment of LANL's monitoring for

plutonium does provide additional evidence of a health physics department and program focused on controlling and monitoring potential radiation exposures.

Okay. And that takes us to the conclusion. Next slide, please.

So, NIOSH's overall conclusions after reviewing and responding to these comments, the first one, there is no evidence that LANL's well-developed radiation protection program was applied differently at various site work areas or work activities, as was originally questioned and used as the basis during the 1976 to 1995 SEC class addition. Multiple independent evaluations of LANL's records, monitoring data, and program documentation consistently show that radiation doses for all LANL workers during the 1996 to 2005 period can be estimated with sufficient accuracy. No evidence to the contrary has been found or presented.

Next slide, please.

These are ref -- key references in this presentation. I'm not going to go through each one of these individually.

Next slide. And that's it.

There's some acronyms and key terms provided at the end of this presentation. They're there for -- for your reference. I'm not going to, you know, go through each one of those line by line. So, with that, that concludes my -- my presentation, and I'll turn it back over to you, Josie.

CHAIR BEACH: All right. Nick, thanks for jumping in there. Any questions or comments? If not, your conclusion --

MEMBER CLAWSON: Yeah.

CHAIR BEACH: Oh, go ahead, Brad.

MEMBER CLAWSON: I -- I just have a question, Nick. You're talking

about the -- the RWPs and that you -- you wouldn't be able to sign on to those. I didn't -- I didn't completely understand, and I can't remember what slide it was.

MR. ALTIC: You're basically talking about --

MEMBER CLAWSON: Go down a little bit --

MR. ALTIC: -- acknowledgment logs.

MEMBER CLAWSON: Right.

MR. ALTIC: So, --

MEMBER CLAWSON: So, --

MR. ALTIC: -- the -- the way it worked at -- sorry, go ahead.

MEMBER CLAWSON: No, you go ahead. That's what I want to know.

MR. ALTIC: So, basically, the way it worked at LANL is you had a radiological work permit, you know, and it listed out, you know, a description of the job, the expected exposure conditions, requirements, all the traditional stuff you would expect on an RWP. So, there was -- associated with that RWP, there was an acknowledgment log that workers would sign to indicate their understanding of the RWP. And so, this acknowledgment log wasn't a sign-in sheet. And so, that's why it makes it very difficult to place exactly, you know, who did what work at LANL, because you could attend the briefing, read in, acknowledge the RWP, and then never do the work.

MEMBER CLAWSON: Yep, yeah. And you brought up exactly what I wanted to bring up there on that, because I don't know if you guys understand how it was interpreted either, because on January 1 of every year for about the first week, we had what we called signing parties, and they'd bring in all the RWPs, which I worked under approximately 75 different RWPs. And we would

sign all of them, and then they would go into the HP's office and be --go into a file. Then when you got on the electronic dosimetry, it would check to see if you had been approved and signed and you acknowledged that you had signed the RWP. And I can tell you what, I didn't understand half of them. And if I wanted to find out more specifics of that RWP, I had to go to the RADCON office, have them pull out the file and go through it.

So, that's -- that's -- that's how it worked in our world. And I just wanted -- I -- I understood a little bit what you're saying. And you're right, there are some people that signed on to those that never did work in those areas. But I was just wondering if you'd ever looked at the dates on those to -- to see when they were signed. I know that sometimes coming in later on in the year with new people coming in that had to work under some of those RWPs, they would have to go in and be briefed on them and then sign into it. But the normal workers, it was the beginning of the year, signed everything that we were under.

MR. ALTIC: Well, I -- I see Brant has his -- his hand up, so --

CHAIR BEACH: So, does Nicole, so I'll -- I'll --

MEMBER CLAWSON: Go -- yeah, go ahead. I was just making an observation.

CHAIR BEACH: All right. Nicole, go ahead.

MEMBER MARTINEZ: My question is, like, delayed, so I'm happy for Brant to elaborate while we're on that topic.

MEMBER BEACH: Okay.

DR. ULSH: Well, I just wanted to kind of follow up on Nick and Brad's exchange there. The important point to note is that just because your name is

on an acknowledgment sheet, that doesn't mean that you can then take that name and say there should be an associated bioassay with this, because you don't know if the person actually went in to do the work. And that, I think, is the point. I think that we're saying that SC&A, when they did that made -- that's not correct, because all the name on the sheet means is you would -- you would -- Brad, you attended the signing party. It doesn't mean that you actually went into every one of the 75 RWPs and did the work there.

MEMBER CLAWSON: Yeah.

DR. ULSH: So, I think that --

MEMBER CLAWSON: You're absolutely right. Yes.

CHAIR BEACH: Okay. Nicole, did you want to comment or a question?

MEMBER MARTINEZ: I have a -- a separate question, if that's okay. Actually, --

CHAIR BEACH: Yeah, of course.

MEMBER MARTINEZ: -- I have two questions. It might not be for Nick because it takes me a hot second to process things. So, sorry if I missed this, but there were multiple contractors who were doing bioassays and one had better adherence, compliance than the other. So, I was curious if the results between the contractors were compared and if there were similar, you know, distributions of intakes. And then my second question related to that specifically was how, like, workers were assigned a contractor? Was that random? Was it at -- like, chronological? Someone said it wasn't based on their job, so I could cross that out. I don't think --

CHAIR BEACH: The question --

MEMBER MARTINEZ: -- (indiscernible) questions.

CHAIR BEACH: Good question. I think that was in SC&A in the slides, so I don't know who wants to take that on, SC&A or NIOSH.

MR. RUTHERFORD: I want -- this is LaVon. I'd like to get one clarification from you.

CHAIR BEACH: Sure.

MR. RUTHERFORD: Are -- were you saying that there were additional people, contractors actually doing the bioassay analysis, or are you saying that the -- the -- there were multiple contractors with bioassay standards? I missed that, because what we were talking --

MEMBER MARTINEZ: No, I --

MR. RUTHERFORD: Okay.

MEMBER MARTINEZ: I'm not -- I'm asking; I'm definitely not saying, so.

MR. RUTHERFORD: Yeah.

MEMBER MARTINEZ: My -- my interpretation --

MR. RUTHERFORD: Let me explain.

MEMBER MARTINEZ: -- was that -- yeah, please.

MR. RUTHERFORD: Okay. LANL did all the bioassay analysis. So, the contractors were not doing their own bioassay analysis.

MEMBER MARTINEZ: Yeah, okay.

MR. RUTHERFORD: And what was pointed out was KSL, which was one of the maintenance contractors, along with Johnson and Controls, I think that SC&A pointed out that KSL had a higher -- they were -- they were providing their routine bioassay samples at a higher percentage than Johnson and Controls. The actual -- I think Report-102 actually has some of the data in it if you wanted to know the specific data. I can't remember if it does or not, but we

could certainly get you that information if you wanted to know how the -- the results break down. I will tell you that based on the -- the co-exposure model that we have now, which is not current with the co-exposure model requirements of -- of today, all of the monitored employees, the large portion of them were well below 100 millirem on their --

CHAIR BEACH: Yeah, yeah. Thanks, Brant (sic). And -- and Nicole, that was in Report-102 --

MEMBER MARTINEZ: Okay.

CHAIR BEACH: -- of SC&A's presentation. I think it was on Slide 20 that they --

MEMBER MARTINEZ: That was --

CHAIR BEACH: -- it was an observation.

MEMBER MARTINEZ: That makes a lot of sense. Thanks for that clarification. I wondered why Los -- why in the world Los Alamos wouldn't be doing their own bioassays since they have radiochemists. So, that makes a lot more sense. So, these are contractors that people worked for. So, it's more like who was motivating their contractors to provide their bioassay?

MR. RUTHERFORD: Correct.

MEMBER MARTINEZ: Okay, great. That's very helpful. Thank you. And then my next question, and this is more out of curiosity and maybe this is something I -- I should know, but so I saw the -- the 2 percent of the stochastic, the SALI, which that made me think about the nonstochastic. And I -- I don't have the radionuclides imprinted on me to know if there are any that would present, like, a -- a nonstochastic ALI would be the more limiting of the two. So, I -- I'm just curious. This isn't, like, a -- a criticism or relate -- just

out of curiosity, has that -- or is the nonstochastic just not of interest?

MR. RUTHERFORD: Yeah, actually, that was brought up in our discussions early on that we had to look at. But I -- I'll be honest with you, Nicole, I can't remember what we determined on that. If -- if Dave Allen was still on the project, I bet he would remember. But Liz Brackett may remember if she was -- she was here right now, but I -- I know that we did discuss that. I will tell you, I will go back and -- and -- and see if I can find out that information and pass it on to you.

MEMBER MARTINEZ: That would be great. Thank you. And Josie, those were my questions.

CHAIR BEACH: Thank you, Nicole. And Mike Schmoldt, you have your hand up.

MEMBER SCHMOLDT: Yeah. I had a related question. For the exotics, are there any that have a particularly short biological or radiological half-life where the timing would be critical for the resampling?

CHAIR BEACH: I'm going to say yes in the short answer, but go ahead, LaVon.

MEMBER SCHMOLDT: I think of, like, tritium for example, not an exotic.

MR. RUTHERFORD: That was discussed as -- also in the discussions on that as well. And Mike, I can't remember the -- what -- what we determined. I know there are very short-lived isotopes involved, but I can't remember what our -- our answer was on that. So, I would have to get back to you on that as well.

CHAIR BEACH: Okay. Anything else? Bob, go ahead. Bob Barton.

MR. BARTON: Hey, Josie. I sort of -- sort of to circle back on the

conversation about Johnson and Controls and KSL. They were the maintenance contractors out at LANL, and what we were kind of showing is what we saw is that Johnson and Controls kind of had a lower percentage of adherence, but KSL had a -- the best adherence to those requirements.

And this is a good way to circle back around because one thing that really stuck out to me from the previous presentation, and just to give a little bit of perspective, you know, why are we making a big deal about these maintenance contractors is that from some experience at other sites, again, mainly Savannah River, those were sometimes non-routine-type exposure scenarios where you're doing maintenance, you know, you're taking apart piping, you're dismantling a glove box, stuff that isn't just your usual operational work. And what stuck out to me, which I think is a new assertion, unless I'm not recalling correctly, but that there was no job-specific bioassay. In other words, there was no connection between the RWP and any sort of actual bioassay requirement other than if you were on the plutonium list, the PAL list.

And that kind of struck me because how do -- how do we even know what these people in non-routine exposure situations could have been exposed to if there was actually no-job specific requirement that -- the site just didn't operate like that. So, I -- I just kind of want to verify that that's what we're talking about, is that basically, you have the routine internal monitoring and then you have for cause, the specials, but there's no actual job-specific portion of the monitoring program. And I just wanted to verify that's what was being said because that took me aback.

MR. RUTHERFORD: John's got his hand up. Are you going to address that, John? Is that what you were intending to do?

DR. CARDARELLI: Yeah, I was just waiting to be called upon. Sorry about that.

CHAIR BEACH: Yeah. Just getting to you, John. Thanks.

DR. CARDARELLI: That's okay. That's fine. I just wanted, for clarity here, there's no such thing as a job-specific bioassay, so don't get the impression that they were missing something. That is something that was very specific to Savannah River. And it was no different than really a routine sample. So, I think just from a clarity perspective, for folks who may not be familiar with Savannah River versus LANL, to compare the two would be inappropriate. This is a site that stands alone on itself, and job specifics were not part of the process. So, don't walk away with an impression that they're missing something simply because it doesn't exist.

MEMBER CLAWSON: And John, -- John, clarify something for me. You're saying that as only Savannah River?

DR. CARDARELLI: No, I'm speaking --

MEMBER CLAWSON: No specific bioassays?

DR. CARDARELLI: I'm speaking specific to Savannah River. They had job-specific bioassays, which were effectively and routinely used as a routine bioassay, but it's not something that we would use those terminologies at Los Alamos National Lab. So, we should not even be using the term job-specific bioassay for Los Alamos. That's my point, Brad.

MEMBER CLAWSON: Okay. But you said that they are only used at Savannah River, because that is -- that is totally incorrect, because --

DR. CARDARELLI: Okay.

MEMBER CLAWSON: -- other sites use it all the time.

DR. CARDARELLI: Well, it's not being used at Los Alamos, and it was used at Savannah River. So, there -- those -- those are the two facts that I think that need to be pointed out at this point.

MR. BARTON: So, would non-routine --

CHAIR BEACH: All right.

MR. BARTON: -- be a better term to use then? Non-routine bioassay? Apart from any sort of incident or decision by the line manager or RCT, there -- there was nothing in place like that for non-routine work.

DR. CARDARELLI: Well, Bob, I wouldn't create a definition for Los Alamos. I would simply use the terms that they used at the site. So, that's my response to that. I'm not going to make up something simply so that we could do an apples to oranges comparison with another site. So, let's just stick with the terminology used by the HP techs and the rad control techs at Los Alamos when we talk about availability of data and how it was used and how we use it to -- to create dose reconstructions.

MR. BARTON: So, I'm just trying -- I'm trying to get my head around this because -- so, if there's no -- okay, not -- can't use non-routine, won't use job specific. If you had a maintenance activity where you had workers doing non-routine work, there was really no formal process involved unless there was an incident or -- or there -- it was a determination by management that they should go for a special sample. That's the terminology they used, I think.

MR. RUTHERFORD: I -- I think -- correct me if I'm wrong, Nick and Dan, but all the jobs are evaluated -- are evaluated to determine if -- if the appropriate bioassay needs to be added to that or something like -- I mean, it may or may not be identified directly on the RWP, but all of -- all of them are

required to be evaluated based on the potential for the air -- air concentrations involved, the radionuclide involved, all of that. And -- and then that's when they would identify a person to be put on a -- a bioassay program --

CHAIR BEACH: A specific --

MR. RUTHERFORD: -- outside of plutonium.

CHAIR BEACH: -- bioassay program?

MR. RUTHERFORD: Outside of plutonium. Plutonium was -- was -- had its own special -- own list and stuff, so. Does that make sense, Bob?

MR. BARTON: Yeah, I think so. I just wanted to get a better picture of how things were operating out there. I get that each site is different and terminology is, obviously, different. I just -- I was wondering if they didn't have these RWP -- there's no connection to an RWP and a bioassay unless there's more cause, and I just wanted to verify that.

CHAIR BEACH: All right. Thanks, Bob.

MEMBER CLAWSON: (Audio distortion.)

CHAIR BEACH: Wait, wait, Brad, you're breaking up. We can't -- we can only get every other word there.

MEMBER CLAWSON: Okay. I just wanted to ask LaVon something, because I'm -- I'm having a hard time understanding how this -- their RWPs worked. Because from my world, you didn't cover all the different radionuclides. You had your basic ones that covered each one of your areas. And they only covered certain things. If you went outside of that, then whatever they wanted to be able to call it, I'm just -- I'm not understanding how -- how you were saying the RWPs worked. And I do understand that each -- each site is unique.

MR. RUTHERFORD: What I'm saying, Brad, is that it -- the RWPs did not

specifically, that I remember, and that's why I asked Nick and -- and Dan to jump in on that, I don't think they specifically identified when bioassay was required. I think they did identify the radionuclide of concern and -- and especially in the later years, I know the later years, they actually as -- when they put together work packages for that, they identified what programs you needed to be on from an internal dosimetry program. But the -- the radionuclide -- I mean, but the RWP did not always specifically identify that you had to be on this bioassay program.

MEMBER CLAWSON: Well, and see this is -- this is what -- because part of the requirements to go into some of these radiological area is you have to be a part of this and be on this -- on the RADCON program, and if you were to do work in that area, you have to be on this RWP because it covers those areas of -- of worry in -- in that area, each building. And if you're to go into a different area that is not covered by that in the same one that has different nuclides of concern, then that's -- that's where these other, whatever you want to call them, RWPs came into. That's -- that's what I've been used to dealing with. And I'm just -- I -- because I'm not understanding how this -- how this system was working.

I -- I take -- I take Pantex or -- or any of these other ones that I've dealt with on this. There -- there was always the RWPs that covered the typical isotopes of concern in this area. But if you're to go into a different area, they had -- you had a different requirement that you had to meet to be able to go in there.

MR. RUTHERFORD: Well, yes, I agree with that. And -- and -- and but recognize, like, for the -- let's take LANSCE, for example, or, you know, where

you're dealing with mixed fission activation products and such, they definitely did that by air sampling for the most part, because -- now, actually, most of the workers at LANSCE were on an annual bioassay for mixed fission activation products. But they also -- it was -- it was a -- they looked at the air samples. They looked at the potential for a person to exceed 100 millirem or if the area monitoring was exceeding what they -- what they expected, so. So, there could be, as Bob called them, for cause as well, on top of a routine program.

MR. FITZGERALD: Yeah, let me if I could.

MEMBER CLAWSON: Who's that?

CHAIR BEACH: Joe.

MR. FITZGERALD: Yeah, this Joe -- Joe Fitzgerald. Just -- just jumping in on the NIOSH response paper dated April 23, 2025, it does touch upon this issue. I mean, let me just quote from this. This is on Page 4 of 58. (Reading): Captured RWPs also contain sections as specified administrative and engineering controls, including rad protection requirements such as personnel protection, respiratory protection, dosimetry monitoring, training, and bioassay. Regarding bioassay, LANL used a health physics checklist form that were completed, entered, and an ES&H rep to document needed changes in the workers in vitro, in vivo, and external dose monitoring program. So, that was the process to reflect what changes might be necessary given a particular exposure situation or work, you know, work. I just wanted to point that out.

CHAIR BEACH: Thanks, Joe. That's helpful. Where are we at, at this point? Any other questions? I do have some comments, but I'm not sure if they should be now or after the next two presentations by NIOSH.

MEMBER LOCKEY: Josie, can I ask Joe a question?

CHAIR BEACH: Sure. Go for it, Jim.

MEMBER LOCKEY: Thank you. That, what you just read, I found that very helpful. Was that different than what LaVon said? I mean, I'm trying to understand that.

CHAIR BEACH: You're on mute, Joe.

MR. FITZGERALD: Okay. I was just trying to be careful given, you know, Mr. Cardarelli's comment that, you know, we use kind of -- kind of be sure to use the LANL -- LANL terminology. And their process is the checklist is the entry point for considering, you know, what -- what exposure circumstances and job situation exists to -- to specify a -- and that's part of the RWP process. So, certainly that is the mechanism, --

MEMBER LOCKEY: Yeah, but did --

MR. FITZGERALD: -- but there is a mechanism.

MEMBER LOCKEY: Did they specify -- did they specify what bioassay needed to be taken? Is that what you -- you said?

MR. FITZGERALD: It just -- it just simple -- yeah, it simply reflects in vivo, in vitro, and external. So, it's the whole gamut of -- of -- of dosimetry adaptations according to exposure source as well as a particular job. So, and that's done with the facility or the -- well, the -- the manager in charge of that particular activity as well as the ES&H rep, the RADCON rep.

MEMBER LOCKEY: So, would that include the radionuclide of in -- of interest?

MR. FITZGERALD: Yes. Yes.

MEMBER LOCKEY: Okay. That's what I was trying to get a handle on, so.

MR. RUTHERFORD: Okay. Yeah, I -- I totally agree with Joe. That's

exactly how it was handled. I had forgotten about the -- whenever they changed jobs and a potential change in a radionuclide would be part of -- they -- they would be reviewing that with the new change in job and HP checklist. So, I -- I agree with Joe.

MEMBER LOCKEY: Okay. Thank you. I just -- I thought I heard something different about it.

MEMBER BEACH: Yeah, thanks for that question and that clarification. And just remember, that changed in 2000 with the added LANL site-wide change up based on the 484. So, that did change. You have to kind of go before and after when you're thinking about these -- the robustness of this program.

MEMBER CLAWSON: Well, and you're correct, Josie. And I think we're all kind of saying the same thing. This was -- this was after their self-evaluation in '99. And I think the -- the 2000 area where we really started to see the -- the change, the bigger changes and the evaluations.

MEMBER LOCKEY: Josie, can I ask one other question? This may be --

CHAIR BEACH: Yes.

MEMBER LOCKEY: -- this -- for an M.D., it's probably a stupid -- it's -- it's -- I'm really out of my ballpark here in relationship to this one issue. And this is sort of following -- I think, Mike, you were the one who asked the question about the exotics and the half-life. Can anybody clarify that for me? The exotics that we're interested in here, what would have been the half-life in the -- in the -- in the samples that were obtained?

CHAIR BEACH: Okay. Can I make one comment? If you go back to --

MEMBER LOCKEY: Sure.

CHAIR BEACH: -- the SEC that was last given to this site, when Jim (sic)

was giving his presentation, he said a very small qualify -- quality -- quantity can result in a fairly large long-term dose when you're dealing with -- with exotics. So, that's -- that's just one key thing that I took out of the other SEC. And then I'm sure Joe has something more profound -- or Bob, to add to that or -- or NIOSH, of course. I don't know if we know --

MR. BARTON: I guess I'll -- I'll --

CHAIR BEACH: -- the half-life.

MR. BARTON: I'll go first.

CHAIR BEACH: Okay. Thanks, Bob.

MR. BARTON: There certainly was a wide variety of these mixed activation products and mixed fission products. To the extent that the amount of dose that was delivered, you know, I think NIOSH did some excellent analysis based on the data that we do have, which was sort of not a comprehensive sample, but, you know, again, illustrative of what the doses could be.

I think the question here is whether the site was actually monitoring those doses. And so, we have this level of uncertainty that we have to balance against a lot of the programmatic arguments, which are persuasive, and I think NIOSH has done an excellent job in presenting those. And it's, again, a judgment call. And, you know, obviously we don't know what we don't know.

And I think that's the point here, is that we don't know, honestly, to -- to a -- a great, reasonable certainty what those exposures were. We can estimate them based on the air samples and smear samples that were taken, all that sorts of thing. And again, we're going to get into that, I think.

So, maybe -- maybe we should move along to the weight of evidence presentation materials. I know this is only one of four for NIOSH, but I think

the question is, were they actually concerned about these sort of rarities or were they really just concentrated on plutonium, which is, obviously, an -- a bad actor. And it's -- it's, you know -- its sister or brother americium also another very bad actor.

So, I think that's really where the question originated from and, again, was the purpose for the SEC up through 1995. So, again, it's do we have the records or can we be reasonably certain that even though they weren't necessarily monitoring on a regular basis, that the, you know -- what's being put forth, the 100 millirem is sufficient or -- I honestly had the question, does NIOSH plan to try to develop a separate co-exposure model apart from the 100 millirem, which is really based on 835 which, you know, we're not quite sure when it was implemented to -- to a reasonable degree? So, I -- I guess that would be my question is what are -- what are NIOSH's intentions here?

MR. RUTHERFORD: Well, I -- I'd like to answer -- answer. I give --

CHAIR BEACH: Jim?

MR. RUTHERFORD: -- Jim a little -- a little information first, that the site actually looked at all of their -- shoot -- their radionuclides that they -- they were dealing with and the -- the -- and they developed threshold limits at which they would -- anything below this threshold limit, they felt that personal monitoring was not necessary. And they put those in their technical basis document. And I did remember that finally. But so -- so, the site did look at that, and -- and they have specific quantities for those.

They -- we also looked at, and we actually have a paper, and I can't remember where the paper is -- we did look at the short-lived radionuclides and, and determined which short-lived radionuclides were of the greatest

concern to us. And I will try to get that information and get that to you, Jim.

MEMBER LOCKEY: Okay. Thank you.

CHAIR BEACH: Well, and another thing is based on that, how long did it take them to get into compliance? If they -- we had an SEC for exotics in '95, did they automatically -- were they in compliance by '96, or did it take a little longer? And I think we all know the answer to that because we have the -- the in-house audit, eight -- 484 and the DOELAP, and all of that didn't really come into play until those -- 2000. So, you got to keep that in the back of your mind as well.

MR. RUTHERFORD: I agree with you, Josie, that there were issues identified in the 1999 assessment, but the point is not compliance. The point is -- is does the data that we have support the dose reconstruction as feasible? We've looked at smear surveys. We've looked at air sample data for all the exotic areas. We do have personal bioassay. It's not -- it's not a routine program like the plutonium. But all of them point to individuals that were monitored for the most part were below 100 millirem, let alone the unmonitored people.

CHAIR BEACH: All right, John, you had your hand up.

DR. CARDARELLI: Yeah. Thanks, Josie. One of the things I want to point out, we keep talking about whether there's a magical date between 1996 or 1997. I think it's important for the whole work group here to -- to be reminded that in 1989, January 1, 1989, DOE Order 5480.11 came in, which had the exact same requirement of monitoring all workers who had a potential for 100 millirem per year committed effective dose. That became codified in the NRC regular -- in 10 CFR, Part 835, starting on January 1, 1996.

So, this didn't happen overnight. It, frankly, was almost a seven-year transition period before it became a regulation. Prior to that, it was still required through DOE orders.

Now, just as we talked about lack of compliance doesn't mean we can't do dose reconstruction. So, I -- I think that -- that message has been sent home. But please -- please note that the -- there was a transition period of almost seven years prior to accepting -- hey, now we're going to start fining you if you don't do it this way. So, it's not an issue of oh, they were doing it bad and all of a sudden, the next day we expect it to be perfect. That's -- that would be kind of a misrepresentation of how the evolution of the radiation protection policies and regulations evolved. That's all I wanted to say.

CHAIR BEACH: Thanks, John. I think, Joe, you had another comment and then we'll move on.

MR. FITZGERALD: No, I think that's a fair -- fair description. I mean, these milestones of radiation protection policy, I mean, 5480.11 came out. You had something right after that. You had 835. And certainly, the intent was to move the operations to some uniform practice. But each of these DOE sites had a history, Los Alamos in particular, of how they did business and what they emphasized and what priority they gave. And -- and that evolution did take time. So, if one is talking about making the assumption that, for example, 100 millirem CED would be satisfied in the internal monitoring program, I think you do have to throw a critical eye on that and look for ways to verify that, in fact, that practice was being followed across the Board.

And I -- I think what we're just looking at, and -- and there's been a lot of effort to provide for this weight-of-evidence review and looking at documents,

looking at data. The question still comes down to was that monitoring threshold being applied uniformly across operations or is there any evidence that it fell short for the non-plutonium act -- operations and exposures. And that's why I think the self-assessment gave us pause, that certainly that -- that indicated that, yeah, there were definitely some shortcomings and ones that the Los Alamos management agreed.

I mean, certainly the upgrades were intended to make sure that practices followed the procedures, and they made those changes. And that's -- that's what followed. So, I think a lot of what the discussion revolves around is just trying to validate when practice followed program and procedure, and at what point can you have that assurance.

And I agree that it -- certainly at Los Alamos of all places, it took a long time for those practices to shift just because the lab had a certain way of doing business, and that was embedded in that culture. And so, it -- you know, it's not, you know, surprising that it took the '80s and probably well into the '90s for some of these monitoring practices to actually change. And I think they did. But again, I agree with John that, yeah, this -- this -- this took time. And no one's saying that -- that it should have turned the corner that quickly. It does take time to change how one does business on the ground in terms of actual results.

DR. CARDARELLI: Josie, can I -- quick response. Joe, I -- I agree with --

CHAIR BEACH: Yeah.

DR. CARDARELLI: -- pretty much what -- what you said there. The one thing I would like to point out that, yes, I think if you look at any program, and I think it's a commemorative on the site itself, that they did a self-assessment

rather than waiting for an independent audit-type situation to come in and find issues, that shows that they were very proactive in trying to protect their workers, and they're making corrections. The real question from NIOSH's perspective and dose compensation is, did those issues that you have identified prevent us from estimating doses with sufficient accuracy for compensation purposes?

So, a lack of compliance doesn't necessarily prevent us from creating a bounding dose. And even if the thing is evolving over time, they -- the weight of evidence that we will soon be hearing, we believe, is overwhelming. The number of data points all support the fact that they really can -- protected their workers to the best of their ability. They watched themselves. They fixed their errors. They did everything we would expect from a mature health physics program to protect the workers.

Now we have hundreds -- or I'll just say tens of thousands of plus types of data and bioassay data that can support the development of a co-exposure model during this modern era. So yes, there's a transition, but does that lack of compliance impact our ability to reconstruct doses? I think that's the fair question.

MR. FITZGERALD: Yeah, and that's -- and that is certainly the question on the table. And as I said earlier, what gives me pause for Los Alamos -- and actually, in one of the earlier reviews, we made a point of pointing out relative TA-53, which is the LANSCE defense accelerator, that -- that source -- and it was a prolific source of MAPS. You know, accelerator produced short -- short-lived particles. It was a prolific source of it.

In fact, it led to a fence-line dose that was measurable and caused

problems with NEPA. So, you know, and by 1995, the laboratory was compelled to, you know, put control equipment at LANSCE just to cut those emissions down, airborne emissions down because they were so substantial. But yes, so the lab reacted.

My issue, though, is the question that you posed, which is in 1999, when the lab did do the self-assessment to see whether or not the 835 monitoring, you know, and -- and yes, these are regulatory requirements, but as you pointed out, these were required practices on how one monitors workers from 5480.11 going back. So, these weren't new ones. But certainly, what was new was the laboratory was actually validating whether the -- whether the facility management and the folks on the ground were actually executing, actually doing and implementing the policies and procedures that were in place for bioassay monitoring.

And this is -- you know, yeah, the impetus (audio break) 835 and the enforcement sword that was hanging over their head at the time. But as you pointed out, this wasn't a new requirement. This was something that had been carried forward. And this was a very salutary event in terms of actually looking at whether or not they could demonstrate that checklists were being used appropriately and effectively to add in vitro and in vivo bioassay requirements, nuclide specific to RWP in the monitoring program --

(Whereupon, an unidentified and unmuted attendee speaks.)

MR. FITZGERALD: -- for -- for workers. I'm sorry. And -- and also whether Johnson Controls personnel -- this is the support contractor, the construction support contractor, whether those personnel were in fact being enrolled in the bioassay program as required.

So, these are very fundamental questions. And they -- they were ones that were the gateway for individuals being included in bioassay in the first place. So, this wasn't a question of did they or did they not come forward to provide a urine sample. This is whether or not they were, in fact, included in the bioassay program in the first place.

So, when those findings came forward, certainly the obvious issue is that you have uncertainty about whether they -- the implications of those findings were in terms of the completeness and representativeness of the bioassays that should have been collected but were not because the workers were missing from the bioassay program. And that part of it, I certainly didn't see any obvious way to answer that.

I think -- acknowledge all the effort that NIOSH has gone through to, you know, look at the existing database, look at the procedures that existed in the facilities and the comprehensiveness of the programs as written. But I still feel that the uncertainty that came out of those findings have not been fully addressed, primarily because Los Alamos did not go back and look at the consequences or implications of those sampling -- the findings that those sampling found.

You know, they did it -- you know, if you found that people -- the checklists weren't being used and Johnson Control workers were not being enrolled in bioassay, you know, certainly one response would be to figure out how widespread that was beyond that sample. That did not happen. Now, we interviewed Los Alamos staff, and they indicated, no, there was no follow up to the finding. They did report it to DOE as NC ID 484, and they did come up with the corrective action program, which overhauled how checklists were done,

overhauled how enrollments were done, and put in place a tracking system, the one that was referred to earlier, a number of other steps.

But I still believe that there's an uncertainty about whether or not, at that -- in that time frame, workers are being adequately identified for bioassay and appropriately enrolled in those bioassay programs. Certainly, after the -- Los Alamos knew about it, steps were being taken. But up until that time frame, until the corrective -- corrective actions were taken, I don't think we have that certainty.

And I -- I -- you know, it's sort of like I -- somebody said, you don't know what you don't know. Well, we don't know how many workers may have been excluded from the bioassay program because the checklists weren't done for those workers or weren't done adequately. We don't know how many Johnson Controls workers were not enrolled in bioassay. All we know is that a substantial number were left out. So, how do we answer that question by looking at the data for those that were included?

I mean, I think you can surmise that the -- you could compare one to the other, but again, we just don't know what might have been left out because of these inadequacies. And that's -- that was, I think, the central root of our concern in the beginning. And we've been at it ever since. But again, I think it's been a good faith effort. It's just -- it's just a hard one to answer.

DR. CARDARELLI: That's a good point, Joe. But I will say, if we don't know what we don't know, that is not the justification for the -- going for a special exposure cohort. We have to go on what data we do have and whether or not that data is sufficient for us to do a dose reconstruction. And if you do find -- if we do find data that supports what we don't know, then that would

definitely justify a re-evaluation, but simply because we can't prove a negative or we just don't know what we don't know, Congress didn't write that into the regulations as a reason for an SEC. It's whether or not we can do a dose reconstruction. And with the thousands of data points at Los Alamos, we have been very consistent in that with all of our reports.

MR. FITZGERALD: Yeah. Let me -- let me respond to that. I think --

CHAIR BEACH: So, let's go with -- last comment here. Thanks, Joe.

MR. FITZGERALD: Okay. Just not to repeat this one, but yes, the -- the Act and the SEC reg both recognized the (audio distortion) of uncertainty when it comes to record keeping and the -- and the -- and -- and dose exposure results. And --- and certainly IG-006 underscores the fact that yeah, one has to look at the representativeness of the information or data that's being used as a basis for dose reconstruction.

And when that representativeness is in question, as I think we're pointing out here in terms of the completeness of what of -- of -- of what workers may or may not have been included in the bioassay program, then I think you do have a basis for -- for a -- for a SEC consideration. So, I would just leave it at that, that certainly those benchmarks exist, and they certainly have been applied in the past for a number of other sites as a basis for SEC consideration.

CHAIR BEACH: Thank you. Thank you, John, and thank you, Joe, and everyone who's commented. I certainly appreciate all the conversation. We have a couple more reports. I would like to go through those reports, and then I want to bring it back for discussion at the conclusion of NIOSH's reports. Does everybody agree with that?

MEMBER CLAWSON: Yeah, that's -- that's fine with me, Josie.

MEMBER LOCKEY: That's fine with me, Josie.

CHAIR BEACH: Okay.

MEMBER SCHMOLDT: Second.

CHAIR BEACH: Great. Okay. So, NIOSH, which report -- are you going to tee up the -- we have not seen the next three. I was kind of thinking you combined the 103. So, is there just two reports left, the weight of evidence and then 107; is that correct?

UNIDENTIFIED SPEAKER: Yes.

CHAIR BEACH: Or am I -- yeah. I think that is correct.

UNIDENTIFIED SPEAKER: I think we're going to do 107 and then the weight of evidence.

CHAIR BEACH: Okay. And then we will get back to work group discussion. We have plenty of time, so don't despair. We will -- we'll do that. And Nick, I -- is going to present this next?

REMAINING NIOSH REPORTS BEFORE THE WORK GROUP

MR. ALTIC: Yeah. Hello again, everyone. Nick Altic here. And I'm back to provide an overview of a method to bound intakes of exotic radionuclides at the Los Alamos Neutron Science Center. And I see Pat's already got the presentation queued up. Thanks for that, Pat. I'm not even going to try to work through my technical difficulties. So, we'll just go with Pat running the slide show. Okay. Next slide.

So, in this presentation, I'm going to give an overview of the methods presented in ORAU Team Report-107 titled "Dose Estimation From Intakes of Exotic Radionuclides at the Los Alamos Neutron Science Center from 1996 to

2005." So, the pertinent details of this subject document are presented on this slide, and the document in its entirety can be found on the NIOSH website.

So, the Los Alamos Neutron Science Center, or LANSCE, is located within Technical Area-53 of the site, and LANSCE houses a proton accelerator that generates intense pulses of neutrons for conducting neutron scattering research.

Okay. Next slide.

So, there's a brief outline of -- of what we're going to discuss. So, we're going to walk through the methodology presented in Report-107. Then we're going to provide an example calculation using that methodology. And then at the end of the presentation, you know, we're going to give some key reference documents and a glossary of key terms and acronyms. Just up front, I'm not going to speak to those references and acronyms, but they're -- they are provided for your reference.

Okay. Next slide, please.

So, first we'll talk about a little background info. Okay. So, Report-107 was born out of a concern within the work group about NIOSH's ability to bound doses of LANSCE workers from exotic radionuclides. So, in terms of how we define exotic radionuclides, so, Report-107 doesn't change NIOSH's definition, but focuses on those exotic radionuclides generated from activation and spallation during LANSCE operations.

So, just, you know, real quick, what is spallation and how is it different from fission? So, we can think of fission as a process where neutron strikes a target, such as Uranium-235 and then splits or fractures. So, whereas, during spallation, the neutron strikes a target and sort of chips away at the mass of the target, so to speak, so you don't necessarily get -- get a full split of the same

magnitude as you do in fission. So, nevertheless, you can get -- both processes yield, you know, radioactive -- radioactive products, some of which are very short lived.

Next slide, please.

So, as previously mentioned, the purpose of 107 is to provide a framework for building doses from exotic radionuclides that weren't effectively measured by whole-body counting. Some of these accelerator-produced exotics that I previously mentioned have short half-lives, and such a hypothetical intake wouldn't be measured by a whole-body count because the activity has decayed. In other words, the time between potential exposure and routine bioassay measurement was long enough such that there was nothing left to measure. Report-107 addresses this issue.

Next slide, please.

The Report-107 approach is similar to that of ORAU Team technical information bullet -- Bulletin 54. I won't read the title of OTIB-54 in its entirety, but it can also be found on the website. So, in summary, for the Report-107 approach is to, one, identify a reference radionuclide mixture containing exotics. Then two, identify an appropriate indicator in the reference mixture. In other words, the indicator is the radionuclide that was measured. And then three, calculate the intakes of the indicator radionuclide using standard dose reconstruction methods. And finally, then four, scale the intakes of each exotic to the indicator radionuclide.

Next slide, please.

So, we're going to dive into parts one and two of the aforementioned approach, which is defined the reference mixture and the indicator radionuclide.

Next slide, please.

All right. So, LANL provided NIOSH with radionuclide mixture inventories for seven accelerator components which represent nine distinct source terms. So, you can see the seven components listed on the current slide. Based on these radionuclide inventories, the beam stop and the tungsten target were the primary components of dosimetric instruments. So, that's what we'll focus on during the remainder of this presentation, which hopefully will become more clear as we get further along.

Next slide, please.

Activation products produced by neutron interactions with air were not considered in this report, and that's because the internal dose delivered by these products are insignificant when compared to the components of the tungsten target. And just talking a little bit about the hypothetical exposure pathway, which is highly conservative. So, the idea here is that the target is volatilized due to loss of cooling. So, the accelerator uses 800 MeV protons, which strike a solid object. And that generates quite a bit of heat. So, that's where the melting comes into play. So, the volatilized mixture is then inhaled. So, it's a conservative pathway because, one, safety systems were in place to mitigate loss of coolant. Two interlocks were in place to prevent personnel exposure while the accelerator was energized. And three, entry to the accelerator hall was delayed to allow the ventilation system time to clear the airborne activation products. Additionally, the delay would also allow for short-lived radionuclides to give them the chance to decay.

Next slide, please.

Okay. The reference components evaluated contains a significant number

of radionuclides, so we wanted to come up with a way to optimize the evaluation. So, we applied criteria to reduce the number of radionuclides under consideration. The criteria were, one, that the reference mixture must have Cobalt-60 is a significant component, and that's because Cobalt-60 was routinely measured via whole-body counting, thus making it a reliable indicator. And two, a given radionuclide must have an ICRP 68 dose conversion factor. So, radionuclides without DCFs have half-lives of less than ten minutes and were not considered.

Next slide, please.

Slide 12. Okay. So, once we have optimized the radionuclides in each of the reference mixtures, each radionuclide activity was normalized to the indicator, which was Cobalt-60. Then the most favorable DCF was assigned to each radionuclide. Finally, the committed effective dose, or CED, for each reference mixture was calculated. Since we normalized each radionuclide to Cobalt-60, the total CED is expressed per activity unit of Cobalt-60.

Next slide, please.

So, in order to evaluate the data, bar plots were generated showing the dose contribution from each radionuclide. So, radionuclides contributing more than 1 percent of the total dose have their own bar and all other share bar. Additionally, another factor we'll denote as X was calculated. So, this is the factor by which the dose increases in comparison to an intake of one nanoCurie of pure Cobalt-60, which was used to select the reference material that gives the highest dose. So, this X factor is going to allow us to sort of triage the components to determine which ones are the most significant in terms of dose.

So, on the next slide, please, we'll take a look at a couple example bar

plots.

So, here we have examples for the Mark I tungsten target and the beam window. So, these two targets have the highest X factor of any of the nine reference components that were considered. And recall, like I just mentioned, X is the factor by which the dose increases relative to unit intake of Cobalt-60.

So, for example, if one were to inhale 1 nanoCurie of Cobalt-60 along with the scaled reference mixture containing exotic radionuclides, a total dose -- the total dose delivered would be approximately 27 times of that than one nanoCurie of pure Cobalt-60. So, note that the Mark I tungsten target delivers a much higher dose than the next highest component, which was approximately 15 times that of the beam window. And most of this dose comes from four radionuclides. As we can see here, the Gadolinium-148, Cadmium-113m, Cobalt-60, and then Hafnium-152. So, at this point, I'll also point out the majority of radionuclides grouped in the other bin contribute less than 1 percent of the total dose. So, we have 132 radionuclides that contribute less than 1 percent of the total CED of the mixture.

Okay. Next slide, please.

So, because the Mark I target delivers the highest dose of any of the components, that's what we'll focus on for the remainder of this -- this presentation and in the upcoming example.

And next slide, please.

We'll give just a brief overview of the Mark I target and where it fits into the accelerator. So, this slide we have a depiction of the Mark I target position at the end of bombardment from the proton beam. So, this proton beam is bent 90 degrees via the bending magnet before striking the upper and lower tungsten

target. So, as a result, the generated neutron flight paths are perpendicular to the proton beam line. And the -- and the point of this is just to give you kind of a physical picture of -- of how the target was set up in the -- in the LANSCE facility.

Okay. Another thing to note is that the target is fairly large at approximately a meter and a half tall and 0.7 meters wide. So, this isn't something that you're just going to be carrying around in your pocket.

Next slide, please.

So, as we saw on the bar plot for the Mark I target, the source term is composed of 136 radionuclides. And recall from that same plot that 132 of the 136 deliver a combined dose of less than 1 percent of the total dose. So, to simplify this -- this Report-107 methodology, the number of radionuclides in the target mixture was reduced. So, this was done by first calculating the dose to each of the 26 ICRP affected dose organs for all radionuclides and any radionuclide that delivered less than 1 percent of the total dose to any organ was retained. So, as a result of this reduction, we're left with 13 dosimetrically significant radiocolloids.

Next slide, please.

So, this table simply shows the organ dose conversion factors per unit intake for three effective dose organs, the adrenals, bone surface, and lungs. So, note that in this table, we've re-scaled each radionuclide relative to total activity in the mixture. So, previously, we scaled everything to Cobalt-60. And that was done in order to calculate that -- that X factor we talked about, which was basically used to select the most dosimetrically significant target. And I'll just -- I'll just point out that we're only presenting this table so that you can

reproduce the -- the upcoming example calculation. Okay. So, next we'll work through an example of a committed organ dose calculation using the Report-107 methodology.

Okay. Just next slide.

Setting up this example, in vivo whole-body counts were performed during the evaluation period and Cobalt-60 was only reported if it was identified by the analysis software. So, if it wasn't identified, Cobalt-60 was reported as less than the minimum detectable activity, which was approximately 0.83 nanoCuries.

So, in this example, we'll use the Cobalt-60 minimum detectable activity to calculate the missed dose due to a Type S Cobalt-60 and reference mixture intake. So, first let's assume that the body burden is equivalent to the NDA divided by 2, or 0.415 nanoCuries. So, we can now use IMBA to calculate the intake and intake rates as shown on the last two bullets of this slide. Okay. So, next slide, please.

The calculation is fairly straightforward, just perhaps a little tedious. So, we're -- essentially, we're simply scaling the intake of radionuclide I within the reference mixture to that of Cobalt-60, which was the second radionuclide listed in the table back on the previous slide. So, that's why you see Cobalt-60 activity denoted A2 because cobalt was the second radionuclide listed. So, now it's just a matter of multiplying the scaled intake by the corresponding dose conversion factor for each radionuclide in the mixture.

So, here for the adrenals, we have an example, first starting with the first radionuclide on the table, which was Cadmium-113 metastable. And then from there, it's just, you know, kind of plug and chart from the remaining

radionuclides in the -- in the dosimetrically significant list. So, for this example, Type S Cobalt-60 was assumed. But we can also do the same calculation for Type M material, noting that we would still use the same organ DCF. And that's because we always select the most conservative one. It's only -- it's only the intake that would differ as a result of changing the material solubility.

Okay. So, easy one, right? So, now we're -- now we're into the summary. Next slide, please. And let's go ahead and go to the next one.

So, Report-107 provides a proof of concept for a method to bound doses due to radionuclides in a reference mixture that may have -- not have been effectively measured by whole-body counting. So, this is accomplished by scaling the intakes of radionuclides in the reference mixture to an indicator radionuclide that is readily detected. So, the end result is a 50-year committed organ dose.

Now, for dose reconstruction, we use the actual annual organ dose rather than the 50-year committed value. So, we need to perform some additional development on this method prior to implementation. But again, here, with this, the purpose of this report, we're just demonstrating a proof of concept, which is why it's -- it's a report, not necessarily an OTIB.

Next slide, please. And that takes us to key references. Next slide. And that's the conclusion.

Like I said, there's -- there's some key acronyms and terms provided at the end of this -- this presentation. They're there for your reference. And with that, I'll turn it back over to you, Josie, for questions.

CHAIR BEACH: Okay. Thanks, Nick. Any questions on this report?

MEMBER LOCKEY: This is Jim Lockey. Beyond my pay scale.

CHAIR BEACH: Thanks, Jim. Mine, too. Okay. Seeing no other questions being raised, would you like to go on to your weight of evidence presentation?

MR. STEMPFLEY: We can do that. This is Dan Stempfley. And hopefully, --

(Whereupon, an unidentified attendee speaks unmuted.)

MR. STEMPFLEY: Sorry, somebody else?

CHAIR BEACH: No, no.

MR. STEMPFLEY: Okay. Hopefully Pat can pull that one up for me, and he'll be running the slides, so I'll wait for that.

Okay. You can see here already that this was going to be presented by somebody else, Tim Adler, who is not available, so I'm stepping in here to present the summary of Los Alamos National Lab weight of evidence memoranda. There are actually two of them.

Next slide.

The first weight of evidence memo titled "Weight of Evidence That Supports NIOSH's Ability to Bound LANL TA-53 Doses for 1996 to 2005." I'll be referring to that one as the weight-of-evidence memo 2023, and the second one, same title with the "Evaluation of Radiation -- or Radiological Work Permits" will be referred to as weight-of-evidence memo 2024. This presentation is just an overview of these memos, and they're associated with Technical Area-53 that was just discussed in the Report-107 presentation. And it presents an analysis of information as compared to the conclusions of Report-101. The 2023 memo focuses mostly on the analysis of administrative and engineering controls and as -- as mentioned, the 2024 memo is an analysis of RWPs for Technical Area-53, and the full memos are available on the NIOSH

website.

Next slide.

Okay. We'll go through the first memo here, 2023. As is the case for all the presentations here today, there is a question regarding -- from the working group regarding NIOSH's ability to bound doses to exotic radionuclides. TA-53 is of particular interest, as previous -- previously discussed in regard to exotic radionuclide exposure because it had an accelerator and other various experimental facilities. And within TA -- Technical Area-53, the accelerator operations directly and indirectly produce exotic radionuclides in a form of activation and spallation products.

Next slide.

So, for the first memo, we first defined the workforce that were -- we were reviewing, and they were grouped in to those performing routine work versus those performing non-routine work. The work -- routine work included roles like guards, custodians, and other support staff that were not performing work under an RWP. From a monitoring perspective, the work may have included error surface contamination monitoring as well as bioassay for the primary -- primary radionuclides of concern, such as uranium, plutonium, or tritium. For this period, Los Alamos designated the radiological control program to comply with 10 CFR 835 with an intended outcome that workers performing routine work, including unmonitored workers, such that they would be unlikely to receive doses greater than 100 millirem per year committed effective dose.

Next slide.

For the non-routine work, the work roles included experimental scientists, maintenance workers, radiological control technicians, and other related workers

that were often performing work within the radiological posted areas, work under RWP, and utilize -- utilizing as low as reasonably achievable protocols. From a monitoring perspective, the work included, again, air and surface contamination, as well as bioassay monitoring. The suspected radiation intakes were subsequent -- subsequently monitored by nasal smears or whole-body count measurements. For this period, health physics personnel monitored the work with the goal of maintaining non-routine worker radiation doses under 100 millirem per year committed effective dose.

Next slide.

The memo then reviewed the access control system at LANSCE. Because the accelerator operations and Los Alamos -- Los Alamos Neutron Science Center presented significant safety hazards, the operations employed robust engineer -- engineered and access control system to prevent inadvertent access during beam operations. These access controls included a number of things. First listed is radiation security system, RSS, which automatically terminated the beam, or shut it off as a result of predefined abnormal conditions.

Second was the person -- personnel access control system, PACS, which was a two-key system to prevent personnel from accessing the area when the beam was active. The experimental personnel access control system was a system to ensure personnel didn't enter a high radiation area while the beam shutter was open. And then there were beam area sweeps that were performed prior to and after the beam operation to confirm that there were no workers present in the beam area.

Next slide.

All right. The next memo -- or next the memo reviewed the surveys of

contamination area boundaries. LANL health physics personnel were required to collect weekly smear surveys in all areas bordering the established accessible contamination areas of Technical Area-53. Quarterly smear surveys were performed in all primary and secondary beam line areas. The Meson Physics Facility-3, Area A, and all other areas specified in the routine monitoring and instructed -- instructions directives.

It should be noted here that for the purpose of collecting samples in the current quarter, if the survey was deferred to the next quarter at the -- they couldn't access the area, they were deferred to the next quarter that the surveys were due.

Okay. And finally, the memo reviewed the portal and gate monitoring documentation. Gate and portal monitors were used to identify and help control worker contamination in Technical Area-53. The 1994 Los Alamos Radiological Control Manual specified how staff were to respond if personal contamination monitors alarmed, otherwise referred to as PCMs. LANL health physics personnel were required to collect week -- weekly large-area swipes between contamination areas and the PCMs to confirm that the walkways leading to the PCMs were free of removable contamination.

There was a formal procedure that detailed the process for responding to gate or area exit alarms. The gate exit was a checkpoint to monitor vehicles and equipment before leaving Technical Area-53. If levels above background were -- were detected on the vehicles, the monitor would alarm. On to the next.

In summary, this first memo presented that LANL strictly controlled access to the Los Alamos Neutron Science Center beam line in the hot area. All the

beam areas during and after beam operation were controlled by RWP directives and radiological monitoring. LANL required workers to self-monitor for contamination when exiting the posted areas and alarm -- all alarms were investigated. Vehicles and equipment leave -- leaving Technical Area-53 were monitored for contamination using the gate or exit monitors.

There is an additional thing that wasn't mentioned, but the REMS database -- Department of Energy data from the REMS database show that no Technical Area-53 worker received over 100 millirem CED, committed effective dose, in any year from 1996 through 2005. The important part here for Technical Area-53 routine workers or any workers that were monitored by whole-body counting, NIOSH can bound exposures to exotic radionuclides using the method that was just described in Report-107. So, this supports that there wasn't anything to the contrary.

Next slide.

So, the conclusion, the evaluation of Los Alamos National Labs administrative and engineering controls at Technical Area-53 supports NIOSH's ability to bound radiation dose at 100 millirem per year committed effective dose with sufficient accuracy for all unmonitored LANL Technical Area-53 workers for the period that we're evaluating. So, this is the end of the first memo, and we'll move on to the second one.

As indicated in the title, this is for Technical Area-53 RWPs, and we reviewed them. So, the background for this 2024 weight-of-evidence memo, LANL issued RWPs and inform workers of the area -- area radiological conditions within Technical Area-53 and to establish the radiological controls for the covered activities. In support of this evaluation -- in the evaluation of this

memo, we did do some data captures in 2019 and 2023, and NIOSH obtained copies of all the RWPs that LANL staff identified for TA-53 covering this period from '96 to 2005. As part of the data capture, NIOSH collected and evaluated 1,349 RWPs for the period covering various operations within the Technical Area-53.

Next.

Okay. This -- this slide shows a breakdown of the RWPs collected by year with the listed date range, total number of -- for the year and the percentage of the total number RWPs collected. I don't have much more to say on this unless there's questions, I'll try to answer, but if not, I can move on.

Next.

This is a different breakdown of the RWPs grouped by location within Technical Area-53 with the total number RWPs for the area over the evaluated period and the percentage of the total number of RWPs. Just a different breakdown. We'll move on.

Of the evaluated RWPs labeled radionuclides of interest as expected, measured, or anticipated, the table on the next slide summarizes the number of RWPs listing particular -- listing a particular expected radionuclide. During the review of Technical Area-53 RWPs, all radionuclides of interest were tallied regardless of the label. However, only the expected label results were presented in this weight of evidence memo. LANSCE activities involve actinide sources as well as activation and spallation products for tallying purposes.

In this 2024 memo, the activation and spallation products are combined and referred to as mixed activation spallation products, or MASP. The presence or absence of Cobalt-60 was also tallied in support of the proof-of-concept

method described in a previous Report-107, and that Cobalt-60 serves as the indicator radionuclide for the Report-107 dose estimation method.

Okay. This is the 2024 weight-of-evidence memo table that lists the RWP with the expected radionuclides grouped as described in the previous slide. The table lists the number of RWPs for each group, with a percent of the overall number of RWPs. It's worth noting that some of the RWPs listed here listed both mixed activation and spallation products and actinides as the radionuclide of interest. Therefore, the sum of the RWPs in this table exceeds the total number collected.

If you look at the bottom of this table, the non-identified row was looked into. The complete RWP content require -- requirements were examined for the 407 RWPs, and NIOSH observed for these RWPs work activities the exposure component -- concerns appear to have been limited to beta, gamma, and external dose potential from mixed activation and spallation products. All but four of those 407 RWPs included a requirement for some time -- type of external dosimetry on their radiation protection requirements pages. The four that didn't, as in -- discussed in the memo, three of the four have information that support dosimetry use. The remaining -- remaining one did not stipulate external dosimetry requirements or contain the post-job portion of the RWP. So, make -- we couldn't make a dosimetry use decision on that one.

Next.

This is a different slide from the memo listing the RWP external dosimetry requirements. The different options for external dose -- dosimetry are listed under type. The total numbers -- RWPs prescribing the particular dosimetry requirement and the percentage of total number of RWPs are also listed there.

As previously noted, some RWPs prescribe multiple types of dosimeters, so the sum of the RWPs in this table exceeds the total number collected. There is a specific discussion of the eight RWPs with no dosimetry site included in the memo. I won't go over it here, but it did assess that.

Next slide.

The memo included a review of the PPE requirements for the Technical Area-RWPs. 73 percent of the Technical Area-53 RWPs required one or more types of PPE. There was a review of the RWPs that did not contain specific PPE requirements, and they were the designation such as non, other, or unknown. For those, the primary concern was external radiation exposure. There were no noted elevated derived air concentrations, nasal swipe requirements, or elevated nasal swipe results.

The work associated with a non-PPE RWPs included inspections, equipment installation and repair, operational checks, and general maintenance. The memo cites 94 percent -- 94 percent of the RWPs reviewed without specific PPE designations require intermittent or continuous RCT coverage.

Next slide.

For the health physics coverage review, all of the 1,394 -- or 49 RWPs prescribed some kind of health physics coverage. The types of coverage listed included intermittent and continuous worker coverage and equipment or other surveys by health physics. A table from the memo listing RWPs and prescribed HP coverage, number of RWPs require -- requiring the coverage and percentage of the total number to RWPs is shown here.

There is a note at the bottom. The specific monitoring coverage associated with the five RWPs and the equipment other row is -- is

undetermined at this point because the RWP monitoring requirement pages were not included or provided with those RWPs.

Next slide.

As part of the evaluation in the memo, the RWP training requirements were reviewed. This table lists the identified training requirements in the RWPs, the number of RWPs requiring this level of training, and the percentage to the total number of RWPs requiring training. Some are -- RWPs specified, again, multiple training requirements. Therefore, the sum of the RWPs here, again, don't match the total number, or they exceed the total number of RWPs.

Okay. Next slide.

In regards to contamination surveys and air monitoring, the eval -- NIOSH evaluated the Technical Area-53 RWPs to determine the extent of air monitoring and contamination surveys conducted before, during, and after work completion. There were 1,244 RWPs that had pre-job cert -- pre-job surveys; 1,052 RWPs that had post-job surveys; and there were 379 RWPs that had in-process surveys. Of those RWPs, there were one -- 1,470 end-process documented surveys of RWPs, and these were surveys that identified something other than pre-job, post-job, item release, or off-site shipment, or on-site shipment surveys.

As far as air -- air monitoring, there were 270 R -- 207 RWPs that had in-process air sampling results. There were -- 652 RWPs with no data for pre-job derived air concentration values were marked as NA, and 934 RWPs listed with no data for post-job derived air concentration values are marked as NA. As -- as discussed in Report-103 presentation, Los Alamos did not require a documentation of the in-process surveys during the performance of work under

RWPs.

Next slide.

NIOSH further reviews the -- these RWPs with air sampling data against the three conditions listed below. Forty-six RWPs reported high airborne activity levels or reported pre- or post-job airborne act -- concentrations above 10 percent DAC. 192 RWPs required nasal swipes. Follow-up bioassay was performed, if necessary, based on a nasal wipe test. Los Alamos required a radiation protection observation report, also referred to in some cases as radiation incident report if the sum of the nasal swab readings in both nostrils was greater than or equal to 50 disintegrations per minute alpha or 500 disintegrations per minute beta. And then lastly, five of the RWPs recorded elevated air monitoring results for monitoring performed during the execute -- execution of the RWP.

The documents cited within the RPWs for the Technical Area-53 review, Los Alamos National Lab often supplemented many -- the RWPs with references to existing procedures and safety-related documents. Some of the examples include -- or the examples do include standard operating procedures, hazard control procedure, special work permits, test plans, integrated work documents, and security plans. Some of the RWPs contain full-text copies of such documents, and 225 of the RWPs cited at least one of these types of documents.

So in summary, the 2024 weight of evidence evaluation of 1,349 T -- Technical Area-53 RWPs confirmed that Los Alamos National Lab regular -- regularly utilized RWPs to assess the hazards and exposure potentials, specified monitoring and PPE requirements, and enforced administrative and engineering controls to keep the worker radiation doses under 100 millirem per year

committed effective dose. The key findings include external monitoring use was stipulated in over 99 percent of the RWPs, though elevated airborne rat -- radioactivity occurrences were not common, the evaluated RWPs provided evidence of appropriate precautions, monitoring, and follow-up bioassay when warranted.

The radiation protection observation reports were issued in the event of unplanned or expect -- unexpected work events. There is evidence of radiological control technician authority to make on-the-job adjustments to monitoring and PPE needs. The training requirements were consistently noted, and the majority of the RWPs require pre-job and post-job contamination surveys.

Next.

The overall conclusion drawn from the assessment presented in the review of the 2023 and 2024 weight-of-evidence memos is that the captured evidence supports NIOSH conclusion that Los Alamos National Lab's radiation protection program applied the same rigor to operations with potential exposures to exotic radionuclides as they applied to operations involving the primary radionuclides. These I eval -- evaluations identified no evidence to the contrary.

And other than the references and the key terms and acronyms, that wraps up this presentation.

CHAIR BEACH: All right. Thanks, Nick (sic). Good presentations. Any questions? Comments?

MEMBER CLAWSON: I -- I guess, I was just wondering about any other place besides LANSCE did we look at? I know it was the biggest one for the exotics and so forth, but there are a lot of other stuff going on with different --

different processes, bench-top work, all of these things, you know, D&D. There was other radionuclides and stuff popping around there, but it seems like you just focused on LANSCE. So, did we look into any of the other areas?

MR. STEMPFLEY: If that question is directed to me, I know we focused on LANSCE because of the question that was specific to LANSCE. We don't have any reports to present other areas. I don't know if John or LaVon or Brant have anything --

MR. RUTHERFORD: Yeah.

MR. STEMPFLEY: -- to add.

MR. RUTHERFORD: I'd like to comment. I -- you know, what we did was we looked at the areas of greatest concern. As you know, Brad, that it -- this -- it takes a lot of effort to do these data captures, to do all of the different things that we have done. We have tried to focus on the areas where we felt we had the highest potential of concern and -- and for exotic radionuclides, because they were the main ones. And -- and so, we pulled the data from the three facilities. We pulled the source -- the surface contamination from the three facilities. And then LANSCE, we looked at specifically in this manner.

You know, it would take years and years and years more than what we've done to look at everything. I think what we've tried to do is to provide enough weight of the evidence that we feel supports that dose reconstruction is feasible for exotic radionuclides. And -- and again, we pulled it from the facilities we thought we had -- that they were the -- had the highest potential for exposures of concern.

MEMBER CLAWSON: And -- and I understand that, Lavon, but -- but you've got to understand also too, as an Advisory Board Member, we have to

take a look at the whole picture and the whole place. And -- and I do understand that -- why you did what you did, and I understand that. I'm just -- you know, it comes down to us as Board members to be able to make these decisions that we have to.

And we can't -- I -- and I understand what you're saying. These sites are very complex and it -- it -- it's a -- it's a -- it's a big task. I just -- there -- there are other areas that -- you know, a lot of times when -- when a company is -- is, like -- well, with LANSCE or whatever, sometimes with the exotics and everything else like that, they're a little more astute to monitor for it. And some of the other areas that are not used to using that kind of rigor, we -- we've got to kind of look at.

MR. RUTHERFORD: Well, you know, and I think that was --

MEMBER CLAWSON: (Indiscernible.)

MR. RUTHERFORD: -- I think that was a concern. And -- and -- and when we actually talked to the health physics staff at LANL, you know, they indicated that these were -- were the areas that they would suspect that had the highest potential of exposure in those. And they also indicated as -- as ORAUT's pointed out, that the controls and methods that were used for the different areas and facilities were consistent.

MEMBER CLAWSON: That's true. Now, I've got a question for you, Lavon, and this is kind of a little off the track. Have you ever heard of perfuming exotics?

MR. RUTHERFORD: Perfuming exotics; no, I have not.

MEMBER CLAWSON: Okay. I just -- I ran into that in a document. It has -- it's kind of off this, but it -- it -- it's been intriguing me, and I've been trying

to figure out what they were referring to when they said that. So, I just wanted to ask you. I'm sorry. That's one that's been on my bucket for a few months. So, okay. I'm good.

MR. RUTHERFORD: I'll have to take that as a lookup.

MEMBER CLAWSON: Okay.

CHAIR BEACH: Yeah, in the next couple of months before you leave.

MR. RUTHERFORD: Yeah, August 31st.

MEMBER CLAWSON: No, no, let's -- let's put a requirement that we need to have that taken care of before you leave. There we go. I -- I just -- I just ran into it in a document. Sorry.

CHAIR BEACH: Okay. No worries. Any other work group members? I think Bob has a comment. He just showed up. If -- any other questions or comments before we move to Bob?

MEMBER LOCKEY: Yeah, Jim, Jim Lockey. LaVon, did the data -- I -- I might have missed it. The -- the exposure levels -- the exposure levels, they did not exceed 100 millirem CED, is that correct, for all the period of time?

MR. RUTHERFORD: That is correct. It's -- I -- I am not the expert on the Report-107. As you know, I was the site lead at LANL after Greg Masevich (ph) left and retired, and then I had that position for a number of years, but I transitioned out. And between Dr. Ulsh and Dr. Cardarelli, we've kind of managed to move that around. So, I -- I would say that answer is yes, but I will ask the ORAU Team to -- if -- if I'm misspeaking. There was no person or individual that exceeded 100 millirems CED, am I correct? I thought that's what you even presented. Am I correct, Dan?

MR. STEMPFLEY: Yeah, that's what's in the presentation. I can go back

and make sure that we are speaking correctly, but yes.

CHAIR BEACH: And while you're looking at that, I understood there was some contamination found at -- air contamination found at the fence line? I would have a hard time believing it was -- it was kept at 100. And I believe --

MR. RUTHERFORD: That --

CHAIR BEACH: -- there was some reports of a few individuals getting above 100. So, I don't know if you can across the board say it was under 100.

MR. RUTHERFORD: I will say that the fence line dose was due to stack release. It was not due to release within the -- within the facility.

MEMBER LOCKEY: Well, the reason -- I -- I did take a note -- Jim Lockey. I did take a note that the air monitoring 5 of 1,349 were elevated. So, that's minimal at best. But that's -- then that would definitely correlate with your lack of elevated -- any kind of elevated CED in this workforce, in this particular facility anyway. I mean, is there -- is there a health risk? I would put that out -- based on those figures, is -- does this present a health risk?

MR. RUTHERFORD: I cannot -- I cannot answer that. I'll let Dr. Ulsh answer that one. He's got his hand up.

DR. ULSH: I do. Okay to go ahead, Josie?

CHAIR BEACH: Yes, go ahead.

DR. ULSH: Okay. Well, keep in mind, you know, in the Report-107 presentation, we went by it really quick, but there was a slide in there about why the method presented in Report-107 was conservative. And if any of you have spent any time around an accelerator facility, the main reason why it's conservative is because it assumes that the entire target was volatilized, and the employee was standing right there to -- to be exposed. And that is

absolutely not how an accelerator facility operates. When the beam is on, people are excluded. They will not turn the beam on if there are people in that -- in that area. And there's an extensive system of administrative controls, including, you know, the -- the two-key system and interlocks that prevent that from even happening.

And then when the beam turns off, they have a cooling-off period specifically to allow for decay of these spallation products before people are allowed to go back into the area. So, that's the primary reason that it's conservative. It's because people aren't there to get even this minuscule exposure. But the point of 107 is simply to show you that even if you make that unrealistic assumption, we can still bound doses. And they're very -- they're -- they're small.

Jim, I think you did hear the right thing in the presentation that the REMS reports showed that there were no people during this time period in these areas that exceeded 100 millirem. All of this tends to indicate that the exposure potential from exotics is minuscule, just like the health physics staff at LANL judged it to be at the time.

MEMBER LOCKEY: Thank you.

CHAIR BEACH: All right.

MEMBER CLAWSON: Josie, I -- Josie?

CHAIR BEACH: Go ahead.

MEMBER CLAWSON: Yeah, I -- I got -- I got one thing about that. You know, what you're saying is -- is absolutely right, Brant. And I realize that. But something that I found interesting about LANSCE down there and when -- when we took the tour is part of the way down there, there's an exit door that comes

out of there, and there's a roadway that runs right alongside of it, and they have a 4-foot -- no, it's actually 8-foot tall, 4-foot thick concrete wall that they have put up there because of that road driving alongside of it. And my question to them was, when did we install that? And that was only back in the 2000-2001 time period, because they come to find out that they didn't think that because it was a gradual incline -- this was part of the fenced area on that, that there was a wall there. So, through the years, they have been learning things. And it's not that it's a continuous hazard, but when that did run, they did come to find out that they had points of access that they had to secure up with concrete walls.

DR. ULSH: Yeah, you got --

MEMBER CLAWSON: If you remember that, that --

DR. ULSH: Well, you got me --

MEMBER CLAWSON: Well, --

DR. ULSH: -- Brad, --

MEMBER CLAWSON: -- no, this is --

DR. ULSH: -- because I --

MEMBER CLAWSON: -- this is what --

DR. ULSH: -- didn't take that tour.

MEMBER CLAWSON: This is what -- this is what intrigued me by it. Because when we walked out of it, and the -- the door comes out and you're into a brick wall, because they come to find out as they started amplifying some of this, there -- you know, this is a fairly old facility really. So, this was a -- this was a new thing to -- to me. And then to have a roadway going right alongside it. And so, it does show that they -- they were monitoring things, and they were

addressing it. But it -- it wasn't -- it wasn't perfect in any way either.

DR. ULSH: Yeah. You've got me --

MEMBER CLAWSON: Yeah, right.

DR. ULSH: -- a little bit of a loss because I didn't take that take that tour. But if you're talking about a big 4-foot-thick concrete barrier, the concern there is going to be the external exposure, not --

MEMBER CLAWSON: Yeah, right. That's my understanding.

MR. FITZGERALD: Josie, can I jump in?

CHAIR BEACH: Yes. And then -- and then we'll go to, I believe, Nick.

MR. FITZGERALD: Yeah, real quick. I -- I -- I agree with what Brant's saying about the LANSCE. I mean, an accelerator operation, and -- and this one in particular, you're talking about short-lived mixed activation products, spallation products, and for the -- for -- for LANSCE, the bigger issue was simply, you know, they had stack releases that were so prolific, substantial, albeit short lived, that the fence line dose at Los Alamos near LANSCE actually was in excess of the -- I guess -- I'm trying to remember the right term. I think it's like unprotected member of the public or something, but that -- that certainly bedeviled the lab for quite a while until they installed stack equipment that mitigated those releases.

But I want to just re-emphasize, though, that, you know, we're not talking about the same accelerator, spallation products as the exotics for the entire lab in the scope of what we're talking about in this instance. I mean, there's a variety of exotics that are referenced in the TBD as well as in the preceding SEC. You got mixed activation products, not just from LANSCE. You have mixed fission products that are reactor related or -- or -- or are waste -- fuel waste

related. And then you have bench-scale experiments involving non-primary other, quote/unquote, radionuclides, which would be sort of in the -- this other category, exotic category.

And so, we're trying to account for that -- that -- the spectrum of what we're classifying as exotics. But it goes back to the scoping that was done both in the TBD and the -- certainly the SEC evaluation report that led to this. So, that's -- you know, certainly LANSCE is part of that. But I just want to emphasize that the -- it is, in fact, a -- short-lived mixed activation products that are involved with that particular facility.

CHAIR BEACH: Thanks, Joe. Nicole, you have your hand up, I see?

MEMBER MARTINEZ: I do. I was actually going to ask if we could have, like, a five-minute break.

CHAIR BEACH: That's funny because I was going to ask if everybody was ready for a break. So, yes, I think -- any other burning questions or comments? Let's take a break, and then I do have some comments I want to go forward with. Bob, would you like to make comments now or --

MR. BARTON: Yeah. I just -- real quick, I don't think it's --

CHAIR BEACH: Okay.

MR. BARTON: -- going to -- I mean, maybe I'm just being dense here, but there were some slides about pre- and post-job surveys, whether they be DAC measurements or smears and that sort of thing. But one of the things caught my attention that says -- it's on Slide 22. LANL did not require documentation of in-process surveys during work performed under RWPs. What was the -- what was the post-job survey? I mean, was that just a -- I mean, I --

CHAIR BEACH: It's a --

MR. BARTON: -- imagining --

CHAIR BEACH: -- together.

MR. BARTON: Yeah. Just to make sure that the area was cleaned up and you're not leaving contamination, but what does that actually say about what was happening? Because also we heard today that there were no directly connected bioassay results to the RWPs either. So, we don't have RWP-directed bioassay. And we -- do we have the during-job monitoring, air monitoring, swipes, everything, because that -- that that was curious. And I -- I think that should probably be clarified.

MR. RUTHERFORD: I think that the clarification to that is, is there weren't connected with directly with the RWP. There were surveys that could have been taken, but we couldn't pull those in -- if they're -- they -- as -- as Dan mentioned, they did not require in-process monitoring. It did occur, but it wasn't -- it -- it wasn't always included or -- along with the RWPs, --

MR. BARTON: Okay.

MR. RUTHERFORD: -- like a package --

MR. BARTON: I understand. So, the connection couldn't be made. But they were walking around --

MR. RUTHERFORD: Exactly.

MR. BARTON: Okay, I gotcha. Thank you.

CHAIR BEACH: All right. Thanks, Bob. I didn't mean to ignore you. I knew you had a question. Anything else, anybody before we take a quick break?

Rashaun?

DR. ROBERTS: Yeah. So, how long? Five minutes? Ten minutes?

CHAIR BEACH: How about let's do ten at least. Come back at --

DR. ROBERTS: Okay.

CHAIR BEACH: -- at 4:10?

DR. ROBERTS: 4:10, yep.

MEMBER LOCKEY: That's good, 4:10.

DR. ROBERTS: That'll work. Okay.

CHAIR BEACH: Thank you. Don't log off.

(Whereupon, a break was taken from 4:00 p.m. EDT until 4:10 p.m. EDT.)

DR. ROBERTS: All right. Great. Let me take the roll, starting with Beach.

CHAIR BEACH: I'm here.

DR. ROBERTS: Clawson?

MEMBER CLAWSON: I'm here.

DR. ROBERTS: Lockey?

MEMBER LOCKEY: Yeah.

DR. ROBERTS: Martinez?

MEMBER MARTINEZ: I'm here.

DR. ROBERTS: And Schmoldt?

MEMBER SCHMOLDT: Here.

DR. ROBERTS: Great. Over to you.

CHAIR BEACH: Thank you. Okay. So, we've heard a lot of reports today, a lot of conversation. Is there any other comments, questions, good to know before we get into the work group discussions and path forward? All right. Hearing none, --

MR. BARTON: As a -- as a --

CHAIR BEACH: Yeah, go ahead Bob. You got something?

MR. BARTON: Well, I wanted to commend NIOSH and ORAUT. There's been a tremendous amount of work to try to get our heads all wrapped around this issue. Because it is -- it is, again, weight of evidence because this is what we have. So, you see what you can gather and tell the story. And I also wanted to say that I completely empathize with LaVon and John's statements about the amount of effort and time it takes to gather this information and analyze it and come up with some sort of picture.

CHAIR BEACH: (Indiscernible) --

MR. BARTON: I also believe I'm the guilty one that said, you don't know what you don't know, which is a pretty nebulous and probably not all that helpful, but it is true. I also understand Dr. Cardarelli's point that, well, if you don't have, like, a smoking gun or even smoke to indicate a fire, you know, what are you supposed to do. Yeah, it's a good point.

I guess, where we diverge on that sentiment, that an apparent lack of information does not an SEC make. And I may be off the reservation here, but -- but lack of information has fed into SECs in the past. Since it's sometimes difficult, you can say you can reconstruct doses with sufficient accuracy and within the bounds of scientific, call it, soundness if there's a substantial amount of uncertainty.

And I'm not saying that is the case here, but I think that's what has to be considered by the work group, is that we have lots of data that was captured very well, evaluated very well. I think the flip side of that coin is that it should be considered what we may not have. And I know that's, again, maybe not helpful, but I think it should be considered because a lot of times at these sites -

- and I'm not saying this is the case with LANL -- we have a wealth of data. But when we, you know, quote, feed it into the machine, are we getting a true reflection of what those exposures were?

So, I -- I wanted to commend and great presentations just now, but I urge not to lose sight of considering what the story might say if we had some of these data points or what have you that we just don't have access to at this time. That's it. That's my rant.

CHAIR BEACH: That is a good -- good rant, and I appreciate you acknowledging the work that has been done. I also want to acknowledge the work that you and Joe brought today, the work that's gone on since -- I mean, I look back through my notes, 2012. And before I continue, John's got his hand up, so I'm going to let John speak. But thank you, Bob, for that.

DR. CARDARELLI: Hey, Bob, thank you very much for that -- that comment. I -- I do agree with what you were saying there with regard to the big picture. One thing I want to note -- I would want to share with the new Board members who may not be aware of the long history here, but we have well over 200 SECs -- I think 268 requests over the course of the 20 years of this program.

I think it's important to know that NIOSH itself has created 53 SECs, because we realized we couldn't bound doses. So, of those, I think that's very worthy to note that NIOSH is not a hindrance. We have recommended and made 53 SECs over the course of this program. Nearly 25 percent of the SECs that are out there that have qualified. So, I just want that -- that little piece of history to be also there so that folks don't get the impression that when we put up a statement that we can do dose reconstructions, that doesn't necessarily

mean that we aren't supportive of it.

And some of the things that you did mention, we agree with, and many of those -- some SEC decisions have gone where NIOSH says we can do dose reconstructions, like the recent recommendation for the SRS or other sites. So, you know, there -- there's going to be some issues, but I think it's important to note that NIOSH itself has recommended and qualified 53 SECs in the past. That's it.

CHAIR BEACH: Yeah. Thanks, John. That is good to note. I also know that we have drawn the line in the sand on some of those SECs that were brought before the Board, and the cutoff dates may have been a little premature.

So, if there's --

MEMBER LOCKEY: Josie?

CHAIR BEACH: -- nothing else I want to --

MEMBER LOCKEY: Jim, Jim Lockey.

CHAIR BEACH: Yeah, go ahead, Jim.

MEMBER LOCKEY: I'd like to make a comment.

CHAIR BEACH: Sure.

MEMBER LOCKEY: Bob, I -- I appreciate your comments -- your comment, what you don't know, you just don't know. But what we know today in the more contemporary period of time in relationship to completeness of data sets and the number of data points we have is really -- can't be compared to what was available in the '40s and '50s, '60s, and even in the '70s. There is no comparison. And when we go back when we were approving SECs, there was little data available, and the data that was available, really it could not be used

to even imagine doing a coworker dose reconstruction.

To say that this database that we're looking at in this very contemporary period of time where there's over 100,000 data points, health physicists on site, where the exposure levels are -- essentially do not represent a health risk, is -- is equivalent to what we were doing with in the past is, I think, disingenuous. It's not -- it's not -- they're not a comparison. This database that we have cannot be compared to what we were doing with -- what I was dealing with 20 years ago. It's not.

And I agree with what John says. NIOSH is a very academically oriented, scientific oriented organization. And when -- in the past, when they saw an SEC could not be reconstructed, they were right out there pushing for it to happen. And that's my comment.

CHAIR BEACH: Thanks, Jim. Thanks.

WORK GROUP DISCUSSION AND PATH FORWARD

CHAIR BEACH: Okay. I'd like to go ahead and make a couple of comments. And this -- just going through my notes prepping for this meeting and the December meeting. I went back through several work groups. And so, my comments are as follows: NIOSH's weight-of-evidence argument does not adequately address its claim that LANL's bioassay monitoring program for exotic radionuclides was sufficient by January 1, 1996, or that it can be relied upon for complete and representative exposure records to support their claim of dose reconstruction with sufficient accuracy. NIOSH has already agreed that its original presumption -- presumption of compliance with 10 CFR 835 on January 1, 1996, is not sufficient to demonstrate implementation of the 100

millirem/year were in place and being implemented. NIOSH's January 1, 1996, cut off cited selected program descriptions and procedures showing the abundance of routine bioassay data and describing bioassay monitoring for exotics at LANSCE but do not address the main question, when did LANL implement TA -- 10 CFR 835 bioassay monitoring requirements adequately so the identified pre-1996 bioassay program grap -- gaps were corrected.

SC&A's June 10, 2019, NC ID 484 report a self-assessment performed in 1999 by outside reviewers, including Dr. LeBone, answered that question. They would -- they found significant program deficiencies cited with ten corrective actions implementing -- or excuse me -- impacting RWP job-specific bioassays, HP checklist procedures, subcontractor enrollments, all of which impaired LANL's ability to monitor individuals and raises questions of data completeness and representativeness for internal exposures. Workers were found to be on inappropriate bioassay programs and RWP requirements. Job-specific bioassays were not submitted.

Major LANL radiological improvements program was undertaken, including an expedited implementation of DOELAP, an accreditation program, internal dose -- for internal dosimetry. These bioassay upgrades were happening across many DOE sites. We've talked about some of them today, Savannah River and Mound. This was in the 1990s. Corrective actions were known to be completed in the early 2000s.

NIOSH also continues to dispute any impacts from NC ID 484 on its use of the 100-millirem threshold beginning in 1996, and contends that NC ID 484 addressed routine use of bioassays for primary radionuclides, for which there are no DR issues, but neither LANL nor NIOSH has gone back to review the

impact of the missing RWP-driven job specific bioassays for that time frame, 1996 to 2000. If two out of the five workers did not submit RWP-required job-specific bioassays, how complete and representative is that database, and how can NIOSH's assumptions hold that there is no reason to believe exotics would have been any different than the primaries if exotics were more likely to figure in job-specific bioassays?

NIOSH and SC&A both agree that the use and exposure to exotics was relatively rare compared to -- with primary radionuclides, but that such exposures did exist and were special cases that would have driven -- be driven by RWP's job-specific bioassays. NIOSH contends that dose associated with exotics at LANL would have been relatively low compared to the primaries like Pu or Np. However, there is no way of knowing what we do not know. There's that phrase again.

1999 NC ID 484 report demonstrates job-specific bioassays were not necessarily collected. NIOSH's assessment of exotic -- exotics focuses on TA-53, the LANSCE facility, but that was not the only source of exotics. Historically at the laboratory, the preceding SEC addresses exotic radionuclides, including the mix activations mix -- the MFPs and other non-primaries of concern.

An upgrade of LANL's bioassay program in 2000 based on NC ID 484 deficiencies provides assurance that 10 CFR 835 mandates at -- for the 100 millirem were being implemented. December 31, 2000, would define a time frame by which program upgrades and corrective actions acknowledged and were representative of RWP job-specific bioassays would be assured. So, I am proposing to the work group and I propose -- I propose a recommendation based on those reasons that the work group votes to add SEC years January 1,

1996, to December 31, 2000, and then moving it to the full Board in August.

So, with that said, it's time for the -- time now is for work group thoughts, comments, support, not support. And then I would like to move it to a vote for the work group. So, I'm opening it up, and I will turn my camera back on. I don't -- I wrote -- most of these notes. We talked about a lot of this today. However, I wrote these notes over the last several weeks and actually the last couple of months. So, some of them we haven't discussed, but I'd like to hear from the work group members and your thoughts.

MR. EVASKOVICH: Josie, this is Andrew. Am I going to get a chance --

CHAIR BEACH: Hi, Andrew.

MR. EVASKOVICH: -- to comment?

CHAIR BEACH: Do you want to -- Rashaun, when is it appropriate for Andrew? Is it okay for him to talk now and then go into work group discussions?

DR. ROBERTS: Yes, I think so. You can --

CHAIR BEACH: Okay. Is everybody else okay with that? Andrew, go -- go ahead with your comments then.

MR. EVASKOVICH: Yeah, I'm not going to take very much time.

CHAIR BEACH: Thanks.

Petitioner Comments

MR. EEVASKOVICH: NIOSH's response to SC&A's Finding 7, Part 4 where it says the SEC class for the period '76 to '95 was not based on evidence indicating disparities in radiation program coverage between primary nuclides of concern and exotics, which is incorrect, as you just mentioned that the -- the SEC, was adopted because of the fact that there was not enough information on

the exotics. And for that reason, the period of concern was -- they wanted to address that issue out to 2005. I've submitted numerous reports of findings, and it deals more with quality as opposed to quantity where there have been findings that the RWPs were not sufficient.

The one I'll reference is the oversight report, it's -- of inspection of environment, safety, and health programs at Los Alamos National Lab -- Laboratory in 2008. In that report -- there were reports prior to this, and it kind of pulled findings from those reports into this one, so it's a good overview. But the neptunium issue -- now I raise the neptunium issue, not to have the neptunium dose reconstructed, but to indicate that they weren't doing it for exotics. They had nothing for the neptunium when it was at TA-55 when they were doing that experiment.

There -- there are problems with the work control documents. They used hazard control plans in place of RWPs. There are issues that they were not performing radiation surveys that the work involved, changing work conditions, radiological conditions. So, I would argue -- I've argued that the quality of the data that NIOSH has, there are holes in it because of these findings. So, that's been my contention for the last 18 years. Although some of the reports and stuff that I have found have been post-2012.

So, my concern is, you know, like, I understand going up to the end of 2000, but I'm concerned about the years following that. The americium incident at SM-66 is another indication where there were failures of monitoring and failures of control and handling of material. I've addressed the reports that talk about inventory. They talk about location, the radionuclides that were put into the air that were supposed to be monitored for under the Clean Air Act.

So, yeah, I would say that, yeah, they've got a lot of -- a lot of stuff, but how good is it? So, that would be my main concern. And that concludes my comments. Thank you.

CHAIR BEACH: Okay. Andrew, and thank you. And the -- the date I proposed was -- my proposal -- the work group can consider going into -- up to 2005 and so can the full Board. So, that was just a recommendation on the stuff that I looked at and thought we had better information based on the -- my previous comments. Okay, Andrew. Thank you.

WORK GROUP DISCUSSION AND PATH FORWARD (RESUMING)

Work group members, so, it's time again to voice your opinions and thoughts. This -- this has been a long time -- long time coming. It's -- we've been working on this for many years.

MEMBER SCHMOLDT: Now, I can't say I --

CHAIR BEACH: I do --

MEMBER SCHMOLDT: -- I've thought about it as deeply as other members of the Board have, because I'm a new one here, but I --

CHAIR BEACH: Yes.

MEMBER SCHMOLDT: -- used the test of is what I know good enough to support the decision I'm trying to make. And initially there were a lot of gaps that were identified, but it sounds like the burden was met with the weight of evidence addressing those concerns. And we didn't find any evidence to the contrary that we didn't have -- or we had things out of control and that the data we had couldn't be relied on to make a decision.

CHAIR BEACH: Okay. Thanks, Mike.

MEMBER CLAWSON: Well, Josie, this is Brad. I -- I beg to differ. I think you ought to look at the report in 1999. And I understand, Josie, why you chose the 2000, because after that internal audit and so forth like that, they still showed several different problems throughout the facility. And this was -- this was one that they brought on and wanted to improve their process there. And they had ten findings on that. So, I'm good with the 2000.

CHAIR BEACH: The end of 2000. Yeah. And you know that -- you can't dispute the 1999 report. It showed several deficiencies. And that -- that doesn't change. That report is there. And -- and after that, you can see the difference that it made in the early 2000s and how it changed their entire program. So, Nicole, did you have anything?

MEMBER MARTINEZ: Sure. I agree with Michael. I -- I think we're getting -- in my opinion, I think we're getting a little bit tangled up in the kind of difference between complying and not complying and the ability of NIOSH to bound the dose. I think what NIOSH has done to suggest that how they could bound the dose is quite clever, and I think they can do it, personally.

CHAIR BEACH: Thanks, Nicole.

MEMBER MARTINEZ: Thank you.

CHAIR BEACH: Jim, can we hear from you?

MEMBER LOCKEY: Yeah, I would agree with Nicole and Michael. I think the databases -- database is rigorous, but what really persuades me is the analysis, the weight of evidence analysis, the 2/24 memo that -- that essentially said the exposures were -- the air monitoring data really matches the bioassay data, and -- and there wasn't any elevated exposure levels. So, I question whether there's a health risk, and I think the database is very complete. So, I

think they can reconstruct exposure.

CHAIR BEACH: Okay. Thank you, Jim. Any other discussion? I think that -- Rashaun, I think I'd like to take a vote. I don't think the work group can do anything more within the work group for these -- this exotic question. So, I would like to see -- take an official vote and then put it on the agenda before the Board, if -- if I could do that.

DR. ROBERTS: Okay. I think that you're -- you need to make a motion that has to be seconded before I take a voice -- a roll-call vote.

CHAIR BEACH: Okay. So, my final comment, I did propose -- so, I can change the wording. I propose a recommendation based on the reasons I stated earlier to add SEC years January 1, 1996, to December 31, 2000.

MEMBER CLAWSON: I second it.

CHAIR BEACH: Okay.

DR. ROBERTS: And it's just to be clear, it's -- it's really not the --a recommendation. It's just to take your findings --

CHAIR BEACH: Yes.

DR. ROBERTS: -- as you've stated to the Board. Okay.

CHAIR BEACH: Yes.

DR. ROBERTS: All right.

CHAIR BEACH: Thank you.

DR. ROBERTS: So, I'm going to start with Clawson.

MEMBER CLAWSON: Yes.

DR. ROBERTS: Okay. Lockey?

MEMBER LOCKEY: No.

DR. ROBERTS: Martinez?

MEMBER MARTINEZ: No.

DR. ROBERTS: Schmoldt?

MEMBER SCHMOLDT: Yes.

DR. ROBERTS: And Beach?

CHAIR BEACH: Yes.

DR. ROBERTS: Okay. So, that would be three to two to take it to the Board.

FUTURE BOARD MEETING PLANS, IF APPLICABLE

CHAIR BEACH: Thank you. And do we need to task presentations or how does that work, Rashaun? I've only taken one other one to the Board, so.

DR. ROBERTS: Yeah. So, this would be for the August 26-27th agenda. So, yeah, I think you need to describe, you know, what it is that you would be needing for that item.

CHAIR BEACH: Okay. I believe just presentations on both sides, NIOSH and SC&A, and then the Board discussion with --

MEMBER CLAWSON: Josie, this is Brad.

CHAIR BEACH: Yeah.

MEMBER CLAWSON: This is Brad.

CHAIR BEACH: Go ahead, Brad.

MEMBER CLAWSON: I hope -- I hope that we give ourselves enough time at the Board meeting to be able to discuss this, because just an hour or two hours is not enough, because this is a very, very complex site and everything else like that. And -- and both sides, like usual -- you know, let's just take for instance, our last Board meeting with SRS. You know, we were in discussion in

that for at least three hours. I'm just throwing this out to you, Rashaun.

CHAIR BEACH: No, I appreciate it. Brad. We did -- Bob brought that up when we were going through different time constraints, and I think we got adequate timing. And now I'm sure Rashaun can make sure.

DR. ROBERTS: And how much --

CHAIR BEACH: ...that we do.

DR. ROBERTS: What would -- just to confirm how much time would you --

CHAIR BEACH: At least I would say three hours.

DR. ROBERTS: Okay.

MEMBER CLAWSON: At a minimum.

CHAIR BEACH: Yeah.

MEMBER CLAWSON: Because you take -- you take and give the presentations and stuff, and they don't have to be -- you know, this is coming before the whole Board. So, these presentations are going to try to give an overview for the whole Board that haven't dealt with it. I would -- I would say minimum of three hours, okay, --

CHAIR BEACH: I know --

MEMBER CLAWSON: -- if nothing else, I'd give us -- I'd give us four hours, because the discussion is going to be very -- I -- I think there's going to be a lot of questions people have.

CHAIR BEACH: I agree, and I'm going to put together a presentation also, with SC&A's help.

MEMBER CLAWSON: Okay.

DR. ROBERTS: Excellent. So, -- so would you present, Josie and SC&A

would present and then also NIOSH?

CHAIR BEACH: I would believe so.

DR. ROBERTS: Is that what you --

CHAIR BEACH: And I don't know whether --

DR. ROBERTS: -- had in mind?

CHAIR BEACH: Yeah, probably -- probably as coming through the work group as a recommendation, I don't remember how you guys did it for Savannah River, but -- but yes, I would like to present.

DR. ROBERTS: Okay. And then, of course, there would be a placeholder if the petitioner would like to speak as well.

CHAIR BEACH: Yes, I agree. And hopefully Andrew's still listening.

MR. EVASKOVICH: Yeah, I am.

CHAIR BEACH: And is not on -- yeah. And my --

MEMBER SCHMOLDT: Regarding --

CHAIR BEACH: Do you have --

MEMBER SCHMOLDT: -- I have a question.

CHAIR BEACH: -- a question?

MEMBER SCHMOLDT: Yeah. Regarding Andrew, we've got his petition and, you know, he went through and listed a number of findings and observations, and some of these we touched on today. And I think reading between the lines, I can see, you know, how I would interpret them based on the weight of evidence. But do we need to respond formally to that? What do we do to address these concerns?

CHAIR BEACH: Good question. I think typically we discuss it throughout the Board meeting. I don't know that we officially get any -- give him anything.

What do you think, Rashaun, is -- is there a better answer to that?

DR. ROBERTS: No, I think what you said pretty much captures it.

CHAIR BEACH: Yeah. Okay. So, we -- unless there's any follow up and actions needed moving forward, I guess once we go in August, we can determine which direction the rest of the work group needs to continue with the TBD items. And yeah, that was just thrown out there, I guess I --

MR. BARTON: I would say that's accurate.

CHAIR BEACH: Okay.

MR. BARTON: Depends on how the Board votes, if they bring it to a vote, some of these items will carry over into TBD discussion.

CHAIR BEACH: Yeah.

MR. BARTON: So, it really depends on what happens in August, whether we keep pursuing the SEC discussion or move some of these things over to the site profile-type territory.

CHAIR BEACH: Okay. And do you need any tasking for the two new reports that -- or the two memos and the 107? I believe 107 was already tasked.

MR. BARTON: Yeah. So, I'll touch on that a little bit. We were tasked essentially to do a full read of it to see if it materially changed what we were going to discuss today. We didn't feel that it did. However, we probably owe you at least some documentation via memorandum or what have you about our view of it. But I -- I don't think it necessarily changes the overall discussion that we've had.

I certainly don't have any technical comments on it right now, and I don't foresee having any. But really, just to put it in the context of, again, what we

discussed today and what -- what's going to be put before the Board.

CHAIR BEACH: Okay. Thank you.

Rashaun, any other tasking that we need or are we good to go?

DR. ROBERTS: Unless there's something else that the work group would like to do, then I think we're where we are.

CHAIR BEACH: Okay. Thank you. Thank you everyone. Good meeting. A lot of discussion. Excellent -- excellent discussion throughout the day. Thanks for sticking with us.

MEMBER LOCKEY: Good job.

DR. ROBERTS: Thank you.

(Whereupon, the meeting was adjourned at 4:41 p.m. EDT.)