US Department of Health and Human Services
Centers for Disease Control
National Institute for Occupational Safety and Health
Advisory Board on Radiation and Worker Health
126th Meeting
Thursday, December 13, 2018

The meeting convened at 8:30 a.m., Pacific Time, at the Crowne Plaza, 300 North Harbor Drive, Redondo Beach, California, Ted Katz, Designated Federal Official, presiding.

Present:

Henry Anderson, Member*
Josie Beach, Member
Bradley P. Clawson, Member
R. William Field, Member*
David Kotelchuck, Member
James E. Lockey, Member
David B. Richardson, Member
Phillip Schofield, Member*
Loretta R. Valerio, Member*
Ted Katz, Designated Federal Official

Registered and/or Public Comment Participants:

Anigstein, Bob, SC&A*
Barton, Bob, SC&A
Blaze, D'Lanie
Burgos, Zaida, NIOSH
Calhoun, Grady, DCAS
Domina, Kirk
Elliott, Michael*
Fitzgerald, Joe, SC&A
Frowiss, Jr., Al
Frowiss, Sr., Al*
Gogliotti, Rose, SC&A*
Hinnefeld, Stu, DCAS
Hughes, Lara, DCAS
Jerison, Deb
Lewis, Greg, DOE
Lin Naylor, Jenny, HHS
Lobaugh, Megan, DCAS
Lorenzen, William*
Mauro, John, SC&A*
Neton, Jim, DCAS
Rutherford, Lavon, DCAS
Stephens, Hugh*
Stiver, John, SC&A
Worthington, Patricia, DOE

*present via telephone

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(8:25 a.m.)

Welcome and Roll Call

Mr. Katz: Okay, everybody, I think we'll get started, get the preliminaries out of the way, and then get on to our first agenda item.

So welcome everyone. This is the Advisory Board on Radiation and Worker Health, day two of our meeting here in Redondo Beach, California. Some preliminaries, well, today's agenda goes through 2:30 this afternoon with a lunch break in there.

We have three SECs we're discussing today. First, Superior Steel in Pennsylvania, and then Metals and Controls, and then this afternoon, LANL.

Two of these SEC petitions are by way of, really, updates. We're not ready for action on a couple of these. But Superior Steel, we don't know. It's being presented for the first time to the Board, so we'll see where that goes.

For people who are on the phone, if you want to see the presentations that we have today, if you go to the NIOSH website, this program, today's date, schedule of meetings, in other words, today's date. For today's date, you'll find all those presentations as PowerPoints or PDFs, whatever. There, you can go through them on your own pace, or you can pull up. There's the agenda there, too, and on the agenda is directions for using Skype if you want to see the presentation in real time as it's presented here, page by page.

I would ask -- there's no public comment session today, although we do have petitioners for these petitions, and they have the opportunity to comment. And I know for a couple of these petitions, we expect them to comment. They expect to comment.

So last bit of instructions for general public is please

to mute your phones, because that will improve the audio for you and everyone else. If you don't have a mute button, press star six to mute your phone and keep it muted for the meeting.

For those who are addressing the Board, petitioners, press star six again and it will take your phone off of mute. And please no one put the call on hold at any point. Someone did that yesterday and it caused a little trouble for everybody. So if you have to leave for a piece, hang up and dial back in, please.

Okay then, we will move on to roll call. Before we do roll call, I'll address conflicts of interest; in other words, people who are going to recuse themselves from sessions. We have no conflicts for the first two items, Superior Steel and Metals and Controls this morning.

This afternoon we have LANL. And for the LANL SEC petition, we have several Board Members that will recuse themselves. Paul Ziemer, who would be on the phone; and Loretta Valerio, also on the phone; and Phil Schofield, I believe also on the phone. So they will recuse themselves from that session.

(Roll call)

I do expect them, at least two of them, so they'll join us when they join us. We have a quorum so we're okay there. So let's get started with the presentation for Superior Steel. Megan? Thank you.

Superior Steel Company SEC Petition #247
(Carnegie, PA; 1952-1957)

DR. LOBAUGH: Can everyone hear me okay? So I'm Megan Lobaugh and I'm going to talk today about our Evaluation Report for SEC 247, covering Superior Steel Company. I'd like to acknowledge our ORAU Team that helped with this which was Tim Kirkham, Mutty Sharfi, and Mike Kubiak.

So first a little bit about the site. The Superior Steel Company site is located in Carnegie, Pennsylvania,

as we talked about a little bit yesterday.

There is a series of five interconnected buildings, as you can see in the picture on the right. These are the five buildings with the dark roof. This company did steel rolling during the wars, and then in the 1950s, the AEC was interested in their ability to roll metal and was looking for a contract to roll uranium metal into thin, plate-type elements for fuel for nuclear reactors.

The thought was that this fuel would be more efficient than the cylindrical types. So they put out a bid for contractors to do this work, and Superior Steel was successful in getting that contract.

The covered period that we're talking about, the operations were from January 1, 1952 through December 31, 1957. That's the current operations period. And then there's a residual radiation period from January 1, 1958 through the present.

There was some remediation done that we may talk about a little bit later, but it was not full-scale remediation of the facility. That's why it exists through the present.

Just a little bit about the processing that Superior Steel did. These are two pictures that are in the Evaluation Report as well. We pulled these from a review that was done in the 1980s of the facility for remediation purposes. So the areas that are marked in that top picture are actually specific to areas that were looked at in that study.

I'm going to speak more specifically about the picture in the bottom. So the bottom picture shows the typical processing that was done, starting on the right-hand side of the picture with a salt bath.

So the metal was entered into a salt bath that was then put into a furnace and taken to a very high temperature, about 1,200 degrees Fahrenheit for about an hour. So that heats up the metal so that

then it can be put through the roughing roll and then through the finishing stands. So the slabs usually came in at about one inch thick, and by the end of this process they were down to about 180 millimeters.

One thing I want to point out is this brushing station here in the middle between the roughing roll and the finishing stands. This brushing station was actually something that was added during the operations period just from research that they found. They wanted to get the salt off from the salt bath before putting it through the finishing stands, so that was something that was added during the processing time.

Then after it goes through the finishing stands, it's actually moved to shearing, where it would be cut or rolled into a useable form for shipment and the sites that it was going to.

So some specifics about the petition we received. It was an 83.13 or a Form B petition that we received May 1, 2018. The petitioner-requested Class was all workers who worked in any area at the Superior Steel Company facility in Carnegie, Pennsylvania during the period from January 1, 1952 through December 31, 1957.

The basis for this petition was the fact that radiation exposures potentially incurred by members of the proposed Class were not monitored either through personal monitoring or area monitoring. The support for that basis was quotes from the current NIOSH Site Profile for Superior Steel.

We qualified the petition on July 19, 2018, with a very similar Class to what the petitioner submitted. All atomic weapons employees who worked in any area at Superior Steel Company in Carnegie, Pennsylvania during the period from January 1, 1952 through December 31, 1957.

As of October 2, 2018, we have received 35 claims

for dose reconstruction for this site, for Superior Steel. All 35 claims had employment during the period under evaluation, during that operations period of January 1, 1952 through December 31, 1957, and all dose reconstructions had been completed.

There are no records of internal or external dosimetry in any of those claims. So there's actually a typo on this slide. The bottom line should say External Dosimetry.

Next, I'd like to step through some of the requirements that we have for dose reconstruction. We need information about exposure time, the sources that employees were exposed to, and the exposure scenarios that existed at the facility, so that's what I'll do right now.

So the first one I want to talk about is exposure time and what information we have for this site. So according to the Savannah River Operations Office, the original contract was destroyed. They have provided information about the contract and what was likely in the contract, and some specific information about contract payments. So this is available to us via the Savannah River Operations Office, so they were the last contracting office that ran this contract.

So the effective date of the contract was June 27, 1952, and that contract ended September 30, 1957. In the documentation that we have, and according to other reports, there's evidence that the fission material counting station, so the counting of the material coming in and leaving the site, actually wasn't revoked until November of 1957. So that's just a point that we may talk about later.

This contract was a cost-plus-fixed-fee contract, and it was for intermittent, on-demand rolling. So they weren't doing this every day of the week for the AEC. This was something on request of the AEC that they were doing rollings.

We have a total number of payments and payments by fiscal year for that contract from 1952-57, so the total payments that Superior Steel received are right in the order of $350,000.

Our CATI information, so the interviews that are done with claimants, we know that overtime work was very common for this facility.

So all of this information together gives us a picture of the years that there are applicable exposures at this site, the annual hours of exposure that we'll talk about later, as well as daily exposure that we think may have happened when the rolling was occurring.

Next, I'd like to talk about the sources that we know of that existed at this site. So the majority of the AEC rollings and why they were contracted was to do uranium work. And the majority of those rollings were for natural uranium metal.

We know this from the contract as well as the natural part of it, the enrichment of the uranium from a compilation of sources that we have in the SRDB. So we reviewed several documents in the SRDB, which included technical reports, shipping reports, customs reports, because this material would often go to Canada for processing before coming to Superior Steel for rolling.

So we have lots of documents that talk about the weights and sizes and number of slabs that came to Superior Steel, as well as the type of source that they were, so whether it was natural or enriched.

So we have one indication of an enriched rolling, and it was really just a few number of slabs within one rolling campaign. So we have evidence of six slabs that were one-and-a-half percent enriched uranium. Our current Site Profile does talk about this, so we knew about this when we read that Site Profile.

All of the work was done post-1952, all the uranium work was post-1952. So we know that the uranium

could have been recycled, which means there could have been other contaminants besides uranium in it.

In this evaluation we found that there was evidence that thorium could have been processed on the site. Our conclusion was that there was one commercial, small-scale rolling campaign with about 700 pounds of thorium, and I'll talk more specifically about that now.

So how we knew that thorium could have been processed on site was documentation of the material licensing that Superior Steel had with AEC. On March 27, 1956, we have a letter from the AEC to Superior Steel that licensed them to receive, possess, use, and transfer 700 pounds of thorium metal from Babcock & Wilcox to perform similar studies that were done for AEC work.

So this tells us that the work they were doing with thorium would likely have been very similar to the uranium rolling that they were doing. It was -- later we learned it was specifically to make thorium fuel plates similar to the uranium ones. So that was the initial license they received to possess that 700 pounds. Seven hundred pounds equates, according to the documentation, to about four ingots of thorium.

On April 20, and then again April 23, Superior Steel Company wrote to the AEC to request another amendment to their licensing to have unlimited quantities of thorium. And again they stated that this thorium was owned by Consolidated Edison and to be used at Babcock & Wilcox.

In these letters it also mentions that they have data from test rollings that they performed. So what these letters tell us is that this material was used for commercial work. Consolidated Edison is a public power utility that developed a thorium reactor that -- well, they brought online a thorium reactor that Babcock & Wilcox developed, basically.

The other piece of information that we get from these letters is the fact that there was thorium rolled on site, at least during that time period from March 27 through April 20. And we know the amount that was rolled, or could have been rolled, which is 700 pounds.

On April 30, 1956, we have a letter from the AEC to Superior Steel licensing them, so granting that amendment license for unlimited quantities of thorium, with an expiration date of April 30, 1958.

So the next thing we had to do was figure out did large-scale thorium operations happen at Superior Steel?

Mr. Katz: Excuse me, there's some people talking on the line while we're having a presentation here. So perhaps you joined the call after the preliminaries this morning, but your phone should be muted. Everyone on the line, your phone should be muted. Please press star six to mute your phone. Can I hear from one of my Board Members? Are you hearing?

Member Anderson: Yes, we're hearing it in the back.

Mr. Katz: Okay, so that's Henry Anderson, so he's joined us.

Member Anderson: Yes, it is.

Mr. Katz: Okay. So can someone in the back of the room ask Zaida to have the line cut, there's someone who's got an open line and is chattering. Thank you, Grady. Okay, Megan, go ahead. Thanks.

Dr. Lobaugh: So as I was saying, our next question was did large-scale operations of thorium happen at the Superior Steel site. So what we did there was review the documents that we have in the SRDB, review the additional data captures that we did as part of this Evaluation Report, to see if there is any evidence of thorium shipping or receiving by this site. And we found no documentation that suggests there was any thorium shipped to or received by this site.

In addition, we looked at radiological surveys that were done in support of remediation. So there's five known radiological surveys that were done post-AEC operations for remediation of uranium on site.

We have access to four of those reports and results, and they did several different kinds of surveys and investigations. But the ones that we were interested in was the gamma spectroscopy and gamma scan surveys because those could give us information about the thorium if it existed.

So what we saw from these results were that the soil and other samples that were taken from inside the buildings and then processed in the laboratories showed evidence of uranium contamination as we expected, but no evidence of thorium contamination.

While the surveys weren't necessarily designed to look for uranium, the gamma spec samples would show thorium if it was at high levels.

Most recently, there was a gamma scan survey done in support of FUSRAP remediation efforts that are being done with the Army Corps of Engineers. And these gamma scan surveys were of the land surrounding the facilities.

Again, as expected, there's uranium contamination found, and it actually showed a spatial distribution outside the facilities, showing that the uranium emanated from the facilities.

They specifically did look at thorium because they knew of the potential for thorium processing on site. And the thorium results showed background levels and spatial distributions as would be expected for normal, natural-occurring thorium. So again, there was no evidence of large-scale thorium contamination as would be expected if there were large-scale thorium operations.

Because those thorium operations would have been similar to the uranium operations in terms of what

was being done to the thorium and scale, I didn't mention this, but in the request to the AEC for the amendment licensing, while they wanted unlimited quantities, they mentioned the first batch would be about 45,000 pounds, which was very similar to the batches they were receiving for uranium.

So again, in terms of amounts processing that would have been done to the thorium, we would have expected that the contamination would be very similar to the uranium contamination. And given the lack of information on receipts and shipping of thorium, we conclude that there was no large-scale thorium processing on this site.

Next, I want to talk specifically about exposure scenarios, starting with internal exposure routes. So here there is a potential for inhalation and ingestion of the uranium and thorium metal that was being rolled. So this would be via dispersion during the rolling and any related processes, so the brushing that was done before, going through the finishing stands and everything else.

Then after dispersion, there could also be dust settling. So once that material is up in the air, it can settle out onto surfaces, and during that settling could be an inhalation or ingestion intake. And once it is on the surfaces, it could be re-suspended, so our typical exposure routes for internal exposure.

For external exposure scenarios, here we're concerned about the photon and beta radiation from the uranium and thorium metal ingots. So this would be via direct exposure. So being within distance of the material itself during rolling or during the storage on site, and then also exposure from the contaminated facility, like the surfaces within the facility and submersion and contaminated air.

And then again, occupational medical x-rays. I'm not going to speak much about those, but I can mention later how we'll handle those.

So what data do we have available to us? For internal dosimetry there's no evidence of personal monitoring. There's no in vivo results for the claims that we've received, and there's no indication that an internal dosimetry monitoring program existed.

However there are four campaigns of air sampling that were done by the AEC Health and Safety Laboratory, and these would have been specifically during the uranium rollings. So we have data for two dates in 1953 and two dates in 1955, and these air sampling campaigns would have been area airs and breathing zone monitoring.

So I just wanted to show some of the numbers that we're seeing. For the two dates in 1955, we have breathing zone data. And what I want to point out on this slide here is that the location of the highest value was for the same process for both of those, the stamping.

For area air monitoring, I apologize for those of you following along on your own with a PDF. The letters, the location of highest value, you won't be able to see, but I'll describe them.

So here we have data from the four dates that HASL was out doing air sampling. And again, I show the highest recorded alpha result. And I'll start with Location A. So this would be for the May 13, 1953 date. Location A is between finishing stands 4 and 5.

Location B represents the August 3, 1953 sample with the highest value, and that would have been over the roughing roll.

Location C is May 9, 1955, the highest result for that date, and that was near in the vicinity of the shear.

And then the last location, Location D, would have been for the September 19, 1955 rolling, the highest result for that day, and that would have been between the brushing station and the roughing roll.

So what you can see from here is that those highest

value locations were throughout the plant.

For external exposure, what monitoring data did we have available? There is no external dosimetry results and there's no indication of an external dosimetry monitoring program, so there's no personal monitoring.

As far as area monitoring, there's also no indication of area external dose monitoring program at the facility.

However we do have information available to us about the Superior Steel Company's AEC contract that tells us the dates that they were doing this work, as well as the radiological material licensing that I discussed before, specifically for thorium.

We have information about the processes, so this work was done in support of a research program at Savannah River, and so there are several technical reports out of Savannah River about the work that they are doing. There are several technical reports from Fernald, where the material was coming from, about the material itself. So we have a lot of information about the processes and the material itself to be able to make assumptions.

Second to last thing I'm going to talk about is our proposed dose reconstruction methods for this site. So I'm going to specifically talk about our years to begin with, because the timing here is different for uranium and thorium.

So the uranium operations we are assuming began with the effective date of the contract, so June 27, 1952, and go through the end of that contract year, which was December 31, 1957, so that's our operations period. And the residual contamination would have been January 1, 1958 through the present.

For thorium, as we said, we concluded that there was no large-scale, production-scale thorium processes

that occurred on the site. So our assumption is that the thorium rolling occurred during that test rolling phase, so March 27, 1956 through April 20, 1956. So the date of the licensing granted for thorium and then the date that they're requesting the unlimited thorium licensing.

Because this is commercial work, the post-operations contamination would only be April 21, 1956 through the end of the operations period, December 31, 1957.

So our dose reconstruction methods for internal exposures. I'm going to specifically just talk about the operations period, 1952-57. Here, I've broken down our approach into the rolling doses and the resuspension doses.

For uranium, we're assuming that they did rolling 500 hours per year. This number comes from the payments that were made through fiscal year 1957. We used the payments and took an assumed mill rate hour that we currently use in the Site Profile, and determined that it was somewhere in the ballpark of 400 to 450 hours. We rounded up to 500 to be even and claimant-favorable.

Here we would use the uranium air concentration results that we have available to us from the HASL results. We know that overtime work was common, so the resuspension would be 2,000 hours per year. So the total exposure here would be 2,500 hours per year.

As usual, we'll assess the uranium via the U-234 as an efficiency measure, and we'll include recycled uranium contaminants because of the years this operation took place.

For thorium, given the small-scale nature of the 700 pounds, four ingots, this is according to the data that we have for the uranium rolling, very easily done in one day. They were typically doing anywhere from 20 to 50 slabs a day for uranium rolling, or per campaign

I should say.

So we assumed that the four ingots were rolled in one day, one 10-hour day, given overtime. And this would be assessed or assigned for that March to April time frame that we talked about.

For the thorium air concentration, we would do a mass-loading approach. So take the uranium results, calculate a mass for them, transfer that to the thorium, and then calculate a thorium air concentration. This has been done elsewhere in this program with Bridgeport Brass.

For resuspension of thorium, it would be applied for the remainder of 1956 and all the way through 1957 as I discussed, and assessed as thorium 232, including the thorium daughter products and secular equilibrium.

For external exposures during the operations period, we have four different scenarios here. Direct exposure during rolling, so direct exposure from the material during rolling; submersion exposure during rolling; direct exposure from storage of the material on site; and then post-rolling exposure from contaminated surfaces or contaminated air.

Again we have 500 hours assumed as the rolling time that was done each year at Superior Steel for the uranium rolling. And here we now have enough information that we can apply Battelle TBD-6000 data.

Before in the current-type profile, we're actually using a surrogate site. We're using Simonds Saw & Steel data to assign dose. And we think it would be more appropriate, now that we have more data and more information, to apply TBD-6000.

For submersion rolling, again 500 hours. As I explained before, I calculated from the fiscal year payments. Also, I didn't mention this, but in looking at our compilation, there's Table 7.1 in the Evaluation

Report that's a compilation of all the rolling data that we reviewed, and this 500 hours jives really well with that number of rollings that we see.

Direct storage, we're assuming it was on site for 500 hours in addition to the 500 hours it was rolled. And that would again be TBD-6000 dose rates at one meter. For post-rolling it would be 2,000 hours to again take into account the overtime that we know was common on site.

For thorium, very similar to what I discussed for internal, 10 hours again. What I want to point out here is the direct storage. So for that time period, March 27 to April 20, 1956, there were 20 workdays in that time period. So one of those days would have been rolling, and we assume the other 19 days would have been storage on site of the material, so that's how we got the 190 hours.

So in conclusion NIOSH has sufficient air data and process information to bound internal and external dose from the AEC uranium rolling operations.

NIOSH has sufficient process information to bound internal and external dose from the small-scale commercial thorium metal rolling operation.

Given the new information that we found and evaluated during this report, the Site Profile needs to be updated. So we'll include that additional information we've reviewed and captured during this evaluation.

Lastly I would like to address the petition basis directly. So for internal monitoring the statement that was used from the Site Profile is individual uranium urinalysis data are unavailable for Superior Steel workers, and none are known to exist.

When personal internal monitoring data are unavailable, NIOSH uses air monitoring data from worker breathing zones and work areas in accordance with Implementation Guide 2 for internal

dose reconstruction.

We have sufficient site-specific air monitoring data and process data to calculate estimates of worker internal uranium doses with sufficient accuracy. And we can apply airborne mass-loading calculations using that uranium process air data to calculate a thorium dose.

For external monitoring the statement that was used from the Site Profile is, "No external dosimetry results are available for Superior Steel employees."

When personal and area external monitoring data are unavailable, NIOSH uses workplace information. So this is that source term, the radiological sources I talked about, the process information that I talked about, we use that to estimate dose in accordance with our implementation guide.

We have sufficient applicable site-specific information using the methods of Battelle TBD-6000 to model the potential external uranium exposures at this site. And we can model thorium metal-related exposures in accordance with those methods in TBD-6000 as well using MCNP.

So this is my last slide aside from references, just a summary of the feasibility. We found that both internal and external dose are feasible for uranium and thorium.

I'll just speak specifically about occupational medical x-rays because they're up there and I didn't talk about that. But we have no evidence that these occupational medical x-rays would have taken place off-site. We have no evidence that they took place onsite either. But in this case we would apply the default assumptions from OTIB-6.

So with that, if there's any questions?

Mr. Katz: Thank you, Megan. That was a beautifully clear walk-through of the evaluation there, really. Kudos to you. So questions from Board Members in

the room? Josie.

Member Beach: Megan, how big -- I know there's only 35 petitioners, but how many workers would you say would be affected?

Dr. Lobaugh: So total from what I've read in the documentation, I think there were about 100 employees at Superior Steel during the time of the AEC contract.

Member Beach: Okay. And then was there any cleanup done, that you know of, between campaigns?

Dr. Lobaugh: So there is discussion of cleanup between the uranium rolling campaigns. Yes, they cleaned materials and the processing areas, but we don't with what methods or that any monitoring was done between those campaigns.

Member Beach: No mention of ventilation was -- do you know of any?

Dr. Lobaugh: Yes, there is. So this was actually one of the several times in the HASL reports they recommended including additional ventilation during the rolling. And there's evidence that it was implemented, but we don't know at what time or what date, or what specifically was implemented. But yes, there is discussion of ventilation being used.

Member Beach: Okay. Not to hog, but I got a couple more quick questions. I noticed that your report said you didn't do any interviews, that you wouldn't get any more information. That's somewhat unusual. Is there a reason for that?

Dr. Lobaugh: Given the time period, that's why we were thinking the 1952-57 time period, we didn't think that would be -- yeah, as LaVon's saying -- it was 66 years ago. So given that, we didn't know that we would get much more information.

Member Beach: Did you look to see if there was any, or just out of curiosity?

Dr. Lobaugh: No. Just given the time period, we assumed. Yes, that was the assumption on our part.

Member Beach: Okay. And then last question on the air samples. I noticed on August 3 you had a pretty high air sample, and it was over by the rough rolling. Do you know when they did those samples? Each one of these say they're in a different location. Did they only do one set of air samples, or did they do all of them?

Dr. Lobaugh: Yes. So that's something I didn't point out, but you'll see here in the second column there's the number of samples that were done. So samples were taken at several locations throughout the facility, and the location that I talked about was the highest location.

Member Beach: So you didn't combine them, just the highest of any of them?

Dr. Lobaugh: Yes, that's just the highest.

Member Beach: Okay, thank you.

Dr. Lobaugh: Yes, you're welcome.

Mr. Katz: Can I just add something to Josie's question about people to interview? The claims we have, are they all survivor claims?

Dr. Lobaugh: I don't know that. I'm not sure.

Mr. Katz: Okay. I mean that might lead you to people who could be interviewed. Board Members?

Member Schofield: I have a question.

Mr. Katz: Yes, Phil, go ahead.

Member Schofield: This is Phil. Do you know if they wore any kind of face mask, any kind of, even just one of the paper filter masks or cloth ones during the rolling process or not?

Dr. Lobaugh: Yes. So from my recollection of the

documents, the only discussion of any kind of PPE would have been tongs that were used to transfer the material when they transferred it by hand.

So in part of the process they would have transferred the material by 10 of the people moving the slab, and there were tongs used at that time. From some of the CATIs, I remember people saying that they didn't have gloves either. So I don't believe that they would've had any kind of mask.

Member Schofield: Were they wearing their everyday clothing or were they issued special clothing during these rolling operations?

Dr. Lobaugh: I'm not sure about that.

Member Schofield: Okay, thanks.

Mr. Katz: Other Board Members? David.

Member Richardson: You mentioned that there was record of one rolling campaign involving 1.5 percent-enriched uranium metal. Do you know the date of when that campaign occurred?

Dr. Lobaugh: I could figure it out very quickly. Let me look in the Evaluation Report.

Member Richardson: Or I guess does that correspond to the dates of the sampling of the monitoring results that you have, I guess is where my question was going.

Dr. Lobaugh: I don't believe it does, but I can check really quickly. Let me grab it.

So for those of you who have the Evaluation Report in front of you, this would be Table 7.1, is what I'm looking at.

Member Beach: Page 26?

Dr. Lobaugh: Yes, starting on page 26. So if you look at this table, it starts with the date of rolling in the first column, then the material, if the material was

discussed in that report; the number of slabs, if we have that, or the weight of slabs, and then any other notes about that document.

So if you look through there, it would have been May 9, 1955, which actually is one of the -- yes, that's true. That's a good question, thank you.

So what this means, actually how we did the initial mass-loading is we assumed natural uranium. Because natural uranium would give us the largest mass-loading on that filter. So while there would have been enriched uranium in those results, it's more claimant-favorable or conservative to assume natural uranium.

But one thing, I guess I didn't say this when I was talking about that either. So this was six slabs of the 32 done that day of the hundreds of slabs that they actually rolled. So we think this was a very small percentage of the work that they did, the enriched uranium rolling.

Member Richardson: Thank you.

Dr. Lobaugh: You're welcome.

Mr. Katz: Are there other questions, Board Members, either on the phone or in the room? Yes.

Member Anderson: --- measurements that were made, they were only on one day in those years?

Mr. Katz: I'm sorry, Andy. Can you repeat that?

Member Anderson: My question was for the air monitoring data, it's only a single day sample?

Dr. Lobaugh: Yes, it would have just been samples. For the area monitoring, there were several locations done and it would have just been during that one day of rolling that the samples were taken.

Mr. Katz: Jim.

Member Lockey: Very nice presentation. I'm thinking

back to Bethlehem Steel and the number of employees employed at Bethlehem versus here. What am I missing here? Bethlehem Steel was like 20,000 employees, and here there's 100, so what's going on?

Dr. Lobaugh: Do you mean just the differences between the facilities?

Member Lockey: Is it that Superior Steel only had 100 employees, or were just 100 employees dedicated to this area, and they had other employees outside this area? That's what I'm trying to --

Dr. Lobaugh: That's a good question. I'm not sure about -- the documentation that I would have seen would have been likely specific to the employees that could have been working on this uranium rolling. But given the documentation that we see, it was a very small-scale operation when it comes to rolling.

And even in some of the documentation when LANL went to review for other reasons, they made the statement that they would only be able to do batch processing. They would never get to a very large-scale rolling process. So I think the facility itself is just a smaller-scale facility. But I don't know much about Bethlehem Steel, so I wouldn't be able to speak specifically to that facility.

Mr. Katz: Although the image of this facility would suggest it's much smaller than Bethlehem Steel.

Dr. Lobaugh: Yes, so I can go back to that.

Member Lockey: I'm just curious. I remember Superior Steel being a major -- maybe I'm wrong about that. But I'm surprised that they only had 100 employees in total.

Mr. Katz: They could have many plants, too.

Member Lockey: That's true.

Mr. Katz: But go ahead, Dave.

Member Kotelchuck: There are also a lot of small specialty steel companies that always existed, and they had a special niche.

Member Lockey: Superior did?

Member Kotelchuck: I don't know Superior. I know there were a lot of small companies in the steel industry in niche production.

Dr. Lobaugh: Yes. So what was stated when they actually received the contract was that they were one of two facilities that could do this work when they got the bid. So I would imagine that that would probably be the case for here, like you're saying.

Mr. Katz: Josie.

Member Beach: Just one more follow-up question. And again, I agree it was a great presentation, thank you. It was very helpful. The petitioners, I won't name them, but are they survivors or are they actual workers? I'm back on this interview thing so --

Mr. Katz: We'll hear from the petitioner.

Member Beach: I know we will. But I'm asking Megan if they were --

Mr. Katz: Yes. So the one we'll hear from is not an employee.

Member Beach: Employee.

Mr. Katz: It represents --

Member Beach: Okay, all right.

Mr. Katz: But maybe we'll hear more from that petitioner about survivors. Other questions from Members? I don't see any in the room, but from Board Members on the line?

Member Anderson: On this point of information, of the 35 claims that were filed, and they apparently have all been reconstructed -- were any of them

awarded?

Dr. Lobaugh: I don't know that off the top of my head. I can get that for you. Jim's nodding his head saying yes, he's sure.

Mr. Katz: Yes, some of them have been awarded. Is that what you're saying, or we could just get the information. I'm not sure --

Member Anderson: I was just wondering that --

Mr. Katz: Wait. Jim's coming to the mic.

Dr. Neton: I don't know for certain, but I'm pretty sure that they must have been awarded, at least for the lung cancers. If you look at the exposure --

Member Anderson: Well that's what I was wondering.

Dr. Neton: Looking at the exposure levels of uranium that we're assigning, they're pretty high. So I would guess, but we'd have to check and make sure.

Mr. Katz: Yes, okay. Thanks Jim.

Mr. Frowiss, Sr.: Nineteen have been awarded.

Mr. Katz: Nineteen, I just heard on the phone. Who's that speaking?

Mr. Frowiss, Sr.: Al Frowiss. I'm looking at the website of the Department of Labor.

Mr. Katz: Okay, thank you. I didn't catch the name for our recorder.

Mr. Frowiss, Sr.: Al Frowiss.

Mr. Katz: Oh, Al Frowiss, thank you. That's Al Frowiss, Sr. Thank you, Al. Anyway, other questions from Members on the Board?

Member Richardson: Just one question. Again, setting this against something like Bethlehem Steel where -- I know you weren't involved in it. So the air

concentrations reported in the tables, some of them seem to me quite high, like 38,000 dpm per meter squared, and 49,000 dpm per meter squared. My recollection is that it would be substantially higher. And do you have a sense, if you were to translate that, assuming natural uranium, what the air concentration would be in micrograms per volume air?

Dr. Lobaugh: For uranium, you're talking, and not the mass --

Member Richardson: Yes.

Dr. Lobaugh: I don't know that off the top of my head.

Mr. Hinnefeld: It's one-and-a-half dpm per microgram for natural uranium so you can to the arithmetic. One-and-a-half dpm per microgram for natural uranium.

Member Richardson: So to get up to 49,000 --

Dr. Lobaugh: 75,000 then, right?

Mr. Hinnefeld: I don't know if I can do the arithmetic standing here on my feet.

Dr. Lobaugh: Yes, I think it's about 75,000, if it's one-and-a-half.

Mr. Hinnefeld: 30 milligrams?

Member Richardson: 30 milligrams, right. You can do the arithmetic standing on your feet.

(Laughter)

Mr. Katz: Plenty of talent.

Dr. Lobaugh: So one thing I didn't mention here, what we would propose to do is actually, you can see that there's a stark difference between the 1953 data and the 1955 data. So our proposal in the Evaluation Report is to actually split those into two different

intake rates for air concentrations.

Mr. Katz: Thanks. Any other questions from Board Members?

Member Field: Ted, this is -- I was just wondering about CATI interviews. Who were they with? Were they with employees?

Dr. Lobaugh: They would be with whoever the claimant is.

Member Field: Okay. So you don't know if any of those were --

Mr. Katz: We don't -- well, let's see what LaVon has to say.

MR. RUTHERFORD: I know where you're going with this, Dr. Field. This is a -- we do not, I don't think we recall whether they were actual employees or if they were survivors, so we'd have to go back and look at that.

Mr. Katz: Right. We're going to follow up on that.

Member Field: All right. Thanks.

Mr. Katz: But thank you, Bill. That's Bill Field by the way. Any other questions, Board Members?

Member Anderson: This is Andy again. When you said you were going to break these into two different periods, what's the difference between the samplings that were done in '53 versus '55? Were hygiene practices better? Did they have better ventilation? If you could explain --

Mr. Katz: Your voice is breaking up a little bit. We heard your question about whether hygiene practices were significantly better in the second period, but the rest of what you said got garbled.

Member Anderson: Yes, that's --

Mr. Katz: It's still, Andy, you need to --

Member Anderson: To make sense of breaking this into groups or, if they're really only single-day measurements, we know that it was just common activities that were going on then? Was there a lesser volume of material going through in '55? Other than the counts being different, what's the justification for why those counts were different between '53 and --

Dr. Lobaugh: Yes, so as I said before, there's indications that there was recommendations to improve ventilations and change some of their processes, but we have no indication of when that would have occurred. So we're suggesting to base it on the dates of the sampling. So we know that there were some changes to their processing and their ventilation, but we don't know specifically when or what was put in place.

So like I said, that brushing station, that was something new that was put in and seemed to increase airborne activity according to their reports. So changing that process as well as including ventilation occurred, but we just don't know when between those sampling dates. So we would use the sample dates and then the results themselves.

Mr. Katz: Thanks, Andy. Other questions from Board Members?

Member Field: Ted, this is Bill again. I guess my only question, the representatives of these -- how well do these one-day samplings and other exposures --

Mr. Katz: So the question, I think, is how representative do you believe the samples are, the one-day samples?

Member Field: Right.

Dr. Lobaugh: So looking at the data in Table 7.1, we see that they did very similar volumes of batch processing. So given that, that the material was very similar, the numbers of slabs they were doing or pounds of slabs they were doing, we think that these

are representative across the whole entire operations period.

Member Field: Okay, thank you.

Mr. Katz: Other questions, Board Members? Okay then. This is time to hear from the petitioner, a petitioner. Do we have a petitioner on the line?

Mr. Stephens: Yes, hello, Mr. Katz and Board Members.

Mr. Katz: Yes, we hear you. Can you identify yourself?

Mr. Stephens: I just wanted to make sure my mute was off.

Mr. Katz: Yes, it's off. We hear you.

Mr. Stephens: My name is Hugh Stephens. I represent [identifying information redacted]. We submitted a short letter to you, Mr. Katz, today by email. Hopefully you received that. I also sent a copy to -- We would just like to see this referred to a Work Group, so that we could review some of the information that this recommendation is based on. I agree with --

Mr. Katz: You're breaking up pretty badly. So far, I've followed what you've said. You would suggest a Work Group, this be submitted to a Work Group for review, and then we've lost you.

Mr. Stephens: Okay. I would just like to be able to review the source documents, and I have not been able to do so yet.

Mr. Katz: Okay. You would like to review the source documents. Good, okay, so we got that. Do you have more?

Mr. Stephens: Well, you know, with the phone breaking up the way it is --

Mr. Katz: I think you need to speak directly into

whatever mic you have. Other people have been clear, but you're really hard to hear.

Mr. Stephens: Is that any better?

Mr. Katz: That's better.

Mr. Stephens: I apologize.

Mr. Katz: No, that's much better.

Mr. Stephens: Very good. So you know, we've reviewed the report and we agree with everyone that has complimented NIOSH on the presentation. We have some comments, but I'm not convinced that --

Mr. Katz: You're breaking up again. Your voice is breaking up again.

Mr. Stephens: Well, I'm just not convinced that a lengthy presentation by me now would be useful, as long as it can go to the Work Group.

Mr. Katz: Okay. That I hear clearly. I have to say, Hugh, I'm looking through my emails and not seeing one from you to me.

Mr. Stephens: Is it dcas@cdc.gov was the email address that we --

Mr. Katz: Oh, I see. So you sent it to the program, that's not my direct email. That's probably why it hasn't come to me yet. Which is fine. You followed procedures fine, I just don't have it yet. Is that something you want me to read into the record, or is that something that can be reviewed by a Work Group that would review this?

If you want me to read it into the record, you should probably just email it to me directly now. What's your preference? I'm sorry, I couldn't hear what your answer was, Hugh.

Member Field: Ted, this is Bill. We're having a hard time hearing you now. Is your speaker off?

Mr. Katz: So I'm very loud in the room, but I'm not sure what's going on. Let me just see what's going on with the phone. John?

Member Field: That's better now.

Mr. Katz: Okay, that's better now. I think our audio person is adjusting things as we go, and sometimes it gets out of whack. So Hugh, why don't you try me again. I don't know whether you want me to read your statement into the record, in which case I'll get you to email it directly to me, or if you're fine with that statement going to a Work Group that would be reviewing this?

Mr. Stephens: That's fine that it go to the Work Group.

Mr. Katz: Okay. I hear you there. And we haven't decided to send this to a Work Group yet, but that's something we always discuss. And if we don't do that, certainly I'll read your statement into the record. Okay, so thank you. If you're finished with your statement, then let's go back to Board Members and discuss how we want to address this.

Mr. Stephens: Let me just ask one more question.

Mr. Katz: Oh, go ahead.

Mr. Stephens: It appears that there's some breathing zone air concentrations in Table 6-2, but there do not appear to be any breathing zone air concentrations for the 1953 sampling.

Mr. Katz: Is that correct, Megan?

Dr. Lobaugh: Yes, that's correct. There was only breathing zone samples done in 1955.

Mr. Katz: Okay. More, Hugh?

Mr. Stephens: I couldn't hear the response, but in any event --

Mr. Katz: Oh, the response was the -- correct, the

breathing zones were only in 1955. I got that right, I think.

Mr. Stephens: And apparently AEC used the mean air concentration in calculations?

Dr. Lobaugh: Could you say that again? You're asking about the mean air concentration?

Mr. Stephens: Exactly. It seems as though if they used the mean air concentration, the highest value would not be included. Is that correct?

Dr. Lobaugh: No. So what we're proposing to do is actually the 95th percentile of the data that we have. So all the tables are listing is the lowest value and the highest value for those dates. So we haven't actually presented what number we would use, but we're proposing to do the 95th percentile of the data.

Mr. Stephens: And this reference to mean air concentrations, what does that mean?

Dr. Lobaugh: Mean is average, but I don't recall actually ever discussing the mean air concentration.

Mr. Stephens: It's at page 21 of the report, and it talks about when multiple samples at a location were collected, AEC used the mean air concentration in subsequent calculations.

Dr. Lobaugh: Yes, so that's how the AEC reviewed and used these data. How we propose to use the data, or how we will use the data, is we have the raw results for at least two of these campaigns. And so we will use the raw results as we typically do with this program, and make our own calculations of them.

Mr. Stephens: Very good. And then the next sentence says, "At most facilities, AEC matched air concentration determinations with information about worker categories, locations, tasks, and worker's time at each location or task. However AEC noted that this was not feasible at Superior Steel Company,

but did not include the reasoning for this conclusion."

Dr. Lobaugh: Again, so this is discussing the report that the AEC HASL laboratory put out regarding these results. So I don't have any more information to provide you regarding why they said it wasn't possible at this facility. But they were not able to give a time-weighted average for any particular job at this facility.

So what that means for our program is that we consider all of the data together, and that there's no difference from any of these worker categories or positions within the facility.

Mr. Stephens: So every worker gets the worst case scenario?

Dr. Lobaugh: Yes. What we're proposing is that every worker at the labor or worker category versus supervisors would be different, but at the labor category they would all get the 95th percentile. And then what we typically do for supervisors is the 50th percentile, I believe.

Mr. Stephens: And is it significant that there's breathing zone sampling in '55 but not in '53?

Dr. Lobaugh: We have no indication why they didn't do them in 1953. It may have been a change in their procedures for how they did these evaluations. One thing I will point out is that the breathing zone samples can't be tied to any particular individual to be able to do personal dosimetry from those data.

They're really going to be used as process information basically, because we have a location of where that sample was taken and that's it. So we can't use them for any particular individual.

Mr. Katz: Thank you, Megan. Hugh, do you have any other comments, questions before we move on?

Mr. Stephens: I think that those were my main concerns so far, but I just haven't been able to look

at any of these reports and I'd like the opportunity to do so.

Mr. Katz: Right, absolutely. Okay, back to Board Members now.

Mr. Stephens: I appreciate your help, Mr. Katz and Board Members. Thank you.

Member Beach: So Ted, as you pointed out, this is a TBD-6000 --

Mr. Katz: Your mic doesn't sound like it's on.

Member Beach: Is it on now? Yes? I would recommend that this be looked at by the TBD-6000 Work Group.

Mr. Katz: So that makes sense. This falls within their purview. Any other comments from Board Members?

Member Clawson: Do we need a second?

Mr. Katz: No, we don't need to have a motion to do this really. Actually, we can just assign it. Everyone agrees? Everyone's nodding here. I expect folks on the line, too?

Member Valerio: I agree.

Member Field: I agree.

Mr. Katz: So we have Bill and Loretta. Do we have Paul on the line? And Andy, are you on the line?

Member Anderson: Yes, I'm here.

Mr. Katz: And you're good with this, right?

Member Anderson: Yes, absolutely.

Mr. Katz: And Gen, did Gen ever join? Okay, so Gen and Paul are absent for this session. But anyway, we have a consensus of the majority of the Board Members that this should go to the Work Group, so off it goes. So TBD-6000 Work Group will review this.

Thank you, everyone. Thank you, Hugh. Thank you for the presentation, and we are, I think we're at a break.

Mr. Stephens: Thanks again.

Mr. Katz: Right. So we're on break until 10:15?

Member Anderson: Okay, back at 10:00.

Mr. Katz: And at 10:15 please be prompt, because we have Metals and Controls. Thanks.

(Whereupon, the above-entitled matter went off the record at 9:34 a.m. and resumed at 10:14 a.m.)

Metals and Controls Corp. SEC Petition # 236
(Attleboro, MA; 1968-1997)

Mr. Katz: Okay. Welcome back. We were just on break and we're back for Metal and Controls Corp. This is SEC petition. This is an -- by way of an extensive update to keep the Board well in tune with progress of the Work Group with this petition.

(Roll call)

Mr. Katz: So, John Mauro?

Dr. Mauro: Yes.

Mr. Katz: We have Stu here, who's going to handle your slides.

Dr. Mauro: Well, I just did something that I might be able to do it myself. I'm looking at my government computer and right on the screen it says, "Feel free to start presenting," which, theoretically, means that I could actually do the --

Mr. Katz: Well, let me just ask you. Do you want to do that or would you rather have Stu do it?

Dr. Mauro: I'd like to have Stu do it today. But, right now, the slides are not on my -- on my -- I have my -- both computers up. One with -- you know -- and

one where I can control it and one where Stu can. If Stu would be -- would do that, that would make it a little easier.

Mr. Katz: Yeah. I'd rather make it easy for you, John. Stu is happy to do that, I think.

Dr. Mauro: I appreciate that.

And, right now, I'm looking at my screen but I don't see my slides.

Mr. Hinnefeld: Okay. Well, do you -- is there something you can do on your computer to return control back over to me?

Okay. Okay. I think that maybe I'm in there.

Dr. Mauro: Right now, it's a black screen.

Mr. Katz: Oh, wait. Stu has it. Stu has it. So --

Mr. Hinnefeld: I might be getting it.

Dr. Mauro: Oh, okay. Great.

Mr. Katz: Don't touch.

Dr. Mauro: I won't do a thing.

Mr. Barton: Just wait in the truck, John.

Mr. Hinnefeld: Just give me a minute.

Mr. Barton: John, this is Bob.

Dr. Mauro: Yeah.

Mr. Barton: There's a little blue --

Mr. Katz: No.

Mr. Barton: -- circle with a -- with a white rectangle in the middle. If you click that, that will bring -- that will make you presenter.

Mr. Katz: No, no. We don't want you to do anything.

We want --

Mr. Hinnefeld: Okay. Let me -- let me get back into the meeting.

Dr. Mauro: Okay.

Mr. Hinnefeld: And --

Mr. Katz: But thanks, Bob.

Mr. Hinnefeld: -- I'll try this and see if I can go from the start and see if I can get this to work.

Dr. Mauro: That's great.

Mr. Katz: And, while Stu's working on this, let me just check again.

(Roll call)

Dr. Mauro: Okay. I see my slides on my computer, right now. So I'm in good shape.

Mr. Hinnefeld: I'm ready, John. I will advance when you want me to.

Dr. Mauro: Thanks very much. I'll let Ted make the introductions and then I'll go on and get started with Josie.

Mr. Katz: Okay. So thank you, John. John Mauro is with SC&A and he is a lead SC&A member. He works with Bob Anigstein on this one, I believe -- this petition.

And you can roll, John.

Dr. Mauro: Okay. Thank you very much.

Good morning, everybody. And I'd like to point out that Rose Gogliotti, along with Bob, did a lot of heavy lifting on this work for me and they are on the line, I believe, to help out with some questions. But let me get started.

I'm here to give a status report on Metals and

Controls Corporation. We could go to the second slide and --

Metals and Controls is a facility located in Attleboro, Massachusetts, quite close to Boston. And the facility, itself, actually began in about 1930. And what they were -- what they did was they fused pressure and temperature bonding of metals to make thermostats. And -- but they have grown and evolved quite a bit over the years.

And, in -- January 1st, 1952, they received a contract from the NRC to help out with weapons and -- the weapons complex in matters related to assembly of fuel assemblies, barium, uranium, enriched uranium; also the manufacture of oils, all of which was a part of weapons complex activities.

And that work continued from January 1st, 1952, to December 31st, 1967. At the end of that time period, all fuel was removed from the facility. The facility equipment was removed and they moved into the residual period. Okay?

Now, it turns out, for the AWE period, '52 to '67, that they had an SEC petition that was granted. And the reason it was granted is the inability to reconstruct internal doses to thorium. And so there was an SEC petition.

And then the petitioners realized that, you know -- through a number of -- oh, I guess measurements that were made later, it was found that there was residual radioactivity located throughout the facility. So a second SEC petition, the one that we're talking about now, Petition 236, was filed covering the period from January 1st, 1968 through March 21st, 1997.

Next slide, please.

I present, here, a timeline that is useful to us, just to get a picture of --

The top line is important because it gives an idea of what took place. From '52 to '67, that was covered

by the SEC. Starting in January 1st, '68 is when we entered the residual period. Now, this is an important period because, when that period began, the work -- the work continued. Commercial work continued and there was a lot of activity that moved forward with the workers and that work was continued without any radiological controls or, quite frankly as I understand it, awareness that there may have been some residual radioactivity.

It wasn't until -- and we can certainly hear more later from the petitioners -- but as I've been reading all the literature, it really wasn't until the 1980s, when Metals and Controls -- and I think, perhaps, by that time they were taken over by Texas Instruments -- requested termination of their NRC license. Certainly, that perhaps -- that did not take place or entirely take place after the termination of AWE operations.

And a key from ORAU has been offered, as done in the past. That's to sort of initiate what they called a FUSRAP or FUSRAP cleanup. They went in to first characterize and say, okay, do we have any residual radioactivity here? Can we terminate, in light of this?

Well, this was a very important -- very important point in time, because it became apparent from the measurements that were made, which I find, as best I can tell, were measurements that were made in a number of buildings, indoors and outdoors, above grade, the floors, the air, swipe samples like that. And it was found that there was residual radioactivity.

So that triggered -- I guess we could move to the next slide.

That triggered an SEC Petition 236 and the petition basically said, you know, in light of the fact that we now know that there was residual radioactivity at the site, we'd like to file a petition for all facilities for construction and maintenance workers that worked in various buildings, both indoors and outdoors, for the time period January 1st, 1968, until March 1st,

1997.

Next slide.

What we have here -- and I'm not going to go over detail. These are all of the items that, if you go on the web, that are posted, that is the history of all of the docket, so to speak. And this all starts with -- after the petition was filed, NIOSH published it's SEC Petition Evaluation Report for 236.

Now, what happened, though, not too further down the road is, when NIOSH appeared before the Advisory Board regarding its SEC Petition Evaluation Report, the petitioners said, hold the presses. I think that you missed a lot of very important exposure pathways and it does describe. The reason being, to go back to the original SEC petition. What that was was a classic -- not unlike Superior Steel in the way the residual period is -- where what you have is a lot of data characterizing contamination on surfaces, on equipment.

And, using that data, you can model the external exposure, theoretically, and internal exposure from these inspections. So you could -- and it was what I would call a classic OTIB-70 approach to doing dose reconstruction.

But the petitioner said, uh-oh, no, no, no, hold the presses. There was a lot of things going on, a lot of activity going on. We're going to get into all that. And, now that we know that the NRC has found contamination throughout the facility and -- you know, it -- we believe your SEC Petition Evaluation Report is incomplete. Okay?

And so, recognizing that, NIOSH convened a series of interviews just outside of Boston. I think it was Mansfield, Massachusetts, not far from Attleboro, where the facility is. And, over a three-day period, Pete Darnell, Pat McCloskey, myself, and Rose Gogliotti met with 12 of the employees and other representatives who were actually there and did the

work. And I would have to say that was an incredible meeting.

We sat there and we posed certain questions, because -- to understand the nature of the work that took place. And those were recorded and it's on the web, the questions and answers and discussions. And it clearly became apparent to all that, oh, my goodness, yes. There are a lot of things that took place that need to be modeled and we're going to get into that shortly. But that was the -- that was the trigger, like I said.

You know, we have to amend the SEC Petition Evaluation Report. And asked -- and we were also -- we were asked -- SC&A was asked to review the original SEC Petition Evaluation Report. So, on February 12th -- slide -- we submitted our review.

Now, you can think of our review from two -- now, keep in mind that we were the beneficiary now of sitting in on the October 24th meeting. So we now had all this information that -- you know, describing all of the different types of things that took place indoors, outdoors, in various buildings, above grade, below grade. There was a lot of digging and stuff going on.

And so our review of the original April 5th SEC Petition Evaluation Report included evaluate -- not only a review of the analysis that was done in the SEC Petition Evaluation Report for the conventional residual-period type of scenarios, but we also did our best to understand the nature of these other activities.

And It's convenient to talk about these other activities using the term "maintenance" and "repurposing" activities. So we submitted that review, which was -- went into all of these other exposure pathways. Okay?

Let's flip to the next page. And what -- what we have now is a series of exchanges of White Papers,

meetings, and discussions that probe. You have to realize that we were all in a -- I would say a unique situation from my perspective in that we had all this new information and a great deal of detail describing what -- the kind of things that took place during the residual period that needed to be looked at. So we had this exchange.

Let's flip to the -- I'm not going to go into detail but I want to go to the next slide. It's -- yes.

Now, these are -- these three items are the really important work files. On October 20 -- which is not that long ago, by the way. On October 24th of 2018, NIOSH issued what I would have considered to be a supplement or an amendment to the original Evaluation report that specifically went into what you would call the exposures that M&C workers might have experienced for a whole variety of exposure pathways that are associated with what we refer to as maintenance and repurposing activities.

This is a good point to point out what does that mean. And we're going to get into that in great detail. But, in effect, what was unusual here is that after the -- once the residual period began and maybe even during the AWE period there was a lot of maintenance going on at that -- of course.

But there was a lot of what's called repurposing where the -- let's -- where a number of buildings -- they would crack through the concrete floor and go into the subsurface for really two reasons. The best way I understand is one is that there's -- there were a lot of conduits and drainage pipes underground, down maybe as far as 8 feet. And they were -- they were -- very many of them of were clogged and had to be replaced, cleaned out, snaked, so that they could continue to do the work that they do commercially.

This is no longer AWE activity, now. This is -- this was -- and I'm only talking about, now, non-AWE activity. And they were doing this maintenance work and they

were doing repurposing. And what that is -- where you dig out to put in footings or a new foundation for new equipment that you just have to stabilize and put in place. So there was a lot of digging going on indoors, especially, you'll see in a moment Building 10, and also outdoors where there -- we know that there was some contamination; especially in what's called the burial area.

So what happened was -- so NIOSH issued its October 24th White Paper. SC&A was -- and I want to look at these danger reports. SC&A said, you know, John, could you review that White Paper, because we just did our review. NIOSH reviewed our work, the February report that we put out. NIOSH reviewed that and did their own analysis and put their report out. And SC&A was requested, well, John, could you look at this new report as quickly as you can, because we're going to have a meeting on November 20th -- the Work Group. And, you know, we're talking about a few weeks ago, right before I called back. Yeah. Anyway, it was November 20th.

And we wrote a draft report that we put out as quickly as we could, which was a review of the October 24th -- but we'll call them a White Paper, which was the supplement to the original ER.

And then, after -- then we held this meeting on November 20th, which was a great -- another great meeting where we got into the nuts and bolts of the -- what I call the various pathways and scenarios of exposure where NIOSH did their analysis, testing, of course, independently -- did a review of their analysis and we discussed it at length.

And I have to say, now, we're in an interesting position because we then went ahead and were asked, could you please finalize your review, because I remember I mentioned that we did a pretty quick review of the October 24th before the 20th meeting. But then we were asked, could you please finish that review, adding material.

So, right now, the latest work product that you-all have before you from SC&A, the status and where it is, is this November 29th report that you should all have received perhaps a few days ago. You may not have even had a chance to read it. So, to a large extent, what I'm about to talk about is that report.

But I'm going to do a little bit more than that. I'm sort of going to set the table for where we are, as SC&A understands it, with regard to all matters related to what we'll call SEC issues and Site Profile issues and their overlap.

Now, If we go to the next page, I included here the original set of findings and observations that SC&A originally had, which is -- which was -- which is currently under BRS. But it's all, I guess, been eclipsed by everything that has transpired. So --

But I'm going to say a couple of quick things that might be helpful, because, if you do go on the website and look at the BRS and look at us there, I can tell you right now that observation 3 -- we're going to see the -- there are reasons for this that we can talk about but -- how observation 3 could be withdrawn.

Finding 1 is still -- in theory, I believe, has been resolved, been talked about. I'm going quickly, just to let you know that the bottom line is, I think that everything here has been at least resolved in principal but not in detail.

In addition, we have some new issues that emerged at the petitioner's rate. So what I'm getting at is we could put through -- and skip over this slide and also the next slide.

They're just here to sort of say, this is where we were before we went through this series of activities that I just described. And many of -- in my opinion, there was -- a meeting is needed to go through these items and determine the degree to which these issues have been resolved and where they could be closed out. And they're --

But, also, I want to point out that there are new issues that we're going to be talking about shortly that emerged from this process that will also need to be addressed by the Work Group.

Let's go to the next slide. I -- they're there just for your information.

All right. Now, this slide is basically our attempt to summarize what the petitioners' concerns are. They have more -- they may have more of them. So this is just SC&A's understanding of what they -- the petitioner's concerns are.

And it is the objective of NIOSH and SC&A to try to address these concerns to see, you know, can we reconstruct these doses and, if so, you know, how are we going to do it and what data are we going to use? And so there are these ten items.

And, when all is said and done, if you go -- what really goes through steps.

First, you have to understand, what is it that was going on in this maintenance and repurposing activities and what data do you have that allows you to predict what the doses were?

Remember, if we go back -- we don't need to do that now. You know, it wasn't until 1984 and then again in 1992 that lots of data is starting to show up. And we have to ask ourselves a question, how much data do we have and can we use that data to predict what the radiation exposures were to the maintenance and repurposing folks and all the folks that are working at that facility. And using that data -- and especially -- the important thing is -- and, also, not just the fact that people are walking around and working. But, also, the fact that there were people that were periodically doing very unique what I would call above-surface and below-surface maintenance and repurposing activities that needed to be modeled. And so this sort of lists the concerns. But that's really what it boils down to. And it begins to identify the

kinds of things that went on.

Let's go -- go to the next slide.

Now, really this is the start of my presentation. Everything I gave you up to this point really sets the table.

The Work Group -- our Work Group, when we got together, I think there was general consensus that there really were two things that we were trying to do during our meeting on the 20th of November and had objectives. We -- it -- we try, as best we can, to separate what we see --- what we would call SEC issues from what we would call site-profile issues. That's not always easy to do, because they're inter-related, of course.

But the emphasis here today and the emphasis in our report -- our November 29th report was to try to come to grips with what I would call SEC issues, which really go to the heart of can you really do these doses and, if you can, then the secondary objective was, okay, if we think we understand the nature of the activities that took place and the nature and extent of the data that we have and we believe that, you know, it looks like that, I think we could reconstruct the doses to these workers that were doing these maintenance and repurposing activities.

Then it becomes a matter of, okay, how are you going to do it? You now, what models are we going to use? What assumptions are you going to make? And I like to call those Site Profile issues.

So, during the course of the rest of my presentation, I'm going to try my best to sort out what I would consider to be SEC versus high profile issues and give that perspective. Okay?

Next slide, please.

In navigating our way through the next series of slides, it's going to be easier to lose our way and I'll tell you why, because this is what's happening. What

we're talking about is that the issues have to do with there were workers that worked indoors and above ground. They were walking around on the work floor. That gets back to the fact that those workers are the conventional residual-carrying workers, which the original Site Profile -- I'm sorry, there is no Site Profile, which the original SEC Petition Evaluation Report addressed.

Now, we have a number of concerns regarding that but that -- that's what I would call the conventional. And we talked about that and I think there's general agreement on the fact that what I would call the conventional exposures from the positive residual radioactivity to all workers in the various buildings -- we can reconstruct those doses, external and internal doses. And these are above-ground exposures.

What is interesting is, in the indoor environment, that you not only have that but you have what I would call part-time, intermittent, episodic maintenance and repurposing activities indoors. We're going to talk about those.

And, also, the same situations outdoors. And that includes different locations, different buildings. Indoors, you'll notice there's a list of buildings, 4, 5, 10. I'd like to say that building 10 is by far the most important, because that -- because that's where most of the residual -- well, the AWE activities took place -- and we had a residual radioactivity located.

There's also outdoors, dirt, outside of various buildings. And, of course, there are people that are walking around at work outdoors. But there are also what I call below-grade contamination and below-grade activities in various locations. So we -- and, in each case, you know, we could identify different types of work that took place indoors and outdoors. And it's good to think about that as above-grade and below-grade activities.

And it's -- and it's interesting to -- it's important that we separate external exposure from internal

exposure. So you've got this array -- matrix that we need to address and see if we can reconstruct the doses from all of these different scenarios and exposure patterns.

Next slide.

Now, you have to imagine that the important thing here is these -- what I would call unique exposure scenarios. The workers --

By the way, can everyone hear me okay? I'm just hearing a buzz and I thought maybe we may have lost anybody?

Mr. Katz: You're fine. You're fine.

Dr. Mauro: We're good. Okay.

What happened is that you can envision us sitting down listening to these 12 workers. We spent about two hours with each one. And they were the ones that did the work. These are the guys -- many of them actually did what we're going to get into -- describing what they did. And we believe, both NIOSH and SC&A, had to use our imaginations and say, okay, what is it that they did where they could have gotten some exposure, external and internal, and that we're going to -- it's going to be important that we address and then do our best to quantify? Okay. And, in the end, I think there was agreement and, certainly -- that NIOSH could weigh in, in my mind, at any time.

But we broke them up into four scenarios. I call them scenarios, because each scenario has associations within it to certain pathways of exposure. And let me just quickly tell you what they are.

The first scenario is -- that we looked at is -- I think it's important that we look at exposure to workers in building 10 during the residual period whose job it was to perform HVAC maintenance activities. And what this was -- and here's what we believe to be one of the potentially important pathways -- is every quarter of every year or every half a year over some

intermittent time period, workers would go in and do maintenance on the HVAC systems in building 10.

And the one activity that we felt -- SC&A felt was the one where you had the greatest potential for exposures -- the people that replaced the filters -- pull the filters out and replaced them, because, from talking to the workers, it was clear that that activity, though it didn't take a very long time, was associated with very high dust concentrations. Not -- and they didn't wear respirators but they may have had a dust mask on.

But there's where you say, what do we have here? You know? Here we are during the residual period. Dust is being kicked up from people working and then being deposited on these filters. The filters are accumulating this activity over time. And the longer you wait between change outs of filters, the more dust -- radioactively contaminated dust, uranium and thorium, are going to be on the filter. And, when they pull it out, it's still -- the dust shakes loose, becomes airborne and the workers inhaled it. So this is the first scenario that was important that we be able to model. We're going to get into the models.

The other one is, there was a lot of maintenance activity done on the upper levels of building 10, near the roof -- the rafters. And we know from the surveys performed in 1984 where -- we're going to get into this in a little more detail -- where -- that there was a lot of data that shows that there was a lot of dust and it was contaminated. Because there were swipe samples, hand-held surveys, alpha beta gamma surveys, lots of data. We'll get into how much.

And anybody who's up there doing maintenance work is going to be kicking up that dust. And that's another source of inhalation exposure. You could almost think of the guys that pull the filters, the guys that were doing maintenance work. And this was -- and this was intermittent. It wasn't going on all the time.

We had to take into consideration the dust loadings,

the amount of radioactivity on the dust, and how many hours per year one or more people might have been involved in these activities.

The next -- the third scenario is subsurface work inside building 10. And bear in mind that, you know, we reconstructed these. You know, we think this is where the action is and let me tell you a little bit about this.

So what happens with the subsurface is that it turns out that it wasn't until the 1990s when they started the FUSRAP characterization and then cleanup activities by Weston and CPS. These are the contractors that came in.

And, by the way, the people we interviewed -- they're probably on the line right now -- they were the folks who managed and oversaw, including a very qualified health physicist. That activity that took place in 1992 to, perhaps, '96 and, they were the ones that characterized the nature and extent of the residual contamination everywhere, including in the subsurface environment in building 10.

Now, that's important because it was inside the subsurface in building 10 where it was found that there was residual radioactivity in the soil beneath building 10 and, also, more importantly, in the drainage lines in building 10 where workers needed to go.

Remember, I started us off just -- you know, where they had to maintain these drainage lines. They actually had -- they had to snake the lines to clean them out and get the muck out. But they also dug down into the -- into, you know, underground and had to cut out and replace these drainage lines or the conduits. So they were physically in the holes in building 10.

And, in theory, what that means is that they could have become -- inhaled resuspended activity. They could have experienced external exposure for both -

- from uranium and thorium. And a new item that just -- that we addressed in our latest report that we didn't talk about before is, you know, they're in a hole in the ground digging with a shovel. And they're going to get really dirty with dirt on their skin, their face, their hands, their clothing. And so, therefore, you've got uranium and possibly thorium dirt, contaminated dirt that gives you what I would call a direct-deposit exposure.

So you think of the guy in the hole inhaling airborne radioactivity in the form of dust from resuspension and, also, being, you know, externally exposed but, also, direct contamination right on -- on your skin. It would be the skin dosage. All right?

Now, the next scenario is what I refer to as the outdoor areas. And right now it's the subsurface areas outside building 10. I think that's a misnomer. It's really outside areas around various buildings, both subsurface and below surface. So I -- you know, it has -- if I had to do it over again, the slide I would -- I would clarify that the outdoor activities, you know, was more than just outside building 10. It was -- there were a number of areas that are discussed in detail in our November 29th report.

So these are the four scenarios. And what the question is is these scenarios capture a range of types of work activities that represent what you would call the limiting maintenance and repurposing activities. Now, clearly there are other ways in which workers involved in maintenance and repurposing might have been exposed. In fact, in one of our reports, we explore some others.

But we've settled in on these four things. You know, I think if we could do these, we could place a plausible upper bound on the doses that these workers might have experienced. So that becomes the question.

If fact, what the really big SEC question -- just a little preview. We're going to get into it more -- is

remember what we're using. We're using data collected in the 1980s, in 1984, by NRC contractor ORAU and lots of -- lots more data collected in 1992 by Weston and CPS as part of the characterization and the subsequent cleanup of the entire facility.

And we're using that data from the point of view -- we're going to use that data and I'm going to -- I use the word as, substitute data or surrogate data.

One of the little debates we had in-house was, well, what term should we use, because, as you all know, the term "surrogate data" has a very specific meaning on this program. It means data collected from one facility, whether it's airborne activity or bioassay data or whatever, and use it to reconstruct doses to workers at a different facility. And there are whole sets of rules. There are five criteria for when you could do that. You have to do that on the dose criteria.

In a way, we're doing -- we're sort of doing that but it's not from a different facility, it's from a different time period. In other words, we have -- we have a limited amount of data in the '80s, a lot of data in the 1990s and we're going to use that -- or can we use that to reconstruct the doses to these workers doing those activities that are on the site that took place primarily in the 1970s and the 1980s? So it's really a time difference.

And that's -- that, by the way, in my opinion, is one of the big SEC questions. And you're going to see -- I'm going to tell a story that says, I think we can do it. But, of course, this is a judgment that the Board -- this is the big sufficient-accuracy question that needs to be addressed. And, once it's addressed, it's ,yeah I think you can do it, or maybe not.

In that respect, to a certain degree, the surrogate-data criteria are helpful. They all apply to a circumstance like this. It's helpful to have that handy when you're thinking about can we use the data collected from this time period and what took place,

you know, with what year -- that data and use it for a different time period?

Next slide, please.

Okay. We're finally going to get into some technical issues. It took me a half hour to get here but I think it was important to set the table. And now we're going to talk about each of these four tablets of scenarios and what we found out and what NIOSH found out. Okay?

The first one is, remember, we talked about HVAC filter replacement? Can we reconstruct those doses? Well, turns out that, at the end of this process during a meeting, NIOSH used SC&A's approach to address this question. In other words, we came up with some models/assumptions to say, yeah, I think we could put an upper bound on the doses to those workers whose responsibility it was to replace these HVAC filters. And it's all -- it's described in detail but let me give you the 30-second sound bite.

We did something that I think wasn't done before and it's going to be a judgment made by the Board to help us on whether this is a good approach for this kind of problem. All right. Think of it like this, we have to figure out what the number of becquerels per gram of soil is on the filter that's been accumulating dust over some time period during the residual period when, at the end of some time period, three months, six months, whatever, if the filter is removed and a big puff of dust becomes airborne.

All right. Now, what we did -- this is sort of SC&A's creation. And I'm very much looking to -- and it looks like NIOSH agrees. In our last exchange at the last report put out -- White Paper on October 24th. NIOSH has said, yep, we like it. And I think it's important that I explain conceptually how we came at that problem. And it's -- I believe it's a first. And how we --

We have lots of good data on the contaminations

levels that were on surfaces based primarily on measurements made toward the end of the AWE operations period. In other words, we have survey data from handheld survey instruments and swipe data. We have this for the end of 1967 and we have lots of it. And we have it also in 1984 when the NRC came in. So we have this idea on the amount of activity.

And we can actually make a distribution of a lot of that activity. How do we know what they mean, 95th percentile, et cetera? Well, we said, you know, what we could do is we apply a resuspension factor to the activity that's on the surface and we get an airborne concentration in becquerels per cubic meter. Very conventional.

And we'll use -- we have a choice, of course. We could use the median, the upper 95th percentile of what might have been on surfaces. And, in SC&A's opinion, you know, because this is the dust that's resuspended, the uranium, the thorium is resuspended. That's going to be sucked into the HVAC system and deposited on the filters. So that's the source of the dust that's on the filters. So, in theory, we could come up with becquerels per cubic meter. All right?

But -- and then we say, but you know -- you know what else we could do? We also know and we're going to talk about this -- we'll get to it -- what the concentration of the dust is in milligrams per cubic meter. Okay? So final becquerels per cubic meter in the air in a chronic -- this is like a chronic situation in a building -- and I know milligrams or micrograms per cubic meter, I know the specific activity of the airborne activity in becquerels per milligram -- okay -- in the dust.

All right. That's the becquerels per milligram, the specific activity of the dust sitting on something. All right? And -- okay. Good. Let's say we agreed. Yeah, I agree. That's a way to get a handle on the becquerels per milligram of airborne dust from the

various resuspension activity that created the dust in the first place. And that stuff is deposited on the filter. I said, okay.

Now, the guys goes in and he pulls out and replaces the filter and the cloud of dust comes out. Well, we know this specific activity now. We know that that dust has a certain number of becquerels per milligram. And we say, you know what we're going to do? We're going to assume that the dust loading, while the guy is changing the filter, is at the highest level plausible. And we've been through this before. Okay? That's 100 milligrams per cubic meter.

A lot of precedent for using that. One of which I'd mention is Bethlehem Steel and we have a lot of -- we have documentation and precedent that, you know, you really can't work in an area without respiratory protection or air supply when the concentration of dust in milligrams, now, gets above that level, because you just choke up. You start to and it's not a setting that you could work in.

So we're saying, we're going to assume that in a short period of time, while the guy is replacing the filter, he's experiencing 100 milligrams per cubic meter of dust. And we're saying -- and this, here, becomes -- a judgment has to be made on, well, how long is he going to be sitting and working in that cloud while he's changing it out?

Well, I talked to a building engineer, a buddy of mine. And he says it really doesn't take that long to change out these filters. So we're -- we did an analysis and it said, well, let's simply present the dose. Let's do that calculation. And the last bullet on this line said, "We came up with a dose of 1.77 millirem per hour of exposure." I want to fix the wording here. It says, "effective dose commitment to the extrathoracic pathways." It really should say, "1.7 millirem per hour dose equivalent," just to be health-physics correct in our terminology, because you used the term dose equivalent when you're talking at a particular organ dose. "Effective dose" is when you're

talking about a whole-body dose.

So, just for the purpose of communicating this to you folks, if you like or accept conceptually the way we came up with this, we end up with a dose rate of 1.77 millirem per hour for very dose connected to the extrathoracic airways, limiting exposure pathway. And now, of course, the question is how many hours per year is a person exposed to this? But, right now, it's in terms of millirem per hour. That's a very low dose.

Now, I say that because you may recall that, on a number of occasions -- and this happens with AWE facilities often -- is that we're always -- especially in the residual period, we're always in a situation where we have limited data. And we have to somehow find a way to construct those when you really have limited data and whether or not there's an FCC situation here where, no, they really can't do it.

But one of the things that came up, and you-all may recall this, and that one of the things the Board discussed is that, you know, when you're doing this and you're taking it from an FCC perspective, to some degree, you have to have a sense are we talking about big doses are very small doses? So that becomes part of your consideration in my mind, the information you need.

So -- and that's why we did those calculations. So all I'm trying to do here is saying, using that conceptual approach I just described and the assumptions, which I consider to be quite extreme, you get 1.7 millirem per hour to the extrathoracic doorways -- the airways, a relatively small number. So we were able to address that first scenario in my mind and that's how we came at it.

Mr. Katz: Okay, John.

Dr. Mauro: Yeah.

Mr. Katz: This is Ted. We are now at 11:07. And this

--

Dr. Mauro: Oh, I've got to speed up.

Mr. Katz: This whole session goes to 11:45. And Josie has at least ten minutes of presenting.

Dr. Mauro: Okay. I'm going to pick it up. I'll pick it up and give it back.

Mr. Katz: So we have to pick it up and -- yeah.

Dr. Mauro: You've got it.

Mr. Katz: Thank you.

Mr. Katz: All right. We'll get -- I'm moving more quickly.

Now we're going to go to the roof. There are guys that are going to be working the -- doing work in the rafters. Okay? Bottom line -- bottom line, lots and lots of data characterizing the levels of contamination that are on the surfaces of the rafters, the walls, and close to the roof where there was maintenance work going on. Bottom line, using that data, NIOSH says, well, the upper 95th percentile contamination level for that kind of activity is 8.99 bpm per 100 square centimeters.

And they assumed that the guys that are doing that work -- they could have an inhalation exposure whereby ten percent of that activity is removable. That is a conventional number that's used Reg. Guide 1.86 for what fraction of residual activity might be resuspendable. And they used a resuspension factor of 10 to the -4 per meter. Highest resuspension factor we've ever used on a project.

In my opinion, you know, they picked the right number. So bottom -- and they assumed that the guys that are doing that work do it for one month per year -- were up there. Maybe it's two months. We checked that analysis. We said, you know -- we looked at all the data. Yeah. We're coming in at

numbers -- they came up with 8.99. We come up with maybe 10 or 12 but we're in the same ballpark looking at all of the data.

We concur with all of the other assumptions and the bottom -- and the important point here is the very last bullet we derived an annual effective dose commitment. Now, this is an effective whole-body dose of .01 millirem per year, a very small dose.

We're going to move on. Subsurface, here's the big one. Big one. This is the one that I think is going to be the one that's going to get everybody's attention. Subsurface in building 10 -- remember I mentioned before people go under -- go underneath the ground and they do work? Well, there is a lot of data collected in the 1990s characterizing the contamination levels in the sludge inside the pipelines and the -- and the subsurface soil under building 10.

But both SC&A and NIOSH did -- independently did their analysis. We think -- we've said that the upper 95th percentile concentration of uranium that we met -- we -- looking at all the data, we come up with 5,878 picocuries per gram and we went ahead and said, using that as my starting point, that concentration which is the upper 95th percentile level that we believe, you know, workers might have encountered while they were in the subsurface environment of building 10.

And then you could -- and we used aw dust loading. We said, while you're down here, for the purpose of internal dose, 200 micrograms per cubic meter. We have a lot of documentation on that. We have it all appendixed and we believe that to be a pretty good number. In fact, we think it's a high number, because we have information that the soil was moist. It probably wasn't that high but we're going to go with that.

And then we used the breathing rate of 2.5 cubic meters per hour. Never did that before. And we had

a lot of discussion, because NIOSH -- the classic number that everyone uses and accepts is 1.2. We went with 2.5, because the guy is down in a hole shoveling. He's working real hard.

And we assumed 184 hours per year. In other words, this wasn't work that was done all the time. And we got information that it collectively amounted to about one month per year of work. And we assume that the same guy always goes down in the hole and does that work. We have lots of information from the interviewees that, no, no, no, whenever somebody had to go down in the hole, that was work that nobody wanted to do. They sent somebody in and, you know, it's your turn in the barrel, so to speak.

But we said, same guy every time. Well, we calculated an inhalation of 20 becquerels per year and a dose of 15.6 millirem per year effective dose committed. NIOSH didn't present a dose. So we have two columns, here. One is what SC&A did completely independent of NIOSH. And the numbers compare pretty well within what I -- you know, where we compare what we did. And, in my opinion, both sets of numbers are reasonable and are good.

The only question that's really -- that's important is, do you folks agree that the activity that was measured in the 1990s and in these conduits and the dirt and everything underneath building 10 can be used as a surrogate? And we said, let's go with the upper 95th percentile to make sure that we're not underestimating the dose. Okay?

So -- but, even doing all that and assuming it's the same guy going in the hole every time, we get 15.6 millirem per year effected dose, a relatively small dose.

Next. We're going -- we're almost done.

The subsurface of the outdoor activity -- I'm going to do this quickly. We have the same situation outdoors. We've got all these different locations. Table 2 in our

report -- I don't know if you've seen it. We sort of summarize all that data, these measurements that were made outdoors, both the surface soil and subsurface soil -- okay? -- that was out there.

And you go out there and you say, well, you know, there were -- the people that are outside who were walking around doing above-ground work, they might be exposed 2000 hours per year, you know, full-time. Probably not but let's assume that they're outdoors. That's where they do their job. And they're going to be exposed externally and, also, resuspension.

So we believe -- well, we know how to do the external doses. So, you know, we've got -- you know, we had lots of activity characterizing the soil and the subsurface from all that 1992 and even the 1984 work. And we said, well, we can reconstruct the doses for the above-ground worker, you know, who we assume that he -- 2000 hours per year. And we used the average activity in the soil, where they're sort of walking around.

For the subsurface guy, no. We picked the upper 95th percentile. They got that. They went underground to do some work. We picked a higher end of concentration but we assume it's only 200 hours per year and that he's in the hole. And, again, we go with this number of 200 micrograms a cubic meter.

By the way, SC&A and NIOSH independently reviewed that number. We came up with it one way, looking at the literature on it. That's how you get -- do these kinds of estimates. NIOSH actually used real data from the type of activity at the metal plant. Turns out, we come up with 200 micrograms per cubic meter. They come up with 220, a little higher. We were amazed that we came so close, since they were independent.

Now, bottom line is, using these assumptions, we're talking about doses on the order of 12 millirem per year, whole body 30, 32 millirem per year. Again,

that's outside.

Finally, all right -- five more minutes. Five more minutes -- we added a new cap on direct contamination of the skin. I'm not going to go into the details. It's all written up. There's -- there are -- there's a couple typos on this page.

I'm moving along. Could you flip the slide? I'm over here buzzing along using my handheld slide that I mocked up.

Oh, no. I'm sorry. I'm sorry.

Mr. Hinnefeld: Yeah. I'm not sure which slide number you want to speak to, John.

Dr. Mauro: Yeah, subsurface -- yes. Typos. The second bullet should say, "Soil residue on clothing, 10 milligrams per centimeter squared." And the dose conversion factor, the next, is "40 millirem per hour per 10,000 bpm per centimeter squared."

I'm not going to tell you where. I could spend a half hour explaining to you where that comes from. It's in the report. It think it's pretty rock solid information. Bottom line is, if a person is in a hole working around, at the upper end, the contamination level of uranium in the soil, 5,878 picocuries per gram. We believe the doses -- direct dose to his skin, an upper-end dose, would be .67 millirem per hour that -- for every hour that that is on the skin and, you know, that's really dirty work. So a relatively low dose.

Now, the last -- let's go to -- go to the next slide, please. I may stop at this point, because I know you want to get through this.

We think that the approach that we used, which makes use of what I would call surrogate data, 1990 data, 1984 data, can be done and this is the big SEC question and I made this slide for that reason only. One -- the reason I'm saying it is, one, we deliberately are working with upper 95th percentile data, which really pushes you up at the top end.

We're using a dust loading of 220. NIOSH is using a dust loading of 220 micrograms per cubic meter. We believe that's an upper-end value, especially, since the soil is moist and this 220 number's probably good for remedial activities but not for the moist soil. If the soil got moist, the dust was cut down.

We're assuming that the same person doing this maintenance and repurposing activity is -- and going in the hole, whether it's indoors, is always the same person. And the reality is, we know it's changing people.

And, now, with the next bullet, notwithstanding these bounding assumptions, the doses are extremely small.

Last bullet that's interesting is we -- there is the remediation that took place in 1992. The kind of work that was done -- they characterize it as cleanup the site -- is a lot like the kind of activity that was done during repurposing and maintenance. And the bottom line is, they did do a complete characterization of the intakes and it turns out, our modeled exposures that we did using the assumption I just described are, in fact, higher than the actual exposures that workers received that were doing the remediation work and the maintenance.

So it's really a collective set of assumptions and findings and information that points us toward -- in the direction that says, you know, I think we could reconstruct the doses with -- keep flipping. We're going to go to the conclusions. You can flip the slides. Keep going. We don't -- we didn't -- because, basically, I handed you all this already.

We concluded that we think the doses for all these scenarios can be reconstructed in a scientifically sound and claimant-favorable manner. And we're thinking that, for the reasons I just went over very quickly that are gone into detail, that this surrogate-data idea, that is we're using 1980 and 1990 data for work that took place in the '70s, can be done for the

reasons I just summarized, briefly.

And then I have one last slide. Would you go to the last slide?

During the course of our meetings, the petitioners said, you know, we heard what you said. We understand what you said. But we think you've missed two exposure pathways that you need to address. And we agree. One has to do with external exposures to thorium. And I don't want to get into details of it but a separate analysis specifically of the external exposure to thorium need -- we need to talk about.

And the other one is that welding operations took place. Now, welding operations, as we know from other work, create aerosols that are quite different than typical resuspension. So you need to look at that.

So these are two additional issues that we believe the Work Group needs to work on. And that concludes my status report of what I would say where we are now and what I believe is our path forward.

Mr. Katz: Thank you, John.

Josie?

Member Beach: Can you -- Stu, can you leave Slide 14 up?

Mr. Katz: Well, are you presenting now or are we taking questions?

Member Beach: I'm just taking some notes. Do you want to do questions?

Mr. Katz: Okay. Why don't we just -- first, let's see if we have questions from Board Members for what John -- all of this that John has covered and then we'll get to Josie. And he was so thorough, that we might not have questions. I don't know.

Member Kotelchuck: I've got a lot of questions but I don't know where to start.

Mr. Katz: So Dave Kotelchuck.

Member Kotelchuck: Yeah. I would say that I read the 12 interviews that were done that were so important. And, to my mind, the results were really quite disturbing. I saw the complete absence of any radiological safety program. I saw that the people had ideas that were -- one of them -- one of the interviewees was in the Environmental Safety Division and talked about, well, you know, we can handle -- we don't have to worry about handling radioactive materials as long as you don't ingest them. I mean, that's -- that's really upsetting.

And, if any -- if there was any kind of a program, any HP would tell a person that that's a very primitive notion of health and safety.

Mr. Katz: Dave, I don't want to -- I don't want to interfere --

Member Kotelchuck: Yeah.

Mr. Katz: -- but do you have a question for John Mauro, because that's what we're trying to get through right now.

Member Kotelchuck: Okay. Okay. No, I don't have a question for him. I have doubts about the --

Mr. Katz: Yeah. That -- your comments we'll get to. I mean, Josie's going to present, too, but --

Member Kotelchuck: Okay. Fine.

Mr. Katz: -- I just want to be able to give Board Members a chance to ask John questions before we get into the other thoughts and so on.

But -- so other Board Members' questions for John -- for John? On the line as well?

Okay. In the room, I don't see questions. And then

we have Josie and you can go and then we'll --

Dave, I don't -- the order doesn't matter to me but --

Member Kotelchuck: Josie should go first.

Member Beach: Okay. So --

Participant: Can the public ask questions at this point?

Mr. Katz: No. No. This is -- the petitioner will have a chance to comment and that'll come after these -- this interaction, here.

Member Beach: Okay. So I just want to make it clear, the Work Group does not have a recommendation at this time. I do have some comments and, hopefully, other Work Group Members may, also.

I asked Stu to keep the slide up. Those were the four SEC issues that are prominent in my mind and, so I don't have to read them, they're up there. I'm going to make small comments to each one of those.

So the survey data from 1982, '85, '92, '95 and '96 was intended to be used to remediate areas in and around Metals and Controls for the purpose of removing the NRC license. It was not to assign dose to unmonitored workers the 14 to 28 years prior.

The models are based on site characterization surveys, gross alpha techniques used to determine remediation and termination surveys to provide information to support NRC termination of radioactive materials license.

In 1982, the survey recommended that the former burial site remain intact and undisturbed. Yet, in 1984, that survey reported the site was disturbed during construction of building 12 and contaminated soil was spread around the construction site. The report concluded the former burial site had been subjected to extensive disturbances. Contamination

was spread throughout Metals and Control areas. It was found on floors, walls, ceilings, roof, piping, utility systems, soil in and around the building, tin, under equipment.

There was 9,414 feet of roof surface that was decontaminated either by vacuuming, scraping, and/or they cut out the entire sections of roof, leaving open spaced directly into the building 10 production areas.

There was 45,000 feet of floor space that was defined in building 4, 5, and 10 to have contamination exceeding the unrestricted-release criteria, an additional 10,000 feet of affected floor area and localized areas of subsurface soil contamination was identified.

The 1996 Survey Report described work controls put in place to protect the remediation workers, including posted boundaries, volumetric data, breathing zone air sampling, and personal protective clothing. Remediation workers did not handle materials in and around the subfloor piping. Those were handled using planned radiological controls. Remediation workers would not have used the shop air to dust off their clothing. They knew the hazards involved.

The 1983 survey released buildings 3, 4 and 10. Yet, in 1985, the follow-up survey by NRC reported surface and subsurface contamination limits exceeded what was allowable by the NRC. Maintenance and Control maintenance workers were not trained, notified, warned, or monitored during residual -- the residual years.

Maintenance -- Metals and Control was an unusual AWE site in that source term was not properly removed, subsurface areas exposed personnel, there was drilling and welding in the rafters and on the roof. They exposed maintenance workers. Residual years at Metals and Control were busy years for maintenance personnel. There were -- there was no way to know how long, how often, or how much

radioactive material they would have been exposed to in their daily tasks.

The Weston 1996 Survey Report reported only on uranium in the affected areas, including buildings 4 and 10. Drainage system characterization investigation to assess the potential for inadvertent exposures to non-radiological workers performing routine drainage system maintenance and the potential for inadvertent or disturbance of highly enriched and concentrated uranium.

HVAC systems were never surveyed. They did not look at the fans, the exhaust ventilations at all. Interview notes describe men climbing through the duct work to change out filters. These are some of the same systems that exhausted out onto the roof. Workers reported changing filters quarterly. There were 12 to 1300 filters. They reported climbing inside the air handlers, cleaning duct work, power washing coils. They cut holes into the duct work to vacuum the stuff out. There's no surveys previously mention reporting any of the surveys of the exhaust fans.

I know this is a lot of information but there's a lot of surveys out there. And it describes the -- what was done in the later years. And during the remediation years, there's none of that. There's no survey data. So that's all I have to say, comment-wise. And I know we do need another Work Group meeting. We haven't had a chance, as Work Group Members, to discuss all these findings and our thoughts.

Mr. Katz: Dave --

Member Kotelchuck: Yeah.

Mr. Katz: -- Kotelchuck.

Member Kotelchuck: Well, I'm -- I think it's important for folks to realize that these -- the people who are petitioning are not like regular industrial workers, either at AWE sites or any other sites, who more or less work at one or two operations over a long period

of time.

Even if we don't have data about those -- for those individuals, which we do not have here, we can make reasonable estimates because they're jobs that we know are done elsewhere. But the persons who are applying here, the maintenance persons, are really like -- in my opinion, more like emergency response personnel. They do everything: they work on the roof; they work on building --

As one of the people said in the interview, interviewee number 10 said, well, I was working in the electrical division but, if I came in and we had a plumbing problem, I became a plumber very quickly. So everybody was exposed to everything and it's -- and what we're doing is taking modeling without any, in my opinion, anchors with -- on the individuals, themselves.

And the result is that I'm increasingly skeptical that we can put together -- everybody is exposed to all of these scenarios. I'm increasingly skeptical that we can put together all of the scenarios, despite the hard work and creative thinking that went into developing the models and put all the models together and come up with an exposure level that -- of reasonable accuracy.

And so I do very much look forward to our Working Group meeting where we can hash out and discuss with the -- with the Members of our Working Group as well as the staff and maybe come to some, I hope, agreement about how to proceed. But, for the moment, I'm -- I am skeptical of the accuracy of this approach, despite its strengths.

Mr. Katz: Other Board Members either in the room or on the line -- questions or comments?

David?

Member Valerio: This is -- this is Loretta. I have a comment.

Mr. Katz: Loretta, go ahead.

Member Valerio: So I'm in full agreement with both Dave and Josie that we do need another Work Group meeting.

I don't agree that NIOSH is assuming that the same individual performed the subsurface work. Looking at the White Paper dated November 29th, on Page 13, it clearly states that "residues were found in the subsurface drains in Buildings 4 and 10." So I -- you know, it's hard to imagine that the same person is doing the subsurface work in both buildings for just the 173 hours or the 22 days. So I don't agree with that either. So I think we have a lot more work on this site moving forward.

Mr. Katz: Thanks, Loretta. That sounds like something that can be discussed with the Work Group.

Board Members? Other Board Members? David Richardson?

Member Richardson: I'm interested in the Work Group's perspective on I think two issues. The first is whether this -- there's -- because there seems to be a lot of creative thinking and innovation going on how to address some exposure scenarios that we've probably not given much consideration before. And are they -- I'm thinking about this as being extremely specific to this facility or is it general? That's one questions. Or are -- are these the types of scenarios which we could imagine being encountered in other scenario -- in other settings that we haven't before addressed?

And I believe, right now, you're focused on these scenarios in the framework of this SEC for the residual period. And would these same activities have occurred during the operational period? And is there an issue of -- if so, is there an issue of logic that one -- that all of those same things would have also been exposure scenarios that people would have

encountered prior to the cessation of operations?

Member Beach: I think I can answer the second part. Yes, the subsurface flooring would have been flooded and they would have been digging out that subsurface flooring throughout the history.

Member Richardson: Changing air filters?

Member Beach: Changing air filters and such. Yeah. And, remember, the first period was a thorium. They were unable to reconstruct doses for thorium. So --

Member Richardson: All right.

Member Beach: This site is unique because there's so much left in -- I mean, if you read, they sent out railroad cars of -- hundreds of them of contamination out of that facility. There's -- it's a lot. It's not a usual AWE site at all.

I don't know if I got your first part of your question answered.

Member Richardson: Yeah. I was -- you know, I -- given just today's discussion about Superior Steel, for example, where they -- where there was a description of a lot of dust, would this -- would there be similar considerations there that we have not considered and have not addressed before?

Member Beach: Potentially. I think you really just need to get into the survey data that they do have. One of the interesting ones was the Weston 1996 Drain Characterization Survey. It's very enlightening. It's out of the web and it's a good -- I mean -- and, like Dave said, if you read -- I encourage Dave to read the interview notes, because there is a lot of information of what was done and why I was so interested in the Superior Steel and -- with no interviews there, because there's a lot that happens that you don't know until you talk to the people that are -- were there. So --

Mr. Katz: How about Board Members on the line?

Questions or comments, before we get to the petitioners' opportunity to speak?

Member Anderson: Yeah. This is Andy. I would agree with the comments made. There's still a lot but we got started with the Committee but we do have to go back over all of this. I think there's a lot of -- a lot of data that -- in the file that many of us have not had a chance to go over yet. That's been mentioned already.

Mr. Katz: Thanks, Andy.

Andy's on the Work Group, by the way.

Member Beach: Yeah.

Mr. Katz: Others? Board Members?

And if -- okay. Not hearing Board Members at this moment, let's just go to the Petitioners' opportunity to address the Board.

Mr. Elliott: Good morning. This is Mike Elliott. I'm one of the petitioners.

Mr. Katz: Right. Welcome.

Mr. Elliott: Thank you. Thank you for the opportunity to speak on behalf of my fellow petitioners.

So, listening to the technical experts at NIOSH in the last few Work Group meetings and SC&A today and other times, we're asked to believe through their -- you know, continuous modeling and their ability to estimate bounding conditions such as short term dust loading and inhalation and ingestion rates and the like, that they claim that it's possible to estimate a bounding dose to members of this Class that is scientifically sound and a claimant favorable manner. But I would suggest that this is far from a foregone conclusion and remains quite uncertain.

Mr. Katz: Mike, I'm sorry to interrupt but I don't know if you're using a speaker phone or a cell phone but,

if you could, I don't know, speak more closely to your mic or something. It's -- we can follow you but with difficulty.

Mr. Elliott: Sorry about that. I'm on -- I'm on a mobile phone here at --

Mr. Katz: Yeah. You have -- you just made it much better.

Mr. Elliott: Okay. Yeah. I've got it up to my -- hold the handset up to my ear. I apologize for that.

So first I would ask that you circle back, as I have done, to the regulation that prescribes procedures for designating classes of employees, as members of the SEC. Specifically, Part C, Section 83.13 stipulates how NIOSH will evaluate petitions. And, in 83.13(c), it states that -- in paragraph (1)(i), it states,

"Radiation doses can be estimated with sufficient accuracy if NIOSH has established that it has access to sufficient information to estimate the maximum radiation dose, for every type of cancer for which radiation doses are reconstructed, that could have been incurred in plausible circumstances by any member of the Class." Let's just add on that last statement.

And then in paragraph (1)(ii) of that same section, it states that, "To establish a positive finding under (c)(1)(i) of this section would require, at a minimum, that NIOSH have access to reliable information on the identity or set of possible identities and maximum quantity of each radionuclide" -- that is the source material -- "to which members of the Class were potentially exposed without adequate protection."

I contend that NIOSH has failed to satisfy these fundamental regulatory requirements and I think that for a number of reasons as I've stated in the past: 1) there's the source term calculation is incomplete for many of the reasons that Josie just outlined; we have incomplete knowledge of the nature, frequency and

duration of jobs performed in contact with the source term. And I would -- I would agree with I think it was Dave who said we may not even be able to, you know, reasonably imagine every scenario that has resulted in exposure to the source term; 3) there's a complete absence of any --

Mr. Katz: Mike, I'm sorry but you're also -- you're becoming just very garbled again.

Mr. Elliott: Okay. Let me slow down a little bit and see if I can get a better angle, here.

Mr. Katz: That's better. Yeah. It's better.

Mr. Elliott: Okay. There's a complete absence of any measurement or monitoring of the workers who are covered by this petition and there is -- there are no comparable populations with measurements and monitoring data that can be relied on as a surrogate for this Class that's in question, the maintenance workers. We're referring to them as maintenance workers and remediation workers.

Concerning the lack of adequate source term characterization, the most obvious example is the 1996 Drain Characterization Survey in Building 10 and Building 4, the -- you know, the interiors of Building 10 and Building 4, which is where we found the highest concentration data -- volumetric concentration data. And, for a number of reasons that I previously described in my written comments on August 29th, we only analyzed the sediments and soil samples for isotopic uranium. We did not analyze the isotopic thorium. So we can never know what the thorium concentration was that these maintenance workers were exposed to.

And, as you'll recall, as Josie said moments ago, the lack of thorium data was the reason that the prior SEC, SEC 149, for the operational-period employees was allowed.

Furthermore, by the time the drain survey was

conducted in 1995, there had been close to 30 years of disturbances of the drain line during the residual period. You know, they were snaked numerous times. Some of it -- the most plugged sections had to be entirely removed. So there's no guarantee that the levels we documented in 1995 represent the maximum levels that were originally present.

And recall, this is -- this is, you know, serious. This is source material. This is right underneath the area where the AWE operations were taking place. We even found, you know, a 6-inch-long fully-formed fuel rod. But it was highly enriched uranium. As I say, we didn't test the thorium, so we don't know what the levels of thorium were. And these were the highest concentrations that we identified that these people were working around.

And I'll just briefly mention, for the outside areas, I brought up in my previous written comments that, you know, even -- we're relying heavily on gross alpha screening for the majority of the soil characterization surveys that were done in 1994 and 1995. And that method, although it was, you know, a godsend for us in terms of the decommissioning activities that we were doing, it was biased low at concentrations above our cleanup standard of 30 picocuries per gram. So really -- and it was biased high below 30.

So, really, there's a majority of the isotopic analyses that we did for the exterior soil samples were those, you know, low concentrations where we were trying to -- we were looking for clean margins. We wanted to try to limit how much material we had to excavate and ship off in those rail cars that Josie referred to, of which I believe -- I believe there were 325 rail cars shipped out to Utah.

And, if you look at the letter from the NRC, you know, supporting the decommissioning where they summarized the activity that we did, they mentioned that, in the building interiors, we excavated 34,600 cubic feet of soil and concrete rubble and, in the

exterior areas, we excavated 532,000 cubic feet. That's close to 600,000 cubic feet that we shipped out to Utah from a facility that supposedly had been released for unrestricted use. So, you know, these employees were definitely messing around in some pretty heavy -- heavily contaminated areas.

I mentioned that there was incomplete knowledge of the nature, frequency and duration of the jobs performed. I really am baffled how NIOSH and SC&A could come away with the degree of confidence they have in their estimate that the average worker received one month -- your average maintenance worker received one month duration of intrusive activity both subsurface and overhead.

When I've spoken to the -- you know, the workers I know, they really don't know how long and, you know, their estimates generally seem a lot greater than that to me. You know, John Elliott mentioned near daily activity in the overhead areas, not to mention how much time he spent on the subsurface areas. And, you know, he was -- he's one of -- he's my co-petitioner and he was a working supervisor.

One of the other working supervisors who was an instrumentation guy, talks about, you know, two to three months a year in the overhead areas, not including the work in the subsurface. But somebody like John, who was a pipefitter and a plumber, he would have been, you know, down in the subsurface probably much more than the electricians.

There's also a complete absence of any measurement or monitoring of the workers who are the subject of this petition. NIOSH has relied on measurements and monitoring data from several populations, you know, either the radiation workers at the end of the operational period or the D&D workers, you know, during the decommissioned activities of the 1990s or, you know, in the case of the dust loading estimates, they referred to the Mound facility. I think that was 1996.

But I would suggest that these populations are not comparable to the typical M&C maintenance worker in this Class. The surrogate classes did not adequately characterize the maximum radiation dose to any member of the Class that -- of this petition.

And I would ask you to just think for a moment, try to visualize what a typical M&C maintenance worker in this Class in this time period would look like. You know, it would be plumbers. It would be electricians, pipefitters, boiler lubricators and, you know, many of the trades that are involved in the maintenance activity.

As was pointed out by Dave and others, they had no knowledge of the radiation exposure that they were being exposed to. There were no safety and health protocols in place, no personal protective equipment. They were often in direct contact with the source material. You know, they would think nothing of just handling their tools with their bare hands. They weren't trained to wear gloves or wash their hands. They didn't have to shower or change their clothes.

They worked mostly in street clothes but, you know, even in cases where they had a uniform, they would generally just take that home and launder it at their home. So they'd be bringing that home with them. And it would be, you know, in their car. They were -- you know, conceivably, they were exposed to this stuff 24/7.

So the typical M&C maintenance worker in no way resembles the population of workers for which NIOSH has relied as for the basis of their dose reconstruction modeling.

And I would just also bring to your attention a letter that was addressed to Josie Beach dated November 20th, 2018 from Congressman Joseph Kennedy, who represents the Fourth Congressional District in Massachusetts, in which he acknowledged some of the uncertainties among Members of the Work Group as to how to evaluate the extent of the radiation

these workers were exposed to, in order to ascertain their eligibility for compensation.

But Congressman Kennedy goes on further by stating, "It is my hope that the Work Group takes a broader view and considers the cases of these workers in their final determination." And I feel the Congressman has really hit the nail on the head with his advice to take a broader view.

Unfortunately, I think, you know, NIOSH, as much as they try, they've failed to take a broader view of the typical M&C maintenance worker and the exposure scenarios that might have existed at the time. The measurements and monitoring data from the '60s, the '80s and '90s are not suitable to estimate the bounding dose of the M&C maintenance worker.

So I'm left referring back to the regulation. I come back to Section 83.13(c)(3) that states, "If it is not feasible to estimate with sufficient accuracy radiation doses for members of the Class, as provided under paragraph (c)(1) of this section, then NIOSH must determine, as required by the statute, that 'there is a reasonable likelihood that such radiation dose may have endangered the health of members of the Class.'"

So I will end my comment there and promise to put as much of this in writing to the Board after the meeting. And I hope -- I think I heard my colleague, William Rusty Lorenzen, who is one of our operational health physicists. I think he's on the line. I hope we'll have time to hear what he has to say.

Mr. Katz: Before we go to that, Mike -- well, first, let me just ask if you have been reading from a script and you want to email that to me, that would help the transcriber for the moments when you were a little bit garbled. If you weren't, then don't worry about it. We'll do the best we can. But, if you have that written down -- what you were saying -- that would be handy.

Mr. Elliott: I do have it written down. It's actually handwritten in primer method. But I will -- I will transfer it onto a -- onto an email I'll send you.

Mr. Katz: Okay. And then --

Mr. Elliott: Who am I speaking to?

Mr. Katz: Just -- you can send it to whatever email address you have for NIOSH -- the NIOSH program. But just address it to me and I'll make sure that it gets to the transcriber, so that the transcriber can work this out.

Mr. Elliott: What's your name again? I'm sorry.

Mr. Katz: I'm sorry. I'm Ted. I'm Ted Katz.

Mr. Elliott: Ted Katz. Got it.

Participant: With a K.

Mr. Katz: With a K. Yes, thank you. All right.

Mr. Elliott: Thank you.

Mr. Katz: Yeah. Thank you.

And, now, you suggested that there's a Lorenzo on the line. We're over our time but that's okay. We have -- we're going into a lunch break. I'm not sure that's more important than hearing. If you want to have your person address us, too, that's fine. Lorenzo, I think that you said.

Mr. Lorenzen: No. It's William Lorenzen.

Mr. Katz: Lorenzen. Sorry. I apologize.

Mr. Lorenzen: That's okay. I'm a -- I'm a health physicist.

Mr. Katz: Yeah. If you could just keep it, William, to maybe ten minutes.

Mr. Lorenzen: I will. I don't have enough time to go into all my comments over that presentation.

Mr. Katz: Okay.

Mr. Lorenzen: I will probably try to provide something in writing because they are voluminous in nature. I was very concerned by the way we're trying to force fit a model to workers which we have no data for. I find that surprising and concerning from a health physics standpoint.

The fact that we have to call a friend who knows something about filter changes to make decisions about exposures is alarming and I would just suggest, as one who has worked in the uranium industry and have seen these processes and these maintenance workers' work, if it wasn't for good health physics, they would have been exposed unnecessarily and, in some cases, overexposed.

So, to think of these workers as being protected, they were not. And knowing my experience with this type of worker, I think it's an impossibility to try to estimate a dose of any reasonable nature based on the fact that we have zero data.

And, if I look at the last bullet on Page 20, which talks about the fact that some of this information data collected from the cleanup period was somehow relatable to these workers is totally ridiculous. These are workers that were protected, knowledgeable, had health physics support. So I just find some of this information in this really concerning from a health physics standpoint and I will try to prevent -- provide comments in writing, so you can work with those.

And I appreciate what the Board's trying to do to protect these workers from the unfortunate exposures that they experienced unknowingly.

That's all I'll say. Thank you.

Mr. Katz: Okay. Thank you very much. And, yeah, we -- we'd love to have your written comments and you can send those to the NIOSH program and they'll get both to the Board and to the program staff that work

on this as well, as well as the Board's contractor staff. Thank you.

Board Members, before we close this session, I just said, is there any other questions, comments, what have you?

Member Clawson: I just --

Mr. Katz: Brad?

Member Clawson: I just had one. What classifies a facility as an AWE? I -- is it usually --

Mr. Katz: So DOE classifies facilities as AWE.

Member Clawson: Okay.

Mr. Katz: They're -- what specifically do you want to know about that?

Member Clawson: Well, my understanding of an AWE was that it was basically like you had one source of material depleted, you know, uranium or whatever else like that, that you were dealing with. And, you know, like Bethlehem Steel, we had one single source of uranium content. So --

Mr. Katz: No. No. So that's not the -- it's not the nature of the exposure or the process, per se. These are all -- they're contractors. They're not government employees. They're not a government plant with contractor employees. They're -- it's a private plant with -- that's contracting with the government. And that's basically --

You know, when the Manhattan Project was initiated, I mean, they were relying, basically, on contractors. They had no facilities. And so, anyway, that continued for actually much longer than most people would think and a lot of support was given by these private companies doing contract work for the government to help support the effort in the -- in the early years of the Manhattan Project.

Member Clawson: Okay. That helped me out. Thanks.

Mr. Katz: Yeah. You're welcome.

Any other questions, comments, quickly?

All right. So we are concluding for now for lunch. We have a LANL SEC Petition that starts at 1:15. So, again, it's an SEC petition. It's also an informational update. We're not acting on it at this point but I would like to ask everybody to try to be here on time, because we will possibly have -- we will not have the petitioner, actually, on the line but we should still be timely. Thank you.

(Whereupon, the above-entitled matter went off the record at 11:56 a.m. and resumed at 1:16 p.m.)

Los Alamos National Laboratory SEC Petition #109
(Los Alamos, NM; 1996-2005)

Mr. Katz: Okay. I think we should get started. Okay, folks. Joe. LaVon.

Okay. Welcome back. We just are about to resume from lunch break. We have one last item on our agenda for this Board meeting which is the LANL SEC Petition.

And, to note again for people that are just joining us, this is a sort of informational update; a sort of pretty thorough, I think, update of where the Work Group's come and the Agency has come since the last time we spoke to the Board about this Petition Evaluation.

Let me check on the line and see which Board Members I have on the line.

(Roll call)

Mr. Katz: So it sounds very quiet on the line. Other than my Board Members, I think we're okay in audio quality. We probably don't have that many people following right now but, if there is anyone on the line from the public, please keep your phone muted for

this session and press *6, if you don't have a mute button, to mute your phone. That way we won't have any audio issues or we have less audio issues.

And, Joe, why don't you -- this is Josie Beach's Work Group but we have presentation from Joe, which is sort of a joint presentation of -- covering the last Work Group and the work that's been done.

Thank you.

Mr. Fitzgerald: Okay. Thank you.

And, for those in academia, this is the proverbial last presentation after lunch on the last day.

So, anyway, yeah, as Ted was saying, this is more of a status briefing. We had a pretty productive Work Group meeting a couple weeks ago and this is, I think, to catch the Board up on where the Work Group stands.

I'm -- LaVon and I talked about doing a tag team but I'm just going to go through all the slides and I think he's going to jump in on the path forward, which I think is a good way to go.

Just to remind you a little bit on the chronology of this, this -- the 109 ER for '72 through '95 was voted on by this Board, approved by HHS in 2012. And that was -- and the addendum, which addresses the post-'95 years, was issued April 24th, 2017. Again, for all support service workers after that time period -- I'm sorry -- that should be '96. that's a typo. '96 through 2005 was the evaluated time period. And you can read the rest of the chronology. I won't go through all of it but a lot of activity since mid-2017 until now.

And the Evaluation Report Addendum dealt with an end date of, as I was saying, December 31, 1995 for the SEC Class. Now, that break point was selected with a presumption of the site compliance with 10 CFR 835, which was the radiation protection rule that was promulgated then. That rule had a provision in it that monitoring would be required of any workers

with a potential of 100 millirem CEDE per year. So, again, the presumption was, with an enforceable requirement on the books, that you would see the DOE sites pretty much monitoring to that level so that, for unmonitored workers, you could assume 100 millirem would be bounding for those workers.

So that was the premise that we were addressing in the review. And, for Los Alamos, certainly, the -- that provision addressed the limitations that were the basis for the preceding SEC Class, which was the inability to bound what we were -- would call exotics. That includes the mixed fission/mixed activation products and certain specific exotic nuclides like neptunium and curium and what have you.

Okay. This is kind of where we are at this point. Last year, I think it was the August of 2017 Board Meeting in Santa Fe, we had a discussion on Los Alamos, at that point. We concluded that, certainly, the presumption of compliance, in other words the compliance with 835, was a key element; a key element of looking at how programs were managing field monitoring. But I think we wanted to make the point that it wasn't the full picture, that there were implementation issues that needed to be addressed that went beyond the question of compliance by itself.

And, in the NIOSH White Paper that was issued, I think it was back in September, I think there was some agreement on that, that, yes, NIOSH likewise felt that the presumption, by itself, wasn't enough, that, in fact, you had to look a little broader in terms of the implementation of those provisions, particularly the field surveillance or monitoring provisions, in order to be confident that, in fact, the 100 millirem CEDE criterion would be, in fact, a valid one to apply.

And what I think NIOSH did, in fact, is look closely at the -- what they're calling the formality and completeness of the monitoring program itself, the radiation monitoring and contamination control

program and its ability to, in fact, support the monitoring that would be required under the rule.

And the second part that would be looking at whether or not the monitoring of primary and exotic nuclides was robust and, in fact, would support that premise as well. So those are the two elements. And, in general, I think as I point out here there was a -- this has come up before, that, in fact, the implementation of the DOE's first enforceable radiation protection rule was a watershed moment that would, in fact, be reflected in the way programs are implemented.

Okay. So one of the first elements, and this is one we've addressed now probably since 2009/2010 --

Oops. Let me see. Should I hit cancel on that? No?

Thank you, Stu.

I think we were talking about the technical capabilities of the monitor. And this is one of the, I think, central questions that we addressed and NIOSH has looked at. It's pretty clear at Los Alamos, and we're talking Los Alamos. This is the premier national laboratory where a lot of health physics was invented in the '40s and '50s at this laboratory. So clearly the capability -- the technological capability existed and certainly paced technology developments along the way.

So they certainly did have the capability to monitor for a wide range of radionuclide, including mixed fission and fission activation products since the early '70s. So we have no disagreement on that. They've always had that technical capability. The question really was whether, in fact, that capability was employed or not in such a way that, at least for exotic nuclides, we find evidence that bioassays were being collected and, in fact, being recorded.

So, if you can imagine, the central question is no -- you know, there's no issue with the technical capability of the laboratory in terms of in vivo

counting. The question is were they focused on these tangential radionuclides that we're calling exotics, just to cover the ground, and whether or not there are sufficient records to support dose reconstruction.

And I'm going to just point out that, in terms of time frame, we're talking what I would consider the current time frame, talking mid-'90s and beyond into the 2000s, you're talking a very mature program and you're talking about a situation at the laboratory. And we -- I think we have agreement with NIOSH on this as well, that the kinds of exotic exposures and pathways that we would have been seeing in the '70s, '80s and before, we weren't seeing as much in the 1990s, becoming somewhat more sporadic.

And so it raises the question -- this is the question I'm going to address with you later is, before '95, the question was whether you had sufficient data to support some dose reconstruction approach that could bound a non-negligible exposure to the exotics.

The question that we're answering or trying to answer after '95 is whether there's sufficient data. But whether or not the circumstance of the sites including -- involved in the amount of source term that might be existing for mixed-activation fission products were sufficiently low that you could demonstrate that those exposures, those potential doses were, in fact, under 100 millirem CEDE.

And a lot of the effort at Los Alamos I can account for in the past has just been trying to find any evidence from the lab that, when the promulgation of 835 came about, that they, in fact, had done similar analyses as a basis for determining monitoring of these various exotics. And, again, LaVon can jump in but I don't think we ever did get something that demonstrated that kind of firm analysis that could give you some confidence that that was looked at. In fact, these doses were bound by 100 millirem. And that's why you couldn't find monitoring data for the exotics after '95.

So that's a question that I'm going to address a little later but I think that's a pathway that might be worth examining as a recourse to this issue.

Here, I'm going to speak for LaVon, which may be a little dangerous but I'm just going to follow his slides from last time. But, in terms of the weight of the evidence, I said there's two prongs to the NIOSH Report.

Uh-oh. Are we good? Yeah, I think we're good. Now it's not moving. Yeah.

Well, let me -- while he's fixing that, I can -- I can talk about it a bit more. You know, the first prong is looking at the -- essentially, the formality of the program; the scope of documents; whether, in fact, one could identify RWPs for which bioassays were required; whether, in fact, you had substantial evidence that they had a complete surveillance program in place that not only met the regulation but was complete from the standpoint of stipulating how they would monitor for a broad range of nuclides.

And I think, you know -- there's several slides here but I think it's pretty clear and not surprising, I might add, that Los Alamos had a very well designed and very complete program.

Okay. Thanks.

But, again, the question that we were focused on as well, in addition to whether the program was broadly designed and scoped, was whether, in fact, it was implemented. A lot of the DOE sites -- and I can speak from experience because I was at DOE during this time period -- you had the world's top health physicists managing those programs. The programs were designed and the procedures were written as good as they could be written as far as I'm concerned.

The hiccup, the problem was always in the execution in terms of the line programs, implementing against

those standards and procedures, and to what extent you had, you know, complete adherence to things like bioassays and as far as checklists and all that.

So, when we looked at this, we wanted to look at the question of validation as well.

Let's see if I can do this. Here we go. Okay.

So, in any case -- so we were looking at the implementation part of it and our concern, essentially, was LANL performed a self-assessment in 1999, which turns out to probably be the most comprehensive look at whether or not the bioassay program was being implemented effectively or not. And it came up pretty short.

And the question that we're most concerned about is to what extent the rather quick sampling that they did in that particular review reflects some serious deficiencies in the completeness of the bioassay records that may undercut come of the assumptions that we have regarding that program.

So we really did not have a chance to go much beyond what was available in the compliance records, as far as that assessment. But we would only point out in reference to the whole question of the -- you know, the completeness of the bioassay program, that, certainly, this review suggests that it was -- it had some pretty substantial problems and it led to a corrective action that was finally accomplished in 2000 that pretty much rewrote a lot of the procedures, put a electronic tracking system in to assure that workers all got their bioassays, as required, and was a pretty substantial change.

So I guess our conclusion on this thing is that -- and we don't disagree that Los Alamos had a very formal and a very well established field monitoring program. What we have a problem with is leaving it at that. We think it's a functional program but we really have some questions of whether or not it was being implemented effectively on the ground. And it has

real implications for any conclusion that we would reach about the validity of the bioassay program.

Okay. The second prong on the NIOSH program is looking at a comparison of monitored worker dose to 100 millirem CEDE. And Los Alamos has, in response to questions, noted that certainly it only monitored what it was required to in terms of the anticipated dose.

In terms of the dose history for exposure pathways and for exotics and particularly for mixed activation fission products, Los Alamos was pretty clear that, you know, they did not see a potential for 100 millirem CEDE and they did not monitor for it on that basis and that their in vivo counting capability had the ability to pick up any exposures that may have occurred in any case. So that was kind of the answer and -- but they still could not really show any records, as well. So it was a little bit of a conundrum on that one.

Okay. NIOSH reviewed the LANL bioassay repository database and you can read the statistics. But, essentially, plutonium and americium made up over 80 percent of the records. Uranium and thorium made up about 20 percent of the balance of the records and there was also a considerable number, 7,000-plus records, that were consisting of fission activation products from the LANSCE operation itself.

And we'll get into LANSCE. But LANSCE -- the accelerator -- defense accelerator at Los Alamos was a prodigious emitter of gaseous mixed activation products. It just -- and it was dramatically probably one of the highest sources of off-site exposure in the '70s, into the '80s. So this was a very significant fraction that was being released.

In the primary nuclides, in this case, primary tritium, plutonium and uranium, over 450,000 urinalysis records for 1945 through 2008, just in general -- just some -- there were just a lot of bioassay records for the primaries. No question that, as far as Los Alamos

was concerned, this was the focus of most of the surveillance, as well as the monitoring that they did. There was a considerable number of records.

The question on this whole matter of monitoring records is just one of, yes, there's lots of primary -- a lot of records for the primaries but the basis for the SEC that this Board addressed some years ago for the preceding years were focused on the exotics. And that situation has not changed. We don't have any additional records, per se. And, at the time when we -- I think the Work Group was trying to figure out with NIOSH, actually, how, perhaps, the primary nuclides could be used as I think we call them radionuclide surrogates for these exotics.

I think, in the end, NIOSH concluded it just wasn't going to work adequately to do that to compare or to use them as surrogates. So I guess our sense at this point is that that's a bridge that's already passed and, really, the focus has to come back to what extent the exotics can be bounded someway, somehow. And, again, I think a lot of us were hoping Los Alamos had that information. But now it's becoming clear they do not.

I think that kind of puts us back to where we were when we looked at the preceding SEC time period. You know, is there any way to gain confidence that one can bound the exotics to at least 100 millirem?

And this gets me to this point that -- and this is a bit of a sidebar to our review -- but understanding that the source terms for a lot of the exotics, particularly the mixed activation products, were coming down readily. And what was happing in a place like LANSCE, the accelerator, they simply were looking at how could one reduce the emissions? So you weren't talking about 10s to 20s to even 100 millirem at the site boundary, which is kind of unheard of.

And a number of things, because these were short lived, they came up with holding -- you know, mechanisms that hold up the emissions so they

would decay. And they also dealt with the source term in terms of operational changes at the accelerator. The accelerator, itself, was being used less.

So, at least for this one particular source term, it became clear that, whereas that was a prime issue of discussion for the preceding SEC Class, I guess the question I wanted to tee up was: it looks like the source term certainly had changed by the mid-'90s and was -- and it was becoming rapidly smaller. And to what extent could that be a starting point to looking at whether or not other exotics were, in fact, not the issue they were and whether or not they could be bounded below 100 millirem, which I think would be an avenue to kind of address this question of, you know, whether the exotics could or could not be shown to be at less than 100 millirem CEDE.

And just, again, this isn't -- I mean, this is basically immersion dose but what this shows, I think in a quick way, is what's happening with this one source of mixed activation products from one facility, which is this LANSCE facility, over about ten years, into the '90s, the time period we're talking about.

And I think it's fairly dramatic that, really, you get down to a point where the actual measurable exposure is negligible by probably '96/'97/'98, in that time frame. And, if you took this curve and you took it out to the earlier years, it would go up even ten times that. So you're talking about a dramatic shift in releases of mixed activation products in that time period.

And I just took this right out of the environmental TBD. And, again, this was looking at occupational doses, external occupational whole-body doses to workers at LANSCE and adjacent facilities and really talking similarly, a dramatic shift in the -- from over 100 millirem in 1990 to something that is fractions by '98/'99.

So, again, just as a matter of perspective, I think

there may be some pathway where, you know, one could examine the source terms and establish whether those conditions have changed enough and whether or not there was data available that could allow you to look at this question of 100 CEDE without relying on, sort of, the regulatory status or to what extent Los Alamos may or may not have addressed the issue in terms of monitoring for exotics.

And this is something that we had Mr. Evaskovich, the petitioner, involved in. Los Alamos, I think, went through a fairly systematic review of all the various documents and records and comments that the petitioner had provided the Board and NIOSH over the years, since the beginning. And the Work Group had requested that NIOSH do a dispositioning of all those comments and issues. And that forms this Appendix A to the Report.

We have reviewed that. I personally looked through all of it and, other than the 835 issues or questions which we -- you know, is part of the broader discussion, we had one clarification issue, which we will be providing to NIOSH. But I think it was a pretty rigorous job and we will provide that comment to NIOSH as soon as we get a chance.

I will give you the NIOSH conclusion to its White Paper, as presented by LaVon at the last meeting. But the field monitoring contamination control program at Los Alamos, again, from their standpoint, was well established and formalized by this January 1st, 1996 cutoff date to ensure that workers that might -- may exceed 100 millirem were, in fact, identified and controlled or monitored.

And, again, based on a review of the existing bioassay records, again, based on the primary radionuclides, they felt that it was unlikely that workers would have received intakes exceeding the 100 millirem CEDE. And based on, again, looking at the program and routine monitoring and contamination control provisions, they didn't see any --

Mr. Katz: I'm sorry, Joe. Can you hold?

(Off the record comments while resolving telephonic interference)

Mr. Katz: Sorry, Joe. Thank you.

Mr. Fitzgerald: Okay. Let me just finish up on the NIOSH conclusion.

And, based on the fact that the program was well established and you had the primary nuclides as the basis for the monitoring, again, I think the conclusion was there was no reason to believe that the intakes of exotic radionuclides for unmonitored workers would be any different than the primaries.

Okay. From our assessments, our conclusions, and I kind of alluded to this earlier, we still believe there's just not any substantiation that 100 millirem per year of CEDE bounds the unmonitored intakes of exotics. I meant his was the basis for the SEC for '72 through '95. We just don't see any substantiation that has changed, other than the fact that the regulatory rule was issued. There just isn't any evidence on that.

And the second thing is that we still -- you know the 1999 self-assessment -- you know, normally, I'm skeptical about outside reviews. This one was a pretty detailed review. They actually -- this was something that Los Alamos HPs ran. They brought in some internal dosimetrists from some other sites that had similar issues with bioassay programs and they did an in-depth review.

Now, granted, it wasn't a -- you know, more than a few days but they were looking at themselves and I think, again, looked at the actual execution of the bioassay program, whether or not -- not just the standards but whether the standards were being implemented or not. And the real motivation is that there was a moratorium that DOE had put in place that said, basically, if you find it first, you know, we're not going to take an enforcement action against you.

So it was very much to their credit to, in fact, find issues and be able to come forward with those issues in that time frame; otherwise, face enforcement action later. So, again, this wasn't just Los Alamos. This was every single DOE site in the complex was being asked to take a look, see if you have issues with your bioassay programs and, if you do, self-report. And that was happening in the '98/'99 time frame.

And that's the -- sort of the basis of our last conclusion, is that, you know, this whole question of a paradigm shift, I think -- I think we can answer that with DOE's conclusion that they had a major problem in about the '98 time frame. They were finding common issues of implementation of the bioassay program implementation at the various DOE sites, at least five major sites. And they decided, at that point, to have all the sites take a look and come back with any results of their review and that, after a certain grace period, they would come in and actually do a pretty rigorous enforcement review of this issue. So that's what was happening in the '98/'99 time frame.

And, with that, I think LaVon's going to talk about some actions.

Mr. Rutherford: All right. So I'm going to talk about our path forward. The main thing is we're going to respond to the 1999 self-assessment. We issued a White Paper that identifies the findings of the assessment, provides the background information for the findings and corrective actions taken by the site. And we'll talk about how it affects dose reconstruction.

We plan to have that by March of next year. I think we've got all the information to do that. And we'll also draft a plan and schedule for addressing how we will reconstruct the mixed fission activation products and other exotics. And we expect to have a plan and schedule by March of next year.

Yeah. There you go. And that's it.

Questions?

Mr. Katz: Questions from Board Members, including Board Members on the line?

Member Anderson: No questions from me.

Mr. Katz: Are you back, Andy?

Member Anderson: Yeah.

Mr. Katz: Josie?

Member Beach: I don't have a question but I --

Mr. Katz: Jim?

Member Lockey: I have a question. Joe, is --

Mr. Katz: Wait. Can you speak into the mic?

Member Lockey: This is Jim Lockey. I just want to --

Mr. Katz: Yeah. Just speak into the mic, not --

Member Lockey: Joe, is this -- is -- I know we shouldn't be worried about time but I am worried about time. Is this it, then? Is -- with NIOSH addresses these issues one way or the other --

Mr. Fitzgerald: Yeah. I think we're pretty much on the same page. There's two central questions. One involves the implications of the '99 self-assessment.

Member Lockey: Right.

Mr. Fitzgerald: And the other is this older question of whether one can, in fact, bound the exotics. That is it.

Member Lockey: So no additional questions going forward other than these two?

Mr. Fitzgerald: Yes.

Member Lockey: Okay.

Mr. Rutherford: Yeah. And I'd like to add that the thought process here is provide the plan and schedule to the Work Group and make sure the Work Group and SC&A are agreeing with that plan and schedule. And, hopefully, we don't get any more of the back and forths in the process. So --

And then I had mentioned to Joe on the side we may have some technical calls in between now and March. And I will make sure I contact Ted before anything like that's conducted.

Mr. Katz: Okay. It also occurs to me and it probably occurred to you before it would occur to me but you may want to work with the site when you're coming up with your plan with them realizing that this is urgent and maybe that can help you with your time line, to keep it as reasonable as it can be.

Mr. Rutherford: Yeah. Our intentions are to -- if we identify additional data captures that are necessary in the process of developing our plan, we will get with the site to make a -- I'm sure we can work out a reasonable schedule that -- to get any additional information that we need.

Mr. Katz: Yeah. And I think Greg will be on his toes to help if he needs to.

Member Beach: Okay. I was just going to say moving forward, once the plans -- when you're finished with the plan, that will go over to SC&A and then we'll have a Work Group meeting or a Work Group call to --

Mr. Rutherford: Yeah. Definitely. I would think we would have a -- I would -- you know, I mean, this is obviously your call but I would think we would have one in March anyway to go over the 1999 -- our response to the 1999 self-assessment.

Member Beach: Yeah. I just didn't want to -- I want to give SC&A enough time to look at both of those before we meet but --

Mr. Rutherford: Right.

Member Beach: -- depending on when it comes out in March, maybe end of March, first of April --

Mr. Rutherford: Right.

Member Beach: -- so we have something. I don't want to just have a meeting and then have to wait for SC&A to come through. So that's --

Mr. Rutherford: Right.

Member Beach: -- you know, what my thinking was.

Mr. Katz: Yeah. And SC&A can add -- it'll be an opportunity, even though they'll have just received the report, to ask clarifying questions and so on that helps them with their review of the report. So --

Member Beach: Right. And then we also --

Mr. Katz: Yeah.

Member Beach: I know we're talking about having things done at the end of February, because of the ongoing contract stuff. So I don't know how that'll progress.

Mr. Katz: Well, that'll be a new contract here and a new -- whole new contract at that point, assuming that that gets awarded right. It's all out of my hands at this point.

Member Beach: Yeah. I know. I know.

Mr. Katz: Yeah.

Member Beach: Okay. Thanks.

Mr. Katz: Okay. Any other matters on this issue/matter, on this topic from Board Members or on the line? Anything else for the good of the -- no?

Do we have a motion to adjourn?

Adjourn

Member Beach: I make a motion we adjourn.

Mr. Katz: A second?

Member Lockey: I second it.

Mr. Katz: There we go. We're adjourned. Thank you everybody on the line. Thanks for sticking with us. I know it's hard. And here in the room and for all the staff work and so on.

(Whereupon, the meeting in the above-entitled matter was concluded at 1:55 p.m.)