Centers for Disease Control
National Institute for Occupational Safety and Health
Advisory Board on Radiation and Worker Health
Metals and Controls Corp. Work Group
Wednesday, September 2, 2020

The meeting convened at 10:30 a.m., Eastern Daylight Time, via teleconference, Josie Beach, Chair, presiding.

Present:

Josie Beach, Chair
Henry Anderson, Member
David Kotelchuck, Member
Loretta R. Valerio, Member

Registered and/or Public Comment Participants:

Rashaun Roberts, Designated Federal Official
Nancy Adams, NIOSH Contractor
Bob Anigstein, SC&A
Bob Barton, SC&A
Zaida Burgos, NIOSH
Grady Calhoun, DCAS
Michael Elliott, Petitioner
Rose Gogliotti, SC&A
John Mauro, SC&A
Pat McCloskey, ORAU Team
Jenny Naylor, HHS OGC
Charles Nelson, DCAS
Lavon Rutherford, DCAS
Mutty Sharfi, ORAU Team
Tim Taulbee, DCAS

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Proceedings

(10:30 a.m.)

Roll Call/Welcome

Dr. Roberts: Good morning, everyone. And welcome. I'm Rashaun Roberts. I'm the Designated Federal Official for the Advisory Board on Radiation and Worker Health.

This is a meeting of the Metals and Controls Working Group. We have a six-item meeting agenda today if you've seen it. If you haven't seen it yet, you can find the agenda on the NIOSH Website under Scheduled Meetings for today's date along with all of the meeting materials which were disseminated to the Working Group in advance.

I'd like to officially welcome all of you again to this videoconference. First off, let's go ahead and address the issue of conflict of interest.

And I will go ahead and speak to that with respect to the Members of the Board who sit on this particular Work Group. My understanding is that in order for them to serve on the Metals and Controls Working Group, they cannot have any conflict of interest.

So with that, let me move into roll call for the Members of the Board who are on the Group, starting with our Chair and then in alphabetical order.

(Roll call.)

Dr. Roberts: I just want to cover a few additional items. In order to keep things running smoothly as was mentioned, let's go ahead and ask you to please mute your phone unless, of course, you're speaking.

If you don't have that mute button, press *6 to mute. If you need to take yourself off mute, press *6 again. As I --

Mr. Elliott: Excuse me. Excuse me, Dr. Roberts. I apologize for interrupting you. Did you ask for petitioners to introduce themselves?

Dr. Roberts: Members of the public, yes.

Mr. Elliott: Okay. I'm sorry. So this is Michael Elliott. I'm one of the petitioners for SEC Petition 236.

(Simultaneous speaking.)

Dr. Roberts: Okay. Thank you so much and welcome.

Mr. Elliott: Thank you.

Dr. Roberts: Are there any other petitioners or members of the public? And, just let me circle back. Has Valerio been able to join?

Ms. Burgos: I see that she's in, but she's having trouble.

Dr. Roberts: Okay. All right. It may be enough that she's there so why I don't I go ahead and move on and hopefully things can get situated for her as we move along.

So again as I was saying, please if you're not speaking, please make sure that you're on mute so that we have as little interference as possible and the Court Reporter can follow along accordingly.

So as I mentioned, the agenda for the meeting can be found on the website. Other materials can be accessed there too.

So let's go ahead and get started and I will go ahead and turn the meeting over to the Chair, Josie Beach. So it's yours.

Chair Beach: The Chair who just lost the video. Hang on. There are so many fun buttons, but. So I have a question for everybody. Looking over the agenda and realizing that the Roadmap, we can go through this Roadmap step by step, but some of the

items that come after the Roadmap, oh, just a second.

I have totally gotten myself out of here. Give me one second. Oh, my goodness. I don't know where I ended up. Can you all still hear me?

Dr. Taulbee: Yes, we can hear you.

Chair Beach: I have totally lost where my -- I apologize. This is a new one for me here.

Dr. Taulbee: There you are. Nope. You just left.

Chair Beach: Nope. Yes. So I'm -- don't know how to get it back on my actually on my screen.

Dr. Roberts: Let me just verify. Did I just hear Loretta say something?

Dr. Taulbee: No, I believe I see Loretta.

Dr. Roberts: Oh, you see it.

Review of the Issues Resolution Roadmap, Work Group Resolutions, Additional Tasks

Chair Beach: There we go, okay. So back -- I apologize. This technology's a little different. So the Roadmap.

Do we want to go through it step by step or does it make more sense to go through some of the papers that support items in the Roadmap?

Dr. Mauro: I hate to interrupt. This is John Mauro. The Roadmap is very long.

Chair Beach: Yes.

Dr. Mauro: And, we did go through it at our last meeting.

Chair Beach: Correct.

Dr. Mauro: And I believe LaVon Rutherford in effect was asked to respond to the Roadmap in his slide

presentation so I'd be more than happy to go through any aspect with Rose --

Dr. Roberts: John?

Dr. Mauro: Yes.

Dr. Roberts: You have both your phone and your computer on so you're giving us a signal.

Mr. Rutherford: I think John suggests that I go ahead and do my presentation since it covers most of the points that were identified in the Roadmap discussion.

Dr. Roberts: Yes, that way would probably be best.

Chair Beach: Yes, I agree. I agree with that also.

"Response to Metals and Controls Corp Working Group Comments," NIOSH Response Paper dated July 16, 2020

Mr. Rutherford: Okay, if everybody's in agreement with that, I will try to see if I can share my screen and everybody sees me so far.

All right. Now let's move on. Okay. I'm LaVon Rutherford. I'm going to talk about the, our response paper we put together. Those who remember back in April we had a Work Group meeting.

SC&A presented the Issues Resolution Roadmap and provided updates. The Work Group and petitioners discussed the issues, expressed some concerns and made some comments.

We were identified, we were tasked with going back to look at a few things. The response paper that we put out and I believe Mr. Elliott got a hard, got a copy of that sent to him.

I did notice that the response paper was not on our website. At least not in the location of the meeting. I know the Board Member, or the Working Group

Members all got copied and I believe SC&A got copied as well. So that response paper addressed the issues that were identified from that Work Group meeting. The first comment that was made by the Work Group, was a general concern was expressed that maintenance work performed at Metals and Controls is unique and therefore standard modeling procedures do not apply.

The Work Group requested a summary of bounding methods used at the sites with a residual radiation period that were added to the SEC compared to Metals and Controls.

So we went back and we looked. There were 16 petitions that covered 15 sites that had evaluated periods that were either part or in the entire evaluating Class falls within the residual period.

Uranium was present at all the sites and thorium at seven of the sites. Simonds Saw and Steel, Norton Company, Blockson Chemical, Dow Chemical, Metals and Controls, Wah Chang, and United Nuclear.

There were three evaluations that resulted in additions to the SEC. Two of those had partial additions of the evaluated period, that's Linde Ceramics and Norton Chemical Company and the third the entire evaluated period of Vitro Manufacturing was added.

Linde Ceramics, the operational years, Linde Ceramics processed uranium ores for the AEC so you were dealing with all uranium progeny and the disequilibrium created from processing that year, that uranium ore called the operational period at Linde Ceramics to be added to the SEC.

The 1954 through and I've got something sticking up on my computer. I can't read it. Until July of '06 I believe. That covered the entire residual period.

During that residual period, the Advisory Board split the entire period into two periods. Renovation period January 1, 1954 through December 31, 1969

and then the remaining balance of that residual period January 1, 1970 to July 31st of 2006.

Linde Ceramics went through a very aggressive D&D effort. They vacuumed, sand blasted, resurfaced, plain cleaned and dismantled equipment. Multiple plants were involved.

Plant B was the worst. The furnace area had smears that peaked out over at 100,000 ppm per 100 centimeters squared alpha prior to the D&D. And after D&D, it was about 8,000.

The furnace area pre-D&D average was about 10,800 ppm per 100 centimeters square. It also had air data which was used for the DR methodology. This is and I'll discuss that later.

Just as a comparison, this data on the concrete from the floor at Metals and Controls was 12.3 ppm per hundred centimeters squared.

The Board felt that the renovation period dose could be bounded with air monitoring data captured during monitoring from earlier renovations but were not plausible for site-wide application for non-D&D workers.

This was a 17 year, or 16, 17-year period that the actually it was a 15-year period that the Board felt that giving everyone the 5,479 millirem per year was really not plausible for that entire period.

They could see it for the D&D workers, but not for everyone else and so they recommended a Class for that period.

Norton Company during its operational years, it produced hexagon shapes using a uranium and thorium oxides and it was added to the SEC.

The residual period is January 1, 1958 through October 31st, 2009. This is one of the first ones where we looked at the D&D operations that occurred during that period.

We had some operational data that we had during the operational period obviously. And then we had some later data so the typical OTIB-70 approach or, you know, TBD-6000, things we would normally use.

We looked at this D&D period or this tear-down period and it occurred from January 1, 1958 to October 1962 and we recognized that cleanup significantly for the materials present placed employees close to disturbed materials.

During this tear-down, there was a kiln that was tore down, there was a furnace -- I'm getting some background feedback. Somebody has a phone that's not muted. Thank you.

Again, during that period, they tore down kiln and a furnace and we felt that both of those would significantly alter the material.

A bioassay and air sampling data were identified for the periods both before and after this time, but no data were identified during teardown and cleanup operations.

From October 1962 through October 31st, 2009, we determined the available data was sufficient. Vitro Manufacturing, again this is another one where they were processing uranium ores during the operational period and generated waste piles containing uranium and progeny no longer in equilibrium due to processing.

Between 1960 and 1965, the site performed remediation and transfer burial of the residue waste piles. There was no personal monitoring data, no workplace monitoring or source term data to estimate exposures to the residue storage site decommissioning and burial operations.

So this was an entire period was added. Our conclusion from it, is that it was clear that these three residual periods that were added were sites with unusual work activities with high dose potential

for which NIOSH was unable to evaluate the source term.

This is not the case at Metals and Controls. You know, again, we had both Linde and Vitro dealt with uranium ores and Norton dealt with uranium and thorium oxides.

The distinction between the potential for a high dose and for a low dose is important because according to former Chair, Board Chair, in circumstances where the absolute value of the exposure may be much higher, we're much more concerned with how accurate these dose estimates may be.

So we also looked at, we thought it would be appropriate to look at the other sites that were not added to the SEC. So there were eleven AWE sites that were not added that residual period was evaluated.

Carborundum Company, Baker Brothers, Hooker Electrochemical, Chapman Valve and Bliss & Laughlin. Chapman Valve, the petitioner requested Class included engineers, master mechanics, steam transfer foremen, steam fitters, machine repair, steam fitting and plumbing, maintenance foremen, electricians, janitors, decontamination workers and firefighters.

So they had the whole gamut included in that. And, it's also interesting with Chapman Valve that we estimated, the re-suspended dust during the residual period and calculated the worker dose using that projected data similar to Metals and Controls.

But the 11 sites also included Bliss & Laughlin Steel, Simonds Saw and Steel, Blockson Chemical Company, Dow Chemical Corp. and General Steel Industries. Blockson also included maintenance workers as well, specifically call out -- this petitioner specifically called out maintenance workers.

And then Wah Chang and United Nuclear Corp. Our conclusion on this is that Metals and Controls

operations were similar to operations at these other sites.

We actually did a search for terms, that similar terms, work terms that you would expect through these Evaluation Reports. We looked at welding, roof and rafter contamination, excavation, pipe, burial and sludge.

All of these terms were searched and at least one of these terms was included in all of these Evaluation Reports. One or more.

The methods proposed for Metals and Controls by NIOSH and SC&A are similar and consistent with those previously approved by the Board.

The types of radioactive material, the craft personnel who work with the material and the tasks performed in Metals and Controls are found across all of the AWE sites.

Josie, I can go through all of this or I can stop after each section, comment and response. Whichever you prefer.

Chair Beach: I -- it might be helpful if we just stop in between each one --

Mr. Rutherford: Okay.

Chair Beach: -- to hear whatever the Board Members think.

Dr. Roberts: And if I may, there's some interference that I'm hearing. Is someone on the phone? I think the area code is 781. If you could please mute, it may make things a little clearer for people.

Mr. Elliott: Josie, this is Mike Elliott. I'm at area code 781, but I do have my phone on mute so.

Chair Beach: Okay. Great.

Mr. Elliott: I'll try again.

Chair Beach: Yes, if you're on mute, I think you're probably okay.

Dr. Roberts: Thank you.

Chair Beach: Yes, this is interesting. Okay. So any comments on that first part? I had a couple. The first part is and I'm not working from your slide, but just that first section where you quoted that review of the sufficient accuracy and data back to the ten-year review.

It's kind of interesting because you look at that quote in its context we're looking, the low dose, I mean I looked through here and I can quote Stu and he states that it's just very difficult given the variety of situations that you run into.

And in terms of exposure potential and records of availability and I go back to Metals and Controls and that actually Metals and Controls we're using sample data from the mid '80s and '90s.

We don't really know what the doses were in exactly in those pipes. And, I guess, LaVon, I have to go back to the low dose. There are some pretty high doses in Metals and Controls in that, those piping lines.

And I'm wondering why we're pushing this as a low dose.

Mr. Rutherford: Can you hear me right now?

Chair Beach: Yes.

Mr. Rutherford: I'm making sure I'm not muted.

Chair Beach: No, you're good.

Mr. Rutherford: Well, I think if you, you know, in later on in the presentation actually I get into that in even much more detail. But the high values were only in the drain lines and it was the high value in the one sample was roughly 53,000 picocuries per gram which is actually, yes, a very high sample.

I mean, I would consider that close to operational. It's 10 percent of the specific activity of natural uranium. But if you look at the models that were developed in the amount of time that people were exposed to that, the doses that come out of that are very low.

And when, in fact, when I get to my later on in the presentation, it's coming up next, you know if you look at the total amount of uranium exposure of roughly 92 millirem, that if you were only considering uranium and not thorium, that would not meet the monitoring thresholds for regulations that we deal with today.

And I think that, what I was trying to point out during this first part is these activities are not dissimilar to what we've already evaluated.

We've evaluated these at all of the AWE sites from various different, I mean magnitudes and we've also, you know, we've used the resuspension model consistently.

And I think if you hear some of the other quotes that come out in here, it's pretty consistent with, you know, Dr. Melius is pretty consistent throughout it. And the fact that these low exposures, we've got to allow for more variability.

Chair Beach: Well, if you go back to Linde, Linde was two populations. One was a low dose and one was a higher dose and you really didn't know what the exposure potential was and I guess that's my argument here is there was one pipe in that west end that was up to a million that they found.

So with the cleanup that was involved, you don't really know how much of the source term was taken out of there in that 30, or 15 to 30-year period. So I'll leave it at that.

Mr. Rutherford: I think I'll address a little bit more of that later on in my presentation.

Chair Beach: Right.

Mr. Kotelchuck: If I may, LaVon.

Mr. Rutherford: Yes.

Mr. Kotelchuck: I mean, what you're saying and I think proven, is that what you're doing here is just what you were doing at all the other sites and that this is normal.

This is normally the way things are handled. To me that's the problem. The problem is, from day one, when we heard the petitioner and then read the interview, at least, you know, that it seemed to be a fairly, to my mind, unstable, rather chaotic situation in which people thought for years there's no problem, we don't have radioactivity. That is because the place was cleaned up by M&C after the operational period.

And, we find no, we're going to check the burial site in 1984 to see you know or eventually getting out of the way. And they start finding things. And then from '84 to '96 they're doing work on the burial pile, people are functioning without consideration that they're working in a site that has a radioactive potential.

And that to me from day one has been the problem and that influences my perspective. So but, I don't doubt that you're correct. And I agree with you. You were doing what you always do. And, that's okay.

Mr. Rutherford: You know, I would like to throw out a couple of things. So I recognize that -- and I understand exactly what you're saying. You know, but if you think about the residual period that we have at these sites, and, you know, yes some of these sites they should have monitored.

They have monitored through the residual period and, you know, and some of them they shouldn't, but if you look at the exposure potential and whether we can bound the dose of the workers, I

believe we've shown that we can do that and SC&A's agreed with us.

Additionally, these doses are extremely low and knowing the fact that the doses are low, and in these residual periods, you're not going to get the monitoring that you have during operational periods.

The doses are low and also, recognize that because these doses are so low, you can allow for variability because it's not going to change the compensation decision.

That's what Dr. Melius, in my opinion, meant was when these doses are that low, you're allowing a lot more variability because it's not going to change the compensation decision.

And, you know, I think that as I've mentioned, that we've already talked about all of these activities are activities that have been covered at other sites.

And the approach that the Board has gone through dealing with residual contamination followed that in M&C. In fact, I think we've looked at things a little closer because of some of the questions that were brought up.

And also, and I'll get into that more, but recognize we used the 95th percentile of the data that we had available. And that data and I know the concern is well that data was taken later on.

But looking at that data, look at what the, you know, the highest number we've got 53,000 picocuries per gram in a drain. That's 10 percent of the specific activity.

That's numbers you'd see during operations. That's not numbers you're going to see so in that same area it was 90 percent flawed.

That area hadn't more than likely as SC&A has put out and we've put out, was not touched. And then

we consider that value the entire time. And again, I'll get into that discussion more, but I just know now.

Mr. Kotelchuck: Okay.

Chair Beach: Before you move on, there's a background conversation going on. I don't know if anybody else can hear it. Just real briefly while you're talking you can hear other people talking so I just want to remind people to mute their phones or computers.

Mr. Rutherford: I appreciate that Josie because I could hear, heard it too.

Chair Beach: Yes. Yes. Well and then back on that dose, the 53, that is not really the highest dose. It actually went up to 59 and then the one that was clear up to a million so and you said you're going to touch on that a little bit later. I know I'll save my other thoughts for that.

Mr. Rutherford: The million value, I may need some help with that from Pat McCloskey and Mutty.

Chair Beach: There was one spot and if you look at the drain lines, western drain lines, it was near Page 4, 1 and 4. Anyway, it was one, it was just a real brief paragraph at the start of that report that talks about that high dose and I just want to touch on that because I still think this is an unusual site.

And I know we'll talk about that some more. I don't want to dominate. Loretta or Henry, any thoughts or comments, questions?

Mr. Anderson: I don't have any, no. I'm good.

Ms. Valerio: Josie, can you hear me now?

Chair Beach: Yes.

Ms. Valerio: It was quite a challenge to get in, but I'm in so I didn't hear everything that they had to say.

Chair Beach: Okay.

Ms. Valerio: It took me, like I said, it took me quite some time with Zaida's help to get in, but I --

Chair Beach: Well we're glad you're here. Don't touch any buttons to get out.

Ms. Valerio: But as far as the site, yes, it is it's very complex, I think that, you know, reading the materials, yes. I'm not real sure where we're at.

Chair Beach: We're just under the first comment and we're going to move into the second comment now, so you didn't really miss much.

Ms. Valerio: Okay.

Mr. Kotelchuck: Could I -- you said toward the end of your what you were saying, you said that, well, people didn't go in there very much. I think, from what I understood, did I misunderstand you?

Mr. Rutherford: I didn't say it right.

Mr. Kotelchuck: There are a number of cases that people had to dig underneath those events that they had to clear the pipes, replace the pipes.

So I don't think we can say oh there was only one time that's when they did the measurements that the pipes.

Mr. Rutherford: No, that was not what I said. There was one value. I was saying that there was one sample that was significantly high. And I'll get into that discussion.

Mr. Kotelchuck: All right. Fine. And also, just to say, I do appreciate that we have raised a number of questions. And it seems to me you and SC&A have tried to respond to them.

And, I respect that. I mean, there's a dialogue here and you are trying to make us understand, if you will, that this is really to be handled just like any

other site.

And so far, I have doubts and disagreement, but we're talking and I also when we disagree, I don't feel like, oh, you're not listening to me. You are listening to me. You are trying, SC&A is trying and I hope we can resolve it. Anyhow, you go on.

Mr. Rutherford: Okay. All right. I'll talk about the Work Group Comment 2. A general concern was expressed that although none of us use the same procedures to bound doses at Metals and Controls as were used in other sites.

The Work Group was not convinced that supporting data was sufficiently accurate or adequate. Okay so, the Board's position and guidance that NIOSH has been following that the uncertainty around the work performed or for the complete understanding of the work performed is not an issue when the bounding doses are very low and specifically, during AWE residual period such as Metals and Controls.

So these are two quotes from Dr. Melius that, you know, I think are pretty good. With the residual period, we are going to have lots of situations where we don't have very much information on the activities, usually very little sampling data.

We are going to be using OTIB-70 a lot in these situations without knowing much about what individuals did on the site. He also said, if you look back at of our decisions and the absolute value of exposure is relatively low, then we're willing to accept more variability in the dose.

And if the exposures' absolute values are higher, then we're looking for a more accurate dose and such. So these are the uranium dose estimates that between SC&A and NIOSH, we've put together.

And if you look at these, we have the subsurface we assume a two-month period internal and external, HVAC one hour, operation, roofing and ceiling one month, welding 48 hours and then the remaining

nine months.

So our total 12 months, as I mentioned, our total dose here for the uranium is 92 millirem per year. Again, if I assumed only uranium, this would not meet the monitoring thresholds for today.

Under 10 CFR 835, 10 CFR 20. We believe that it, that NIOSH, when they estimated maximum radiation dose that it could have been incurred under plausible circumstances.

Even under these maximizing conditions, they estimated dose of workers was quite small. And these are some of the maximizing things that we've done.

We used the 95th percentile on the subsurface model, HVAC model, roofing and ceiling, and welding. We've used ten to the minus third in resuspension for welding model.

We've used 200 milligrams per cubic meter for the dust load HVAC. And we assume the same person doing all of the work so again, everybody that was on site is a Claimant today, we're assuming that or that was a Claimant during that period, we're assuming they did two months of subsurface work.

They did it one hour of maintenance work. They did one month of the roofing and ceiling and the welding and then you know so we're not just saying maintenance worker.

We're saying all workers. We're not just saying in certain individuals. Even though we know not the same person did all of this work. And then we're using the most Claimant favorable solubility time.

Dr. Mauro: LaVon?

Mr. Rutherford: Yes.

Dr. Mauro: Can you hear me?

Mr. Rutherford: Yes. I can, John.

Dr. Mauro: I'm sorry to interrupt, but there's one more point --

Mr. Rutherford: Yes.

Dr. Mauro: -- that I thought about recently. In order for those levels of exposure to occur, we're assuming that the soil beneath the Building 10 which is one of the dominant pathways, is at about 1 percent of the concentration of natural uranium.

And now, if you think about the volume of soil underneath Building 10, we're talking about tons of uranium that were lost in the AW handling.

So in effect, it's a circumstance that I believe is a substantial overestimate because no NRC operation is going to proceed and allow the loss of thousands and thousands of pounds of uranium in the process.

This is almost prima facie evidence that the fundamental strategy we're using is extremely conservative. Because if that much uranium was lost, it would have been, now we're talking during the AWE operations which is responsible for the subsurface uranium in the AWE period.

So this is something we've never mentioned before. And it gives another level of argument of why the scenarios we picked are extremely conservative. I hope you understand the point I'm making.

Mr. Rutherford: Yes. I do, John. It's a good point.

Mr. Kotelchuck: So okay, so you're saying that these losses could not have been occurring during the AWE period and at the levels we're concerned about so what's going on in the residual period has to be less than that. It has to be small? Is that what you're saying?

Dr. Mauro: Yes, that's my point. That we've truly bounded what might have been in the subsurface environment because at that level at that one percent of the uranium, that would be quite a loss

of processed uranium that would have occurred and would have been noticed by the NRC.

During the process that you have safeguard controls so it sort of put the real, it got me to a point to realize we're operating under extremely conservative assumptions by assuming all of the workers that worked in the subsurface environment whether they were doing repurposing or maintenance or are in a hole under Building 10.

That's where most of the exposures are occurring. That for them to be always exposed to soil where the concentration of uranium is 1 percent.

If you add up that volume, we're talking about thousands of pounds of uranium that in theory was lost and that really convinced me that we're operating in an extremely conservative bounding mode of operation.

And even then, doses we're talking about when you combine that with the fact that we're assuming the same person is always doing those activities. You put those together.

We're in a domain that is extraordinarily conservative and still we're seeing doses that are extremely small.

Mr. Kotelchuck: Well, certainly they're conservative assumptions. And like having everyone, acting as if everyone was doing that work and being exposed to every single thing.

But I wanted to ask you, do you have a sense, do you know the flow through the pipes during the operations period? You're saying it had to be, you know, there had to be tons of uranium going through which would not be noticed.

I mean we do or you do know or LaVon? Somebody knows the flow in the pipe? Scratch that. No, that it would result in tons of uranium being lost if that were the case.

Mr. Rutherford: Yes. Dr. Kotelchuck, I think John's point was more of the fact that we know what we've done is conservative because there's no way that that amount of material would be underneath there and the AEC allow it or the NRC allow it.

In 1 percent of, I mean, that would have been way more material. Their material controls and accountability would not have allowed that.

It's not whether the piping would have allowed it or not, it's more of the discussion of this is a very conservative model and it's proven by the fact that there's no way that they would have allowed that amount of materials to be mixed into the subsurface under Building 10 from a materials controls and accountability.

Mr. Kotelchuck: Okay.

Chair Beach: This is Josie. It seems to me that the materials and control is in question based on some of the interview reports that I've read where, I mean we found fuel rods outside in the burial grounds and inside.

So we have interviews, quotes where people are walking around holding uranium metal taking it from one area to another without gloves or not even realizing what he's carrying so I guess I question what would actually happening the in the AWE period and how stringent they were?

Remember they released a site a couple of different times and then ended up digging the whole site up so why --

Mr. Rutherford: I agree. You make a good point about that, Josie. Now, --

Chair Beach: I understand what John's saying, but.

Mr. Rutherford: It's just that the magnitude of one percent is a lot more than a few fuel rods. All right, if there aren't any other questions, I can go on to

Comment 3 now?

Okay. Comment 3 was although the doses are small, the workers questioned the adequacy of survey data from the '90s to bound doses incurred in the '70s and '80s.

We'll make a couple of points here. Surface- and mass-based contamination surveys are almost never performed by radiological facilities for the sole purpose of assessing doses.

However, they are routinely used to assess exposure potential. The application of recent suspension factors and dust load estimates and surface and mask-face contamination surveys are very common.

An accepted approach used today to meet the requirements in 10 CFR 20 and 10 CFR 835. The Board has routinely approved the use of such data to down doses when the data selected creates a Claimant-favorable and plausible dose estimate.

So again, we had, you know, we have been, put together bounding scenarios for 15 of the 16 sites using contamination survey data. The one lone site that we did not do that is because we needed air concentration data at Linde and interpolated that data.

We also went back and we looked at okay, you know, we used this 95th percentile and which is 1 percent of the activity in natural uranium as our bounding dose or bounding concentration.

And we'll need to go back and look at drain-line data from other AWE sites and see if it looks like the drain-line data is uniform or if it has a clear distribution and that where there's significant difference at the ends.

So we looked at these six sites. These data were used to determine the likelihood that the 95th percentile specific activities for specific activities for

Metals and Controls could be considered bounding.

We reviewed Vitro, Bridgeport, Horizons, Peek Street, Mallinckrodt, and DeSoto. In each of the cases, the maximum specific activity was at least an order of magnitude larger than the majority. This indicates that although there could be sporadic hot spots, one is unlikely to encounter systemic exposures to the drain line sediment at the 95th percentile.

Now the M&C data of the 20 sediment results, 16 are at least an order of magnitude less than the 95th percentile. The point here is that this 95th percentile, by taking that number, we're assuming that person hits that number every time they dig, every time they're in there, they're in that 95th percentile.

And it's clear if you look at the 20 sediment results we have, 16 are at least an order of magnitude below that so when they're digging in those 16, they're in an order of magnitude lower than what we've estimated.

And we've also, you know, you can look at this as we've proven with the other six sites that we've looked at, the maximum specific activity was at least an order of magnitude larger than the majority of the other standards. So this is consistent.

We're seeing this. You have this big distribution cluster where you can have very large numbers and the rest of the numbers be much lower. And we've used that 95th percentile considering all the activities.

Although the worker expects, you know, in addition to the discussion we've had about the activity that we've assumed is one percent of the specific activity of natural uranium, we also wanted to point out that that one soil sample, as I mentioned, was in an area that was 90 percent clothed.

Okay, and that specific area of sample was 10

percent of the specific activity of natural uranium. And, so in addition to that, we also looked at the contamination levels surveys that we've done in 1983 to 1995.

These surveys were done for HFIR, but they were in Building 10 area. If we could provide some additional assurance that this value is conservative.

During the first 14 years of the residual period, 1968 to 1981, Metals & Controls performed routine alpha contamination surveys in Building 10.

If wide-spread removal alpha contamination existed at levels higher than the 95th percentile in the areas where maintenance was performed, then routine surveys would have eventually identified tracking throughout the plant during this 14-year period.

If you think about it, no monitoring going on and they're doing maintenance activities and they're doing this work and they're tearing into it, no contamination control, no nothing, and it's at the 95th percentile.

You continuously do this, you're going to spread that contamination throughout the facility and those routine contamination surveys would have picked it up in that first quarter.

So again, this is another reason why we feel that this 95th percentile is a good number. That's it.

Chair Beach: I've got a couple of things on this one unless --

Mr. Rutherford: Okay.

Chair Beach: -- somebody else has anything. So part and I'm going back to your White Paper. Part of your paper talks about the contamination surveys during the residual period.

Mr. Rutherford: Right.

Chair Beach: So the first one talks about the one with SRDB number 16985. It's the Safety Manual. The safety program. I noticed you didn't mention it in your comments, but it took up a couple of paragraphs.

That manual, when I go back through every single interview and you asked a question of the workers in that time period, not one of them can tell you they've seen that manual or had any type of radiation training whatsoever.

So I thought that was kind of interesting that you put that in there and then it does say on Page 7 of that manual that all new employees will be given orientation by a health physicist which I don't believe they had one on staff at that time.

And then that goes into the next paragraph when you're talking about the M&C engineers were considered pioneers in low-level alpha counting.

I found that just to be a sales brochure for the M&C plant, all the products that are available because they were the first private company so I was kind of thought that was interesting that you added that in this document.

It really doesn't have anything to do with 1968. Most everything's quoted in for '57 timeframe. The other thing is there, they mentioned on Page 34 of that document all the different qualified people that work at Metals and Controls and there's not one mention of a Health Physicist on staff.

So I thought that was kind of interesting based on this whole comment under Worker Comment 3. And then the last point I wanted to make is you did in your slides talk about the first 14 years of the residual period. The '68 '81 timeframe. For you have samples.

There's no SRDB noted with that paragraph so I wasn't able to go back and find where you're getting those doses and that seems to be new information

to me. Can you go back and tell us where those air samples are, what document?

Mr. Rutherford: I can definitely, I can, I'm sure that ORAU can give me the SRDB numbers, but those were alpha determination surveys associated with or as HIFR.

Chair Beach: Yes.

Mr. Rutherford: That HIFR crossed over that activity of the other program.

Chair Beach: Right. But there should be a place where we can see what those examples are. And I mean if you go back to all of the interviews, that may been occurred --

Dr. Taulbee: Josie, you've been -- inadvertently muted your computer.

Chair Beach: No, it said the host muted me. Can you hear me now?

Dr. Taulbee: Yes.

Chair Beach: Yeah. Anyway, I guess I'm talking too much. If you go back and you look through those interviews again, which I have done a couple of times, they were mopping that area, the HFIR area and then they were dumping the mop water outside.

So the controls you are talking about are kind of non-existent, in my opinion, because if it was a contaminated area and they were being careful, they later found that area where the mop water was being dumped to be contaminated.

So it just goes back to the lack of training, the lack of knowledge of what they were dealing with. And so I don't have a lot of confidence that they were tracking what came out of there and what might have went through Building 10.

So those are my comments. Anybody else have any

before LaVon goes on?

Member Anderson: Yeah, this is Andy. I have the same sense there that they may have the documents and the plan, but it didn't really look to me like, at least from the interviews, that they had been implemented to any extent.

So they may have gone through the upfront work-up. There's what the training and documents ought to be, but it hadn't really been fully implemented or adequately implemented. That, at least the workers didn't remember anything.

And as you say, the demonstration of what they actually did would also suggest, even if they had been trained, they didn't follow what they had been trained to do. So --

Mr. Rutherford: Well, one comment would be that we didn't take credit for that. I mean, in our models.

Member Anderson: Okay. Well, that's what I --

Mr. Rutherford: There was no credit taken for it, so --

Member Anderson: Yeah, okay. And so maybe we should have left that out, what you've indicated.

Mr. Rutherford: Now, Worker's Comment Number 4 Work Group never took exception --

Member Anderson: LaVon?

Mr. Rutherford: Yes?

Member Anderson: Just wondered, I mean, the alpha surveys, the 14 years, I was not aware of that or, I would say, maybe not conscious of that.

I'm not saying you didn't mention it. It may have passed over me. But I know I have said in the course of discussion that there was no program. There was no radiological safety program during the

entire residual period.

And it struck me that, whoa, wait a second. There were alpha surveys going on. That's from HFIR --

Mr. Rutherford: Yes.

Member Anderson: And --

Mr. Rutherford: It's a non-covered activity under the program.

Member Anderson: Right. But you're saying -- so the argument is that if there were high levels of alpha in a HFIR, it would knock itself into the rest of the plant? And if so --

Mr. Rutherford: So, vice versa, what I was saying was that you had these maintenance activities and things that were occurring in Building 10, outside of HFIR.

And HFIR's doing routine contamination surveys looking for the spread of contamination. So you had these maintenance activities occurring outside that area, and they were generating this contamination level at the 95th percentile that, we've assumed, it would eventually spread into that HFIR area and they would've noticed.

Member Anderson: Aha. Okay. I would like to see some information, some background, if it hasn't been requested on that.

Mr. Rutherford: Yeah, I've got that.

Member Anderson: Yeah, okay.

Mr. Rutherford: All right, Number 4, Work Group took exception to NIOSH's use of surrogate data obtained during an outdoor excavation and found indoor exposures, even though SC&A's independent method came to a similar result.

Yes. Although outdoor work provides more air changes and greater volume of air for dilution,

during the Mound study, the high-volume air samplers were positioned close to the excavation which reduces the impact of the larger outside air volume.

So if you take and you think about this, we've got the excavation occurring. We're keeping our high-volume air samplers in fairly close proximity to that. Therefore, the effects of the winds and the volume of air is not as great.

So with the use of the 95th percentile case from that study, the smaller air volume available for work inside a large industrial facility is offset by the limited airborne-generating capacity of snakes and shovels.

And we show, you know, one to four pounds dropped at one to three feet on wet soil inside compared to backhoes used outside of hundreds to thousands of pounds dug, pushed and dropped six to 14 feet.

So we believe that that generation is going to have a greater chance of generating higher dust under that soil drop situation that we've identified for now.

In addition, SC&A's value of 200 micrograms per cubic meter is very comparable to our 220 micrograms per cubic meter. You know, in fact, if the Work Group feels that SC&A's number is a more defensible number, we have no problem using that 200 micrograms per cubic meter at this point.

We also went back and we looked at this from another sense. We looked at TBD-6000, where we know we have weighted average air concentrations. And we took a general laborer and we converted that to a dust load.

Assuming the specific activity of natural uranium, we just did this -- the paper doesn't really address this because this was done after I seen Dr. Kotelchuck's email and I knew that we were going to have additional discussion.

So for processes such as extrusion, rolling, forging slug production and scrap recovery, we calculated the dust load for general laborers would range from about 65 to 556 micrograms per cubic meter.

And these type of activities are considered more aggressive and should result in higher dust loads. However, NIOSH's suggested dust load is within this range and, therefore, should be considered bounding.

That's it with that comment. I know, Dr. Kotelchuck, you had a lot of concerns with this point.

Chair Beach: Yeah, I'm going to refer to Dave, other than your point of using SC&A's, because I think Dave found some issues with that also, so, Dave and --

Member Kotelchuck: Yeah.

Chair Beach: Oh, go ahead.

Member Kotelchuck: That's right. Two things: one, with the SC&A, the 200 micrograms per cubic meter, I read through the materials. I asked long ago for background, where did you get those numbers.

And reading through it, reading through the Abaqus and it did seem to me that the 200 was drawn from environmental situations and without any relationship to this plant. And so, I did not find that a credible number for the plant.

The Mound, on the other hand, I mean, the Mound data, was relevant. I mean, relevant in the sense that, look, this is a coworker situation.

And there were real measurements made in a real plant. And we could ask, then, is this an appropriate coworker, is this appropriate for use and in M&C.

So that -- and I will say, I saw Tim Taulbee's comments, you know, in the paper. I have read the paper. This came to me, these slides, came Monday

night. And I was working on other things on Tuesday, particularly with respect to the thorium.

So I didn't -- I haven't -- I would say, I haven't been able to think about and absorb the impact of what this was. There was a discussion, a technical discussion that Josie and I had with Bob Barton and Rose.

And at that time, I asked. I said, well, let's take the Mound data. We have criteria for coworker -- putting coworkers, and I said, I went over it and there were some questions I had about whether it fit. And at some point, Rose, you said, well, it doesn't really fit the coworker criteria, but it's okay. And if you've --

Ms. Gogliotti: I did say the surrogate data criteria.

Member Kotelchuck: Yeah, right. And I actually, I wondered, after that discussion, I wondered what was the problem with that. And it may be you haven't -- I mean, I don't want to just confront you now, you know, in terms of saying.

But I would appreciate why you thought that that was -- wouldn't fit the criteria -- and if it didn't fit the criteria, why are we using it? And so I want to continue to look at the Mound data.

I feel like the Mound data has a real-life existence, a real measurement, set of measurements that may be appropriate. And I'm not -- I'd like to think about that a little bit more and understand both the criteria and how they would apply.

And also, what's -- I've learned now, from Dr. Taulbee's comments, about the high-vol air sampler. And, you know, if I may, I would just say I'd like to take a pass on that and think more about it.

Ms. Gogliotti: Dave, if I could add a correction?

Member Kotelchuck: Surely.

Ms. Gogliotti: It's not surrogate data in that it doesn't meet the criteria to be considered surrogate data. NIOSH did do a prospective surrogate data criterion review in one of their papers.

Member Kotelchuck: Yeah, and I was -- I had looked over that, over the summer, and was trying to see what fit and what didn't. And I would have to go back to my own notes to -- I wrote some notes up to myself as to which criteria seemed questionable.

But let's just -- let's talk more about that.

Chair Beach: Well, and I --

Member Kotelchuck: And I feel like there's new information for me that I had not known before, that is helpful. Any new information is helpful in these situations.

Chair Beach: Well, and this is Josie. I have one comment. You mentioned Tim Taulbee's, Dr. Taulbee's --

Member Kotelchuck: Yeah.

Chair Beach: -- comment. And you guys also added it to your White Paper. Isn't Tim conflicted for Mound? And is it appropriate to have his comments, being conflicted, in this White Paper? Just a general question or comment.

Member Anderson: I would let Grady answer that probably, if he's on the phone. I will say that Tim was given authority to speak on certain things with Mound. And this was a paper that was done in a prior -- I think before this program.

And so I think it's -- you're referencing something that was done a long time ago. So -- but I'll let Grady or Jenny answer any questions on that. I'm not for sure, is what I'm saying, Josie.

Chair Beach: I don't think it really weighs on this. I was just curious.

Mr. Rutherford: Right.

Chair Beach: Based on having to disconnect, step away. So, anyway, we can be --

Mr. Rutherford: I will check into that and see what we are allowed to use and not allowed to use with respect to that.

Chair Beach: All right. All right, any other comments for -- Comment 4 from the Work Group?

Member Kotelchuck: I have no -- I'm not related to the comment about whether it's appropriate for him, but I --

Chair Beach: Yeah.

Member Kotelchuck: I did, when the Mound case came up, I went back through the papers that came from SC&A and NIOSH. And I could not find descriptions of the Mound work.

I mean, and whether it was just a straight trench from one place to another, outdoors, or whether they were doing the kind of digging around pipes that was happening at M&C.

So there wasn't really much in the way of published data, in fact virtually nothing. I mean, I went through it and --

Chair Beach: But there was a one-page document, I recall, that -- and that was all that was associated with that. Is that correct? And I think you reviewed that.

Member Kotelchuck: Right. There was a one-page document. And the one-page document had -- it was not a discussion of what the Mound project was. I mean, it was that I found the -- if I remember right, it is, I found the data and we can use it -- which is good.

But what was the project? And if I'm trying to compare that project with this one and is it

appropriate to use it for this, then I would like to know more, and I really never did.

And I suspect, but I worry that there's not a lot of background data there. I even went into the site, the Mound site. And, you know, when they said, we need an analysis done, there was no detail about it, like a plan, right.

What's the plan where --

Dr. Taulbee: This is Tim. I don't know -- as Bomber indicated, we're going to need to get, I guess, a ruling since Josie raised the question about whether I'm conflicted or not.

So those questions that you're asking, Dr. Kotelchuck, those are certainly things that I can answer. That's not a problem. And there is documentation out there, and it's actually public, much of it is public-available. So those are all things that I can do. But I think we, first, do need to get that ruling from OGC on, I guess, whether I'm conflicted --

Member Kotelchuck: Yeah.

Dr. Taulbee: -- with regards to this.

Member Kotelchuck: I'm -- yeah, I'm neutral. But I would love that information that you could get. And it needs to be checked out. And we'll check it out. And if we can, I would like to get that information.

I went -- I spent a fair amount of time on the websites looking for it but, of course, I'm an outsider. I mean, I don't -- you worked there before you came to NIOSH. And you, I'm sure, have access to a number of things that I couldn't find.

So I'd appreciate it if you could, if you're able. Okay.

Mr. Rutherford: All right. You want me to --

Member Valerio: Well --

Mr. Rutherford: -- continue, Josie?

Member Valerio: Actually, Josie, I have a question.

Chair Beach: Yeah, go ahead, Loretta.

Member Valerio: So I'm going to backtrack just a little bit, and I believe it was the Work Group Comment 3. And I apologize, LaVon, for going back. Mr. Rutherford: No problem.

Member Valerio: But I have a question. I went back late last night and I actually read the White Paper from July which was, I believe, the response, the response from NIOSH or to NIOSH.

So I'm just wondering, as recent as 1993, another survey was done out at the site and they found elevated radiation levels on the southwest side of Building 5.

And I know that the majority of our focus is on Building 10, but I have, I guess, two questions. One is, more than a decade later, and if I remember correctly, they were still doing surveys in the mid-80s on this site, around Building 10 and around the burial site.

But I'm just wondering, what prompted them to do another survey, more than a decade later. And in that 1993 survey, were there also elevated levels of in and out of Building 10 and around the burial site.

Mr. Rutherford: Loretta, I don't remember exactly what prompted it. I think I'll let Pat McCloskey jump in on this one because I don't remember specifically what prompted --

Mr. McCloskey: Yeah, I -- I'm sorry. This is Pat McCloskey. I can try to answer that, Loretta.

So the slide you're referring to, say, the first surveys that we had were in '83. And there was a -- and they stretch out into the mid-90s.

And what you've heard Mr. Elliott say in the past is

that they had to chase this -- they thought they had a short and easy project to deal with out in the burial area. But then it just kept expanding.

And it expanded for like a decade, and they had to chase this contamination all around the site. And, but what -- when we addressed this in our paper, what caused some of this was the changing requirements from the Nuclear Regulatory Commission about what it takes to release a site.

And so, you know, initially you may start with one set of criteria where you have to dig into areas, a certain amount, and do maybe superficial or surface contamination surveys.

And by the mid-90s now, you're digging into recesses and cracks and now you're doing more of a statistical approach. So that's why those surveys extended for a decade or so. Does that answer your question?

Member Valerio: It answers -- yeah, it does. It does. Thank you, Pat.

Mr. McCloskey: You're welcome.

Mr. Rutherford: Okay, are you ready for me to go onto Work Group Comment Number 5?

Chair Beach: I believe so. And I don't hear any other comments.

Mr. Rutherford: Okay. All right, a Work Group Member commented that explosions and fires are not considered in bounding methods, especially the HVAC model.

We did do an additional search. We did searches on SRDB, looking for records of the fire and did not find any references to the fire or explosions at Metals and Controls post 1967.

We also inquired with the Director of the State of Massachusetts Department of Public Health, Rad Control Program and the State's Director of the

Department of Fire Services to find records of the event or an incident inspection reports.

And they did not have any records. We know this event occurred. We had a very credible interview with an individual who described the event and also indicated that they were locked out of the facility after the fire explosion.

And -- but in the end, we agree with SC&A's assertion that additional dust created by a fire or explosion would dilute the specific activity concentrated in the HVAC system, thus making NIOSH's HVAC model more claimant favorable during these rare events.

And that's all I had on that comment.

Chair Beach: Okay. This is Josie. One of the things I want to clarify is the hours worked and the different hours that you're giving to these different doses.

That's all considered Site Profile and subject to change. Correct?

Mr. Rutherford: Right.

Chair Beach: Okay.

Mr. Rutherford: Yes, it is.

Chair Beach: So I went back through the interview notes and I did find the reference from Interview 10. But there was also a reference for Interview 5 and Interview 7.

One of them was explosions in the manholes. And they knew that because they had to go in and clean up in the manholes from those fires and explosions.

And then, another reference, there was explosions in Building 10 all the time. So, I know your comment with 10 leads us to believe that as soon as there was the fire and explosion, everybody moved out.

But I think there was more fires, maybe, in different parts of the building, based on the other interviews. And it wasn't always the case, they moved everybody out. So that's just my comment on that.

Mr. Rutherford: And I agree with -- I understand that. I think the one we were specifically pointing out was that one interview. But again, it's not -- it's going to make our HVAC model more claimant favorable.

That was the one we were concerned with at that, during that discussion.

Chair Beach: Any other comments on Comment 5? I guess you can move on, LaVon.

Mr. Rutherford: Okay. Work Group Comment 6, a former worker has a concern regarding exposures to radium-226 glass beads and other exposures during maintenance work, including excavation, roof, ceiling area and HVAC work.

Radium-226 working room, whenever it was commercial work, was limited to a single process in Building 1 and was kept separate from the Metals Controls AWE facility weapons-related work.

Metals Controls radium-226 work is not considered an EEOICPA-covered exposure during the subsequent residual radiation period addressed by this ER, Evaluation Report.

The other exposure scenarios described by this former worker addressed by the models NIOSH and SC&A have developed for maintenance work. However, this was, when we got into the end of our Work Group meeting, this discussion came up from one of the workers about the radium-226.

And we felt like we should at least acknowledge that discussion. Again, this was not covered work during the AEC-covered period. It was covered work during operations, which everyone should know that when we get into residual work periods, that non-AEC

work is not covered exposure during that period.

Just wanted to clarify that a bit. I see --

Chair Beach: Yeah, I think --

Mr. Rutherford: Go ahead.

Chair Beach: No, go on.

Mr. Rutherford: Go ahead.

Chair Beach: Okay. I was going to say that, that beadwork, I think there was a comment from an interviewee that said they used to go in and throw those beads at each other, which is -- I understand your modeling, and I tend to agree with it.

But I think that's where that issue came up, was --

Mr. Rutherford: Right.

Chair Beach: Any questions, comments?

Member Kotelchuck: Yeah, this is Dave.

Chair Beach: Okay.

Member Kotelchuck: I feel like, if it's not covered, it's not covered. That is, we have to go by the rules and the law that was set up.

And this always happens. Whether I agree or disagree with it or wish it was this way or that way, that's the law. Jenny, listen to me here.

Now, I know that and so, my feeling is, as far as I'm concerned, that resolves it, on Number 6. And that's that, for better or worse.

Chair Beach: Okay, anything, Andy or Loretta? I think only one question came up about a comment about the survey data for the '68 to '81 time period.

Member Kotelchuck: Yeah.

Chair Beach: And then the conflict. Is there

anything else? Oh, Dave, did you need anything more for the dust loading example for Mound or will we just have to wait for Tim to get back to you on that?

Dr. Taulbee: Dr. Kotelchuck, you're muted.

Member Kotelchuck: Yes, I would love the information from Dr. Taulbee. But since the issue was raised as to whether there's a conflict of interest, I recognize that he can't send me the material until that is resolved.

And he'll get resolution, and when he gets the resolution and is given permission, then I'm hoping to get that material, so --

Ms. Gogliotti: Can we talk about that for a second?

Mr. Rutherford: Yeah.

Ms. Gogliotti: I'm somewhat confused on why this is a concern only because there's nothing special about Mound. They were just using it because it was an excavation site where they could get air monitoring data from.

That's my understanding. There's -- we just take that reading left of materials site as just the amount of dust that's generated from digging. Isn't that correct?

Member Kotelchuck: Yes. Yes, that's correct. But the information that we got was all from Tim. And there wasn't documentation behind it. And Tim conducted that study. And there's been several things he's clarified as issues were raised about the outside versus inside measurements, that I raise.

Then he's tried to clarify it. And as I said, he gave that information, and I have no -- I mean, he was there. I have no dispute. And it's more information and I have to think about it and see what the impact is.

Ms. Gogliotti: So if we had industrial hygiene data

from digging that showed the amount was comparable to the numbers that both SC&A and NIOSH have come up with --

Member Kotelchuck: Anything further we had would be good because it's, because of the different environmental circumstances of the two. And so, I was just trying to understand.

The minute I saw that difference, I started looking at Mound, at what I could find on Mound, but I couldn't find much except that little bit from Tim. But I couldn't get background documents to check either both what you were saying or affirm or just understand it better than what I was told.

So any information would be useful. And there is already more information. I certainly will think about it and everything, and it was useful.

Ms. Naylor: Dr. Kotelchuck, this is Jenny Naylor. So it seems like you just need some information to be sent to you. Correct?

Member Kotelchuck: Right.

Ms. Naylor: So any NIOSH staff or SC&A could actually make that happen. And also, I want to note for the record, Dr. Taulbee is not conflicted in Metals and Control.

Member Kotelchuck: Good.

Chair Beach: Oh, well --

Member Kotelchuck: Well, then he'll -- then the information will be sent. I'm happy to hear that, and that's --

Chair Beach: Or he could actually speak to your question right now.

Member Kotelchuck: No, I wanted the background information, so I don't -- I think he'll certainly, if there's any questions around, I will certainly discuss it and raise it in the Work Group.

Chair Beach: Well, and --

Member Kotelchuck: I don't think it's a discussion, to my mind --

Chair Beach: Okay.

Member Kotelchuck: -- at this point because --

Chair Beach: Well, and correct -- this is Josie. Correct me if I'm wrong. This dust loading model is being used for all the dust loading modeling at M&C. Correct? Or any surface modeling of the dose other than the thorium welding? I know that's separately.

Mr. Rutherford: And the HVAC dust is a different value.

Chair Beach: But all other is based on this Mound model --

Mr. Rutherford: Correct.

Chair Beach: -- for dust loading?

Dr. Mauro: This is John. Dr. Kotelchuck?

Member Kotelchuck: Yes?

Dr. Mauro: Yes, you had mentioned some problems with the 200 micrograms per cubic meter --

Member Kotelchuck: Yes.

Dr. Mauro: -- in the literature that we forwarded to you.

Member Kotelchuck: Right.

Dr. Mauro: That number is sort of widely used throughout dose reconstructions and dose assessments as almost like a generic good number to use for remediation.

But you have some difficulty with the review of that data. Could you just give us little more information? Because we do rely on that and we want to feel

comfortable that we're working with good numbers.

Member Kotelchuck: I do see and I recognize in the readings that that is widely used. And it's a standard.

But what I did was ask myself, does this 200 micrograms per cubic meter, does that apply, how does that apply to this particular claim? Does it apply to this particular claim?

And I saw nothing, when I was reading Abaqus and others, I didn't see anything that told me anything about M&C, how that might -- so it's a good general -- it is an accepted general use figure and absolutely appropriate.

I mean, it's appropriate for you, as you did that first study, to say, well, 200's a reasonable number. And that, compared to the 220 that was found from the Mound data.

But in the beginning, there were two different -- I saw it as, if you will, a Board member, I saw it two different numbers. And I said, okay, let's take a look at each one of them as to -- because each one could stand on its own.

And so, I just didn't see its relation to M&C, that it was appropriate for M&C. Whereas, with Mound, I feel like it might well be appropriate. And then the question is, you know, does it satisfy the criteria?

So that was my concern, and it came mostly out of environmental studies which did not give me confidence.

Member Kotelchuck: Thank you.

Mr. Rutherford: Okay.

Chair Beach: Okay, so a couple of things for me. There's nothing really here that gives us an actual concentration activity distribution for maintenance and cleaning that was performed.

How do we know -- I mean, back to how do we know what was cleaned out of the pipes? And how does that -- would it degrade over time? Bob Barton brought up an interesting topic, looking at the scale and how it degrades over time. Is that something that we can explore for M&C? I don't know if Bob's on the phone.

Mr. Rutherford: Yeah, Bob's going to have to explain that because I'm not sure exactly where we're going with that.

Chair Beach: I thought I heard Bob on the phone. Is --

Dr. Mauro: This is John. If Bob is on the line, he should respond. But if he's not, we had discussed this extensively.

And it's an interesting issue you bring up. And I've spoken to building engineers. The issue is, is it possible that the continual flooding and draining during the residual period ended up with.

My understanding is your concern is that that water is now draining, some of which may or may not have gone through the pipelines that we used the data.

I'm not quite clear. I'm hearing from one perspective that they were clogged and not used during the AW period. But then I've heard others claim that no -- it was still functional. And so some of that waste water that drained away during the AW period, did, in fact, pass through the pipes that represented -- the array of pipes that is the basis for all of our work.

For the purpose of this discussion, the issue you raised, Josie, is interesting. And when I spoke to my building engineer friends, who spend their life working on pipelines and residue accumulation of the nature that you're bringing up.

And so what I have to say is -- so I did spend a lot

of time working with Bob Barton and also working with building engineers that are involved in this, not from a radiological perspective, but from a building engineering perspective and the nature and extent that such incidents do result in the accumulation of scale, crud, et cetera, in drainage lines in buildings, in general.

And there's a lot of information on that. And your concern is that, as I understand it, is that that drainage has residue in it that would deposit in the pipelines of interest to us, diluting the concentrations of the uranium.

So that what we're looking at in 1996 by way of distributions of uranium in pipelines may be lower than what was actually there in the 1970s because of this accumulating residue. So I see your issue.

That's a tractable problem. What I mean by that is, after discussing this extensively with these engineers -- they deal with this problem all the time, but of course that work was not done.

It is at that time when I started to think about two questions: one, were those drainage lines in operation during the AWE period? And I'm not quite sure whether that's the case.

If they were not, then this issue goes away. If they were, then it becomes a question, okay, to what degree could there have been some dilution.

Now the other side of the question, of course, is what I brought up initially. The amount of uranium that we're assuming in the subsurface environment, not only in the pipelines but throughout the subsurface environment, is such a large number that I find it difficult to believe it would go unnoticed during the AWE period.

So it's almost as if, even if that process was at work, we're operating at concentration levels that are probably substantively over-estimating what the levels of uranium were that the workers were

exposed to during the subsurface activities.

But I'm not dismissing your concern, but I would like to hear a little bit more about the degree to which those drainage lines were, in fact, in use during the AWE period.

Chair Beach: Okay, thanks, John. And I'm assuming Bob's not on the line.

Member Kotelchuck: Bob is on the line. And I see him speaking but we cannot hear him --

Chair Beach: Oh.

Member Kotelchuck: -- for some reason.

Mr. Barton: Can anybody hear me now?

Member Kotelchuck: Yes, we can.

Chair Beach: Yes. Hi, Bob.

Mr. Barton: Okay. All right. Well, actually, John did a pretty fair job. And I think this is really sort of a cross-cutting issue and it just sort of occurred to me that, you know, when we're dealing with something like pipe scale, you know, that contamination is placed, you know, 1968 or whenever AWE operations ended.

And then, several decades pass. And if you are still using that drain line, then basically what you, or at least to me, would logically end up with is a combination of the contaminated scale and non-contaminated scale that just builds up over time.

So I guess the simple question is, when we look at the 95th percentile in the 90s, is that really reflective of what the 95th percentile would be in the 80s and the 70s? And I think that's the question. And it's really largely, I think, a cross-cutting question.

And I was glad to see that, in LaVon's presentation, he talks about looking at other sites where scale

measurements have essentially been used.

So I guess my question would be, to NIOSH, has it ever been considered that there might be dilutions, again, as John mentioned, over time with that contamination number so that the specific activity that we're assuming might actually decrease in much the same way that, when we deal with these residual periods a lot of times there's a removal, a fraction, for service contamination, sort of the same type of mechanism.

So I guess the question is, has that ever been looked into, either at M&C or any of these other sites where pipe scale contamination found in piping was essentially used as a basis for assigning doses.

Dr. Mauro: Bob, this is John. One clarification about the comments you made. The 95th percentile values that we selected from the data we have available during the FUSRAP measurements, that was a way to accommodate. We were not looking for the 95th percentile during the 70s.

We're using the 95th percentile observed during the 90s as a way to accommodate all of the activities that took place, such as snaking and refurbishing where radioactivity may have been removed.

So we're saying that that's plausible. And by using the 95th percentile, we cover that. So another dimension to this is, does that 95th percentile also cover the possibility of this dilution effect from the drainage.

And that's how I would pose the question. In other words, we're adding another factor besides snaking and refurbishment that would change what might be there in the 70s as compared to the 90s. And does the 95th percentile value that we're using cover all ills, so to speak?

I want to just clarify that.

Mr. Barton: No, and I agree with that, John. I think

there's, obviously a lot of the discussion today was about all the conservatisms that are built into how we get to these doses which are rather small.

But, like I said, it occurred to me, and I think it might be cross-cutting to, whenever we consider pipe scale, especially if it's a measurement taken decades after that contamination was actually plated out or placed in the drain.

So I agree wholeheartedly that I think you put it correctly, that it's a tractable problem, certainly, and perhaps that 95th percentile does cover any sort of dilution that may have occurred during that period in time.

I'm just very curious to see if that's something that has been considered either at this site or other sites where, again, we're looking at pipe scale to have a number that we can get off of and use this specific activity to reconstruct doses. And that was my question.

Ms. Gogliotti: I think an important point to point out is, we're not trying to capture the highest possible concentration that anyone could have encountered.

We're trying to find the concentration that an average individual worker definitely did not encounter. I'm trying to bound the doses on average, not in an individual isolated instance they were digging.

Mr. McCloskey: I'd like to -- I'm sorry. I'd like to add one thing about the pipe scale phenomenon that we're talking about here. The survey data, the sample data that we're using -- this is Pat McCloskey in case you guys didn't hear that out.

The sample data that we're using to come up with this 95th percentile wasn't pipe scale. There would have been some pipe scale in there, sure. I mean, when they sent their sampling devices down to pull out material, they were going after sediment, is what we landed on as a term to use in all of our

papers when we negotiated this with SC&A when we went to Work Group meetings.

But we -- they pulled out sediment and it would have been sediment that was within the pipes and sometimes just outside of the pipes when these iron pipes would degrade over time.

That's why they would have to go down there and unclog them. So just wanted to point that out, that it's not exclusively scale that we're using for sampling.

Mr. Barton: Well, I suppose my question would apply in either case. I mean, is the sediment a combination of the contaminated material that was placed there during operations and what came afterwards? Or is it -- was it essentially in stasis?

And, as John pointed out, if they weren't actually using those lines for anything after the operational period, then one might consider that sediment to be in stasis and not changing. The concentration doesn't change over time.

Sediment was added to it, essentially diluting what the contamination levels were. Well, I'll leave it to the Work Group to discuss.

Mr. Rutherford: Yeah. Bob, this is LaVon. Yeah, off the top of my head, I don't remember looking at this specifically during the residual period at other sites.

I think this is something that we can take a look at just to see what we come up with. And, you know, I do feel that, off the top of my head, using the 95th percentile, the data that we have, it's still a bounding number, as John had pointed out, recognizing that one percent of specific activity of natural uranium in all cases is a pretty high amount.

But there are some comparisons, I think, we could look at. We've already looked at, as you've indicated, we've already looked at some of the

sample data at other facilities. And let's see what we come up with.

Chair Beach: LaVon, this is Josie. We were dealing with enriched uranium also in that sub-flooring, weren't we -- not just natural?

Mr. Rutherford: I don't remember specifically offhand. I know that it was just a comparison using natural uranium. A specific activity of natural uranium was used as a comparison mechanism more than anything.

Chair Beach: Okay. Any more comments on this paper? Does anybody want to take a comfort break before we move on to the thorium and welding modeling issue?

Hearing none, I guess we'll move forward then. We do have a couple of tasking items from this paper. And I'm sure LaVon's got those written down. Is that correct, LaVon?

Mr. Rutherford: Yeah, I've got written down that we want to try to get whatever information we have on the alpha contamination from HFIR, in Building 10. I want to get that --

Chair Beach: Yes.

Mr. Rutherford: -- approved. Where the drain lines used during the residual period or not? And then the discussion we just had about whether the phenomenon of using the drain lines during the period would reduce the concentration over time such that -- and then, if it does, does the 95th percentile still make sense?

Chair Beach: Okay, and then the Mound data, I think there was something there that --

Mr. Barton: Right, I'll be providing answers to Dr. Kotelchuck's questions.

Chair Beach: And the entire Work Group, I'm assuming, right?

Mr. Barton: Of course. Of course.

Chair Beach: Of course, yeah, goes without saying. Okay, and hearing no one wants a break, let's move on to, I believe --

Member Anderson: Well, if you do break --

Chair Beach: No, it's okay. I'm just checking in with the group. So if you're raising your hand, we can take a break, but --

Member Anderson: I just want to not miss lunch.

Chair Beach: No, yeah, let's get done before lunch then. I mean, it's only 9:13 here, so.

Member Anderson: Oh, you're at --

Chair Beach: Okay, so I'm assuming that SC&A is going to present their slides, correct? And then we do want to hear from the petitioners and we have some Board correspondence.

I know we've all read that letter, but -- okay. So I'm sure -- I believe SC&A is queuing up.

Mr. Barton: All right.

Ms. Gogliotti: Bob, can you confirm that you're bringing up the slides? If you're speaking you're on mute.

Mr. Barton: Yeah, Bob was on earlier, but for some reason, we're not hearing him right now. I could try giving him a call on my cell to see if his -- so I'm going to step away for a second and make a phone call.

Member Kotelchuck: Bob, can you hear us? Bob Barton? We can't hear you, Bob.

Mr. Barton: Yeah, I think we're looking for Bob Anigstein, if you can hear me now.

Chair Beach: Yeah, we are.

Mr. Barton: A different Bob.

Chair Beach: Different Bob. How do I get rid of this chat on the right-hand side of my screen without getting rid of my whole screen? Anybody know?

Member Kotelchuck: You should be able to just click in the upper right-hand corner of the chat box.

Chair Beach: So how about if we take a ten-minute break while SC&A gets loaded up? What do you think?

Member Kotelchuck: Sounds good.

Member Anderson: Works for me. Yes.

Chair Beach: All right, so it's 12:16. Come back at, I don't know, ten minutes from now, 12:26 or so. Is that enough time?

Member Kotelchuck: Yeah, fine.

Chair Beach: Okay.

(Whereupon, the above-entitled matter went off the record at 12:16 p.m. and resumed at 12:27 p.m.)

Dr. Roberts: I'm back on. Yes. I think that's a good idea, just to do a quick roll call again. I have 12:27 so we can go ahead. So Josie, I see that you're here. What about Anderson? Andy, have you made it back?

Chair Beach: He probably went to grab lunch.

Dr. Roberts: Okay. Dave Kotelchuck, are you here?

Member Kotelchuck: I am here.

Dr. Roberts: Okay. And Valerio?

Member Valerio: This is Loretta, I'm here.

Dr. Roberts: Hi. Okay. Let's see if Andy comes back. Okay, and I think we need to make sure, when we get started, that everyone is putting their phones

back on mute, please. Josie, did you want to wait for Anderson to get back, Andy to make it back?

Chair Beach: No. I think we should give him at least a couple minutes.

Dr. Roberts: Yes. I agree. Okay. We'll do that.

Dr. Roberts: There you are, Andy. We were giving you a couple of minutes. Okay. So we're going to go ahead and get started. Josie?

Chair Beach: That sounds great. Andy, did you get lunch? Okay. Never mind. Go ahead, John.

Dr. Mauro: Yes. I'm not going to need the slides. I'm going to paint the picture for you and then hopefully Bob will connect at some point. I think it's the conceptual approach that's more important than the numerical values. Let me explain.

The issue has to do with, we don't have information on the thorium concentrations in the pipelines under Building 10. And Bob came up with an approach, well, there was quite a bit of work involved, looking at a lot of issues. But in the end, Bob came up with what I consider to be a very straightforward and simple conceptual approach to solving the problem.

We have a large number of measurements of thorium in soil, and of uranium in soil outdoors. We have a large number of measurements of uranium in the pipeline. Okay? Problem is, we have no thorium measurements in the pipelines.

So the approach Bob said is, okay, let's get the distribution of the concentration of uranium in the soil and the thorium in the soil outdoors, separately as independent entities. Here we have distributions, and let's get the distribution of the uranium in the pipelines and get the full distribution. Okay? So we have these three independent distributions.

Then he said, okay, the thorium inside the pipelines is equal to the ratio of the thorium in the soil, to the

uranium in the soil. So he got this equation. Each one having a distribution. And then he ran 10,000 Monte Carlo simulations of what the concentration in the thorium would be according to that, this very simple equation.

Thorium in the pipeline equals the ratio of the thorium in the soil, to the uranium in the soil. And from that, you get a distribution of the thorium in the pipeline. Are you with me? Then he took the upper 95th percentile of that distribution and got a picocurie-per-gram number that he says is inside the pipeline.

Okay. Very simple concept. And that's how he got his thorium. That's the end of the story. We could certainly get into the details, but that's the strategy that was used. So you may have questions regarding that, but when I spoke to him about it because we worked together on that, and he bounced it off of me. I said, you know, I like that very simple approach and I believe it does place --

Dr. Anigstein: Hello?

Dr. Mauro: Oh, good. Oh, Bob. You just came on.

Dr. Anigstein: I don't know what happened. I got locked out and I'm trying to get this screen going. I'm on my phone.

Chair Beach: Bob, you're slides are up. Can you present and then have Rose just forward, or whoever is presenting?

Dr. Anigstein: Sorry, I --

Chair Beach: So Bob, can you hear me? This is Josie.

Dr. Anigstein: One second.

Chair Beach: Okay.

Dr. Anigstein: Hello?

Chair Beach: Yeah. We can still hear you. Is it possible, Bob, for you not to have to log on, but just to let somebody else move your slides and you can talk through the slides? Will that work for you?

Dr. Anigstein: I've got the slides going, a little portion of it. For some reason -- yeah. Yeah, I have it out. Rose, can you put the slides on? Would you be able to do --

Ms. Gogliotti: The slides are up now.

Dr. Anigstein: Hello?

Ms. Gogliotti: The slides are up. Just let us know when you wanted to move forward.

Dr. Anigstein: Okay. Can you show the slides?

Chair Beach: Are you having trouble hearing us, Bob? The slide show is up and Rose can advance them for you.

Dr. Anigstein: Okay. Okay, good.

Chair Beach: Can you speak up because I'm having -- you're a little faint for me.

Dr. Anigstein: Okay. One second. I have another phone where I hear -- where I'm louder but I don't hear quite as well.

(Simultaneous speaking.)

Dr. Anigstein: Should we just start off with the first slide?

Chair Beach: Yes.

Dr. Anigstein: Okay. Well, that's the title. Let's go to the second slide. This is the internal exposure to the thorium inhalation. It's one of the two topics. And the source of this thorium inhalation is actually similar to what we've talked about before, which is the aerosol generated from the soil that would be disturbed during the subsurface remediation in

Building 10.

Dr. Mauro: Can someone advance the slides, please? The slides are not being advanced on the screen.

Dr. Anigstein: One second. I'm going to try the other phone.

Dr. Mauro: Am I correct, Rose and Josie? Am I correct. The slides are not moving.

Chair Beach: Yes. Who is going to move the slides forward?

Dr. Anigstein: Okay. So the -- I'll just give us first of all, just sort of an overview.

Dr. Mauro: Bob, hold on one second. We're having trouble advancing your slides on the Zoom meeting screen. We've got to get someone, whoever's the host, would be in a position of advancing the slides. Once we get that going then you could, of course, use your slides and we can work through this.

Who is the host on this meeting?

Ms. Adams: I can try to see what I'm doing with those slides.

Dr. Mauro: Yes. Whoever is the host could do that.

Dr. Anigstein: One second. I think maybe I'm okay. I'm okay. I'm on Slide 2. Can everybody see it?

Chair Beach: Yes.

Dr. Mauro: Yes. We're good. Thank you.

Dr. Anigstein: Then we're in business. Sorry. I don't know what happened but it fixed it itself.

Chair Beach: Okay. Just a second. The Court Reporter made a comment. I didn't catch it all. Court Reporter, are you okay? Okay. Thank you.

and Welding Exposure Model," SC&A Memo dated July 8, 2020

Dr. Anigstein: All right. So I'm going to proceed then. So I'll start again. So the source of the exposure. We know there's thorium on site. This is why the issue was raised by the petitioners. And the question is how to assess the thorium inhalation.

Now, the main source for the, one of the scenarios is the exposure to the aerosol generated from soil that was disturbed during the subsurface remediation in Building 10. So the activity is in the pipe residues. And we have a doc on the 1996 Roy F. Weston reports on measurements of uranium in the pipe.

They were measuring uranium because they were concerned about, there was enriched uranium and there was concern that they could be some spontaneous fission going on. Anyway, that's why I didn't visit uranium in that scenario. So now the thorium concentration visualized by NIOSH -- the whole, the purpose of my study was not to dispute the doses, the final exposures as done by NIOSH. It turns out that the result was consistent with what we did.

But the concern was at the data they used. Simply, we felt not defensible, not sufficiently accurate. So NIOSH had cited the inventory of uranium and thorium that was prepared in 1962 by M&C Corporation, the Metals and Controls Corporation. There was concern that their using this material that belonged to the government, belonged to the Atomic Energy Commission, and they might be, if something happened to it, they could be financially liable and there were concerns that maybe they should take out liability insurance.

So as a result, they had this inventory performed. There is no description of this. There's only a mention that it exists in the DOE documentation. Just the values -- no descriptive text. So under the second column, Commission, we assume this is the

Atomic Energy Commission. And whether these quantities were in their possession, whether they were -- we don't know what it's --

The third column, it says License. I think it probably is their radioactive material license and it's very different from the Commission. So the autumn, the next, so then the total uranium was up. Then finally, total thorium, which is also is different from the license. Then there's the uranium thorium ratio. Well, it depends which column.

I'm cutting out? How is this? Okay? Can you hear me? Yeah. Okay.

So the uranium thorium ratio, it all depends what number you use. You could have as low as 7.5 if you stick with the Commission numbers. 138.5 if you stick with the license numbers. Or if you combine the two, it's 32. So this does not, in my estimation, our estimation, give a sound basis for determining fractioning of the material. The materials are, in fact, thorium.

So I just repeat what I say. However, there were measurements of thorium-232 concentrations ostensibly in soil samples, which were not -- they were studied by NIOSH but they were not utilized in estimating the intake. So SC&A constructed a model toward determining thorium-232 in the pipe residues based on this measurement of thorium-232 in the soil, and uranium-238 in the soil, as well as in the pipes.

So there were 88 measurements of thorium-232, which (audio interference) a report by Sowell published in 1985 to work with, or under contract to NRC. Sowell actually worked with ORAU and there were 88 measured concentrations, 88 samples. Every one of which had a concentration of 232, and/or 80 concentrations of U-238, the same sample. The difference being that eight of those assays for uranium were below the lower limit of detection.

And then moving on to the pipes, there were uranium-238, as well as U-235, which is not good, concentrations measured by Weston in the pipe sediments as part of the (audio interference) study. They had done -- just to fill in because I just looked it up. There was a preliminary pilot study done and it was a final remediation of these pipes in order to determine what kind of hazard they were encountering before they proceeded. Now there was concern with the possibility -- because it wasn't, they were concerned that there could be criticality issues.

So they listed U-238 concentrations in 18 pipes or pipe segments under Building 10. In this case, they also listed volume of sediment in pipe segments. So with that data, we produced the following reasonable -- simply assume that the ratio of thorium-232 in the pipes to the thorium-232 in the soil, is approximately the same as the ratio of U-238 to U-238 in the soil. (audio interference) thorium being worked on site (audio interference).

Some other process, or a related process, where it ended up in the soil in this burial area. And the same difference should apply to the uranium. These are possibilities but we're dealing with a waste product from special processing, or (audio interference). So we end up with this very simple equation --

(Simultaneous speaking.)

Dr. Anigstein: Talking too low? Okay. Okay. One second. Let me change to another phone. Okay? I'll go ahead.

So we end up with solving for thorium-232 so we end up with this simple equation. But the question is, what values do we use. Do we -- have the term on the left that we need. And we have the term on the right, there terms on the right. The question is what values do we put into this equation.

So these concentrations for thorium-232 in the soil,

the uranium-238 in the pipes, the uranium-238 in the soil. Each of these can be characterized and we have between 18 and 88 samples, we can fit a distribution, a log-normal distribution to fit this data.

I will skip ahead now to show you what it looks like. There's a curve where we plotted the 88 thorium-232 readings. (Audio interference.) In a perfect log-normal distribution, they would have fallen right on this line, straight line. So you see there's some deviations. We could've probably gotten a better fit it we omitted those two high points. That's not scientific (audio interference) just to make it look prettier is not a good reason.

So we left it in and we end up with an R-squared, or a correlation coefficient, of about 0.76, which is reasonable. The guidance from NIOSH and OTIB-0019 says that anything above 0.7 could be utilized.

Next, the U-238 activity in the pipes and pipe segments are taken from the Weston report. We simply rank-ordered the concentrations in the segments and calculated -- and listed the volume of the residue in each pipe, the pipe sediment, then for purposes of curve-fitting, we calculated the cumulative volume distribution, take the first one, then for the second one you add the sum of one and two. But each one of these in the third column is a cumulative sum of the ones in the second. And the fourth column is the midpoint.

Chair Beach: Bob, this is Josie. Can I interrupt for just a sec? Do you have another phone that you can try? Because every time you speak, we get static. So it makes it really hard to follow what you're saying.

Dr. Anigstein: Oh, you're getting static?

Chair Beach: Yes.

Dr. Anigstein: I think I see the problem. I had two phones too close together. Is this better?

Chair Beach: Go ahead and start speaking.

Dr. Anigstein: Okay. So the curve fits for that --

Chair Beach: Bob?

Dr. Anigstein: Okay. I'm going to -- I probably have a phone problem here. I'm going to go on another phone where my voice is louder. But you'll have to hold your comments because I won't be able to clearly hear.

Chair Beach: Okay.

Dr. Anigstein: Okay. Can everybody hear me now?

Chair Beach: Yes. It's better.

Dr. Anigstein: Okay. Good. Okay. Anyway, so here is what the U-238 in the pipes looks like and it's a reasonable fit, 0.88. 0.9 is very good. 0.88 is quite good. And then finally, we have the U-238 in the soil, which is based on the 80 samples that are measurable. So this, this is something, I won't go into the details of this. This is simply called a regression or an order statistics, which accounts for the eight non-detects. So you can see the distribution is not symmetrical. If it was symmetrical, zero would be in the center.

So the, going back to the original, so what we did was, we took this equation and we solved for thorium-232 in the pipes by sampling each of those three distributions. These three quantities now are not represented by a distribution. We randomly, we used Monte Carlo sampling methods to randomly sample for each. And we take one from here, one from here, if you see my mouse moving, one from here, multiply the top two, divide by the third one. Just single values taken for this distribution.

We repeat this one million times, which sounds staggering. It actually didn't take that long. And then, the result is now another distribution. Now we have one million values of the thorium-232 in the

pipe, which represent a distribution, and we can take -- the aim is to get the 95th percentile value. So we take the 950,000th of those one million to get a value.

So now I'm going to skip these quickly. And here are the results. We have the R-squared for -- skip the last column for a second. So we have the R-squared that we saw before on the charts, 0.76, which is marginal but usable, 0.952 and 0.884, which are all quite good. And then we have, for each one, we have a geometric mean which is taken off of that straight line that is fitted through three curves, and the geometric standard deviation.

Then the next issue that comes up is, well, we're following OTIB-0019, but there was a later guidance for the ORAU team report called 95, which states that, well, you can use that simple regression order statistics if you have a single LOD. In other words, if you have a single value and anything below that value is not measurable, and everything above that value is measured and recorded.

However, the data, the way the data is presented for the U-238 in the soil, there was a separate LOD value for each of those eight measurements. So that method is not strictly correct. So we applied another, more sophisticated method, also using regression order statistics, which was recommended by the ORAU team.

And we got an R-squared, by fitting the data, we got an R-squared slightly lower, but still quite good, 0.936. We got a higher geometric mean for the uranium, and a lower standard deviation. The result then is, the final result is we calculated, this is what NIOSH reported, 2.42 for the airborne activity of thorium, ten to the minus 13. And then calculated an effective dose of 10.42 millirem per year based on one-month exposure.

I believe they have now decided to go with a two-month exposure, but we're comparing oranges to oranges, so we're sticking with the same

assumption.

The first methodology, the simpler methodology, gave us a higher airborne concentration, 3.56 ten to the minus 13. And an effective dose of 14 millirem per year. The dose calculation was slightly different. We used the 200 mcg, not the 220 mcg. And we used the default dose conversion factors; NIOSH used the maximum. So there were small differences. That's why I compared the airborne activity.

But we can still see we're in the same ballpark. And then, when we do the more sophisticated methodology for the U-238, we get a lower airborne concentration, simply because you remember the U-238 for the soil is in the denominator so a higher value gives you a lower result and a lower effective dose of 4.54.

So the interesting thing is, you look at your effective dose, we essentially bracket it, the NIOSH value. Using the simple method that was used in the past, we get 14. Using the more advanced sophisticated statistical method, we get 4.5, where NIOSH gets 10 in the middle.

So we're not disagreeing with the NIOSH value. We simply would recommend that NIOSH uses whichever statistical method they feel is the most appropriate. They could come up with a slightly different value. But did they use real site data instead of just the inventory of thorium metal and uranium metal, and saying, well, it can't be one to one is conservative. It can't be any worse than that.

So that's basically it. It's a question of methodology, not a question of results. Now I'll go on -- this actually might be a good time to pause because the next topic is separate from this. For me to pause and answer questions.

Chair Beach: Any questions, Work Group Members, or comments?

Dr. Anigstein: I'll switch to my other phone for this. Are there going to be -- does anyone have questions?

Member Anderson: And this is using the site data? The soil and everything?

Participant: Yes.

Member Anderson: Okay.

Chair Beach: And my comment is about the --

Dr. Anigstein: Okay. One second, please.

Chair Beach: Okay. Andy asked about site data.

Dr. Anigstein: Yeah. What about the site data?

Member Anderson: I just want to be sure that you're using the site data, not data from not elsewhere.

Dr. Anigstein: The data I'm using came from two reports. Sowell --

Chair Beach: And Weston.

Participant: Yes.

Dr. Anigstein: Not everything in there. There was something like 450 measurements, if my memory serves correct. We only used a subset of 88 because the other -- they were from different locations and the other locations were basically background. Maybe one or two elevated readings, and everything else was in natural background. And this Building 12 burial area was the one that had the distribution that seemed to be elevated representative of waste from the plant operations.

So we used that for the soil data, and then we used the same pipe data that everybody else used. Evaluating it slightly differently, but the same raw data.

Chair Beach: All right. So this is Josie. Can you hear

me okay?

Member Kotelchuck: Barely.

Dr. Roberts: You're very faint, Josie.

Chair Beach: Okay. I don't know, I'm not sure what happened with my volume here. Okay. Can you hear me good enough for me to make a comment?

Dr. Roberts: Yeah, now.

Chair Beach: Okay. I just wanted to point out that the Sowell 1985, and Table 6 is where you got your data points, this is a really small set. It's not very representative in my opinion of the contamination that's onsite. My understanding is that is a depth of two, maybe to three inches of walkover sample sets. So I have a concern about this not being representative of the actual doses that are onsite.

So, I know when they've got into the burial grounds, they went down several feet, and the highest level of contamination were actually down towards gravel level, the bottom level. So I have a question on that, or a comment on that. I don't know if it's a question, because you don't have any other data to use. Right?

Dr. Anigstein: No. I believe it was Table 6A that I used.

Chair Beach: Right.

Dr. Anigstein: And the reason I used that data is I wasn't trying to characterize the entire site. I was trying to find data where you have uranium and thorium data that are representative of discharges from the plant.

Chair Beach: Right.

Dr. Anigstein: And, therefore, something similar could be found in the pipes, had the thorium been measured. And then eyeballing all the rest of the data, I looked at each of the tables in the Sowell

report, the vast majority were natural background on the order of one picocurie per gram. Where the Building 12 burial ground had a significant number of elevated readings. So it seemed more fruitful.

Chair Beach: Yeah, and my problem is not with the model itself, it's just I don't feel if you have good data going into any model, it's going to be a problem.

I think, Dave, I heard you in the background.

Member Kotelchuck: I do. Can you hear me well?

Chair Beach: Yes.

Member Kotelchuck: Can folks hear me adequately?

Chair Beach: Yes.

Member Kotelchuck: Good. I have a different kind of problem with the quality of the data in the soil, about which we are taking back to tell us about trying to take those ratios and tell us something about what's going on down in the pipes, where we only measured the uranium.

Let's go -- let me read from page 2. Well, I can read from it. The bottom line is that if you look at the thorium in the soil and you look at the uranium in the soil, they are essentially uncorrelated. That is to say, they don't have a relationship to each other such that is one is high, the other would be this, and if one is low the other would be that.

They're uncorrelated. Their R-squared value, it's 0.0064, so R is 0.08. And you want 0.7 for things to have a relationship. So that is why, now I'll read from page 2, a pairwise comparison of 232-thorium and 238-uranium concentrations in the 80 samples with reported low values of both radionuclides yielded a square correlation coefficient of R-squared 0.0064, which indicates that the measured values of the two radionuclides are essentially uncorrelated. Consequently, using paired values to derive a ratio

of the thorium to the uranium in the soil to calculate levels in the Building 10 pipe residues would not be statistically valid.

And that is correct. And you used that information to reject using a very simple model of taking the ratio of outside, and that's what led you to the more sophisticated model that you then propose in the paper.

First, I accept and agree with your critique of, if you will, the simpleminded model. However, it seems to me that you are recreating the problem in the original equation of the very high-powered statistical calculation you just completed, you've just showed.

If you take a look at the equation that you used -- you could go to that slide if you like, Bob, or whomever is working that. Could you go back to the original equation? Yeah, one slide back where it's presented. Could you go one more slide back? There. Thank you.

If we transpose the terms, I mean, that is, you're saying the ratio of thorium in pipe and soil is the same as the ratio of the uranium in pipe and soil.

Dr. Anigstein: Okay.

Member Kotelchuck: I mean, you know, and I'm not telling you anything, you who did the calculations, but just pointing out to Members of the Working Group, if we transpose the 232-thorium in the soil and the 238-uranium in the pipe -- which we can do; that's just arithmetic -- what we're saying is that the thorium to uranium in the pipe is the same as the thorium and uranium in the soil.

Dr. Anigstein: Okay.

Member Kotelchuck: So you're essentially saying that the soil ratio is the ratio down there, except you now have the -- but that ratio is of two -- the ratio in the soil is of two uncorrelated, which is to

say independent, things, independent measurements. Why they are not dependent, why there isn't a relationship between the two, I do not understand and I cannot answer for it. But I recognize that you are still taking the uranium-thorium ratio in the soil, which is uncorrelated, and then, I would argue, force-fitting this whole thing by saying, look, I know the distribution in three of the areas, therefore I'm going to power it through, do a force-fitting, and get a value.

Now, you've gotten a value, my goodness. I mean, it is powerful statistical methods that you used, and I'm impressed with them. But if the original assumption was weak; that is, the uranium to thorium ratio in the soil is not a relationship, then you're getting a number by saying, I'll create a thorium in the pipe. But does it have any relationship to reality, to the measurements? Can we say with confidence that this really tells us what the thorium is in the pipe?

And my feeling is the data you put in said there's no relationship, and now you're telling me, oh, well, I'm just going to create, you're going to create a distribution. That will cause these two ratios to be similar. Yeah, but that's not real.

I mean, let's put it this way. I don't see that that would reflect a -- that that would reflect reality. And so I'm just -- and I think you're using powerful statistical methods to create something that is mathematically correct but is not real in terms of the measurement, that that is not a measurement of the exposure of thorium in the pipe.

Dr. Anigstein: Okay. My response to that is, we thought about that. And as a matter of fact, there is an earlier version, which was not valid, where we did do a pairwise comparison of the uranium and thorium data in the soil, and it had very -- and it completely agreed. The correlation is almost nonexistent.

However, if you sit back and look at the physics of

it, the physical reality.

Member Kotelchuck: Yes.

Dr. Anigstein: If the thorium and uranium entered the soil through the same -- sorry about the noise here. If the uranium and the thorium were commingled prior, so it was like a big vat of waste material in like a cement mixer truck, got all mixed up and very thoroughly homogenized and was deposited in the soil, then you might expect a correlation pairwise because wherever one was, the other was.

But the assumption, or my impression, is the thorium and uranium were handled onsite at different times, at different processes, with very little information on the thorium. And, therefore, it got buried at different times by a different process. In got discharged -- I'm seeing like a production facility discharging some of its waste and inadvertently the uranium and thorium get discharged, but not at the same time. Not simultaneously. They were at different times and, therefore, a certain fraction of that ended up in the burial ground, but not at the same time. So, some would be in the higher level of the soil, some would be in the lower level of the soil.

But I'm making a leap of faith that the same differentiation between the uranium and thorium entering would apply to what went into the pipes. As a matter of fact, it may be that the pipe residues ended up in the soil. We don't know.

We're not making the statement, we're not making the assumption, that there is a correlation between the two. Just the opposite, they're independent values. There's almost zero correlation, you can say. And, therefore, it is valid to randomly pick values from one distribution and from the other distribution and use them to -- and then assuming at, let's say, year one of the process, they were experimenting with thorium fuel and there was a lot of thorium generated. And it went into the pipes

and it went into the soil.

Later they said, no, thorium is not good, we're going to stick with uranium. So the uranium came later. So it was differently distributed. But I'm just making the leap of faith that whatever distinguished the uranium from the thorium waste generation, whether it was temporal or different processes, and also uranium is more soluble than thorium, so it moves through the soil, percolates through the soil more rapidly, whatever process caused the thorium and the uranium in the soil to be differentiated could also apply to the pipes.

It's not a perfect argument. But it's the best we've got. Still better than (audio interference) assumption of one-to-one mass ratio, for which there is no scientific basis. Except to guess. We know there was more uranium than thorium onsite, it can't be worse than one-to-one. That's not the way this project has worked in other areas.

(Simultaneous speaking.)

Mr. Rutherford: I would like to respond to that. I would like to respond that using that one-to-one ratio, as you indicated, they definitely used, processed way more uranium than they did thorium. And, clearly, we have taken very conservative approaches on this project when the doses come out very low, as I'd indicated earlier. And if you look at the doses in all three models that were presented, we're talking 10, 14, and four millirem.

So, yeah, I mean, trying to sharpen the pencil down when you're down at 10, 14, and four millirem makes no sense when you can clearly say that there was no more thorium than there would be uranium, and there assuming a one-to-one mass is good.

Member Kotelchuck: Let's say I'm not sure how that, the one-to-one ratio fits in with this, but I'm looking at, simply, the derivation of the thorium. You might want to argue that it doesn't matter; there wasn't much thorium and to hell with it. You

know, or this is the best we can do. Maybe that is an argument that can be or will be used. But I just find that the logic behind this particular calculation of thorium doesn't ring. And I can turn it around and make a much simpler argument --

Mr. Rutherford: Dr. Kotelchuck, I agree with you. I don't disagree with you.

Member Kotelchuck: Yeah.

Mr. Rutherford: I don't disagree with you at all. What I'm saying is the NIOSH model used the Building 10 uranium data, and then we assumed that, clearly, the thorium concentrations would not be any higher than the uranium because they processed roughly 29 times more uranium than they did thorium. So, assuming the mass is equal, it would clearly be a bounding approach.

Dr. Anigstein: I'm sorry --

Mr. Rutherford: I'm not saying what --

(Simultaneous speaking.)

Dr. Anigstein: LaVon? Hello?

Mr. Rutherford: Yeah.

Dr. Anigstein: Sorry to interrupt you but I lost my phone. My battery ran out so I had to dial in. So the last couple of minutes of what you said I did not hear.

Mr. Rutherford: Oh.

Dr. Anigstein: I'm on the screen, but I didn't hear you.

Mr. Rutherford: Okay. What I had said was that there was a couple of things that I disagreed with. One, you know, NIOSH used the uranium data from the soil under Building 10, and then we assumed -- we did not use the inventory as our basis for this, but we assumed that the uranium and the thorium

masses were equal when we created our thorium model. We only said that, using the inventories, we looked at the uranium inventory that processed 29 times more uranium, I think is what we said, than they did thorium. That was only to corroborate that if we assume equal masses it clearly should be bounding.

Dr. Anigstein: That was not the impression I got, because when we responded to the first iteration of this report we started off using -- SC&A, we started off saying, okay, NIOSH is using a pairwise comparison, we'll do a pairwise comparison. And then we find out there's no -- and the response to the first iteration of this, which goes back two years, a year now, was -- yeah, it was about a year ago.

The first iteration was, we were told, no, no, you don't have a good correlation between the two. And I agreed. It was not a good correlation. That's why we gave up the pairwise comparison and went to this other approach. And the response that I got from NIOSH, and I can't document it right this moment, was, no, they did look at the soil samples, but, at the end, they did not utilize the soil sample data. They used the inventory data. That's my understanding of what NIOSH had said.

Mr. Rutherford: No. That was incorrect. What we used was only the -- we used the Building 10 subsurface data for uranium, and then we assumed, the last model we presented, then we assumed a one-to-one ratio, uranium to thorium.

Member Kotelchuck: So you essentially took the uranium and just said it's half thorium.

Mr. Rutherford: We'll assume it's an equal amount of thorium. This was --

Chair Beach: And then I believe you said you'd use the highest between the two in a dose reconstruction. Is that correct, LaVon? At the 95th percentile?

Mr. Rutherford: Yeah, I think -- I mean, I know that we indicated we would use the 95th percentile. I think we are adding those doses to the thorium and the uranium. Pat McCloskey, am I correct? I don't want to misspeak.

Dr. Mauro: This is John again --

Mr. McCloskey: You have it right. Whichever nuclide attributed the highest dose for the --

Mr. Rutherford: You are correct, Josie.

Dr. Mauro: This is John. Could you hear me?

Chair Beach: Yes.

Dr. Mauro: I'm a simple guy. All right?

(Laughter.)

Chair Beach: Right.

Dr. Mauro: You tell me the quantities are twenty-to-one. All right. So what we have is this operation with 20 times more uranium moved through than thorium. Okay? And I say to myself, okay, so, when you have residue, whether it's in the soil or in the pipe, you would expect that there's going to always be more uranium than thorium. We realize at different times -- and the fact that we're integrating over time, we're going to reflect an aggregate number.

In other words, we're looking at what we think, as a result of these, all the years in which uranium and thorium were being handled, maybe at different times and different ways, but we do know, in the simplest sense, that there's 20-something times more uranium, if it's by mass or curies, I don't care. We know that.

So, in the simplest world, one could say, well, then in the pipe, you're probably going to see 20 times more uranium than thorium.

You know, I realize that I'm oversimplifying, but then I'm going to now draw upon Dr. Melius' philosophy: don't overanalyze something when you're dealing with extremely low doses.

So, I walk into this and say, listen, every one of these approaches that we looked at are ways to come at a problem, each of which has its limitations. If you're looking for fault, you're going to find it. And I'm saying, we can find some fault, but at the same time, there's a certain amount of common sense here that says, at least, if you really wanted to make this simple, let's go to your twenty-to-one ratio and see what kind of doses we get. And they'll be small. Then we can go to your approach, the one-to-one ratio, which is extremely conservative, conceptually, because it wasn't even. It was much more uranium than thorium. So, certainly, your approach, fundamentally, is more conservative.

And then we get into the sophisticated approach. Okay? And I'm thinking that even though each distribution -- the fact that each one has a distribution -- and if you think about them, well, they're completely independent of each other. Right? But the only thing they have in common is they all moved through the plant at some time and ended up some place in its own way. All right?

And then say, well, what do you with this situation? You say, well, we'll go with the 95th percentile of that. They're not paired values now, we're treating each of these measurements as if they were completely independent and the only thing they have in common is they all moved through the plant over some time period.

And I say that each of these three approaches, if we focus in on their limitations, we should be looking at the simplicity and the common sense. And they all come to the same dose. This is what's staggering about this.

And, now, do you reject this because it has many

imperfections? And I say, in this particular case, no. The reason is the Melius rule. We don't need a high level of resolution and precision when you're dealing with extremely low doses that are within the uncertainty and variability of the other doses from this, from the uranium from subsurface.

And the fact, like Dr. Kotelchuck mentioned, we can just ignore it. The 95th percentile that we used for the uranium alone could be argued to cover even this ill, the fact that we didn't accommodate the thorium. Do you see what I'm trying to say? We're making it more complicated than it really is.

Member Kotelchuck: Well, I would say the argument about using one-to-one, to me, is more sound. The equation, the attempt to equate the ratios of the soil and the pipe I think is logically not sound. And I could make a backwards argument to show that, no, no, it's not logical.

However, you want to suggest that there's another way and that the one-to-one way is better, that's an argument. And I feel like I'll look at that. I was looking at this in itself. That is, how do we measure thorium? There's only one measurement of thorium that we have.

And I could go into the logical argument but it seems to me -- should I? I mean, what I argued was that these two things are not correlated. But if I just went backwards, John -- yeah, I'm going to do it. If I may. If I went backwards and I said, look, I have uranium in the pipe sediment, but I don't know what the thorium is. So let me go to some other place and let's assumption that the processes are going on somehow the same, continuously, monotonically, whatever.

Then I would say, okay, so you're going to take the uranium in the pipe. You're going to go and you're going to say, okay, I'm going to take a sample of uranium in the soil and a simultaneous measurement of the sample of the thorium. And the thorium has no relation to that. So they use the

uranium in the pipe to get the uranium -- and then take the uranium in the soil to get the thorium in the soil. But the thorium in the soil is not related to the uranium in the soil.

I mean, there's no -- so, to me, this falls in terms of the initial assumptions. And it's entirely different -- and LaVon, I accept that -- it's entirely different. And I'll look at that again in that light and now trying to think about the thorium. And it appears that's conservative.

Anyhow, that's --

Chair Beach: Thanks, Dave. Any other Work Group comments or questions? Andy or Loretta?

Member Anderson: I just want to go back to what our first question was, is when this came up at other sites sometimes we said it could be reconstructed and other times we said no. And I don't think the ones when we said no, it probably didn't -- we didn't say no because the estimates were going to be high measurements. So now, well, you're going to say, well, it doesn't matter. That kind of goes against --

Chair Beach: You faded out. I don't know if we got your whole point there.

Member Anderson: Well, the point was, to use this to say we can do dose reconstruction, is that consistent with those other sites? I mean, this one, we don't have any thorium measurements. Others we had some, but it wasn't as representative as we wanted, and things like that.

Chair Beach: Yeah.

(Simultaneous speaking.)

Member Anderson: -- presentation on, I just don't know where -- it could be that we're evolving as we go through this and we're now getting to the issue of, well, it doesn't resolve an a lot dose so nobody's

going to get awarded if we do the dose reconstruction. On the other hand, the basic principle is you ought to have sufficient data. And, again, we don't know what went through the pipes. It could be when there was more flow through the pipes, when the uranium was there, and it scoured out any residual that was there. And then when you did the thorium, there was less flow, because of volume or something, and they had more sediment about. What's actually happening in the pipes that then gets into where the workers were digging. (Audio interference.)

I'm not sure how well we're taking care of all -- like I said, I would agree that calculated dose is likely to be quite low.

Dr. Mauro: This is John again. One more thing I'd like to say. We have been in this situation so many times where we had, the only information we had was the throughput of the thorium and the throughput, or the inventory of the uranium at the site. And the Health Physics Programs only measured uranium. And what we did on many occasions, say this is how simple things got. We simply said, well, we know there was ten times or 100 times more uranium that moved through this system than thorium.

And we're going to use that ratio in deriving our doses. I mean, we have in the past used that level of simplification, to deal with the thorium contribution, now we're bringing the evaluation to a level of sophistication in dealing with thorium that's way past anything we've ever done before. We actually found it acceptable just to use throughput as the basis for getting your ratios.

Member Anderson: When they were working in the pits and the trenches like they were doing here, I mean were the workers that we're estimating doing this kind of soil and pipe removal and working underground?

Dr. Mauro: They were in -- I'll tell you what they

had in common, all the other sites --

Member Anderson: How were the workers exposed?

Dr. Mauro: I'll try to answer your question and you make a good point. In the other examples, in both cases, the uranium and the thorium were moving through these processes for the purpose of making fuel. Okay? They did it at different times. They, of course, used different methodologies. But their objective was to make fuel.

And it always was a case where the thorium part of the operation to make fuel was almost experimental. To say listen, is it possible that we could use thorium for making fuel as an alternative to working with uranium. So that was the degree to which there was a commonality. But when you get down to it, the methodologies that were employed in the chemistry, and the processing, and the handling were different. So they were independent, just like Dr. Kotelchuck said, these are independent. But the fact that we knew the throughputs and the totals was sufficient, at least in the past to simply use that ratio of throughput as a way to get a handle on the thorium that was not measured.

And I'm seeing here where I feel as if we're bringing the level of analysis to a level of -- attempt at a precision that goes way beyond what we did in the past. So it breaks with precedent and even though we are doing that, and even though it's filled with certain questions that are all legitimate, we're getting doses that are very small.

So I look at it as a collective view looking at the totality of the whole program since we've been working on it since 2004. And I find it, that here we are tending to this one at a level of granularity that we never did before. And even in the face of the fact that the doses are small.

So you put all that together, I find this to be an exceptionally detailed evaluation, as compared to what we've done in the past to deal with thorium.

Chair Beach: So John, this is Josie. Can I break in? You're talking about the doses being small and we have awarded SEC's for doses being small. We also have that nice sales brochure, the 64 pages that said all the different thorium products that Metals and Control used. So it really, whether we use SC&A's model or whether we use, we go down with NIOSH --

Dr. Roberts: Josie. You're echoing.

Chair Beach: Horribly. I don't know what do with my -- can you hear me?

Dr. Roberts: With still an echo.

Dr. Taulbee: You might try muting and then unmuting, Josie.

Chair Beach: Yes. Sorry. Okay. How's that?

Dr. Taulbee: Good.

Chair Beach: Okay. So if you go back to just the basics, for me, is your sample sets are not representative of what was used at Metals and Control, in my opinion. The Sowell data is a very, very small look and a very thin layer of soil. It doesn't get into the values that I think were present and that the Metals and Controls maintenance workers were exposed to.

I mean, bottom line, right there. And then we have an added issue of, we have NIOSH's model and we have SC&A's model, so it confuses the issue. I almost think we need to go back to the basis. Oh, I'm echoing again. Why is that?

Back to the basis of what are we actually going to use so that the Work Group can get their head around exactly what we're planning, and so we can vote on each of these issues and move forward. I mean, we can argue models forever and I know, John, you could probably talk for the next like eight hours on models and I appreciate you being able to

do that.

Mr. Rutherford: Josie. Can I make a suggestion?

Chair Beach: Yes, please.

Mr. Rutherford: Why don't we have, since apparently Bob wasn't familiar with, totally familiar with our final approach that we had presented, why don't we go back and have SC&A take a look again at that one to one ratio that we did, this very simple model, using the Building 10 subsurface real data and see, and come back, and I know that, I think it's pretty defensible and it's very basic, and it does the job.

Chair Beach: Yes. And I think Bob said that wasn't real data, but okay. Yes.

Mr. Rutherford: It is real data.

Chair Beach: I just think we need to get our hands around exactly what NIOSH is planning on doing, and then SC&A. Because we keep coming up with all these different models and I don't know about anybody else, but it is, it's a lot to throw in, for my mind. And you just get back to the basics of what samples do you have? Do you have samples of thorium in the pipes? No. So you're using models from outside that are, in my mind, not a good representation of what happened at M&C.

So I don't know. Do we want to finish up with -- and I don't want to cut anybody off. Do we want to finish up with Bob's presentation?

Dr. Mauro: Before we leave, I want to say one thing. Don’t forget we've selected the 95th percentile to account for all of this uncertainty. It's not that we're using the best estimates. We're saying we realize there's all of these complications. So we're going to accommodate that by going to the 95th percentile.

I feel, and I'm going to say something maybe I

shouldn't, I think we're gilding the lily on trying to get to a level of precision of the mechanics of modeling this, where in the end, we all know the doses are small, and are probably already covered by the 95th percentile we picked for the uranium when we did this calculation.

So, again, please, I apologize for this but we're gilding the lily.

Mr. Calhoun: This is Grady. Can I chime in for a second.

Chair Beach: Sure.

Mr. Calhoun: This case here, it's like, we got to, I agree with Josie, we've got to stay focused on what we're, what our threshold here is. And our threshold here for this entire petition and evaluation report, is can we bound the doses.

SC&A thinks we can. We certainly think we can. And in order to come up with something saying we can't bound the doses. It's got to be scientifically based. It can't just be, oh, I'm really not sure that we can based on what we have. We've got a lot of, a fair amount of data, we've got a lot of bases based on numbers and there has to be an equally robust counter-position that we can't bound the doses.

Not that we can't do them in a precise way, but we can't bound them. So it needs to be scientifically based and defensible as well.

Member Anderson: I would just say that bounding, you can always bound. Is it a reasonable bound. That's --

Chair Beach: Yes. There you go.

Mr. Calhoun: At the levels that are less --

(Simultaneous speaking.)

Member Anderson: Or just assume they're being exposed then as they were if it was operational.

Mr. Calhoun: That doesn't work because we're looking at doses here that are less than 100 millirem per year, that wouldn't even require monitoring under 10 CFR 835. So trying to make the argument that these are unreasonably high doesn't really make sense.

Now I'd agree with you if we said, well, we can't do it. Let's make everybody's legal limit of 5 rem a year bounding. Now that doesn't make sense. But the approaches here aren't hocus pocus. We actually have something that are based on numbers and reasonable assumptions by both NIOSH and SC&A. So any counter to that that has to go up to the Secretary, can't be well, we're not really sure we agree.

Chair Beach: Yes, I don't know if we're not sure we don't agree, but I understand the scientific point of it. You also have to have representative samples, which I don't agree that you have them for Metals and Control. And somebody else was trying to speak.

Ms. Naylor: Hi. Yes. This is Jenny with OGC.

Chair Beach: Yes. Hi.

Ms. Naylor: I just wanted to remind the Advisory Board that while we are promulgating 42 CFR part 83, which is the SEC Procedural Regulations. We specifically, and this is with the Advisory Board's support, reject the approach of pre-decision. There's not a good scientific or logical basis for establishing scientific measures and procedures. And so that's why it's very consistent with the regulatory language of possible circumstances.

And also, going back to the statute where the Advisory Board specifically tasked in the statute to look at this visibility issue. There's two criteria, as you know, for designating a Class to the SEC. One is that it is not feasible to estimate with precision accuracy the radiation dose that the Class received. But then it follows that there is a reasonable

likelihood that such radiation dose.

So the radiation dose that is well concerned in the statute for the framework, is the one that is likely to cause harm to the member of the Class. So this is the dose that will cause cancer.

Dr. Mauro: This is John. I'm sorry to do this but you just cited the regulations that I think I heard that what we did is okay within the framework of the regulations. Or did I miss that? It was you, you brought in the legal side of the language on what our threshold is for reconstructing doses. And I was listening to the legalese and I have to say, what I heard you say is we met that standard. Am I wrong?

Ms. Naylor: Well, just to start out, as an attorney, I don't opine on the scientific evaluation. That is entirely up to the Board, NIOSH, and SC&A. And so, again, the Advisory Board is charged by the President to evaluate, you know, the scientific and technical basis for designating a Class to the SEC.

So those are the, sort or, your major missions if you look at the science and the technical aspect and, you know, make a decision of whether, in your recommendation to the Secretary, whether that scientific evaluation and conclusion have met, is consistent with the regulatory standard, which asks you to reject this decision, you know, specific measures of completion. But operating under plausible circumstances.

And also, keep in mind, the statutory priority here, or the dose that the statute is concerned about is the dose that would harm the Class member. And the harm here, like where we think about Probability of Causation, and so harm that caused the cancer in Class members.

So that's the dose that cannot be reconstructed, and likely cause harm.

Member Kotelchuck: And that's the burden. I mean,

that's the burden of the argument that is being made by NIOSH and SC&A that this is just too small to cause harm. And therefore, all kinds of assumptions that they've made are -- don't get us anywhere near what would be harmful.

And I acknowledge that that's something that the Working Group will have to address and come up with, if you will. I mean, the question is, is the uncertainty and chaos, in terms of dealing with radiation and the residual period, and the harm that may have been caused by unwitting exposure, whether that does or could rise to a level of harm.

And until we do that, this would not get approved at whatever level.

Court Reporter: This is the Court Reporter. I would encourage everyone not speaking to mute themselves.

Dr. Taulbee: This is Tim. If I can just circle back a little bit here to what Bomber was saying earlier. I mean, when you look at this particular scenario, we're taking the measured uranium data that is site specific from Metals and Controls. Okay? For these different dig projects. And we are using a resuspension value, which we're going to, you know, adds -- provides some more information about to Dr. Kotelchuck. Actually, the full Work Group.

But we're using the 95th percentile here. So we're taking the highest concentration of soil, or the 95th percentile concentration. We're using the 95th percentile of resuspension values, and now we're assuming a one to one mass ratio of uranium to thorium to estimate this thorium dose, when we know that the site processed a lot more thorium -- or a lot more uranium than they did thorium.

So it's this basis, this building one upon the other, 95th percentile, 95th percentile, and then this one to one ratio, which is what gives us confidence that this dose is bounding. Okay? In light of not having

the measured data that Josie, you were pointing out, we don't have the measured thorium data. But when you take this into context of all three, we believe that this is a bounding scenario.

Dr. Mauro: I agree with you Tim. This is John. I agree completely.

Dr. Anigstein: This is Bob. The issue with not bounding, or not about bounding, and to answer something that LaVon said earlier, I went back through the report, to the April 8th White Paper. For April 8th, 2019 White Paper, where they did discuss, I mean, I'm just going to read from Page 4 it is. NIOSH determined the ratio of uranium to thorium-232 using data from samples taken from waste and materials removed from former AWE facilities and placed in the burial area. There were 754 samples taken. Outside perimeter of Building 10 and the burial area that were analyzed for both uranium and thorium.

NIOSH determined a paired activity ratio of uranium to thorium-232 for each of these samples, and calculated a geometric mean ratio of 9.88 to 1. However, there is no statement here about the correlation, which Dr. Kotelchuck objected to in our data. And furthermore, my understanding is that they didn't use this information because the next paragraph says new NIOSH bounding method, April 27th, 2019, which is nine days later than the date of the report, but anyway, and then the only, where they talk about the subsurface Building 10, that NIOSH can bound thorium exposures by assuming the subsurface sediment contains equivalent amount of natural uranium and thorium.

So I think there's a disconnect there. And when I pointed out that they used the soil sample that we're told, no, no, we did not use the soil sample. We looked at it but we didn't use it.

Dr. Mauro: I'm going to -- I have a real problem. If you figured out how much thorium was in the subsurface environment, using any one of these

methods, it's probably more than the throughput of thorium at this facility. That's how far we've gone afield. Because remember what Bob just did, keyed back to this relationship that, you know, in the end, what we're saying, some immense amount of uranium and thorium ended up underground as opposed to in the product, or that was originally made by M&C during the AWE period.

I think we are losing sight of the simplicity of the problem. We're creating something that, in physical reality, I hate to say this, at a point where it can't exist. We're saying we're putting all this thorium and uranium in the ground. We're forgetting that, no, we're putting this thorium and uranium in product that went out the door during the AWE period. Because the quantities that are in the ground now, from both the uranium and the thorium, through these models, are so large that it belies the possibility that this could have occurred this way. We're actually in the domain where we run the risk of being implausible by setting ourselves up with models the way we're doing them right now.

So that's where I think we are. I hate to say that.

Member Kotelchuck: John, look, NIOSH and SC&A agree that the SEC is not warranted. And you put out a lot of arguments, and different ones. At the level of agreement, you don't disagree with the folks at NIOSH. Some of us on the Working Group, at least me, have problems, and the problems stem from things that seem, to me, we didn't look at, which was people doing things that were egregiously bad in terms of radiation exposure.

And I feel like the ball is in our field. That is to say, we've got to come up -- if this is real, if the disturbance and chaos in the radiation safety situation in that period does not contribute enough to cause harm, right, that's likely to cause harm, then the argument fails. The Board will reject it and it will not be sustained.

And I can say, at this point, I don't have evidence

that it will cause harm. You folks are making a lot of strong arguments that you're being conservative and it's still very low. I feel like I have to think about, I mean, for example, just small things like ingestion. Your calculation of ingestion of radioactive material comes from resuspension and breathing in material and some of it gets into the mouth and digestive system.

What about people who were working without gloves, without taking minimum precautions? And I feel like, first, I hadn't raised this issue before. It's an issue in my mind, but we hadn't come to it. But, ultimately, I feel like we have to come -- we who are concerned about what was going on in terms of radiation safety in that plant in that period have to be able to make a reasonable argument, or make some reasonable estimation, about the harm that's caused by ingesting unusual amounts of radioactive material because of lack of proper radiological precautions.

That's, in a way, up to us. And it's been frustrating because -- by the way, I'm sure others are frustrated with what we're arguing --- but I've been frustrated because it appears as if the issues that related to the disturbance and chaos in that period never got looked at. And when I read, you know, what the workers testified when you went down, you know, it was disturbing. But does it raise to the level of harm? And have we looked at everything that might? The things you've looked at certainly -- the things that NIOSH has looked at certainly do not raise to the level of harm. I mean, so far, as I can see.

So, I think it's up to the Working Group, and those of us who want to argue that there's still a problem, to be able to account for what he's saying.

Chair Beach: Dave, this is Josie. Thank you. That was a good summary. I hesitate to say more because I'm echoing really bad for some reason. Okay. Where does that move us? And that gives us

a lot to think about, so I appreciate that, Dave.

Do we want to go ahead and finish up the White Paper or SC&A, or is there any other comments, Andy or Loretta?

Member Anderson: No. I think we've thrashed on it long enough (audio interference). While we can be unhappy with the conditions that were there, all of those worst case assumptions, that it was, you know, bad, but did it raise exposures so bad that they'd put them into SEC? I'm just reminded of if somebody was working there under the regular time and estimated exposure got them to 49.9 percent probability and one-tenth of a percent could potentially make a difference. But clearly anybody who was working there only during the residual period would not end up with a compensable level of dose.

So does a small amount added make a difference for some of the workers? And I think it's clear from the interviews that, compared to the other sites we've looked at, this one did seem to be what they were doing was somewhat different. Exposures may well have been different. But is that sufficient, other than pointing that out, to say you haven't bounded it with any one of these methods?

And I don't know what more information you could get. We're sort of it is what it is, and we've got the opinions as they are. And we then have to -- you know, there's to hear from the claimants who filed it in the first place as to has NIOSH and SC&A provided sufficient information that, while things were not done properly, what was there wasn't sufficient to have resulted in egregious harm.

Chair Beach: Okay. Thanks, Andy.

Member Anderson: We've got to move on, I think.

Chair Beach: Yeah.

Member Valerio: Josie, this is Loretta.

Chair Beach: Hi, Loretta. Go ahead.

Dr. Anigstein: Are we ready for the welding yet?

Chair Beach: No. Loretta has a comment.

Member Valerio: Actually, I don't have a question, it's just that, I don't know, you stopped echoing. I had a hard time hearing Andy. I heard Dave clearly, but, I don't know, I heard most of what Andy said, but it was broken up in the process.

Chair Beach: Yeah, it seems like we all have a problem with the echoing. And I don't know about that, at this point. And I'm echoing now, too. So I don't know if it's a problem with each individual phone, or I think we're just going to have to do the best we can.

I do have a question on the welding. What is NIOSH doing for welding? Is it different from what you're going to show us here, that SC&A is going to show us?

Mr. Rutherford: Josie, that's an excellent question. I think Bob's going to -- I think there are a couple of factors that are a little different, but let's hear that.

Dr. Anigstein: There's only one issue that SC&A has with the welding. Is it appropriate to go on with that?

Chair Beach: Yes, please, Bob.

Dr. Anigstein: Okay. So, we looked into the welding scenario. And I believe John Mauro had a colleague who had some information on welding. And prior to welding seal or pipes, the welder would work -- we don't have a meticulously clean surface, so they always take any corrosion, any coating on the parts to be welded get very aggressively cleaned using a power tool, a wire brush or a surface grinder.

And that kind of work generates an awful lot of airborne dust. So, anything on the surface essentially becomes airborne. And also the worker is

working at arm's length from this. So he's going to get a lot of inhalation during that time that he's actually cleaning the metal.

So we believe -- or we agree with the surface concentration that NIOSH is using that's plant-wide, and we agree that they furnished documentation for the exposure duration, that this is based on one worker's testimony during interviews, I think it's about four hours per month would be spent on that.

However, we disagree with the resuspension factor. We believe that, because this is a very aggressive activity, we should use the highest of the resuspension factors listed by OTIB-0070, which was in turn taken from the NRC document, NUREG/CR-5512, Volume 3, which in turn was taken by earlier studies on resuspension factors of a man named Sehmel.

So, we recommend that the highest listed in the OTIB-0070 is a range from 1.02 to 4.2 times ten to the minus-two. And this was done deliberately, it was an experiment that looked into it, deliberately done to measure resuspension factors. They sprinkled some barium sulfate, I believe, on the ground and vigorously swept it up.

Well, even so, sweeping the floor and measuring the resuspension activity at some distance from the floor is probably less aggressive than the cleaning of the metal. So I would assume that we should use the highest recorded -- the highest measured resuspension factor. And 4.2 times ten to the minus-two might be a little bit too far because probably the entire four hours were probably not spent in nonstop activity of cleaning.

So, as customary, we use a power of ten, we don't get into the detail, use the power of ten. We believe that ten to the minus-two would be a conservative and reasonable number.

Now, NIOSH had responded to that during a Work Group meeting in January by observing that, no, the

NUREG 5512 did not, in fact, even though they listed it, they did not use it as part of their range of resuspension factors on which they used to construct an occupation scenario. That was the whole purpose of 5512. What are reasonable criteria for releasing structures and facilities from licensing control? In other words, how much would they have to clean up for it to be released?

And so they took a number of resuspension factors and did a distribution of them. I believe they did statistical sampling. They did not use this because this is not characteristic. Of course it's not. Because what they were looking at is eight hour a day, five day a week occupancy. This was done for a very brief period of time.

But, here, we're not talking about a 40 hour week; we're talking about four hours per month. So it is entirely reasonable to use a very high value during that short period of time to characterize an activity which only takes place during a short period of time. And that fact that NIOSH's response was, well, this is not characteristic of M&C; we never said it was. It's just characteristic of this one operation.

So, anyway, that's the only place where we disagree.

Dr. Mauro: I'll add to that by saying if there's any circumstance where we use the high-end resuspension factor, this is it. This type of operation. So, even though, under other circumstances, the ten to the minus-three, we use ten to the minus-four, but, boy, if you're going to pick a nasty one where you're really aggressively removing material, this is when you use the high-end resuspension factor.

Chair Beach: How about -- what would jackhammering do to those numbers? Because I know they did a lot of jackhammering. So I don't think sweeping was the only vigorous activity by the workers. They jackhammered out that concrete regularly, according to the interviews.

(Simultaneous speaking.)

Dr. Anigstein: Excuse me. Hold it. John? John, let me respond.

Dr. Mauro: Yeah, Bob. I'm sorry, Bob. Go ahead.

Dr. Anigstein: Let me respond to that. Josie, the sweeping was not done at M&C. The sweeping was done by an experiment designed to measure resuspension factors, and they simply used that example. But this is the highest in the documented literature.

Chair Beach: Okay. And I understand it wasn't -- this is a model and we're using sweeping. But jackhammering seems to me like it would be --

Dr. Anigstein: But this is for the welding.

Chair Beach: I understand. And you're using it for the cleaning the work area to do the welding, the scrubbing of the metal. I believe that's what the basis of this is. Correct?

Dr. Anigstein: Yeah. Okay. I misunderstood you.

(Simultaneous speaking.)

Dr. Anigstein: I don't believe the jackhammering was one of the listed measured resuspension factors in OTIB-0070.

Dr. Mauro: Jackhammering would be a situation that is not amenable to a resuspension factor. It would be more amenable to a mass loading. If there was jackhammering going on, which we didn't model, I would use the 100 milligrams per cubic meter as the upper bound. Because if it goes above that, you can't breathe. That's what we did when we did the dust loading inside the ventilation system.

So, if you were to ask me, John, we've got another scenario that we need to look at and it has to do with jackhammering, and you wanted me to say what kind of dust loading you might encounter, I

would say, well it can't exceed 100 milligrams per cubic meter because people won't be able to breathe. They'd actually need respiratory protection to work in that environment.

So the resuspension factor has no relevance to jackhammering.

Chair Beach: Okay. And we just go back to modeling and the worker interviews. I go back to that because they worked in very, very dusty environments and not everybody realizes they're in a dusty environment until they get out of it. But that's beside the point. Any other questions or comments from Work Group Members on the welding?

Member Valerio: None here, Josie.

Chair Beach: Okay. Thanks. And hearing none, I'm going to say that, for me, that brings us to the end of -- well, we've got Board correspondence, but for this task, I think, for myself, I need to ask NIOSH to fine-tune what they're going to use. You have several of your own models. You have SC&A's models. Where are we at? What is NIOSH going to use to reconstruct those for the workers at Metals & Controls?

I think the Work Group needs to hear that and the Work Group needs to make a decision. And if someone else has a comment to that or disagrees, please speak up.

Member Anderson: Pick one.

Chair Beach: Well, someone needs to -- yeah, we do need to pick something.

Mr. Rutherford: Josie, this is LaVon. I will say, yeah, we'll go ahead and pull that specifically together for you.

Chair Beach: I'm sorry, I didn't catch all of that, LaVon.

Mr. Rutherford: You said that you need to show specifically what we are going to use in all these cases. We'll take care of that.

Chair Beach: Does that make sense to the rest of the Work Group? Or am I off-base here?

Member Kotelchuck: No. Yes, it does.

Board Correspondence

Chair Beach: Okay. Thank you. Let's move onto the Board correspondence. Does anybody have any comments? I mean, you all heard what was read. Does anybody want that re-read? I'm sure you all have copies of the letter from Congressman Kennedy.

Member Anderson: No, I don't need it.

Member Kotelchuck: I don't need it. By the way, I think that folks, petitioners listening in, should know that we had a Board meeting earlier this week, and all of us who are here in the Working Group, and many others, attended, and we had the letter read to us. So it's not because we haven't listened to the letter. We've all heard the letter within the last week, verbatim. The whole thing.

Petitioners' Comments

Chair Beach: Yeah. Thanks, Dave. And we appreciate the support that Congressman Kennedy has given to Metals & Controls. And they have for the past several years. So we do appreciate that.

I think, if no other questions are arising right now, we can hear from the petitioners.

So, Loretta, do you have anything? I think you just said no, but --

Member Valerio: No, Josie, I don't.

Chair Beach: Okay. And Henry or Dave?

Member Kotelchuck: No, thank you.

Chair Beach: Okay. Mike, are you still with us?

Mr. Elliott: I am. I am.

Chair Beach: Okay. We'd be pleased to hear from you at this time.

Mr. Elliott: Thanks very much, Josie. And thank you for the opportunity to speak on behalf of my fellow petitioners with regard to SEC Petition 00236.

So, I'd like to open my remarks first by referring back to the findings section. Section 7384 of the enabling statute for the compensation program. Among other things, it states, in Paragraph 6, that studies indicate that 98 percent of radiation-induced cancers within the nuclear weapons complex have occurred at dose levels below existing maximum safe thresholds.

So, I only bring that up because I hear us talking so much about absolute values being high or low and otherwise, and let's not forget that Congress recognized that even low levels of dose can be dangerous. It's important to keep this finding statement in mind when we consider whether NIOSH can estimate a bounding, a maximum dose to any member of the Class of workers covered by this petition under plausible circumstances.

The only fact of which we can be absolutely certain is that there is no measurement on monitoring data for the Class of workers under evaluation. Dr. Mauro of SC&A made that abundantly clear in his testimony on May 3rd, 2018. In fact, his exact quote was, "it's a stretch" to be able to reconstruct dose to M&C maintenance workers.

Despite this absolute reality that no measurement and monitoring data exist to estimate a bounding dose, the NIOSH/ORAU Team and SC&A have gone to great lengths to prove the contrary. They have developed what I consider unrealistic and

unsupported assumptions, force-fit models for residual period exposure scenarios that are inconsistent with exposure to M&C maintenance workers, and mixed data sets from completely unrelated survey efforts that bear no relevance to the Class of workers under evaluation.

The end result of this academic exercise is NIOSH's old assertion that the bounding dose can be estimated with sufficient accuracy. And, by the way, it just so happens that the absolute value was so low that we really don't need to be concerned about its accuracy. If this isn't an example of circular logic, I don't know what is.

I really don't want to give any legitimacy to their tenuous assertions by debating the validity of the latest technical arguments presented today by NIOSH and SC&A. But I will, however, point out a couple of limitations that jump out at me. I'm sure there are others, so please do not consider these an exhaustive list.

Concerning the response paper entitled "Response to Metals & Controls Corp. Working Group Comments" that was written by NIOSH, dated July 16th, 2020. In the section entitled "AWE Sites with Residual Radiation Period Classes Added to the SEC," at the top of page 8, NIOSH concludes, it is clear that these three residual periods added to the SEC were for sites with unusual work activities that had high dose potential for which NIOSH was unable to evaluate the source term. NIOSH then quotes a former Board Chair on the importance of the distinction between the potential for high dose and the potential for a lower dose.

I would argue that the M&C maintenance workers meet the standard for unusual work activities. We know they performed a wide range of work tasks of an unpredictable nature, and at a high frequency, i.e., daily.

As for the distinction between the potential for high dose versus low dose, since we have no

measurements or monitoring data for this Class of workers, and no surrogate measurements that are applicable or relevant, I believe it is not possible 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.

And I'm obviously quoting there the procedural regulation, 42 CFR 83.13. Therefore, one cannot establish whether the maximum radiation dose incurred in plausible circumstances is either high or low. Certainly, the way NIOSH has built its assumptions around exposure scenarios for this Class of workers, NIOSH contends that the potential dose is low. But as I stated before, this is an example of circular logic.

In the section dealing with Work Group Comment 2, on page 14, NIOSH is addressing the standard procedures it has developed to deal with the reconstruction of doses during periods where monitoring data are sparse or nonexistent. NIOSH argues that it is following the Board's position and guidance that concern for the plausibility of circumstances used for bounding is not an issue in the realm of very low doses, and, specifically, during AWE residual periods, such as at M&C.

NIOSH then presents a table summarizing the annual uranium dose estimates that it has developed for M&C maintenance workers using its assumptions of plausible exposure scenarios.

Essentially, NIOSH has jumped to dose reconstruction to estimate the dose from exposure scenarios it believes to be plausible. To me, that sounds like Site Profile issues, without having first satisfied the SEC issue of whether or not it is possible to estimate with sufficient accuracy 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.

Again, I just recited a quote from the procedural regulation. Stated another way, NIOSH has yet to demonstrate the existence of sufficiently accurate measurement and monitoring data for this Class of workers to estimate a bounding dose to any member of the Class under plausible circumstances.

In the section entitled "Contamination Surveys During the Residual Period," NIOSH highlights examples of sophisticated radiological measurements and survey techniques developed at M&C and used for various applications, most of which were for analyzing product quality, and none of which were used in any way, shape, or form to monitor exposures to the Class of workers under evaluation.

The reference to the area surveys conducted in Building 10 during the first 14 years of the residual period deserves a direct critique. Page 18, first full paragraph at the top of the page. NIOSH asserts that M&C performed routine alpha contamination surveys in Building 10 during the first 14 years of the residual period, from 1968 to 1981.

I personally -- mind you, I didn't start until 1983, working at M&C -- but I personally have never before heard mention of such routine alpha contamination surveys. And I've never seen any data of these surveys in Building 10. Presumably, if they did, in fact, take place, they likely would have been limited to the small area where M&C continued to conduct fuel manufacturing until 1979 to support the high-flux isotope reactor program, or HFIR, not the entire building.

I can't stress strongly enough how small the area was that the HFIR operation occupied. It was confined to the northwest corner of Building 10. You can get a sense of the relative size from a couple figures that have been submitted in the original August 2016 SEC petition. And I would refer you to Section E of that petition, page 6 of 6, Figure A3,

entitled "Map of Building Areas Depicting Affected, Unaffected, and Previously Decommissioned Areas." And there's a line pointing to the HFIR area in the northwest corner of Building 10.

Or if you look at Section F1, Exhibit 2, "Remediation of Building Interiors." This is the report by Weston that was done in October 1996. Figure 4 is the Building 10 affected areas, and if you just look at Areas 7 and 8, that covers the full extent of the former HFIR manufacturing area.

So, inserting this reference seems irrelevant, and doesn't change the fact that there was never any measurement or monitoring data of the workers under evaluation in this petition. Additionally, I suspect the routine alpha surveys, if they even occurred, were probably not very effective.

I say that because I distinctly remember, during the building interior characterization surveys, that we found considerable surface contamination on certain features in that area, which, it should be noted, had previously been decommissioned and released for unrestricted use by the U.S. NRC in 1981.

And I personally observed shiny, metallic particulate fines with elevated radioactivity filling the circular gap between a floor drain plug and the surrounding concrete floor. All completely accessible and visible to the naked eye. These metallic fines weren't buried or hidden. So the fact that they evaded the routine alpha monitoring program of the manufacturing operation for the entire 14 year period is evidence that it was not very effective.

What is more likely is that the routine alpha monitoring program was not as robust as NIOSH would have us believe. Certainly, that was my experience of safety programs when I started at M&C in 1983. While there may have been many safety policies and procedures in writing, the actual work practices rarely lived up to what was described on paper.

This SC&A memorandum -- now we're switching over to the SC&A memorandum, the presentation that Dr. Anigstein presented, entitled "Reply to NIOSH Metals and Controls Corp. Thorium and Welding Exposure Model," prepared by Robert Anigstein and Carl Gogolak on July 8th, 2020, largely relies on two referenced documents, the Sowell document from 1985, "Radiological Surveys of Texas Instruments Site," and the Roy F. Weston 1996 "Building Interior Mediation Drainage System Characterization."

I don't have any confidence that these reference documents can be relied on to estimate a bounding dose to a worker in the Class under consideration for this petition, especially with respect to the parameter (phonetic) estimates.

Concerning the Sowell 1985 document, Josie correctly stated that this study was limited in nature. So, in the interest of time, I will not repeat everything Josie said on that point. However, I'd like to point out, skipping down here, it should be noted that the isotopic concentration of radioactive contamination in the exterior areas, and especially the former burial site, was completely different from the isotopic concentration of the radioactive contamination in the interior areas, and especially the subsurface drains of Building 10.

The exterior areas exhibited uranium isotopes with depleted and natural abundancies of U-235, whereas the interior areas exhibited enriched abundancies of 235. They were not at all the same source materials. So I would have no confidence that the thorium-to-uranium ratio of the exterior areas can be used to estimate the thorium-to-uranium ratio of the interior areas.

Specifically, with respect to Dr. Anigstein's assumption that he articulated today that the ratios of materials in the burial site were representative of discharges from the site, I disagree. My understanding is that the majority of process waste

was drummed and shipped to Oak Ridge for disposal. The majority of what ended up in the burial site was related to a decontamination effort ordered in the 1960s, knows as the Great Smidgen Hunt.

In short, I don't believe the composition of isotopic concentrations found in the burial site are representative of what was routinely discharged during the AWE operations, and, by extension, to the subsurface drains.

I'm skipping down some more. Skipping over a lot of the stuff that I think the Board Members covered quite well.

Referring to the policy sections of the Executive Order 13179 that was issued December 7th, 2000, it concludes that the Departments of Labor, Health and Human Services, and Energy shall be responsible for developing and implementing actions under the Act to compensate these workers and their families in a manner that is compassionate, fair, and timely.

So, let me reiterate that last phrase for emphasis. I believe this is the standard to which the Advisory Board must hold itself: to act in a manner that is compassionate, fair, and timely.

I feel that the NIOSH/ORAU Team and SC&A are expending enormous intellectual and government resources to defend a position that is not suggested by the plain facts of the case. Dr. Mauro suggests that we're losing site of the simplicity of the problem. The simplest description of the situation is that we have no measurements and monitoring data for this Class of employees. We have no idea how much thorium was present in the subsurface drains. And the M&C maintenance workers were exposed in an unknowable number of scenarios on a frequent basis.

NIOSH asserts they can estimate the bounding doses in plausible circumstances to any member of

the Class, but the mere fact that they can model the dose incurred by exposure to a certain set of plausible exposure scenarios, albeit still hypothetical, does not mean that NIOSH has satisfied the sufficient accuracy standard codified in the Compensation Program regulation and enabling statute.

Once again, I would like to implore the Advisory Board to exercise its statutory authority under the enabling statute and the subsequent Executive Order at the time of the EEOICPA when it was established in 2000, and recommend addition of this Class of workers as members of the Special Exposure Cohort.

Thank you for your careful consideration of my testimony. And with that, I conclude my remarks today.

Chair Beach: Thank you, Mike. Are there any other petitioners on the line that would like to make comments?

Mike, did you expect anybody else?

Mr. Elliott: No, I did not, Josie.

Chair Beach: Okay. All right. I just wanted to verify in case they were on mute.

Mr. Elliott: Thank you.

Path Forward, August Board Meeting Presentation, Plans

Chair Beach: The system can be troubling. Okay. So that brings us to Number 6 on our agenda, and that is the path forward for not August, that should've been removed and December put in its place. I don't know, I guess I need to hear back from NIOSH on their timing for documents and we need to have another Work Group meeting in order to present in December. So, NIOSH, can you give us some estimate? I think the workload's on you.

Mr. Rutherford: Yeah, I think most of the workload is on us. Let me do this, Josie. Let me get with our contractor, get with our people, and we'll go through everything, put together a schedule, and then I'll send the Work Group a detailed when we expect to have these items complete. I don't want to commit to anything until I talk to them and try to get a good idea.

Chair Beach: Sure. That's understandable. And then could you also, I don't know if you took any notes during Mike's comments, the petitioner's -- he did bring up some good points on the source material from the inside versus the outside. And that was something I was kind of alluding to.

Mr. Rutherford: Right.

Chair Beach: So I am concerned that we're not -- don't have a good handle on the source that was inside Building 10. So, if you could kind of address that also.

Mr. Rutherford: Right.

Chair Beach: I don't know if anybody else has any comments. Work Group Members?

Member Kotelchuck: Josie? Dave.

Chair Beach: Yes.

Member Kotelchuck: I assume that Mr. Elliott's comments will be in the -- are in the transcript, and that sooner or later, we'll get to see that. I would like to see his statement. He may have it already available.

Chair Beach: Yeah. Mike, I guess we could ask you if you could send that to Rashaun, if you haven't already, so that she can get your comments to the whole Work Group.

Mr. Elliott: Certainly. And that has been my practice in the past. I will again. And I have not yet submitted my comments to Dr. Roberts, but I will

certainly do so.

Chair Beach: Okay. That's great.

Mr. Elliott: In the next few days.

Chair Beach: Thanks. And thanks for raising that, Dave. I forgot to mention it earlier.

Okay. Any other comments, Work Group? Anything else before we move to adjourn? We will hear back from NIOSH and get a sense of when we can get together for another Work Group call.

Rashaun, anything else that I might have missed?

Dr. Roberts: No, I think that pretty much covers it. I will expect an email from Mr. Elliott and I will subsequently distribute the comments, as was requested. Apologies for all of the technical issues today. It just goes to show how unpredictable that can be.

But I think that this has been a good discussion and I think a lot of good points have been raised. And once LaVon, Mr. Rutherford, follows up, we can determine when next to convene this Working Group.

Chair Beach: Okay.

Dr. Roberts: Thank you.

Adjourn

Chair Beach: And with no further comments, I'll move to adjourn this meeting. Thank you everyone.

Dr. Roberts: Thank you.

(Whereupon, the above-entitled meeting went off the record at 2:33 p.m.)