U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
CENTERS FOR DISEASE CONTROL
NATIONAL INSTITUTE FOR OCCUPATIONAL
SAFETY AND HEALTH

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ADVISORY BOARD ON RADIATION AND
WORKER HEALTH

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CARBORUNDUM WORK GROUP

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MONDAY
MARCH 13, 2017

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The Work Group convened via teleconference at 9:30 a.m. Eastern Time, Genevieve Roessler, Chair, presiding.

PRESENT:
GENEVIEVE S. ROESSLER, Chair
BRADLEY P. CLAWSON, Member
R. WILLIAM FIELD, Member

ALSO PRESENT:

TED KATZ, Designated Federal Official
BOB ANIGSTEIN, SC&A
BOB BARTON, SC&A
KARIN JESSEN, ORAU Team
ROBERT KIFER
JANICE KNAPP
JENNY LIN, HHS
JOHN MAURO, SC&A
JIM NETON, DCAS
JOHN STIVER, SC&A
TOM TOMES, DCAS

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P R O C E E D I N G S

9:39 a.m.

WELCOME AND ROLL CALL

MR. KATZ: Welcome, everyone, to the Advisory Board of Radiation and Worker Health, the Carborundum Work Group. And this is a preliminary call before the Board meeting which occurs next week, the 22nd and 23rd of March in Naperville, Illinois.

And the agenda for today is to wrap up some issues that the Board had addressed when we had the last Board meeting in November. The agenda for the meeting is posted on the NIOSH website and it is under Schedule of Meetings, today's date. You can find the agenda there and also, I believe, a White Paper from Tom Tomes from NIOSH following up on the issues that the Board had raised and the Work Group had raised previously.

There is an interim review by SC&A. It just came in because they didn't have much time to do it. It just came in this weekend. It will get

posted to the NIOSH website. It's not posted yet. So you won't find it there.

And I'm certainly able to send it on to you, for example, members of the public who want it. I can email it to you right after this meeting.

(Roll call)

Okay. Then everyone please mute your phones. If you don't have a mute button, * and then 6 to mute your phone. And that will improve the audio of the people who have to speak during this call.

If you want to take your phone off of mute, you press *6 again and it will take off of mute. And please don't put this call on hold at any point because that will cause real problems for the audio.

And with that, Gen, it's your meeting.

CHAIR ROESSLER: Okay. I have a question first. What is our time limit today? I know Bob has another appointment.

MR. KATZ: Bob needs to leave around noon. We'll still have Mauro and Stiver from SC&A,

if we need to go longer, that's fine. Bob said just before this call whether he might present both Tom's report and his together if that would save time. But let's hear from Tom whether he wants to present first or how you want to do that.

MR. TOMES: I'm fine with Bob going ahead and summarizing what we would present. That would work fine for me.

CHAIR ROESSLER: Okay. So, Tom, you won't be presenting then.

MR. TOMES: It's whatever you prefer. I can go through our responses or however you prefer to do it.

CHAIR ROESSLER: Well, it saves time and you and Bob are willing let's just let him go ahead with it then.

I did want to make a couple comments just so everybody is on the same page. I wanted to remind the Work Group that at our last meeting on November 17th, the Work Group had concluded that we had resolved all issues.

So I prepared a slide presentation for

the November 30th Board meeting and I was unable to attend. John Stiver made the presentation. Thank you, John. Let me just read that final slide so that we're oriented as to where we're going.

The conclusion slide was: the Work Group concluded that with appropriate adjustments, NIOSH can reconstruct doses for the proposed SEC Class. And then the Work Group moved that the SEC Petition 00223 be denied.

I wasn't there, but I read the 40 pages of the transcript. From there, I realized that there were some concerns about some of the things, particularly Dr. Melius said that he felt that the Board needed to be assured that the dose reconstruction could be done with sufficient accuracy.

What had been left is that NIOSH said, "Yes, we'll do this," but there wasn't anything specific on several of the items. So the conclusion was that NIOSH should develop the responses which they have done, that SC&A should review and the Work Group would meet again. And

we have done that.

With that, I think we're ready to go. And we'll let Bob lead off. Bob, are you going to be using slides?

DR. ANIGSTEIN: No, I don't have any slides.

CHAIR ROESSLER: Okay. But we got your final report. Actually, I saw it this morning. It came through last night. So if people have that in front of them, they can just follow along.

DR. ANIGSTEIN: Yes. I had the preliminary one on Friday and then the one yesterday.

COURT REPORTER: Dr. Anigstein, can you get a little closer to your receiver?

DR. ANIGSTEIN: Is that good now?

CHAIR ROESSLER: That's much better.

USE OF SURROGATE DATA

DR. ANIGSTEIN: Okay. Let me start off my saying I did not do a complete top-to-bottom

audit of the dose reconstructions because we certainly didn't have enough time. We got the report at the end of the work day on Thursday. That gave us basically one work week to work on it.

So I did find a number of -- I'll just go through them. Starting off with surrogate data issues. On the first AWE period, NIOSH accepted our suggestion that we use the uranium slug that had been previously modeled for TBD-6000. The results were published in the Journal of Health Physics. So the photon dose rates from those had been calculated. And we're fine with that.

However, what we didn't see until now was the beta doses from the same materials. Since this was an MCNP calculation in the first place -- this is a state-of-the-art radiation transport code -- it made sense to do the beta doses in the same manner.

So the beta doses were at contact and at one foot for purposes of skin, even though skin was not one of the organs in the example. But nevertheless the methodology needs to apply to

skin.

And we found that in fact the calculated beta dose was not significantly different than the one that was used. NIOSH just assumed that we would go 10 times the gamma dose. So it would go from 0.524 to 5.24 millirem per hour. And we got 5.4 instead of 5.24 which is close enough.

However, for the skin dose we find that NIOSH was using a generic number that was based on a publication from 1989 of 230 millirem per hour at the surface. And that was undoubtedly for a very large shape. And the same calculation they did it at one foot showed at contact only 77 millirem per hour instead of 230.

So we suggest -- and we're not going to make that a finding. By the way, my whole presentation right now we should say is preliminary observations and preliminary conclusions. Given the very short time we did have the time to have a thorough, in-depth review that we would normally do. So we can't say, most likely these are correct, but we are just saying these would be the

preliminary observations.

EXAMPLE OF DOSE RECONSTRUCTION

MR. KATZ: Bob, this is Ted. If I could just interject here. It might be helpful for you -- perhaps you've been so much involved in a lot of the SEC DR example cases. But the intent with reviewing dose reconstruction examples for SEC evaluations is really a proof of concept. It's not so much that everything be buttoned down to some sort of perfection. But it's proof of concept again so that the Board can feel confident that dose reconstructions can be done, but not necessarily that everything be perfect.

DR. ANIGSTEIN: I see. Understood.

MR. KATZ: Yes.

DR. ANIGSTEIN: My impression from listening in to the Board meeting was they did want to know though what --

MR. KATZ: I just covered it for you, Bob, they want to know those dose reconstructions can in fact be done in reality. That's why they

want to see a dose reconstruction example.

DR. ANIGSTEIN: Alright. Well, there's no question that there is sufficient information out there particularly including what the analyses that were just performed and I can share these with NIOSH. We have precedent with that for General Steel Industries where NIOSH simply took -- we did MCNP runs and basically examined our files, said, "Yes they agree with the methodology. They agree with the results." So it became, sort of, jointly adopted numbers.

The fact is that the use of the hand uranium slugs during the first AWE period, which is 119 days in 1943, is acceptable for the photon doses. It's acceptable for the beta doses. We think there is an overestimate of the contact dose. And NIOSH may want to revise that downward. But in principle, it can be done.

The second AWE period is a little different in that there again NIOSH accepts our recommendation as adopting as a source term --

CHAIR ROESSLER: Bob, I'm wondering --

this is Gen -- if we should stop and take each item as you present them.

DR. ANIGSTEIN: Say again?

MR. KATZ: Right. Bob, give a pause and ask the Board Members if they have any questions on this first.

DR. ANIGSTEIN: Sorry. Go ahead.

CHAIR ROESSLER: I guess my question would be on this one that you state we conclude that the surrogate data used by NIOSH, blah, blah, blah, are reasonable except for the skin dose. So I guess on this one and following what Ted said that we're really looking for proof of concept as we go through these, I'd like to make sure that the Work Group has a chance to discuss it and that we get SC&A's final word on it. I'd like to close the items, in other words, as we go along.

DR. ANIGSTEIN: Okay.

CHAIR ROESSLER: So I wonder if anybody has any questions or concerns on this one.

MEMBER CLAWSON: Jim, I understand what you're doing. What I also thought now is --

I thought NIOSH was going to -- have they given us a test run and dose reconstruction? Is this Bob's --

MR. KATZ: Yes.

MEMBER CLAWSON: Okay. I just wanted to make sure. So this is what we were going off of. Okay, that's all I wanted to make sure on that and I'll just follow through.

MEMBER FIELD: Okay. This is Bill. I'm fine to sign off and close it out.

CHAIR ROESSLER: Okay. Would this be SC&A's final word on this then that NIOSH has the concept and that you feel confident that they'll follow through.

DR. ANIGSTEIN: For the external exposure during the first AWE period, we're fine.

CHAIR ROESSLER: But we don't want to get into the same situation at the Board meeting that we did last time where there are still questions on it, I guess. I'm looking to hear what Stiver has to say on this.

DR. MAURO: This is John Mauro --

DR. NETON: This is Jim Neton. I think that the issue before us back in November was basically looking at doing the dose reconstruction with a different configuration for source term. And as far as the modeling and all that goes, it's certainly tractable. Again, the issue was whether it's sufficiently accurate because the doses were so much higher. And I could understand why Dr. Melius wanted to run that to ground.

I think that what Bob has shown is that, yes, they are certainly tractable and within reasonable bounds. Now the skin contact dose rate, it's a bit different, a little lower, based on our calculations. But certainly, I don't think that's something that would hold up a decision on the part of the Board, though.

John, I know you wanted to say something. Do you want to jump in there?

DR. MAURO: You stole my thunder.

I second what you're saying. I spent a lot of time with Bob going through these. There are differences in the assumptions, but

fundamentally -- you see, originally, the problem was we could not match the example problems. And as a result, Dr. Melius thought until we could do that, there really is no assurance that it can be done.

And spending time with Bob on the phone, it's clear that we can now match their numbers, except we don't agree with them. But that doesn't mean --

DR. ANIGSTEIN: Let me interrupt you.

DR. MAURO: Yes.

DR. ANIGSTEIN: Actually I was not able to do a top-to-bottom audit of the dose reconstruction. There just wasn't enough time. So I did not run all the internal doses. I have no reason to believe they can't be done. But it's simply that I could not do it in the time remaining.

I could continue, we could continue, this and hopefully have a complete or more or less complete report let's say within a week prior to the next Board meeting, certainly with the Work Group. Barring any major disagreements, we may be

able to put it entirely -- formally put it to rest.

MR. KATZ: Bob, why don't we just keep going through these and see what it is that actually, if anything, there's discomfort with. But it seems like it's premature to already be abandoning ship here.

CHAIR ROESSLER: Okay. Let's do that.

DR. NETON: This is Jim. I'd just to point out on this first item the difference in the skin dose rate is really related not to any calculational differences but a geometry difference.

DR. ANIGSTEIN: Yes.

DR. NETON: I mean we have assumed that there was a potential exposure to a somewhat distributed source and Bob and SC&A has indicated that a person could only hold one uranium slug or rod at a time. Therefore, the dose is equivalent to what was modeled by Anderson and Hertel.

I'm not sure that we agree with that assumption. I mean it's an assumption. I think we prefer to stick with the higher dose rate because

we don't really know for certain. What Bob says has some merit, but again it's just an interpretation issue on our part. It's not a calculational issue here.

DR. ANIGSTEIN: There is very good documentation which Tom or NIOSH found and we confirmed that they did, in fact -- I mean this is one time we have a source term even towards way back in 1943 that is very well defined. They said they did ship in what are called Clinton slugs and they weighed a total of 30 pounds. So you can say they're three pounds each. And three pounds is very close to the slugs that Jerry Anderson and Nolan Hertel did in the paper in the Health Physics paper.

So there apparently was not a large chunk of uranium that someone could put their hand on and get --

DR. NETON: But in reality, we're using a 10 slug value which is more of a distributive source.

DR. ANIGSTEIN: Understood.

DR. NETON: And you can't certainly be near that source.

DR. ANIGSTEIN: No, that's for the noncontact. And the noncontact we come very close.

DR. NETON: I understand that, but --

DR. ANIGSTEIN: But for the skin contact --

DR. NETON: Someone is going to be grabbing those slugs in a pile, right? I mean they're there.

DR. ANIGSTEIN: Okay.

DR. NETON: I don't necessarily think that I agree that it's one slug at a time is the bound.

DR. ANIGSTEIN: Understood and this is an observation, not an objection. I don't have a problem with that if that's what you wish to go with. I know that would make it consistent with the way you handle uranium in general using TBD-6000.

I just pointed this out. This was the

result of our calculation. But we're not digging our heels in on this.

CHAIR ROESSLER: So it appears that NIOSH is proposing is certainly claimant-favorable. Is that what I'm hearing?

DR. NETON: We think so. That's true. This is Jim.

CHAIR ROESSLER: You know we may get into more of this as we go on in the discussion where there are some disagreements in what I consider the details of the dose reconstruction. Maybe we should do as Ted suggests and continue on and see if we can come to a resolution on that.

And this, Bob, what you just said is that you agree with this. You would accept this, Neton's approach.

DR. ANIGSTEIN: I'm sorry. I'm not sure I understood your question.

MR. KATZ: Bob, Gen was saying that you had just said that you agree with Jim Neton's --

DR. ANIGSTEIN: Yes, we can accept it. Yes, we can live with that.

MR. KATZ: Right. So this is one I guess that we can close.

CHAIR ROESSLER: Okay. Do the other Members of the Work Group agree with that?

MEMBER FIELD: This is Bill, I'm in agreement.

MEMBER CLAWSON: This is Brad. Sorry. It took a little while to get off mute. I agree.

CHAIR ROESSLER: Okay. Then let's go on to the second AWE period, Bob.

DR. ANIGSTEIN: Okay. The second AWE period goes the other way. NIOSH accepts that the source term as being the flat plates, because that's again the one that seems to be closest. We don't know what their shapes were. We do know what the total amount, again the limit was 30 pounds in one place would be source documents.

Consequently, they accepted that this would be -- again the HP-10 rate was 0.23 millirem per hour to an operator which is the dose at one foot. We have no problem with that. That's straight out of the calculations that are shown in

TBD-6000.

But here the beta dose -- saying that the beta dose is 10 times the photon dose doesn't work for a shape like this because it's dependent -- the beta dose only depends on the surface area. The beta particles can't penetrate more than about a millimeter of uranium. So it's the top millimeter that counts.

However, the photons may be attenuated, but irrevocably they never go to zero. So a larger, a thicker shape gives you more. Therefore, the relatively low photon dose that comes out of this flat bar that's about four centimeters thick, I think, does not give you an adequate -- multiplying that by ten does not give you an adequate beta dose.

We got a very good dose by running the model that's four times as high. It's lower than the beta dose that NIOSH would have assumed from this very large ingot which is not representative of what they had. But it's higher than by simply taking the tenfold -- simply multiplying by ten.

That may work for a large shape. It does not work for a relatively thin flat shape. That we find we have a problem with that.

We would suggest that NIOSH reconsider that, and our rate instead of 2.31 is 9.5 millirem per hour. And we'll be happy to share the MCNP ones so that NIOSH could inspect them and determine whether they're acceptable or not.

CHAIR ROESSLER: Okay. Tom or Jim, do you have any comments on that?

DR. NETON: Yes, this is Jim. I think first of all I'm not sure what dimensions were used. Bob mentioned something about four centimeters. So we really need to see those MCNP runs.

DR. ANIGSTEIN: Sure. They were exactly the dimensions in the Anderson and Hertel paper in Health Physics.

DR. NETON: Right. Okay.

(Simultaneously speaking)

DR. NETON: The other issue is though we use exactly what is in TBD-6000 which is based on -- Bob is correct -- film badge measurements, the

beta-to-gamma ratio as established on film badges which has been the default for quite some time in 6000. That takes into account, at least in my opinion, the variability of the exposure geometry, the worker in relationship to the material itself.

Even if Bob's number is right which is 9.5 millirem per hour, that's exactly a person's skin at exactly one foot for 1,000 hours. I forgot what we modeled.

DR. ANIGSTEIN: Yeah, one foot exactly. One foot away.

DR. NETON: Exactly one foot. And I'm not sure that's the relevant dose to use. We've just seen this. We need to think about it. But I'm not sure that I necessarily agree.

DR. ANIGSTEIN: As I just said, this is still lower than the default dose used in TBD-6000 which is from the large ingot, which has been used for other things. You would get, I believe it's 2.08 millirem per hour photon.

DR. NETON: That's correct.

DR. ANIGSTEIN: That would give you

20.8 beta.

DR. NETON: Right.

DR. ANIGSTEIN: So this, what we're suggesting is lower than that which is relevant to this particular shape. I say that's arbitrary. We have to adopt it. We really don't know what the shape of the metal was in doing the second AWE period.

So it was just chosen as a claimant-favorable because of the shapes that roughly correspond to the total mass. This has the highest surface area, which is along a flat bar and consequently it gives you the highest photon dose.

DR. NETON: Yes, I understand and I think though that it actually comes up as something like 40.1 beta-to-gamma ratio, which is something we've never seen on any film badges under any exposure geometry consideration. Not never, I guess, but it doesn't comport with what we know to be what's been measures in a lot of AWE facilities over many years.

We're not trying to model the highest

dose at one foot. We're trying to model what the dose to the general skin is here. And I don't know that this --

DR. ANIGSTEIN: One foot is what is being used. My understanding is that one foot is being used as a representative, whether it's realistic or not. But that seems to be the one that's used.

DR. NETON: Well, it's one foot from the surface. But then the beta-gamma ratio takes into account varying distances of the worker's whole body skin, not the hands and forearms, but the whole body skin dose. I don't see that the whole body skin is representative of 1,000 hours at one foot.

We need to look at it. I guess I can't comment any more on that other than we need to look at it. We need to see the calculation and then.

DR. ANIGSTEIN: Sure. I'd be happy. If I get approval from Ted, I'll be happy to send them to you later on today.

MR. KATZ: Yes, you don't need

approval, that's fine to send them.

DR. ANIGSTEIN: Very good. Okay, it will be a little later this afternoon when I come back from my appointment. Okay. Other than that, we're okay on the external for the second AWE period.

And the next issue is just the order that I have in this memo is, we went into considerable detail in the report that came out last January of 2016 on the modeling of the glove box for the plutonium or for the plutonium glove box --

MR. KATZ: Hey, Bob. Before you go onto that, I think the Work Group wanted to talk about this issue by issue.

DR. ANIGSTEIN: Yes.

CHAIR ROESSLER: Yes. Well, I was going to bring that up. But it seemed to me that we have to leave that one. And there may be others that will come up, too, that we can't answer right now. I don't know. Does the Work Group have any questions on the second AWE period presentation?

MEMBER FIELD: This is Bill. I don't have any questions, but I'm just trying to get an idea. Do we really need to leave it? It seems like it's just a matter of some recalculations.

DR. MAURO: This is John. I'd like to just mention that what we're discussing is judgments. The issue of can you reconstruct the doses is not at issue here as it would be with an SEC. What we're really talking about is what is the most reasonable, appropriate and claimant-favorable assumption to make to calculate the dose. And certainly there's a degree of discretion that anyone individually making this can use.

So the kind of differences we're talking about right now as Jim has brought up and Bob brought up, I think it's very important to keep this in mind.

At least with regard to the analyses that we looked at, Bob had mentioned he hadn't looked at the internal yet. But as far as the issues we're talking about today, you'll notice

that we're really discussing differences in judgment on what reasonable people would assume to come at the problem.

I don't want anyone to lose sight of that. And we're really talking quite frankly in my mind Site Profile-type discussions on how best to go about doing the modeling. And I thought it important just to remind everyone of that.

CHAIR ROESSLER: The thing, I think, though that we have to answer that Dr. Melius brought up at the Board meeting the main question which is can the dose reconstruction be done with sufficient accuracy. If SC&A agrees that it can be done on this item, then I think you can discuss the details later.

DR. MAURO: I think that's where we are on this item.

CHAIR ROESSLER: So I guess the Work Group is probably looking to SC&A to answer that question for us.

MR. KATZ: Right. So John said affirmatively. So it's up to you, Gen and Bill and

Brad, to concur or not concur however you want.

MEMBER CLAWSON: This is Brad. I'm sitting here listening to this and I'm hearing one side saying, yes, it can be done. But we've just got a judgment decision. So in my mind, we have taken care of the issue. It can be done. It's just we've got to allow these two to be able to work out what's the best possible organ, what is the best one.

To me, what I'm hearing SC&A telling us is, yes, it can be done with accuracy.

CHAIR ROESSLER: That's what I'm hearing.

MEMBER FIELD: Yes, Bill. I agree. It's all a question of sufficient accuracy. It sounds like it has sufficient accuracy. It's just the method.

CHAIR ROESSLER: And I agree with that. So I think since we're going through this item by item, I think we can close this one.

MEMBER CLAWSON: Yes, I can agree with you on that, Gen. The only thing that I would like

to see is when NIOSH and SC&A come together on this and which way they decide. I'd just like to have a memorandum just letting us know how it went so I understand.

MR. KATZ: Yes, Brad. We'll have a follow-up Work Group meeting just to close out this sort of issue where there's a discussion that it hasn't been completely finished.

MEMBER CLAWSON: Okay.

MR. KATZ: So we can have another teleconference and close these matters out for Site Profile purposes. Of course, it's very helpful to NIOSH to have this kind of review.

MEMBER CLAWSON: Okay. So I have no problem, Gen, closing it if you'd like to close it.

CHAIR ROESSLER: Sure. Okay, and that's the common procedure to have another Work Group meeting afterwards to close out some of these Site Profile issues.

MEMBER CLAWSON: Sure.

CHAIR ROESSLER: Okay. So hearing no objections to that, then we'll close this one

and we'll move onto the next one, Bob.

DR. ANIGSTEIN: Okay. The next one is the issue that was raised in our review back in January of last year about the MCNP analysis that was done on behalf of, or commissioned by NIOSH, on the plutonium glove box worker. We wrote it up and I won't go into every detail because there's a detailed appendix to the report of last January 27, 2016, report. And they were using apparently -- the person I happen to know who did this named from the MCNP files. The analysis itself was done in a very professional manner.

But the assumptions, they were using a glove box design that had been proposed and then withdrawn by NIOSH during OTIB or TIB-10, which was about glove box workers.

And there were some objections to that. SC&A and I reviewed that. We had some concerns about the design of the glove box and the MCNP analysis that was done at that time. This goes back several years. And then NIOSH withdrew that. That was Rev 3 of TIB-10 and then we went on to Rev

4 and did not utilize that.

That model had never been accepted. And there were some problems with it, the main problems being the distance from the source or the operator. It was assumed by NIOSH earlier and we agreed with that that the glove box worker would typically have the source out one foot from his body, at 30.5 centimeters. And in this one instead it was 35 centimeters. And the inverse square law, that distance significantly changes the dose rate.

And it's one foot in a horizontal direction and then the dose was calculated. Also five centimeter displacement, that makes it a little more than 35 centimeters. Sorry. It was 35 centimeters -- I misspoke -- in a horizontal direction and then another five centimeters into the vertical. So you take the right triangle and you come with even more than 35 instead of the 30.5 that was used earlier in the Attila calculation, which everyone agreed was a reasonable distance for an average height between average length they would be working with.

Second of all, the other issue was the characterization of the fuel. Now there were a number of different fuel mixtures used. But with plutonium fuel, the older it is the more time there is for the ingrowth or the decay of plutonium-241 to americium-241 which is a much stronger gamma emitter than any of the plutonium isotopes.

Consequently, assuming that it's five years old which is an assumption that it's used by Hanford dose analyses or the default assumption, would make this again to increase the source term. And then also there are different configurations, different mixtures.

And there was -- sorry, I'm looking at this. Oh yeah. The fuel pellets were not just -- they were mixed up with plutonium and uranium. And there was a question of the uranium being enriched. And there was enriched uranium used at Carborundum. Literature says anything from 10 percent enriched uranium, 24 percent enriched uranium.

So without going into the details of this, it's all in the report of January last year.

We got photon dose rates of 50 percent higher. We believe that that is a more accurate, claimant-favorable model. We don't know exactly what the source terms were, but if you use documented -- we're not making these up. These were documented in the various reports and correspondence from Carborundum.

And using the most claimant-favorable assumptions, we get much higher. Fifty percent higher at the one foot distance that is assumed for the operator. At one meter for example, the general laborer, the difference is not as big.

And then there is actually the NIOSH analysis which is slightly more favorable to neutron dose. But the neutron dose is a very small constituent of total dose, so it does not offset it. So that's one.

And again, we've done a very comprehensive MCNP analysis. We can pass that on to NIOSH to see whether they would want to utilize that model and cut down on some of the labor costs of rerunning it. So I'll pause for any discussion

or questions on that.

CHAIR ROESSLER: Do we hear any response from NIOSH?

MR. TOMES: This is Tom. I'd just like to point out that we have not seen our views of the comments on plutonium sources in preparation of the responses that we sent the Work Group, we focused on the findings. And it wasn't in with the findings.

But we included it along with other observations for completeness. But the comments from SC&A are still under review. And we would like to see the MCNP files from Dr. Anigstein.

CHAIR ROESSLER: We have sort of the same question on this item as the other ones, I think. Is the concept accepted by SC&A? And it's a matter of looking at the exact approach. Or is this something that needs to be looked at before we can go any further on it?

DR. ANIGSTEIN: Yes, I would agree that we accept the concepts. In other words, we have a model. NIOSH has a model. NIOSH obviously is

capable of running these models. So just a change of the source term and the configuration that we need to agree on.

But in principle, we completely agree that there is enough information available, perhaps more than enough which is more than one data source, that this analysis can be done. We don't dispute that.

CHAIR ROESSLER: So you would agree that dose reconstruction here could be done with sufficient accuracy.

DR. ANIGSTEIN: That, in principle, it can be done.

CHAIR ROESSLER: It seems it's just in the same category then. It's an item that the Work Group -- I'm just throwing this out now -- could close, but it would come up then at the Work Group meeting that we would have, the next Work Group meeting.

MEMBER FIELD: This is Bill. I just have a question here. You said "in principle." Can you expand on that a little bit?

DR. ANIGSTEIN: Yes, I say in principle it is possible to model the dose to the glove box worker and other workers standing nearby. Using this general methodology would simply have some disagreement. We don't completely agree with the input data, but if you change input data, of course, you will change results.

It's not a question of that nobody knows how to do this. It's a question of we didn't make it a finding. Maybe we should have because we didn't have quite as strong an opinion as to the acceptability of the assumption that we're proposing.

MEMBER FIELD: I understand. I just wanted to clarify.

CHAIR ROESSLER: Okay. I'm not quite sure yet where to go on this. The Board depends very much on SC&A's evaluation. That's why we have SC&A. So I'm looking for something from SC&A that can help our Work Group Members come to a conclusion on this.

MEMBER FIELD: From my understanding of

what was just said -- that's why I wanted to clarify the in principle -- it sounds to me like what you're saying is agreement that this can be done with sufficient accuracy.

DR. ANIGSTEIN: Yes.

CHAIR ROESSLER: Well, Bob says yes. So then I think that this fits in that same category. We can close this item for the purposes of this discussion. And we'll follow through on this later. Am I correct on that?

MR. KATZ: Yes, yes. We'll follow through. This will be another Site Profile matter to button down.

CHAIR ROESSLER: Okay. But I think we need to hear from the other Work Group Members on this.

MEMBER CLAWSON: Gen, this is Brad. I'm good with it. I'm like you. I just wanted to make sure that it could be done with significant accuracy. Seeing that, I'm good with this.

CHAIR ROESSLER: Okay. Bill?

MEMBER FIELD: Yes, I'm good, too.

CHAIR ROESSLER: Okay. Then unless there's something further from Bob or NIOSH, I think we can move onto the next item.

DR. ANIGSTEIN: Okay. Now I'm going through the seven issues that were raised in the original review. Issue No. 1 is doses to skin. But they are actually using it for this. So maybe you should delete the word skin and just say doses from the x-ray diffraction apparatus because NIOSH is using that for the whole body also.

And I explained here in my memo there was a report that came out last June about the x-ray diffraction apparatus. And I did not do a detailed review of that because that report was attached to a second report by Tom Tomes who said XRD is not the limiting pathway. The uranium metal is. So I figured we don't have to really do a detailed examination because they've looked at it and then said it doesn't rise to the surface as the bounding pathway.

But now that we lowered the suggestion, the source term from the uranium, now XRD came up

again to the fore. Now NIOSH found that the dose to the operator is limited by exposure to the uranium because he's up close and personal with it. But the dose to the other workers who were a little further away, the XRD becomes dominant.

I did a detailed examination because there was some question about the assumptions about how this was performed. I took the occasion on Saturday to telephone the worker who had furnished the information. This was sort of a chain referral. One of the claimants that had been interviewed -- I believe NIOSH interviewed six former workers and one survivor as part of their original SEC Evaluation Report -- and one of them struck my eye as being interesting because he claims he had worked with thorium which I will get to in a minute.

So I spoke with that gentleman. And I also asked him if he knew anything about XRD. And he said, no, he didn't, but he was in touch with a former colleague, a fellow worker from that era, who did, who was familiar with XRD.

So I called that gentleman. That was a year ago, over a year ago. And we spoke and he had some information. I included a report of that interview in our review of the ER.

And then subsequently, a member of the ORAU team -- I believe someone is on the phone now -- spoke with him to confirm the information. And the one factor that basically was consistent -- there were some differences in some slight details -- with the interview notes that I had made from both of the gentlemen.

Wrote it up and typed it up and mailed it to him. He didn't have email. So I mailed it to him with a stamped self-address return envelope. He very graciously wrote in comments in ink on this. So there was what appeared in the final review included with my initial notes with his comments.

Anyway, the issue/question that I had in my mind was how much time did he spend in the vicinity of the apparatus. My impression from the review from the report was that it was an assumption. He did not answer that question when

I asked that question.

He did say that he would set it up. Then once it was running, he would walk away because it didn't require his presence and he was aware of radiation exposure hazards. But as far as I could tell he didn't get the time. So it was assumed that it was two minutes which just intuitively sounded to me like a very short time. But mostly it was undocumented.

When I spoke to him and asked him how much time did he spend, he said, "Well, two or three minutes to change the sample." Then in the same vicinity he said there was a chart recorder that was his friend that was with the apparatus. So he would check the chart recorder, make a notation on it. He couldn't be precise.

But basically my takeaway was that he spent about five minutes, two or three minutes with the chart recorder, two or three minutes actually changing the sample. Perhaps somebody would come by and say something to him and he might linger near the apparatus while they have a conversation.

Five minutes rather than two minutes sounded like a much more favorable and a more conservative assumption.

And then the other objection that I had to the analysis done by NIOSH was that we agreed to use a paper published by Joel Lubenau and his associates who were working for the State of Pennsylvania Department -- I'm not sure I'm getting the exact name right -- of Radiation Control. And they were concerned.

They had done a survey of a number of such instruments throughout the state. And they came away -- it was published in Health Physics -- and reported that the highest rate at the edge of the table, not on the table itself, was 2 mR per hour.

We don't know what the skin dose was to the hands. However, given the high skin dose rate -- 5230 millirem per hour of contact with the uranium metal, that would certainly bound this exposure. So I would not have a problem with that.

However, the 2 mR per hour was measured

with one of two instruments, either a Victoreen 440RF or Nuclear Chicago 2586. It so happens that there was this symposium or meeting sponsored by a predecessor of EPA. It was a government agency called Bureau of Electronic Products. They sponsored a meeting in about 1970 in Philadelphia. And Lubenau was one of the speakers and also a man by the name of Els, E-L-S. Els said that for the purposes of making measurements, radiation protection measurements of the XRD apparatus they assumed that it was a copper target which is what this worker at Carborundum confirmed that their apparatus used a copper target.

And therefore the scattered radiation, it's not the primary. The primary beam is quite well contained or the beam catcher would stop the primary beam. The primary beam is a 50 KeV x-ray.

But the scatter beam is the selected -- that's why they use a copper target -- copper characteristic radiation. It's in the range of 8.0 to 8.9 KeV. And Els' paper said that 90 percent of the photon slug of scattered radiation is in that

range. And therefore the instrument under reports if that's calibrated for that low energy.

He calculated depending on the dose rate either 2.42 or 2.48 correction factor. You multiply that reading by this factor. And I actually corresponded with Mr. Lubenau by email and showed him what we're doing and asked him whether he thought that this Els' correction factor which he was a participant in the same meeting where this reported. He said, "Yes, he would agree that this should be adopted to be conservative."

So now we have two factors. We go from two minutes to five minutes. And we go from 2 mR per hour to twice, 2.48 or basically 5 mR per hour at the exposure rate. However, if we grant that this is around 8 to 9 KeV, then in calculating organ doses we should use the dose conversion factor MB OCAS-IG-001 for under 30 KeV rather than the 32 250 KeV. And that brings it down to a factor of ten. So we're basically back to where we started. Different methodology, but the organ doses for the two organs under consideration, the kidney and the

kidney which is represented by the liver and the lungs actually come out less even with these other assumptions from this component.

So we have a technical quarrel with the NIOSH's analysis. But in principle, we can establish limits. So in principle, it can be calculated with reasonable assumption that can be calculated. I'll take accuracy even to SC&A. It's not the one that makes that judgment. The Board makes that judgment.

CHAIR ROESSLER: Okay. The discussion you just had just came out. I think you just sent it out last night.

DR. ANIGSTEIN: That is correct.

CHAIR ROESSLER: I don't know whether -- it sounds like you did a very thorough job and looked at everything here. But I'm wondering what NIOSH's approach is on this is.

DR. NETON: This is -- go ahead, Tom.

MR. TOMES: Go ahead, Jim. I was just going to say I hadn't had a chance to review this very thoroughly.

DR. NETON: I've looked at it and of course this is based on new information that Bob obtained by interviewing one of the people involved here. I have no doubt in what he's saying.

I will point out that Bob's correct that in a security sort of way we end up at the same point. And I'll point out that both exposures are in the 100 millirem range to the organs. So even though we got similar doses at the end of the day, I will point out that I think this is a Site Profile type issue and especially in light of the fact that these are pretty small doses altogether.

If you divide the 1.03 R by dose conversion factor which is about ten or 0.1.

DR. ANIGSTEIN: 0.1.

DR. NETON: What's that?

DR. ANIGSTEIN: The dose conversion factor that energy range is around 0.1.

DR. NETON: Right. So you multiply 1 rem per year times 0.1 you get about 100 millirems to the organ.

DR. ANIGSTEIN: Correct.

DR. NETON: And I checked some of the other ones outside of the two that Bob looked at and they're all similar. You can even have smaller doses because the further the more internal organs obviously you have less dose.

I don't know that we would 100 percent agree with this. But I think we need to take into account this new information and we will. But again I think this is a matter of a problem that we can do something here. It's just how much we can tweak it.

MR. TOMES: This is Tom again. I think we'd like to see a copy of the additional information from the worker that Dr. Anigstein obtained for a reference for us. Let me look at this if we could get that.

MR. KATZ: Yes. Tom, we'll send you everything.

MR. TOMES: Okay.

CHAIR ROESSLER: Board Members. I'd make a comment on this. I've read through this quick thoroughly and I have studied this issue

before. Certainly by using the references from Lubenau and others it's very authoritative people on this issue. And also I think by having the interview from the worker and using claimant's information, the times here you've got values for the exposure. You've got values for time. I'm convinced that you can do dose reconstruction with sufficient accuracy. I think it's the Site Profile issue.

But I'd like to hear from the other Board Members, Work Group Members.

MEMBER FIELD: Sure. This is Bill again. I agree. I think it's a Site Profile issue.

MEMBER CLAWSON: This is Brad. It's already been said that they can do it. It's just how it's done where there's a little bit of a problem there. But it comes down to a Site Profile issue. So I have no problems closing it.

CHAIR ROESSLER: Thank you. And any other comments?

(No verbal response)

Thank you, Bob, for all the research on this. I think we can close this item. Is that agreed upon?

MEMBER CLAWSON: This is Brad. Yes.

MEMBER FIELD: Yes.

CHAIR ROESSLER: Okay. All right. Then let's go to thorium.

DR. ANIGSTEIN: Okay. The thorium was something we raised. Again, what worker for the same year that we found. But one of the workers that was initially interviewed as part of the SEC evaluation by NIOSH I then called and re-interviewed just to confirm and get more details reported working with thorium. And based on our experience with this project, thorium always raises a red flag because for some reason, I mean it's a higher dose conversion factor than the uranium which we typically encounter. And also there is data on it. So we said this guy worked with thorium.

Also the manager or supervising engineer -- I won't mention him because he was an

official. There is no need to enter his name -- in a biographical sketch of his, he reported that one of his duties or accomplishments at Carborundum is setting up a facility for handling plutonium and a second facility for handling uranium and thorium. So that's clearly indicated. Uranium and thorium are handled and there was some thorium handled. And they were handled in the same facility.

So the issue came up of this was in between the AWE periods. So the thorium at the time was handled would not be a source term that would have to be considered. But if there was thorium contamination in that facility and that workers were later exposed to it. And since we have data HASL Laboratory of the Atomic Energy Commission had come in and made measurements. They simply measured gross alpha. It was assumed to be uranium because at that time only the uranium was being handled.

We said wait a second. If there was thorium from past contamination and it was resuspended. And without going in more detailed

analysis which they didn't do, some of those gross alphas could be thorium.

Our find was simply that since NIOSH made no mention of this they should address it. That was basically our conclusion in the original review.

Now looking at it NIOSH responded that they looked into it further. They agreed that thorium was handled in this in-between period. It was handled, but uranium work was also being done at this same period. So any residual contamination would be uranium and thorium.

Since uranium was correctly modeled, I did what I would call a back-of-the-envelope calculation. My envelope is an Excel spreadsheet, but anyway it was just using some general assumptions saying "Let's say that thorium was deposited in 1955." But that's a period that that worker mentioned.

And let's say that a deposition rate of -- but granted NIOSH said that also uranium was being handled. So let's say equal amounts of

thorium and uranium were deposited. And the total amount of deposition was comparable to what was deposited later during the AWE period.

But also we looked at this to OTIB-70 that has the depletion year by year. But what happened to the deposits. Well, there's no real rigorous cleanup. It nevertheless just in sweeping the floor and just normal attrition it goes down.

So let's say using 1961 which is when we had the majority of the air samples were taken by that time any original activity done in '55 would be defeated to 29 percent of its original value. So we say there was some deposited then. Half of it was thorium. It went down to 29 percent.

And then by 1961 it's now mixed with the stuff, with the new material that's not depleted. Then if you consider the fact that it has an 88 percent higher dose conversion factor for the lungs, nevertheless with these it would make a difference of 10 percent. But that's only if you assume that everything is re-suspended. And

forgetting that some of the activity that was measured by HASL might have come from ongoing. That would be operations.

The original dust that was being generated just making these bounding estimates we said the worst it could be at 10 percent and even that is not a realistic number. So the chances are it's going to be smaller.

We agree with NIOSH that this source term can be neglected. So we considered that NIOSH did in fact address this because they did fail to address. Now they have remedied that. They did address it and we consider it to be a satisfactory matter.

CHAIR ROESSLER: Okay. So your conclusion in your paper then is that this item is closed.

DR. ANIGSTEIN: Yes.

CHAIR ROESSLER: Good. Okay. Any questions by the Work Group or anyone else?

MEMBER CLAWSON: This is Brad. I have no problems with it.

MEMBER FIELD: This is Bill. I'm fine with it.

CHAIR ROESSLER: Okay. Then let's move onto the next one.

DR. ANIGSTEIN: Okay. Issue three we're skipping because I was told that has been closed already. And then Issues four and five NIOSH has failed to assign doses from medical x-rays. In the original SEC Evaluation Report and the example of dose reconstruction that was done way back in July 2015, there was inconsistency. In one case, they said they would use medical x-rays. The dose reconstruction did not assign medical x-rays. It was not consistent with general NIOSH policy.

NIOSH responded to that. In the latest dose reconstruction, they did assign medical x-rays in the two cases for every year of employment during the AWE period. We confirmed it. In that respect, it was done.

However, we did find some discrepancies in the actual doses that were assigned. In the

first case for the lung, they used this OTIB-006 which prescribed the doses for radiographic examination of the chest. They prescribed the doses for each organ. And for the lung, they prescribed a dose of 83.8 millirem. That in fact is what was entered into the spreadsheet.

However, the same document should have assigned an uncertainty of 30 percent. The discussion of the uncertainty was the recommended prescribed uncertainty of 30 percent. And this I think was probably just a calculational error because the spreadsheet, the IREP input, does list an uncertainty of 16.75 millirem which comes out to be exactly 20 percent.

So I would suspect it was a slip in the calculation. But the fact is that if the uncertainty is lower given that IREP takes the 99 percentile, it would slightly lower the contribution to the overall dose. That unless there's a reason for it needs to be corrected.

Then the other organ for the kidney there is another document of OTIB-5 which gives

substitute or the kidney is not one of the target organs in the ICRP model. So they use the closest organ for which there is external dose calculations. They use the closest organ.

And the substitute organ that is prescribed is the liver which is in fact what was done for all the others, uranium, and all the other external radiation sources. To calculate the dose of the kidney, they actually take the dose of the liver and assign it to the kidney which is appropriate.

However, in this case, it wasn't done. And the dose to the liver would have been 90.2 millirem. But instead the dose that is entered for the medical x-rays is 25 millirem. And I'm just speculating. I just looked on the table in the OTIB-6 to see what organ could they be using. My guess was that they were using the urinary bladder because that is one of the organs that had that particular dose.

We believe -- my background is in physics even though I have quite a bit of experience

in the medical field. John Mauro has his degree in biology. So I can consult with him as an expert. He agreed that the bladder -- the actual anatomical diagram probably from a textbook presented in OTIB-006 would show that the bladder is way down in the body quite far away from the lung on the radiation field that would be imposed on the lungs and therefore is not an appropriate substitute for the kidney lying just under the liver. So the liver is in fact appropriate, not that it's already been decided but particularly for this field.

So I believe again that we disagree with the dose. We agree the idea that they did assign doses. They did assign doses for each year of employment. And in this case incidentally the uncertainty based on this 25 millirem was calculated of 30 percent of the dose which indicates again that the other one that was 20 percent was probably just a calculational error.

In principle, they did respond. They did assign medical x-ray. But we believe that there's a discrepancy with the dose that was

assigned.

CHAIR ROESSLER: Okay. Does NIOSH have any response to that?

MR. TOMES: This is Tom Tomes. Yes, I take Dr. Anigstein's suggestion that I made an error in using 20 percent uncertainty for the lung activity and should have used 30 percent uncertainty. I do want to point out that when I forwarded those examples I indicated they were draft and had not been thoroughly reviewed sufficiently. That error was not caught by me when I was preparing those.

On the other discrepancy on the dose to the kidneys, I would have to concur that the wrong category was selected. So I basically agree with Dr. Anigstein's comments that the x-ray dose would be as specified by Dr. Anigstein.

MEMBER CLAWSON: This is Brad. What I'm hearing is that they can do it. It's not an SEC issue. It's a Site Profile issue again.

CHAIR ROESSLER: Okay. And that's my conclusion, too. Bill.

MEMBER FIELD: Yes, I agree.

CHAIR ROESSLER: Okay. So thank you, Bob, for catching that and I think we can proceed on then unless there are other questions to the next item.

DR. ANIGSTEIN: Okay. The next issue was that in the original calculations back in July 2015 NIOSH had calculated the external dose both from photons and electrons from submersion in a cloud of radioactive dust and from exposure to contaminated surface. They used an old EPA report called Federal Guidance Report No. 12 -- it came out I think in 1998 -- which is not consistent with the way NIOSH does it.

TBD-6000 is being used as a source document. TBD-6000 does in fact give calculated values of the dose rates per unit from both air submersion which is always insignificant and from the contaminated floor. I verified that in fact in the current calculation they did employ. They did remove any reference to Federal Guidance 12 and did in fact correctly copy the values from

Tables 3.9 and 3.10 in TBD-6000. Those were correctly copied into the spreadsheet.

I have to add though where I verified those -- I verified the formulas -- I did not finish. So I did not do a top to bottom audit to see whether the dose is calculated in such a manner were in fact transferred to the IREP input. I just ran out of time for doing that. I have no reason to question it one way or the other. I have no opinion on whether it was utilized. But the approach -- the intent was correct -- was correct.

CHAIR ROESSLER: By saying the approach was correct, you would believe that NIOSH can do an accurate dose reconstruction.

DR. ANIGSTEIN: Absolutely.

CHAIR ROESSLER: Okay. Any questions or any comments by Work Group Members?

MEMBER CLAWSON: Gen, this is Brad. I'm good with it.

MEMBER FIELD: Yes. I am, too. Bill.

CHAIR ROESSLER: Okay. Anything else on this item? We'll follow through on this later

then. Okay.

MR. KATZ: Well, there's no follow-up needed, Gen, on this one.

CHAIR ROESSLER: Pardon?

MR. KATZ: There's no follow-up really needed on this one.

CHAIR ROESSLER: Okay.

MR. KATZ: He doesn't have to do the calculations. No.

CHAIR ROESSLER: Yes, usually that's not a requirement to go through an example of dose reconstruction.

MR. KATZ: Right.

CHAIR ROESSLER: Okay. Issue seven.

DR. ANIGSTEIN: Okay, Issue seven, which was simply said we could not match the dose calculation in the original example DR. Unfortunately, we can't resolve that because we have not -- it was just not enough time to do a total dose -- look at individual components which I just discussed. But I could not do a total dose reconstruction just for lack of time.

So that one remains in my opinion in abeyance. Again, I have no reason to believe that there will be a problem, but we have not been able to verify that.

MR. KATZ: Bob, it's not necessary for you to audit it that way for this purpose. This isn't an individual dose reconstruction case.

DR. ANIGSTEIN: That was one of the things we did before and was not able to match the number.

MR. KATZ: Yes.

DR. ANIGSTEIN: So I can't say we've resolved it until we've resolved it.

CHAIR ROESSLER: There's not enough information here for me to really evaluate this. But I'm thinking that this is something that we don't have to answer for our presentation to the Board. Am I right on that?

DR. ANIGSTEIN: What I would propose doing is I believe that since there's still 10 days before the Board meeting that now that we're way, way up the ladder finishing this that we started

and then sending out a brief memo, maybe not a formal report but basically an extension of this memo filling in that seventh item. That's something that should be done. We could probably do it in a few days. Hopefully, we don't find any problems.

CHAIR ROESSLER: I think that's up to SC&A as to whether they feel that it should be done.

MR. KATZ: It's actually up to the Work Group as to whether that's necessary.

CHAIR ROESSLER: Well, I don't think that's necessary for our presentation to the Board. I guess it would just complete things if there's time to do it.

I guess I'd go ahead with getting our presentation ready. I guess we're not quite through with everything here, but if we close all the other items, I think we'd go back to the Board and come up with the same conclusion that we did before that doses can be reconstructed. Then if we have this confirmation by the time of the Board meeting, that would just add to it.

DR. ANIGSTEIN: Yes, I think we can have it.

MR. STIVER: Bob, this is John Stiver. You're pretty confident you can have the results in time for the meeting.

DR. ANIGSTEIN: Yes, I'm reasonably confident.

MR. STIVER: Right. Let's bring this up because this is one of the issues of Dr. Melius last August.

DR. ANIGSTEIN: Yes, they were specifically concerned with the fact that it could not -- that the doses --

MR. STIVER: Yes.

DR. ANIGSTEIN: I think they will be happier.

MR. STIVER: Yes.

MR. KATZ: Let me clarify. There were issues that we've gone over in detail and the issue is not being able to then run through. We've already covered all of the substantive matters.

DR. ANIGSTEIN: I believe so, but you

know the expression that I like to use is the devil is in the details. And we just need to know. I would feel much more comfortable knowing that if I do an independent audit of reconstruction to see if there are any differences. And if there are differences which by the way does happen, they can be explained. Here is a little shortcut. Here's something. They could be explained away.

MR. STIVER: But, Bob, we're basically to the Site Profile space here now. I mean this is really verifying a sample of reconstruction that we've already agreed is being done according to reasonable efforts. So we're not really -- this is not an SEC issue. Let's make sure that's not conflated on the part of the other Board Members. We have to make sure that that's understood.

MR. KATZ: Right. Thank you, John. That's my main point. And it's fine to do that, Bob, just in case something was missed in your review.

DR. ANIGSTEIN: Exactly.

MR. KATZ: But again remember that this

is not an actual dose reconstruction for a claimant.

DR. ANIGSTEIN: Of course.

MR. KATZ: This is just a proof of concept. So it's fine to do that to see if you've missed anything. But it's not holding the process up.

DR. ANIGSTEIN: Okay. We should be able to do that.

MR. KATZ: What I'm saying in my opinion it's not even necessary for Gen's purpose in proving the methods are there and viable and so on and generally can be done.

CHAIR ROESSLER: And I think he agrees that it can be done.

MR. KATZ: Right.

DR. ANIGSTEIN: Yes. But if we can go ahead during this next week and put out a supplement to this I assume that would add some value.

CHAIR ROESSLER: But our criterion is can dose reconstruction be done. I think that's what you agreed that it can be.

DR. ANIGSTEIN: Yes.

CHAIR ROESSLER: You just want to check the details.

DR. ANIGSTEIN: Exactly.

CHAIR ROESSLER: Yes. So then I think our purpose for today we have completed that item. But I think we should get Work Group comments on it.

MEMBER FIELD: This is Bill. It seems like it can be done with sufficient accuracy. It sounds like what's being purposed is to check to see as is the case. But I see no problems with doing this.

DR. ANIGSTEIN: Okay.

MEMBER CLAWSON: This is Brad. I have no problems with it either.

CHAIR ROESSLER: All right.

DR. ANIGSTEIN: And then this -- Sorry.

CHAIR ROESSLER: Go ahead, Bob.

DR. ANIGSTEIN: Yes. The final observation which just happens -- again, I started on what I'm proposing to do, but didn't get that

far. Didn't finish. Something that crossed my eye was simply a discrepancy that on one worksheet of the same workbook in the files that were transmitted by NIOSH for 1943 time period for AWE. The external doses assumed that the work that they worked 2400 hours per year which is simply a 48 work week which was common at that time. They worked six days a week, eight hours a day multiplied by 50 weeks with a couple of weeks off. So that comes out to 2400 hours per year.

On the very next page, it calculates the intakes of inhaled dust. There they used 2500 hours a year. And it would seem to me that the two calculations should be consistent.

MR. TOMES: This is Tom Tomes. I can take a look at that. I assume that Dr. Anigstein is correct in saying that. I haven't had a chance to verify that. But all these values we have are considered draft until we've gone through and discussed them. That change can be made. I agree with you that it should be 2400.

CHAIR ROESSLER: Okay. I think that

completes your presentation, Bob.

DR. ANIGSTEIN: I'm sorry. Say it again.

CHAIR ROESSLER: Does that complete your presentation?

DR. ANIGSTEIN: That completes what we've gotten as of last night.

PATH FORWARD FOR ISSUE RESOLUTION OR PRESENTATION TO BOARD

CHAIR ROESSLER: At this point, I think we've crossed off everything on this list. It appears to me that we have done a thorough evaluation of this whole site with the Board comments particularly in mind. It also appears to me that we still have the same conclusion that we had in our presentation to Board.

I think we have to go to the Board then next week and make a presentation along these lines. Do other Work Group Members agree with what I've just said?

MEMBER FIELD: This is Bill. Yes, I agree, Gen. I think we're unanimous in that.

MEMBER CLAWSON: This is Brad. I agree with you, Gen.

CHAIR ROESSLER: So then I think what we have to do in our approach is in order to actually have a slide presentation for the Board it has to be done, Ted, I think you said by the end of the day today.

DR. ANIGSTEIN: Oh no.

MR. KATZ: Bob, wait. I'm not asking it for an SC&A presentation at this point. The deadline is today. I've warned them that today is not going to work for this one since we're meeting today.

But we are pressed to get it in. It's got to be posted in advance and it doesn't get posted in a day or two. So we need to get it done. I would say we probably could get away with this until maybe Wednesday at latest like midday Wednesday.

DR. ANIGSTEIN: I can't commit to that.

(Simultaneous speaking)

MR. KATZ: So let's talk about it then

who could do a presentation, who could prepare, how we can do this.

CHAIR ROESSLER: Fine.

DR. ANIGSTEIN: The presentation. I'm sorry.

CHAIR ROESSLER: I think it's up to the Work Group to make the presentation.

DR. ANIGSTEIN: Yes, I'm sorry.

CHAIR ROESSLER: Unfortunately I'm a little bit tied up in the next couple days. But I think that we need somebody. I've got notes from what transpired today. But I'm wondering if Tom would be available to put something together and work with me on this.

MR. TOMES: Yes, I should be able to do that. I just need a little guidance on how much you want to include.

CHAIR ROESSLER: I think we have an hour at the meeting. If you do a good job on the slide presentation it probably won't take that long. But we want to make sure there's plenty of time for discussion.

MR. KATZ: Right, and we need to leave time for the Petitioners if they want to comment too. So really we're talking about an update here. And I don't think you need to rehash much. It's just to remind them where we left things off I think.

DR. ANIGSTEIN: Excuse me, Bob. I misunderstood what we are talking about. I'm certainly available to help with the presentation. I thought you were talking about doing the dose reconstruction.

MR. KATZ: No, we weren't talking about that.

DR. ANIGSTEIN: I'm definitely available.

CHAIR ROESSLER: Bob, I think what we could do here is have Tom put together if he's willing to do this a brief slide presentation. Then you and I can go over it and make sure that we are all on the same page on it.

DR. ANIGSTEIN: Sure.

CHAIR ROESSLER: Ted, can Tom and I do

this offline?

MR. KATZ: Yes, of course. Absolutely.

CHAIR ROESSLER: Okay.

DR. ANIGSTEIN: Or if I may make another suggestion. Gen, would you want to work off of the presentation that was prepared for last November and just update it?

MR. KATZ: Yes, I think so.

CHAIR ROESSLER: We'll take a look at that. I can see several points in it of parts that we could use from the one that was used at the last Board meeting.

DR. ANIGSTEIN: I helped prepare that one.

CHAIR ROESSLER: Yes.

MR. KATZ: So Tom has that presentation.

DR. ANIGSTEIN: Sure.

MR. KATZ: I think we sent some emails, Bob, offline about this before this meeting. I think if Tom just cannibalizes what is useful from

that and then just goes forward to update on all this checking work that you've done, Bob, and the Work Groups' conclusions, that will work out. Then, Bob, Gen and Tom will share that draft with you.

CHAIR ROESSLER: We can get that done before -- Well, how soon do we have to have an actual presentation?

MR. KATZ: I think Wednesday midday is probably as far as we can get and get it posted in time for the meeting.

CHAIR ROESSLER: Okay. Tom, I'm available the rest of the day. I think we can work this out and then we'll get something to Bob.

MR. TOMES: I think I could get a draft relatively soon if I work off the former presentation with just editing it and up updating it.

CHAIR ROESSLER: Right. Okay.

MR. KATZ: Check me if you want. I've taken notes during this whole meeting too. If you guys are short on these items, I think I should have

it.

CHAIR ROESSLER: And I think from the former presentation we don't need those detail slides in my opinion on each finding. I think we can flush that out without all that detail.

MR. KATZ: I agree.

MR. STIVER: Hey Gen. One other thing. Bob Barton is also taking notes and he takes really good detailed notes. He could send you whatever he has, too.

MR. KATZ: Yes. So, Bob, go ahead and email that to Tom and Gen and copy me.

MR. BARTON: Will do.

CHAIR ROESSLER: Ted, I also don't know how we can get Poston's comments on this. Certainly I think we could get them before the Board meeting.

MR. KATZ: Yes. We don't always have all our Work Group Members present for the last meeting before a Board meeting. I think that's okay.

CHAIR ROESSLER: Okay.

MR. KATZ: I think he's received all of Bob's reports. Then we can copy him on the presentation so he's up to date on what the Work Group did.

CHAIR ROESSLER: Okay. That sounds good.

MR. KATZ: I think that will work fine.

CHAIR ROESSLER: Okay. So I think we have completed everything unless someone from the Work Group or NIOSH or SC&A has any further comments. Oh, we didn't hear from the Petitioners.

MR. KATZ: We don't really have to -- I mean the Petitioners, we have some time if the Petitioners want to talk to us now.

But we didn't have it on the agenda. But that's fine, Robert or Karen, is it?

MR. KIFER: Jan, did you want to say anything?

(No verbal response)

MR. KATZ: You're welcome to if you have something you want to say.

PETITIONER COMMENTS

MR. KIFER: I only had a couple from when the doctor was talking about cancer of the liver and the lungs. He didn't mention bone and that was included.

DR. ANIGSTEIN: This is Bob Anigstein. The reason we didn't, NIOSH had simply chosen to use as an example a kidney and lung as the organs. There are something like 22 organs that are considered and NIOSH has a methodology for each of them.

MR. KATZ: Robert, are you understanding. NIOSH's example didn't involve bone cancer. But that's not to say that there isn't a method for bones.

DR. ANIGSTEIN: Exactly.

MR. KIFER: That's what I was wondering.

MR. KATZ: Yes, so there will be a method for bones. It just wasn't the example that they prepared so that we could see that the methodology is correct.

MR. KIFER: And could I ask you what year the person worked at Carborundum? What year you interviewed him about? What year was he there?

MR. KATZ: So, Bob, you can say the date range. But actually, Robert, he can't tell you the year.

DR. ANIGSTEIN: I understand.

MR. KATZ: That's a privacy issue.

DR. ANIGSTEIN: He was there I believe in -- give me one second. He was definitely there in the 50s and 60s.

MR. KIFER: Fifties and 60s.

MR. KATZ: Yes.

MR. KIFER: Okay. I was just wondering. That's it on my side. I don't know if my sister has to say anything. Jan, are you still on?

(No response)

MR. KATZ: I guess not. But thank you, Robert, for that.

MR. KIFER: Okay. Thank you.

MR. KATZ: Thank you. So, Gen, I

think we can adjourn.

CHAIR ROESSLER: I think so.

MR. KATZ: And I want to say thank you very much. I know on both sides --

MS. KNAPP: Hello.

MR. KATZ: Is that Jan?

MS. KNAPP: I'm sorry. I'm still on.

MR. KATZ: You're still there. So, Jan, your brother just asked if you had any comments you wanted to make or questions at this point.

MS. KNAPP: Right. My only question is are you doing the dose reconstruction based on these workers that you interviewed or is it just something that needs to be done?

MR. KATZ: Jan, the dose reconstructions that they were talking about today are just example dose reconstructions. They're not an actual claimant in these cases.

MS. KNAPP: Okay.

MR. KATZ: They're just examples to show how it would be done as opposed to the real dose reconstructions that they do when they receive

a claim.

MS. KNAPP: Okay. Thank you.

MR. KATZ: You're welcome. So I was just saying a real special thanks on both sides. I know this is a lot of work to try to cover everything for NIOSH in this amount of time.

And it was especially difficult for Bob, SC&A. You had a week to grind through all this new ground. You had an incredible amount of material in this time and it's much appreciated. That's it. Thanks everyone for their hard work.

ADJOURN

CHAIR ROESSLER: Then I think we can close.

(Whereupon, at 11:15 a.m., the above-entitled matter was concluded.)