

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

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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

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

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

6 (Roll call)

7 Okay. Then everyone please mute your
8 phones. If you don't have a mute button, * and then
9 6 to mute your phone. And that will improve the
10 audio of the people who have to speak during this
11 call.

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

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

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

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

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

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

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

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

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

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

22 So I prepared a slide presentation for

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

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

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

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

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1 we have done that.

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

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

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

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

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

17 DR. ANIGSTEIN: Is that good now?

18 CHAIR ROESSLER: That's much better.

19 **USE OF SURROGATE DATA**

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

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

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

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

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

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1 skin.

2 And we found that in fact the calculated
3 beta dose was not significantly different than the
4 one that was used. NIOSH just assumed that we
5 would go 10 times the gamma dose. So it would go
6 from 0.524 to 5.24 millirem per hour. And we got
7 5.4 instead of 5.24 which is close enough.

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

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

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1 preliminary observations.

2 **EXAMPLE OF DOSE RECONSTRUCTION**

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

14 DR. ANIGSTEIN: I see. Understood.

15 MR. KATZ: Yes.

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

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

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1 want to see a dose reconstruction example.

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

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

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

22 CHAIR ROESSLER: Bob, I'm wondering --

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

3 DR. ANIGSTEIN: Say again?

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

7 DR. ANIGSTEIN: Sorry. Go ahead.

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

18 DR. ANIGSTEIN: Okay.

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

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

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1 I thought NIOSH was going to -- have they given us
2 a test run and dose reconstruction? Is this Bob's
3 --

4 MR. KATZ: Yes.

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

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

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

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

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

22 DR. MAURO: This is John Mauro --

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

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

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

19 DR. MAURO: You stole my thunder.

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

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

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

10 DR. ANIGSTEIN: Let me interrupt you.

11 DR. MAURO: Yes.

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

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

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

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

7 CHAIR ROESSLER: Okay. Let's do that.

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

13 DR. ANIGSTEIN: Yes.

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

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

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

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

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

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

22 DR. ANIGSTEIN: Understood.

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

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

6 DR. NETON: I understand that, but --

7 DR. ANIGSTEIN: But for the skin
8 contact --

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

12 DR. ANIGSTEIN: Okay.

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

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

22 I just pointed this out. This was the

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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1 TBD-6000.

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

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

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

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

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

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

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

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

18 DR. NETON: Right. Okay.

19 (Simultaneously speaking)

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

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1 beta-to-gamma ratio as established on film badges
2 which has been the default for quite some time in
3 6000. That takes into account, at least in my
4 opinion, the variability of the exposure geometry,
5 the worker in relationship to the material itself.

6 Even if Bob's number is right which is
7 9.5 millirem per hour, that's exactly a person's
8 skin at exactly one foot for 1,000 hours. I forgot
9 what we modeled.

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

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

16 DR. ANIGSTEIN: As I just said, this is
17 still lower than the default dose used in TBD-6000
18 which is from the large ingot, which has been used
19 for other things. You would get, I believe it's
20 2.08 millirem per hour photon.

21 DR. NETON: That's correct.

22 DR. ANIGSTEIN: That would give you

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1 20.8 beta.

2 DR. NETON: Right.

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

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

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

22 We're not trying to model the highest

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

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

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

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

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

22 MR. KATZ: Yes, you don't need

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1 approval, that's fine to send them.

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

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

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

16 DR. ANIGSTEIN: Yes.

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

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

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

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

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

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

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

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

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

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

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

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1 Brad, to concur or not concur however you want.

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

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

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

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

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

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

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

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

9 MEMBER CLAWSON: Okay.

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

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

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

20 MEMBER CLAWSON: Sure.

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

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

2 DR. ANIGSTEIN: Okay. The next one is
3 the issue that was raised in our review back in
4 January of last year about the MCNP analysis that
5 was done on behalf of, or commissioned by NIOSH,
6 on the plutonium glove box worker. We wrote it up
7 and I won't go into every detail because there's
8 a detailed appendix to the report of last January
9 27, 2016, report. And they were using apparently
10 -- the person I happen to know who did this named
11 from the MCNP files. The analysis itself was done
12 in a very professional manner.

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

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

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1 4 and did not utilize that.

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

11 And it's one foot in a horizontal
12 direction and then the dose was calculated. Also
13 five centimeter displacement, that makes it a
14 little more than 35 centimeters. Sorry. It was
15 35 centimeters -- I misspoke -- in a horizontal
16 direction and then another five centimeters into
17 the vertical. So you take the right triangle and
18 you come with even more than 35 instead of the 30.5
19 that was used earlier in the Attila calculation,
20 which everyone agreed was a reasonable distance for
21 an average height between average length they would
22 be working with.

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

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

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

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

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

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

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

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

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1 or questions on that.

2 CHAIR ROESSLER: Do we hear any
3 response from NIOSH?

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

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

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

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

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

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

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

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

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

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

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

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

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

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

22 MEMBER FIELD: From my understanding of

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

5 DR. ANIGSTEIN: Yes.

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

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

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

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

21 CHAIR ROESSLER: Okay. Bill?

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

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

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

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

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

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

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

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

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

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

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

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

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1 I asked that question.

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

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

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

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

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

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

17 We don't know what the skin dose was to
18 the hands. However, given the high skin dose rate
19 -- 5230 millirem per hour of contact with the
20 uranium metal, that would certainly bound this
21 exposure. So I would not have a problem with that.

22 However, the 2 mR per hour was measured

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1 with one of two instruments, either a Victoreen
2 440RF or Nuclear Chicago 2586. It so happens that
3 there was this symposium or meeting sponsored by
4 a predecessor of EPA. It was a government agency
5 called Bureau of Electronic Products. They
6 sponsored a meeting in about 1970 in Philadelphia.
7 And Lubenau was one of the speakers and also a man
8 by the name of Els, E-L-S. Els said that for the
9 purposes of making measurements, radiation
10 protection measurements of the XRD apparatus they
11 assumed that it was a copper target which is what
12 this worker at Carborundum confirmed that their
13 apparatus used a copper target.

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

18 But the scatter beam is the selected --
19 that's why they use a copper target -- copper
20 characteristic radiation. It's in the range of
21 8.0 to 8.9 KeV. And Els' paper said that 90 percent
22 of the photon slug of scattered radiation is in that

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

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

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

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

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

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

14 DR. ANIGSTEIN: That is correct.

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

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

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

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

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

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

15 DR. ANIGSTEIN: 0.1.

16 DR. NETON: What's that?

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

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

22 DR. ANIGSTEIN: Correct.

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

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

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

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

19 MR. TOMES: Okay.

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

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

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

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

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

20 CHAIR ROESSLER: Thank you. And any
21 other comments?

22 (No verbal response)

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

4 MEMBER CLAWSON: This is Brad. Yes.

5 MEMBER FIELD: Yes.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

18 DR. ANIGSTEIN: Yes.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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1 assigned.

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

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

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

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

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

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1 MEMBER FIELD: Yes, I agree.

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

6 DR. ANIGSTEIN: Okay. The next issue
7 was that in the original calculations back in July
8 2015 NIOSH had calculated the external dose both
9 from photons and electrons from submersion in a
10 cloud of radioactive dust and from exposure to
11 contaminated surface. They used an old EPA report
12 called Federal Guidance Report No. 12 -- it came
13 out I think in 1998 -- which is not consistent with
14 the way NIOSH does it.

15 TBD-6000 is being used as a source
16 document. TBD-6000 does in fact give calculated
17 values of the dose rates per unit from both air
18 submersion which is always insignificant and from
19 the contaminated floor. I verified that
20 in fact in the current calculation they did employ.
21 They did remove any reference to Federal Guidance
22 12 and did in fact correctly copy the values from

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

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

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

15 DR. ANIGSTEIN: Absolutely.

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

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

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

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

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1 then. Okay.

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

4 CHAIR ROESSLER: Pardon?

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

7 CHAIR ROESSLER: Okay.

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

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

13 MR. KATZ: Right.

14 CHAIR ROESSLER: Okay. Issue seven.

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

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

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

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

11 MR. KATZ: Yes.

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

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

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

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

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

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

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

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

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

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

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

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

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

14 MR. STIVER: Yes.

15 DR. ANIGSTEIN: I think they will be
16 happier.

17 MR. STIVER: Yes.

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

22 DR. ANIGSTEIN: I believe so, but you

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

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

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

21 DR. ANIGSTEIN: Exactly.

22 MR. KATZ: But again remember that this

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1 is not an actual dose reconstruction for a
2 claimant.

3 DR. ANIGSTEIN: Of course.

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

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

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

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

16 MR. KATZ: Right.

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

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

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1 DR. ANIGSTEIN: Yes.

2 CHAIR ROESSLER: You just want to check
3 the details.

4 DR. ANIGSTEIN: Exactly.

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

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

14 DR. ANIGSTEIN: Okay.

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

17 CHAIR ROESSLER: All right.

18 DR. ANIGSTEIN: And then this -- Sorry.

19 CHAIR ROESSLER: Go ahead, Bob.

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

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1 far. Didn't finish. Something that crossed my
2 eye was simply a discrepancy that on one worksheet
3 of the same workbook in the files that were
4 transmitted by NIOSH for 1943 time period for AWE.
5 The external doses assumed that the work that they
6 worked 2400 hours per year which is simply a 48 work
7 week which was common at that time. They worked
8 six days a week, eight hours a day multiplied by
9 50 weeks with a couple of weeks off. So that comes
10 out to 2400 hours per year.

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

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

22 CHAIR ROESSLER: Okay. I think that

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1 completes your presentation, Bob.

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

4 CHAIR ROESSLER: Does that complete
5 your presentation?

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

8 **PATH FORWARD FOR ISSUE RESOLUTION OR PRESENTATION TO**
9 **BOARD**

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

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

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

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

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

8 DR. ANIGSTEIN: Oh no.

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

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

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

21 (Simultaneous speaking)

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

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

3 CHAIR ROESSLER: Fine.

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

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

8 DR. ANIGSTEIN: Yes, I'm sorry.

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

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

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

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

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

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

14 DR. ANIGSTEIN: I'm definitely
15 available.

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

21 DR. ANIGSTEIN: Sure.

22 CHAIR ROESSLER: Ted, can Tom and I do

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1 this offline?

2 MR. KATZ: Yes, of course.
3 Absolutely.

4 CHAIR ROESSLER: Okay.

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

9 MR. KATZ: Yes, I think so.

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

14 DR. ANIGSTEIN: I helped prepare that
15 one.

16 CHAIR ROESSLER: Yes.

17 MR. KATZ: So Tom has that
18 presentation.

19 DR. ANIGSTEIN: Sure.

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

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

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

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

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

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

19 CHAIR ROESSLER: Right. Okay.

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

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1 it.

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

6 MR. KATZ: I agree.

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

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

13 MR. BARTON: Will do.

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

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

22 CHAIR ROESSLER: Okay.

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

5 CHAIR ROESSLER: Okay. That sounds
6 good.

7 MR. KATZ: I think that will work fine.

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

13 MR. KATZ: We don't really have to --
14 I mean the Petitioners, we have some time if the
15 Petitioners want to talk to us now.
16 But we didn't have it on the agenda. But that's
17 fine, Robert or Karen, is it?

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

20 (No verbal response)

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

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1 **PETITIONER COMMENTS**

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

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

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

16 DR. ANIGSTEIN: Exactly.

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

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

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

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

7 DR. ANIGSTEIN: I understand.

8 MR. KATZ: That's a privacy issue.

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

12 MR. KIFER: Fifties and 60s.

13 MR. KATZ: Yes.

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

18 (No response)

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

21 MR. KIFER: Okay. Thank you.

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

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1 think we can adjourn.

2 CHAIR ROESSLER: I think so.

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

5 MS. KNAPP: Hello.

6 MR. KATZ: Is that Jan?

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

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

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

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

19 MS. KNAPP: Okay.

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

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1 a claim.

2 MS. KNAPP: Okay. Thank you.

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

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

12 **ADJOURN**

13 CHAIR ROESSLER: Then I think we can
14 close.

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

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