Centers for Disease Control
National Institute for Occupational Safety and Health
Carborundum Work Group
Thursday, June 13, 2019

The Work Group convened via teleconference at 10:30 a.m., Eastern Daylight Time, Genevieve Roessler, Chair, presiding.

Members Present:

Genevieve S. Roessler, Chair
Bradley P. Clawson, Member
R. William Field, Member

Also Present:

Ted Katz, Designated Federal Official
Robert Anigstein, SC&A
Robert Barton, SC&A
Joe Guido, ORAU
Stuart Hinnefeld, NIOSH
Michael Rafky, HHS
John Stiver, SC&A
Tim Taulbee, NIOSH
Tom Tomes, NIOSH

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Proceedings

(10:31 a.m.)

Welcome and Roll Call

Mr. Katz: Welcome, everyone. This is the Advisory Board on Radiation and Worker Health. It's the Carborundum Work Group.

And the agenda for today's meeting is posted on the NIOSH website under meetings. So if you go to meetings, this date and you'll find both -- well the agenda and the two documents that are relevant to the discussions today which are quite technical.

Anyway, and also just a general note everyone please keep your phones muted except for when you have to address the group. And if you don't have a mute button, press *6 to mute your phone, *6 to come off of mute. But please keep it muted. That would be good for everyone.

Okay, then let's start with roll call. So I know I have Gen. Let me speak to conflict of interest too because this is a specific site this Work Group deals with.

So the Board Members on this Work Group do not have a conflict so I address that up front. But for agency and contractors and so on please speak to conflict as well when you report in on roll call.

(Roll call.)

Mr. Katz: Okay, then. Then with that I just want to remind everyone keep your phones on mute, and, Gen, it's your meeting.

DCAS White Paper: NIOSH Response to Findings on the MCNP Analysis for Carborundum

Chair Roessler: Okay. I hope everyone has had their coffee and are ready to go. I want to do just a brief recap. Our Work Group last met on December 4, 2018, and after that meeting we reported our status at the Board meeting on December 12.

At that time we reminded the Board that the Carborundum SEC Petition 223 was denied at the March 22, 2017 meeting and that all of our Site Profile issues were resolved except for three. And these three dealt with the MCNP modeled calculations of external dose from fuel pellets.

The full Board then voted to accept the Site Profile review and our proposed resolutions and tasked us, the Work Group, to work through the three open issues. And that's what we're going to do today. And as we'll find out there will be two that I think are going to be relatively easy and one that will need some discussion.

So we'll follow the agenda and have NIOSH first respond to their three findings based on their January 18, 2019 White Paper. And then we'll have SC&A follow with their paper which was published on April 24, 2019.

So we will start with NIOSH, and my understanding is that Dr. Taulbee is going to present.

NIOSH Finding 1

Dr. Taulbee: Thank you, Dr. Roessler. I'm just going to present our position on the Finding 1, our response to Finding 1, and then Tom Tomes will take over for Findings 2 and 3 here.

Just a little bit of a recap. What we're talking about here is the difference in the air kerma to fluence

dose conversion coefficients that are in ICRP 74.

There's two tables of these that are in ICRP 74, Table A.1 and then column 2 of -- or I'm sorry, column 4 of Table A.21. They both list kerma to fluence dose conversion coefficients.

So what we're talking about here is that there's a difference between those two tables purportedly using difference in data from Hubbell 1982 and then Hubbell and Seltzer 1995, or just what we refer to in our report as Hubbell 1995 for simplicity here.

And so one of the reasons that we are disagreeing with SC&A on the use of the column 4 values in Table A.21 is the consistency with our implementation guide.

And that is the whole ICRP 74 was used when we developed all of our dose conversion coefficients, and those were all developed before this latter data of Hubbell 1995 came about.

And if you go through the text of ICRP 74 you can see in the development of all those organ dose conversion factors that that's where that -- that they were all generated before this time period. They were all using that Table A.1.

ICRP itself on I believe it's page 36 indicates that if -- for the conversion coefficients for effective dose and operational quantities that -- for photons may be presented in a manner to be consistent with those of neutrons in terms of particle fluence and to provide a complete database for the possible -- as possible for a variety of calculational purposes the data can be transformed into conversion coefficients using photon fluence using the information in Table A.1.

And so this is why we use Table A.1 in conjunction

with column 2 of A.21 to develop our ambient dose equivalent per fluence. So it was more from a consistency standpoint.

One other point that I should mention that we didn't put here into the paper is that this is the method that we've used in other Site Profiles such as Blockson and GSI.

The second reason that we disagree with SC&A as far as using that, I believe it's column 5 of ICRP 74 -- or Table A.21 of ICRP 74 is that the variability in these values is really small. And Bob -- or SC&A even mentions that in their write-up.

ICRP whenever they were doing their comparisons in the generation of ICRP 74 even indicates the excellent agreement between the older values and the newer, that they were all less than -- I believe they were quoting 3 percent there.

So when you put this in context of what we're doing with the dose conversion factors which is our discussion here in point number 2 is these dose conversion factors that we use have a very wide range of uncertainty associated with them such that this 2 percent is really -- we use the word trivial. It's just not as significant. So from that standpoint we feel that this particular issue is really not critical.

But the final reason is really the main crux of why we are disagreeing with SC&A in this particular case. And that is there's an implication here that the older values are outdated. And we're not sure that they are outdated. There's a draft report out by a joint commission of the International Commission on Radiation Units and Measurements, ICRU, and the ICRP.

And we've got a copy of that. And the title of it is Operational Quantities for External Radiation

Exposure. And if you compare the dose coefficients for air kerma within that particular report you will see that those values, and this is our Table 1 in our response by the way, and I hope you have that in front of you.

Actually for those that don't I'm wondering if I can present it here. Hold on. Give me just a second here. See if I can share it. No, okay. Sorry. There's a new app here. Okay. Hopefully everybody has Table 1 there.

And what you'll see is that the values from 10 KeV up to about 60 KeV, that they vary between Hubbell '82 and Hubbell 1995, but the draft ICRU/ICRP are following very closely, within rounding error really, of Hubbell 1982.

So this is one of the major concerns that we have is if we were to make this change when the ICRP/ICRU document comes out and if these are the values that come out then we would be changing back.

And so we've got a consistency issue with previous Site Profiles as well as intelligence telling us that these values are going -- that the draft values we published here are what's going to be coming out.

And so from a resource standpoint to make the change and then next year or later this fall when the ICRU/ICRP document comes out we would be changing back, or having to update other documents.

So that's why we are currently sticking with our current calculations, our current methodology. Are there any questions?

Chair Roessler: Does the Work Group have any questions? Well, I have some comments later, but I think if there are no questions or other comments

should we move on then to the other findings?

Mr. Katz: Gen, it's Ted. I'm just wondering given that you just had this nice summary from Tim I wonder if this isn't -- if it wouldn't be easier for all of you actually to follow the argument if you hear from Bob now on this matter and then you can move on to the other two which are easier to resolve.

It's up to you. Other Work Groups generally try to go one by one on these.

Chair Roessler: That sounds like a good flow to me if Bob is ready. And I'm sure after he presents there will be more questions and perhaps comments.

Mr. Katz: Yeah.

Chair Roessler: So, Bob, are you ready to present?

Mr. Katz: Bob, is that okay?

Dr. Anigstein: Yes, well, I have a -- yeah, I have a presentation. Skype seems to have changed. I hope I can get it to work.

I think maybe I'm just going to talk because this is --

Chair Roessler: It looks like something is coming up.

Dr. Anigstein: And it's going to take me -- give me one more moment.

Mr. Katz: While you're struggling with this, let me just check and see --

Dr. Anigstein: I think I've got it.

Mr. Katz: Let me just check and see. Do the other

Board Members have -- are you on Skype? I know Gen is. I don't know about Brad and Bill.

Member Clawson: Ted, I'm not on Skype. I can't get it.

Mr. Katz: Okay. What about you, Bill?

Dr. Anigstein: Okay. I think I'm just going to read my presentation.

Mr. Katz: Yes, that makes sense.

Dr. Anigstein: Yeah, because --

Mr. Katz: That's fine, Bob.

Dr. Anigstein: Is there anything on the screen? I have something on the screen now. Does anyone see my presentation?

Mr. Katz: Yes, your report is on the screen but Brad doesn't have it anyway, so -- and I don't know about Bill.

SC&A Response

Dr. Anigstein: Okay. What I heard from Tim Taulbee is that really what we're talking about is policy issues. And that's not really SC&A's province to address NIOSH policy issues.

Basically I'm not completely won over by his argument. I'm not going to say it doesn't have any merit, but it does have some.

First of all, we have one observation which is that the calculation of -- let me stick with my -- reading my presentation.

We believe that since ICRP has presented in its Table A.21 column 5 they've already presented the -- there's no need to calculate the air kerma

multiplied by the -- there's one factor which is the H*10 divided by air kerma. That's in the second column of the Table A.21.

And then there is the ratio of the H*10 to air fluence already done through the photon fluence. So that has already been done by ICRP.

Now ICRP apparently used in this table, according to the footnote, they used the latest, the latest being the 1995 which are still currently used. This is Hubbell and Seltzer 1995 which is the NIST, National Institute of Science and Technology. These are the latest physics.

The physics has changed significantly between -- I mean somewhat from 1982 mostly because much better instruments were developed during the period of time.

And since NIOSH claims and DCAS claims that using these new numbers will be inconsistent with the Tables A.2 through A.20, but apparently ICRP does not think it's inconsistent because they have in the same calculation they multiply it out.

They don't display the numbers that NIOSH is using. Meaning the old air kerma from Table A.1 multiplied by the H*10 to air kerma dose conversion factor. They have not done that.

They have instead given a new set of values. And if this is what ICRP has presented I think it should be used. That's basically the argument.

And there is an observation also that there was an error in the calculation in the MCNP files that we saw and were used, and there were two places. One for the 0.01 MeV, in other words 10 KeV, where according to the DCAS methodology the factor should be 0.059 and the one in the MCNP file is

0.011. So that's a fivefold reduction.

And there is a small error also in the 1 MeV which is instead of the calculated value 5.23 they have put one of 5.16. So these are apparently errors of data entry into the MCNP input file. Those will be corrected in any case.

The argument that the -- since the data in the OCAS-IG-001 uses already the number from Table A.21. And a footnote in Table A.21 says, and this I take it refers to all the values there, the footnote says data compiled from ICRU Report 47 using Hubbell and Seltzer 1995.

So in fact the numbers, the H*10 divided by air kerma ratios which DCAS does use already used the newer data. So at least that's the way I'm interpreting it.

So consequently it would be inconsistent to do the opposite, to use the older values. And furthermore the MCNP analysis itself which is, well, previously they used the version 6.1 which has an error in it. They're going to repeat it using MCNP version 6.2.

Well, this was released about two years ago, and it certainly contained all the latest physics data. I mean, that's what Los Alamos does. It maintains the MCNP program, and it maintains the data file, and it stays current with the current physics. So to use 1982 data in conjunction with the 2017 MCNP calculations to my mind that would be inconsistent.

And then finally as far as the new ICRU/ICRP, well, I and SC&A were not privy to intelligence that this report would be finalized.

So far it's two years old. The draft came out two years ago. ICRU has subsequently had later reports on different topics so they are continuing to publish

reports.

This report has never been finalized. There were 40 comments during the comment period, and I looked at some of the ones from some of the major agencies like the Japanese Atomic Energy Agency. I think their name has changed.

And they had substantive -- nobody commented on this particular table, but then I did not read all 40 comments. That would have been beyond the scope of our assignment.

But nevertheless they had some substantive issues. Not just -- it wasn't simply they put this out pro forma and said okay, anybody comment, no comment, it was accepted.

There were comments on a number of issues within that report. So this report is not final. As a matter of fact it says on every page do not quote, not to be referenced or something like that.

So therefore that data should not be used. I think that it's not -- personal opinion is it's not so much a difference in the physics.

Air kerma is an approximation, and there are subtle differences in the way it's calculated. It's the energy deposited but then energy escapes, electrons escape. There is bremsstrahlung that escapes.

If you get into higher energy there is a pair production that allows energy to escape. And there are different ways of handling it. And I believe that's the difference between what the ICRP/ICRU draft report did, not so much that they used newer physics which of course they did use, but because there were some different assumptions.

And the thing is I think that it's questionable which

set to use. And I believe that given there is uncertainty we should go with the value that produced the higher doses. It seems to be -- that's sort of our position.

So that's about -- I think that summarizes what I have to say.

Chair Roessler: Okay. So does NIOSH want to respond to Bob's -- everything he has presented?

Dr. Taulbee: Yes, this is Tim Taulbee. I do have one small comment and that is the footnote in Table A.21 that Bob is referencing saying the data is compiled from ICRU Report 47 which is 1992.

He assumes that all of the data in that table is coming from that ICRU 47 as well as using Hubbell and Seltzer which is 1995.

And if you go to ICRU 47 and you look at the ambient dose per Ka values you will see that those values are -- well, except for 10 and 15 KeV follow along with ICRU 47 which is in 1992 which is three years before the 1995 data.

So it's not all using that newer 1995 data, that Table A.21. It's a combination.

The difference is that Hubbell and Seltzer 1995 is the Ka for phi values. Ka for fluence values in that column 4.

And what ICRP did in Table 21 if you go through the math is take column 2, multiply by column 4 to get their column 5.

So the update is that kerma per fluence values that they have produced there in Table A.21. At least that's my interpretation of these.

Dr. Anigstein: No, I checked those numbers. It is

in fact -- you're entirely correct. Column 5 is a product of column 2 and column 4.

Dr. Taulbee: What I'm saying is that column 2 values are coming from the 1992 ICRU 47.

Chair Roessler: I heard a comment in the background. I think someone wanted to comment.

Mr. Hinnefeld: Yes, Gen. Gen, this is Stu Hinnefeld. Can you hear me?

Chair Roessler: Sure.

Mr. Hinnefeld: Okay. I just wanted to comment along the lines of what Bob started his presentation with is that there's a policy decision here about the timing of finalizing this answer.

And our discussions with people involved with the ICRP publication that's in draft form is that they are likely months away from publishing it. Even though with two years I guess, it would have two years to resolve the comments or whatever, deal with the comments. But we're just some months away from publishing it.

And so our view that whether it's a few months, whether it's this fall or whether it's next spring or whatever it turns out to be, it's really a policy decision to decide let's wait for this update which seems to be at least on the not far horizon and make our decision based on those numbers that are in that update and sort of eliminate the debate that we're trying to have today.

So to me this is in fact a policy decision. I think the program's resources are better spent by waiting for that rather than to change no matter which choice we make now, any change we made now we'd have to reconsider that anyway.

So to me it's a policy decision, and it should wait for the publication of the ICRP document. And in the meantime the doses are so close that it's not as if it's a huge difference that we're talking about anyway.

Chair Roessler: Okay, thank you, Stu. I would like to follow on with what you've said. It seems for us the Work Group our decision really is should changes be made related to Finding 1 as proposed by SC&A at this time.

And Bob brings up some scientific reasons for doing that. But to me it seems that since this is policy, when in doubt we don't. We don't make a change unless you really have some good evidence to make it.

And especially in view of the anticipated new report and especially since it should be coming out. It seems like our Work Group, it would be prudent for us to not make a change at this time, but to wait. That's my view.

Member Field: Yes, this is Bill. I agree completely with you. I understand the arguments on both sides. I think they were well stated.

But it just makes sense that if we go back and make the one change and then there's an updated table we'll be facing the possibility of making another change. If it's truly going to come out in a few months I would think that would be the course to go from my opinion.

Chair Roessler: Okay, any other comments?

Member Clawson: Yes, Gen, this is Brad. I feel the same. If it's going to be an actual two months, not two years, I would wait until that officially comes out and in a document we can actually use and that

is set up for that.

Chair Roessler: I do have a question though. In Bob's presentation, Bob, you mentioned some numerical errors. Those seem to be kind of a different situation, and I'm wondering if those are things that if NIOSH could respond to that and if that's something that because they're actual errors whether that should be looked at.

Mr. Katz. KATZ: Bob, do you want to address that? Bob or Rick?

Mr. Tomes: Yes, this is Tom. Dr. Roessler, we verified that there are a couple of entry errors, and we plan to correct those on our update runs we plan to do.

Chair Roessler: Okay. That's -- had to make sure we answered that. Does anybody else have -- it seems the Work Group is in agreement on the approach.

If we take this approach, Ted, I'm wondering how do we handle it as a Work Group. Do we actually table this finding discussion or how would we approach that?

Mr. Katz: Yeah, thanks, Gen. I think that's fine. I think essentially not tabling this discussion, but we're just suspending the matter until the new report comes out.

And at that time I think then NIOSH can determine what it plans to do, its course, given whatever comes out there and report back to the Work Group and the Work Group then can address that.

If there is some sort of substantive change before section -- before the Work Group meets could -- would review that.

A change in whatever -- however the approach is I think SC&A should probably review that. Then we can have another Work Group meeting, right. So in a way it's tabled, but it's a mixed matter because there will be a new report.

Chair Roessler: Okay. What I've heard, and I assume this is a vote. I presented that we don't do anything at this time. Bill and Brad have agreed, and I think that's a unanimous decision by the Work Group. So I think we're ready to close this particular, this discussion on Finding 1. Dr. Anigstein: Yes, I have nothing further to add.

NIOSH Finding 2

Chair Roessler: Okay. All right, then let's move on, and I think the other two findings are going to be discussed by Tom.

Mr. Tomes: Yes. Finding number 2, this was an SC&A finding on the -- report back in November. It says NIOSH used incorrect source biasing in the MCNP analyses.

This was a reference that Dr. Anigstein made previously about the glitch in version 6.1 of the code that we need -- get corrected in our revised estimates by using MCNP 6.2.

And we believe our updated values for americium-241 are in agreement with Dr. Anigstein's values.

SC&A Response

Dr. Anigstein: Yeah, we're in complete agreement with NIOSH's proposed solution for Finding 2.

Chair Roessler: So we can -- if Work Group members agree, I certainly agree. We can close Finding 2. So Brad and Bill?

Member Clawson: Yes, Gen, this is Brad. I'm good with that.

Member Field: That sounds good.

NIOSH Finding 3

Chair Roessler: Okay. Now I think we can move on to Finding 3.

Mr. Tomes: Finding 3 was an issue that Dr. Anigstein identified in his report back in November. And he had a Figure 1 in that report which showed a presentation of how the geometry was arranged in our MCNP model such that the dosimeter would have been partially shielded by the floor of the glovebox. And we discussed that at the previous Work Group meeting and agreed to correct that.

And Dr. Anigstein suggested a fix to that, and we have adopted that suggestion, and we reran the results. And as I indicated before our results with both Finding 2 and Finding 3, changes made are in agreement with the independent calculations Dr. Anigstein did.

SC&A Response

Dr. Anigstein: Yes, I reread the proposed solution for Finding 3 and again we're in complete agreement.

Chair Roessler: Okay. I think that was a very interesting discussion, and I think we really appreciate Dr. Anigstein's comments and review of that.

So I vote in favor of closing Finding 3.

Member Clawson: Gen, this is Brad. I agree with that.

Member Field: This is Bill. I agree as well.

Chair Roessler: Okay. So it looks as though we've completed the agenda. Am I missing something, or is there other further questions or comments?

Plans/Follow-up

Mr. Katz: Gen, so I think that's good. If you would just -- we had promised the Board that we would just keep them abreast as we knock out these issues.

So if you wouldn't mind giving a very brief during the Work Group session report-outs of just where this stands, very brief update, then I think you can explain it in a minute or two. That would be plenty I think.

Chair Roessler: Okay. We'll work on that, and we'll plan on reporting at the Work Group meeting.

Mr. Katz: At the Board meeting in August.

Chair Roessler: I mean the Board meeting.

Adjourn

Mr. Katz: Yes, yes. And I actually just want to second -- thank you from both sides I think for a very thoughtful consideration of the matter. I think that's great. The discussion was great so much appreciated on both sides.

And I think we can adjourn. Bill, if you could just hang on the line a second, Bill Field.

Member Field: Will do.

Mr. Katz: Thanks.

Chair Roessler: Thank you.

Mr. Katz: Thank you, everybody, and have a good rest of your day.

(Whereupon, the above-entitled matter went off the record at 11:09 a.m.)