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

convenes the

WORKING GROUP MEETING

ADVISORY BOARD ON

RADIATION AND WORKER HEALTH

BLOCKSON CHEMICAL

TECHNICAL CALL

The verbatim transcript of the Working Group Meeting of the Advisory Board on Radiation and Worker Health held telephonically on November 2, 2007.

STEVEN RAY GREEN AND ASSOCIATES
NATIONALLY CERTIFIED COURT REPORTING
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C O N T E N T S

November 2, 2007

TRANSCRIPT LEGEND

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-- (sic) denotes an incorrect usage or pronunciation of a word which is transcribed in its original form as reported.

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-- "uh-huh" represents an affirmative response, and "uh-uh" represents a negative response.

-- "*" denotes a spelling based on phonetics, without reference available.

-- “^”/(inaudible)/ (unintelligible) signifies speaker failure, usually failure to use a microphone.

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NETON, JIM, NIOSH
TOMES, TOM, NIOSH

NOVEMBER 2, 2007

P R O C E E D I N G S

(11:00 a.m.)

WELCOME AND OPENING COMMENTS

DR. WADE: So is Gen Roessler on?

(no response)

DR. WADE: Jim Melius?

(no response)

DR. WADE: Mike Gibson?

MR. GIBSON: Yeah, Lew, I'm here.

DR. WADE: Hi, Mike, how are you?

MR. GIBSON: Fine, how are you?

DR. WADE: So we have Munn, Gibson, Clawson --

DR. ROESSLER: And Roessler just checked in.

DR. WADE: Hi, Gen, how are you?

DR. ROESSLER: Good.

DR. WADE: We are missing only Dr. Melius. We do have Ray up and functioning, right?

COURT REPORTER: Yes, sir.

DR. WADE: Well, Wanda, do you want to wait a moment or do you want to start, do the introductions and move on?

MS. MUNN: I really want to go ahead and start because I want to make clear -- Ray,

we're on the record now, okay?

COURT REPORTER: Yes.

TECHNICAL DISCUSSION

MS. MUNN: I want to make clear that this is not a standard meeting of the work group. It is instead a technical discussion of NIOSH for our contractor with respect to the last couple of items that are involved in Blockson site review. So we have these items discussed at our last full working group meeting.

SC&A was asked to provide written documentation of their position with respect to some additional reviews that had been done of the materials. They have done that for us in a document dated October 24, a review of the white paper prepared by NIOSH entitled, "(Unintelligible) of Outstanding Issues on the Review of the Blockson Chemical Company, Basis Document and SEC Petition Evaluation Report."

This is intended to be specifically a technical discussion between SC&A and NIOSH with respect to these two points. But if we don't have NIOSH on the line right now --

DR. NETON: NIOSH is here.

MS. MUNN: Hi, how are you, Jim?

DR. NETON: Good, good morning, I got here a couple minutes late.

DR. WADE: So maybe we'll just do a real brief set of introductions so we can be sure who's with us and who's not. And then, as Wanda said, this is a technical call. It is being transcribed. It is open to the public. So Board members Munn, Roessler, Gibson, Clawson are with us. Are there any other Board members on this call?

UNIDENTIFIED SPEAKER: No.

DR. WADE: Okay, so we don't have a quorum of the Board, and we can proceed. Let's have the NIOSH/ORAU team that's on the line identify themselves and as well as specifying if you have a conflict relative to the Blockson site.

DR. NETON: Jim Neton, no conflict at Blockson.

MR. TOMES: Tom Tomes, I also have no conflict at Blockson.

DR. WADE: How about the SC&A team?

DR. MAURO: This is John Mauro, SC&A, no conflict.

DR. MAKHIJANI: Arjun Makhijani, SC&A, no

conflict.

DR. ANIGSTEIN: Bob Anigstein, SC&A, no conflict.

DR. WADE: Is that the sum of the SC&A team and the NIOSH/ORAU team on the line?

(no response)

DR. WADE: Is there anyone else who would like to be identified for the record as being on this call?

DR. MELIUS: Jim Melius.

DR. WADE: Hi, Jim, thank you for joining us.

MS. HOMOKI-TITUS: Lew, this is Liz Homoki-Titus with HHS.

DR. WADE: Welcome, Liz.

MS. HOWELL: And Emily Howell with HHS.

MR. KATZ: Ted Katz with NIOSH.

DR. WADE: Okay, Wanda, you can proceed as you will.

MS. MUNN: As I said earlier, this is specifically a technical call, a working group discussion, as we had intended it to be. We sent a note to Stu earlier asking that NIOSH lead off on this. I see the logical path forward, the NIOSH response to the information

of October 24th.

Is that all right with you, Jim?

DR. NETON: You sent a note to Stu you said? I didn't see a note on this, but --

MS. MUNN: I'm sorry about that. Perhaps I didn't copy you.

DR. NETON: That's fine. We can lead this off or SC&A can put forth their position. It doesn't matter to me one way or the other. Whichever is your pleasure.

MS. MUNN: Since we have SC&A's white paper as we had requested at the last meeting of the work group.

(Whereupon, loud classical music ensued.)

DR. WADE: I'm going to have to -- there's music playing in the background on this call. Someone has to consider the fact that there's music playing in the background, and we can't continue if that remains.

MS. HOMOKI-TITUS: I think somebody put us on hold, Lew.

MS. MUNN: Let's just call back in again.

DR. WADE: I hate to impose. Let's wait one more minute, and if that doesn't work, I'm going to have to ask you to call back in.

Who's answering my questions when I ask them, if I might ask?

MS. HOMOKI-TITUS: Lew, this is Liz. I'm the one that's been, they might have put us on hold. But I'm not sure who's been answering questions.

DR. WADE: Okay. Yeah, I understood that, but someone is answering my questions.

Okay, I guess with apologies to all, could you please call back in, and then I'll do a little speech when we start. Thank you.

(Whereupon, the working group ended the call and called in again.)

DR. WADE: I'm sorry about that. So I assume the offending party is not on the line, but to any and all please be mindful of background noises. And if at all possible mute the instrument that you're using so we can conduct our business.

Wanda, are you back with us?

MS. MUNN: Yes.

DR. WADE: Let me do a quick roster check. Gen Roessler?

DR. ROESSLER: Here.

DR. WADE: Mike Gibson?

MR. GIBSON: Here.

DR. WADE: Brad Clawson?

MR. CLAWSON: Here.

DR. WADE: Dr. Melius?

DR. MELIUS: Here.

DR. WADE: So please proceed, Wanda.

MS. MUNN: As I had said earlier when we were interrupted, our expectation is that this will be specifically a technical discussion and not necessarily a meeting and discussion of the work group per se. We're asking that NIOSH ^ up on this because we have before us a white paper document that was provided by SC&A, a response made to a request made during our last working meeting.

Go ahead, Jim, it's all yours.

THORIUM-230

DR. NETON: I think there's a number of things I'd like to discuss, but I guess I can just sort of bracket our feeling and thoughts on this, the review of our position on the Thorium-230, which I think is the main issue we want to talk about today.

DR. MELIUS: Excuse me, Jim, one quick question. Is this being transcribed? Or how,

what is the procedure for this particular call?

DR. WADE: Yes, Jim, it is being transcribed. But while Wanda has defined it as not a normal work group meeting, we did put out notice of it, and it is being transcribed.

DR. MELIUS: Okay, thank you.

MS. MUNN: Because we are so near to the end of our discussions, because the last standing items that we had, we felt that it was necessary for us to have a permanent record of the discussion that took place.

DR. MELIUS: I'm not objecting. I was just asking.

DR. NETON: I'll continue then. I should mention that Larry Elliott has joined us at the table here in Cincinnati.

In reviewing SC&A's paper, it appears, you know, they've taken (telephonic interruption) some issues related to the bounding nature of the Thorium-230 calculation. And I believe that we have sufficiently demonstrated that we've bounded it for all raffinate streams. And my take on this document is that they're specifically,

and I think it specifically discusses raffinate streams that occurred in Building 55. I think, I don't sense from this paper that they're insisting that there were other raffinate streams in the general plant that could have been higher in Thorium-230. If that's the case, I think we're on the same wavelength.

DR. MAURO: Yeah, Jim?

DR. NETON: Yes.

DR. MAURO: This is John. Yes, you could tell by, we basically took off from the Elzermann report where he made reference to two filter locations in Building 55 which he calls Filter One and Filter, I guess, Step. He calls them Steps One and Step Four. And I think we felt that he did a good job in characterizing where the thorium might have gone. So we felt that those were the areas that were the most of concern.

DR. NETON: Right, so there are essentially two steps, two other steps to look at here, and one is Step Four. And I think in our original white paper we wrote that we believe that Step Four by all accounts was sort of a

liquid step. That is, that there was no, it was a raffinate step, but it was a liquid that was just pumped out of the building, I believe, into a holding pond of some type. So there really was no sort of traditional filtrate at that step.

DR. MAKHIJANI: Jim, this is Arjun. I think there were three places where there were, well, in one place the raffinate was actually the uranium. And that's the place where the filtrate was the waste. And that's not the place that I think we're talking about.

DR. NETON: I think it is, Arjun.

DR. ANIGSTEIN: Can I --

DR. MAKHIJANI: I don't have the diagram in front of me, but I can get it, but --

DR. ANIGSTEIN: -- this is Bob Anigstein. The step in particular that you're referring to is on the, ^ Elzermann report ^. The simpler diagram is in the Figure 2 of the TBD. And there is the, at the very beginning in the upper right-hand corner of the diagram, there is a, I believe that's what Arjun referred to as Step One, but there is -– (classical music interruption) here we go -- where it says heat

to 60 degrees Centigrade, and just below that it says filter cake going to waste. And then at the very bottom of the diagram, just before the end, there is another place where it says filter. So filter certainly applies to dry material, I mean, a solid material, not liquid.

(Whereupon, classical music continued, and louder.)

DR. WADE: This is Lew again. We're going to have to take some additional steps.

Liz, could you do what you did before?

MS. HOMOKI-TITUS: I would be happy to. Hang on one second.

DR. WADE: And with the possibility of then limiting calls onto this line. (Music stops.) And now it went away.

Someone, if you're still on the line, someone is putting this call on hold and is disrupting this call, and it really needs to stop. You need to disconnect from the call if you can't conduct your business any better than that. So there is someone who's putting this call on hold. It just stopped again. If that's you, then please don't do that because

we can't continue this call if you do.

DR. NETON: Okay, so we're getting into this discussion about the different filters. And there are two filters listed. Let's ^ right now is that we believe that was a liquid waste. Let's just talk about that.

There are three points here where Thorium-230 could concentrate. And I think Bob Anigstein raised a good issue here. We consider the uranium product sort of as an extension of the raffinate stream in itself. And what we've done in this document is dumped all of the thorium into that raffinate stream, and as it's well known by now, we assume that that's somewhere around 140 nanocuries per gram if it's in equilibrium with the original uranium product.

So our contention still remains, and aside from these calculations that SC&A has made about 23 millicuries per gram specific activity Thorium-230, that we are still unconvinced that there is any raffinate streams that could be generated here or anywhere in the DOE complex that exceeds a raffinate concentration of 140 nanocuries per

gram. I'm not sure that SC&A has agreed to that.

DR. MAURO: Jim, let me give you conceptually why we, when we originally discussed this -- this is John -- I think your two arguments were very compelling. And, in fact, we even said that in our meeting on October 2nd, I believe it was. I'm not sure if it was the 2nd or 3rd. And basically the argument being the 140 nanocuries per gram. Certainly it's a high number when you look at other raffinate streams. And also the fact that it's likely that other raffinate streams are going to be primarily moist.

Now what happened was when we regrouped after that meeting, and we said, well, let's take a little closer look at it, maybe do some what-if calculations. What I did was I said to myself, well, if, in fact, what you're saying is they've got this material that contains Thorium-230 at 142 nanocuries per gram, and you're also effectively saying that the dust loading that a person might be experiencing is on the order of 30 micrograms per cubic meter. In other

words, that results in your 41 picocuries per day.

DR. NETON: But, John, you've got to remember that's a time-weighted dust loading ^ with that.

DR. MAURO: My write-up acknowledges that.

DR. NETON: And so it could be much, much higher than that if there was an episodic exposure of a half hour duration once a week or something like that.

DR. MAURO: Yes, and I agree with that.

DR. NETON: ^ to a hundred times higher.

DR. MAURO: And I agree with that, and I actually support that. But in effect what happens is so these people, in other words, your bounding scenario effectively means that, well, we're really not going to experience an intake of greater than 41 picocuries per day of Thorium-230. It's very unlikely that other locations where there might be some raffinates containing some thorium could be higher than that. And then so what we did is we said, well, is that a compelling argument. And our first review said, yeah, it looked reasonable. But then we did some scoping calculations. In

fact, Bob Anigstein did one. We didn't put it in the report because it was just that. It was just a what-if. And we found out we could easily come up with some numbers that could be higher than that.

Bob, perhaps you can just give a quick rundown of --

-- really, this is the trigger that said that maybe we need to take a closer look at this.

DR. ANIGSTEIN: Well, first of all let me answer Jim's comment. If you have a filter, I mean, excuse me if I'm being didactic. If you have a filter, the filter is removing solid material. So if you have, according to the diagram and according to the Elzermann Report which we think is very definitive, he said there was a 30 percent chance of the thorium parting ways with the uranium during Step One, which I identify on the TBD diagram as the first filtration step in the upper right-hand corner. There is also something like an 80 percent chance that the thorium may be separated from the uranium in Step Four, which I think is that last filtration step.

DR. MAKHIJANI: No, Bob, it's the second last. I think that's what's confusing the thing. There are four filtration steps.

DR. ANIGSTEIN: And he refers, Elzermann refers to four steps. And Step Four is the one where there is another likelihood of taking out the thorium. There are four filters, and he has four steps, so I believe that's it. But actually, it's immaterial, Arjun.

DR. MAKHIJANI: No, no, because of what Jim was saying, both those filters on the right side of the diagram --

DR. ANIGSTEIN: Arjun, I'm talking about the one on the bottom. I believe that's Step Four because it's the last step, last filtration step.

And in both cases it's being removed as a solid. Now maybe I grant you it would be, we all agree, it would be a wet solid. But nevertheless it's being taken away and in a very simplistic way, we think of it what if it's loaded into a wheelbarrow and taken off to the waste dump. Being in an open area, not being treated as if it were a toxic material,

there is going to be some spillage. There's very likely to be some spillage. And we calculated, I calculated that if you spill as little as one percent of it, and the spill -- and this is just again a scoping calculations. I'm just using powers of ten. So if you spill one percent, and if you then, say, you have 100 kilograms --

DR. NETON: What concentration is the thorium, Bob?

DR. ANIGSTEIN: Well, we're assuming that --

DR. NETON: Is it pure thorium?

DR. ANIGSTEIN: No, that's the thing. We're not dealing with concentrations.

DR. NETON: That makes a difference.

DR. ANIGSTEIN: Because if we simply say there is 3,000 pounds of uranium, of the equivalent, it's not really that chemical form, but the equivalent of U-308, it's being produced ^. So 85 percent of that is uranium which has specific activity of the uranium in that U-308 is approximately 10,000 Becquerel per gram. So therefore, you have 1.4 of ten to the tenth Becquerels per month of uranium being produced.

So at the same time by the same token you have 1.4 times ten to the tenth Becquerels of Thorium-230 being produced. But when I say uranium, I mean Uranium-238. So then if we spill one percent, we're spilling 1.4 times ten to the eighth Becquerels per month onto this floor. And again in round numbers, let's say the floor has an area of 100 square meters, a big room ten-by-ten meters, 30-by-30 feet. So now you will have an average surface activity of 1.4 times ten to the sixth Becquerels per square meter. And if we assume a resuspension of ten to the minus five per meter, then you end up with an airborne concentration of 14 Becquerels per cubic meter.

DR. NETON: This is in picocuries. I'm not --

DR. ANIGSTEIN: I'm sorry. I did this in Becquerels.

DR. NETON: I know, but I prefer picocuries. It's about three-tenths of a picocurie --

DR. ANIGSTEIN: I'm looking at my spreadsheet.

DR. NETON: It's about four-tenths of a

picocurie per cubic meter.

DR. MAKHIJANI: No, 14 would be times 27, Jim, so it would be about 300 or 350. It would be about 350.

DR. MAURO: Bob, certainly --

DR. ANIGSTEIN: Just a second. I'll happily give you picocuries, 385 picocuries per cubic meter. And then if we go again factors of ten, let's say there's a, over the month there's an average occupancy of ten percent. Ten percent of the time there's a, a worker is in that area. Then he could have an intake of 300 based on a normal breathing rate of 370 picocuries per day. Now, I'm not saying that this is an exact number. I'm just saying that conceptually it could be higher than the 41 picocuries per day assumed in the TBD. That's our point. ^ opportunity here.

DR. NETON: I think you've sort of ignored the dilution of this material. Now I understand what you did.

DR. ANIGSTEIN: We're not talking anything about dilution. We're talking normal concentration.

DR. NETON: I understand that, Bob --

DR. ANIGSTEIN: We have so many Becquerels or picocuries if you wish being spilled, a certain fraction goes into the air.

DR. NETON: I understand that, Bob, but if it's diluted in a large matrix of material, the availability of it for resuspension is a lot less. I mean if you threw five million pounds, let's take a crazy example, on the floor in that same area, the availability of it for inhalation is not as if it's in its pure form.

DR. ANIGSTEIN: I agree with that.

DR. NETON: The dust loading is related to the amount of material that's there to be re-suspended, so --

DR. ANIGSTEIN: If you have --

DR. MAKHIJANI: Jim, Bob, I have to go in a minute, so let me just put this on the table, and then I'll have to leave. I did some scoping calculations on that, Jim, and I agree that if there is a huge, if you're producing ten, twenty thousand tons of raffinate every year, then the dilution would be very great.

But if you're producing hundreds of tons I think the intake could easily exceed,

easily exceed 41 picocuries per day. So there is, that's why if you look at the white paper, you'll actually see one of the things that we thought needs to be investigated is the amount of raffinate produced. That's why that is there. I have to go, thanks.

DR. MAURO: Arjun, thank you. I think the team ^ calculations that Arjun's. You could see why we're sort of holding onto this issue. We think that it needs to be explored further.

DR. NETON: Let me ask another question here. You take a ten to the minus fifth of the thorium, but is that really a resuspension, ten to the minus fifth of the material that's deposited on the floor?

DR. ANIGSTEIN: Yeah, it is.

DR. NETON: And so if it's being diluted by a factor of a thousand --

DR. ANIGSTEIN: No, no, no, no. Even -- I agree. Typically, a resuspension is the top millimeter. I know there's been some, according to -- I forget who's the expert on from PNL that wrote on resuspension.

DR. NETON: Bob, let me finish here. I think what you're doing is you're re-

suspending ten to the minus fifth of all the thorium that went on the floor.

DR. MAURO: Yes, no, ten to the minus five per meter.

DR. NETON: Per meter, right.

DR. MAURO: Yeah, in other words it's ten to the minus five picocuries per meter cubed --

DR. NETON: But don't you re-suspend ten to the minus five of the material that was deposited, not of the pure thorium?

DR. ANIGSTEIN: Of course.

DR. NETON: Well, then if it's --

DR. ANIGSTEIN: But you don't dilute it. We're not talking, we're not giving you grams. We're simply saying whatever is on the floor, whatever mix, of course, it's not pure thorium, but whatever mix is on the floor as long as it doesn't exceed a millimeter thickness, and, of course, it wouldn't because it would be stepped on -- (telephonic interruption) oh, oh, here we go.

DR. WADE: Yes, just hold on for one minute and see if it ends.

Liz, could you make the call again?

MS. HOMOKI-TITUS: Certainly.

DR. WADE: We've been doing well on calls until now.

(Whereupon, telephonic interruption continued.)

MS. HOMOKI-TITUS: They're going to disconnect the line here.

DR. WADE: Is it possible that they could block a line?

MS. HOMOKI-TITUS: I don't know. Do you want me to go back on and ask the operator?

THE OPERATOR: This is the operator.

MS. HOMOKI-TITUS: There's the operator, Lew.

DR. WADE: Is there a way that you could not allow that line to connect again? Is that possible?

THE OPERATOR: I can't block it, but I think I just located it and muted it. I can mute disconnect it, but I can't block it.

DR. WADE: Can you limit anyone calling into this line?

THE OPERATOR: No, I don't have the capability.

DR. WADE: Okay, well, thank you for that.

Let's proceed. After about five or

ten minutes I'll speak to the issue because right now it probably wouldn't work, but okay, please continue.

DR. ANIGSTEIN: What we're talking about is that we have an area of 100 square meters which means one million square centimeters. So if you had like one millimeter, let's give it a bulk density of one which is probably not a bad number, so what we're really talking about is you could have ten to the fifth grams on the floor, meaning 100 kilograms on that floor at any one time. And it would still all be subject to resuspension. It would not be such a deep layer that, you know, we're not talking about knee deep in raffinate. So I think it's a commonsense. I'm not defending it as mathematically accurate. It's just conceptually such a situation could happen.

DR. NETON: And it never would have been cleaned up in the --

DR. ANIGSTEIN: I didn't say, I would say like let's say it accumulates until it's about a millimeter deep at which point somebody says, hey, this floor is dirty. Let's clean it. But I'm assuming once a month rather than

once a day cleaning. And talking to some, you know, I remember thinking about Blockson where they said the floor did not get cleaned on a daily basis.

DR. NETON: That was a site-wide requirement I've been told that they hosed down the floor after every shift.

DR. ANIGSTEIN: Well, that -- at Blockson?

DR. NETON: At Blockson Chemical, yes.

DR. ANIGSTEIN: I see, well, then the number would be smaller, but it still could be, particularly if it's intermittent, and particularly if we had ten to the minus five is probably a low, John will know what the resuspension factor is. He said it could be as much as ten to the minus four in an area which has traffic, not a dormant area, but a --

DR. NETON: Well, exactly. I have trouble believing that calculation only because if you look at other areas, say, in the phosphate industry where they were dealing with radium and such, where there were large amounts of alpha activity in the filtrates, you don't see this.

If you look at that Florida Institution of Phosphate Research Report where there are air samples throughout the chemical process area including one that was taken right at the filter change-out area, they have trouble getting air concentrations over a picocurie per cubic meter. So in practice I'm not seeing this in the literature. I understand your scoping calculations. They're good for, I guess, some purposes, but it just doesn't ring true with what we've been seeing in the literature.

DR. MAURO: Jim, if you're working with radium, I guess the radium is contained in a much larger bulk. Where I'm going with this --

DR. NETON: This is a filter. One percent's being spilled as you're speculating here.

DR. MAURO: Okay, but you're saying, but I guess what it comes down to is that we see your argument, but these kind of scoping calculations where you assume something very simple. If there are some other places where raffinate is accumulated, where thorium is accumulating in raffinate, and I think there's

good reason to believe Bob Elzermann's report that that could very well be happening. In fact, it's likely. I mean, I got the impression that his sense -- and by the way our own independent sense is similar that it's likely. And I think the main dilemma here is, and Bob did it based on a resuspension factor approach. Namely, okay, if only one percent of the material or one percent of the thorium that's going through the system finds its way onto the floor, I mean, that's basically what we're saying, and that's just a number we picked out of the air.

DR. NETON: That's assuming 100 percent efficiency in one of those filter places.

DR. MAURO: Right, and there's one other steps, but we could assume one percent. We could assume something less than one percent, or we could assume ten percent. I mean, we just picked one percent --

DR. NETON: Yeah, I know.

DR. MAURO: -- just to ask ourselves the question if we do this calculation, scoping calculation, and if we were to come back with a number that was a very small fraction of 41

picocuries per day intake, we would say, yeah, we've convinced ourselves that this is just not a scenario that's plausible. But when we did this for just the way we said it, one percent of the thorium that's being handled in we'll say a wheelbarrow, fell down on the floor. It's spread out, and then it has a resuspension factor of ten to the minus five. All of a sudden we have an intake rate that could posit that could easily be ten times higher than the 41 picocuries per day.

And that left us a little bit off balance. And now we realize that the reality is that if you were to come out on a rather than a resuspension factor approach but on a mass-based approach where the volume of the raffinate is substantial; and therefore, the number of nanocuries per gram in the raffinate for the thorium is well below 140. It's contained in much larger volume which might very well be the case.

And then arguments could be made, well, even if the dust loading were on the order of a -- see, then I would take a different approach. If there's some way to

place, let's say, an upper bound or a reasonable estimate of what the filter cake, for example -- let's go with the filter cake and the diatomaceous earth step. That would be Step One.

Let's just assume that somehow we could come up with what the quantity of that material is produced each year or each month or each change out. Right now, of course, we don't have that information --

DR. NETON: But what if we just use this 140 nanocuries per gram though? That's our position is that it's no more concentrated than that.

DR. MAURO: Well, here's the problem --

DR. NETON: They could still fill a wheelbarrow full of this stuff.

DR. MAURO: Just for a minute there's another way to come at it. Let's assume that some other place has 140 nanocuries per gram, but then we ask ourselves what dust loading do we assume that the person's exposed to. Do we go with the 30 micrograms? Do we go with one milligram?

DR. NETON: No, no, see, I think you take

the same wheelbarrow full, stick 140 nanocuries per gram material, spread it out and see what you get.

DR. ANIGSTEIN: You know, the argument is that there is a large raffinate stream all told in the entire process, but at each particular filtration step I don't know what the raffinate, how much filtrate, not filtrate, precipitate is being removed by these filter steps. And I'm thinking that there could be some filter steps where there is relatively little solid material and a high concentration of thorium.

DR. NETON: I'd be surprised because we've not seen this anywhere else in the DOE complex as we reported. There would have to be some magical chemical processing step that would produce this --

MR. ELLIOTT: ^ search for thorium then that would have been the obvious --

DR. MAKHIJANI: I was able to get back onto the call. This is Arjun.

I don't think the concentration has to be 142 nanocuries per gram actually. The 142 nanocuries per gram is an inferential

concentration that isn't directly related to the 41 picocuries. The 41 picocuries is the number that you're trying to compare it to, and a lot of it will depend on how much raffinate you have. You can have a concentration that's quite a bit less than 142 nanocuries per gram and still have intakes greater than 41 picocuries per day.

DR. NETON: We're not saying that the intakes are episodic intakes as we've calculated them. You're --

DR. MAKHIJANI: Quite right, no, we agree --

DR. NETON: -- you're assuming a chronic, a chronic --

DR. MAKHIJANI: No.

DR. NETON: -- intake of -- let me get this straight though. You guys have calculated that it could be 350 picocuries per cubic meter for 365 days a year based on that spillage?

DR. ANIGSTEIN: No, I was saying there would be a ten percent occupancy of that room.

DR. NETON: What was that?

DR. ANIGSTEIN: I was assuming ten percent occupancy, a one-tenth of the day average --

DR. NETON: And that came out to 350?

DR. ANIGSTEIN: And that came out to, yeah, that came to an intake of 370 picocuries per day.

DR. NETON: At a ten percent occupancy?

DR. ANIGSTEIN: Yeah.

DR. NETON: I really have trouble. I'd like to -- and I wish you would have put this calculation in your report because I'd like to see all the assumptions that you're --

DR. MAURO: Bob, why don't you e-mail it? Then they have a chance to look -- remember, what this is --

DR. ANIGSTEIN: No, it's just a spreadsheet.

DR. NETON: Well, I'd like to get all the assumptions down here because this does not ring true with industry practice that I've seen. I've worked in plants. I've looked at phosphate reports. I mean, I understand what you've done, but the assumptions just seem to be off base somehow in reality.

DR. MAURO: Yeah, Jim, and I understand your position. The way I see it is we went through this process, and we asked ourselves these questions, did some scoping. Arjun did some

scoping calculations. Bob did some scoping calculations, and they made a very -- in other words, they didn't say that this was definitely happening, but it raised enough of a question that we just could not set aside the possibility that these scenarios could occur.

And there was really nothing in your report that would basically defeat these lines of calculations or assumptions. And so the way we wrote our white paper was I think these areas need to be explored. And we'll certainly send you both Arjun's and Bob's what-if calculations, and if you could show why that just can't happen, that's great.

But right now we walked away with the idea that, well, these really can't be ruled out right now. And my sense is the best way to rule these out is to get a handle on what the mass volume might be, production rate, on these various filters and get what the concentrations of thorium might be in that material.

And then do some analyses that demonstrate if some of that material somehow

became airborne did it dry out because it spilled or became airborne. Or whether you use a resuspension factor approach as Bob did or you use a mass loading approach where you assume a certain number of micrograms per cubic meter and demonstrate that under no circumstances would it even approach 41 picocuries per day, I would then say yes, and you made your case. But right now we don't have that.

(Whereupon, loud radio music ensued.)

DR. WADE: Oh, we did it again, didn't we?

MS. MUNN: It looks like we missed our opportunity to catch the thief.

DR. WADE: I wonder what it is. Liz, one more time, please. I'm sorry.

MS. HOMOKI-TITUS: Certainly.

DR. WADE: I'm not sure I understand the mechanics that would lead to this.

MS. MUNN: Well, I think it's a person who's putting us on hold.

DR. ANIGSTEIN: My guess would be that somebody has an incoming call, and they put it on hold so they can take the incoming call.

DR. WADE: But this is a message of someone

they're calling.

MS. HOMOKI-TITUS: The operator's going to take care of it.

DR. WADE: So I'll try now, and I'll try in five minutes. I assume you're not on the line, but someone in Arizona is putting this call on hold and disrupting the call. If you hear this, please don't do that, and I'll set my watch for five minutes and come back and do this again, so please continue.

DR. MAURO: Anyway, I was hoping that you did hear before --

DR. NETON: Yeah, I heard. I think we can get that write-up because we're not going to answer the question here, and I'd just like to look at the assumptions because this is new to me. I mean, basically, the report I read said that it could happen. Now I see your basis that you didn't provide.

DR. MAURO: Yeah, well, because it was as I would say, what I would call hypothetical what-ifs. But what-ifs in a way that say, you know, it's not unreasonable to assume that this could happen. Quite frankly, the reason we did it was to see if we go through this

kind of what-if, are we going to come up with something well below 41 picocuries per day. And that would have really convinced us, but it didn't happen that way.

DR. ANIGSTEIN: I'll volunteer to have it ^ write up in a few hours.

DR. MAURO: Arjun had something also. Arjun came out a little differently. He did an independent, another approach that was equally informative.

Arjun, are you still on the line?

DR. MAKHIJANI: Yeah, I'm on the line, but I'm on the road unfortunately. I can try to do something this weekend while I'm traveling and then send it to you early next week or I won't --

DR. MAURO: We'll get you Arjun's as soon as we can, but certainly we'll get you Bob's. And that will at least get the thinking going, and you could see where we maybe have gone afoul.

DR. NETON: My original comment here, I was going to say that all of this is pure speculation in your report, but it sounds like you've got some, at least some scientific

basis behind it because I didn't see any of that coming out in this report.

DR. MAURO: Oh, yeah, like I said, we didn't want to put this kind of material in here. In retrospect I'm sorry we didn't. We could have put an attachment and characterized it appropriately that it was purely a hypothetical just to explore what the possible intakes might be. Yeah, that would have been more helpful. But we'll get it to you. We'll get it to you.

DR. NETON: Okay. There's one other thing that I'd like to go over. I might have misunderstood. Let me just see here. There's this one paragraph on page four. I really just don't get what you're trying to say here when you calculate the specific activity of the thorium material could be greater than what was in the barrel. I mean, I don't even see why that's relevant to be honest with you. I mean unless you're assuming somewhere in here that you're going to have pure thorium.

DR. MAURO: Let me tell you why this is here. One of the steps we went through is to say, okay, what's the worst situation that

could arise, including Thorium-232 was isolated all by itself. And during --

DR. NETON: Well, I don't think that's possible but --

DR. MAURO: I'm with you. Now, the reason we did that was my original thought was, well, if that comes in at a concentration that's comparable to 142 nanocuries per gram, I think that solves the problem.

DR. NETON: You know that wasn't going to happen.

DR. MAURO: You know, it almost did. It was only 20 fold higher because Thorium-230 is a very low specific activity. And quite frankly, I walked away from that saying even if the pure thorium, I was at the point where I said I think when we did this we came in about 20 times higher. And I actually wrote a paragraph that says if this happens, and you're only 20 times higher, well, we know that there's going to be some solid diatomaceous earth that's going to substantially reduce the concentration, and we're going to get well below.

DR. NETON: Right.

DR. MAURO: That's where I came in on. And but then, quite frankly, we realized, based on this Koppinger* report, well, there's a real possibility that Thorium-232 and Thorium-230 are going to go their separate ways and not be entirely, so quite frankly, that left me in a place where, hmmm.

So it's possible that the Thorium-230 is sort of on its own commingled with this diatomaceous earth. And the only way to get the concentration on the Thorium-230 in the matrix down is to have some sense of what the volume of the diatomaceous earth stream might be or whatever the raffinate stream is.

And without that I felt as if we were sort of, it's difficult for us to walk away and say this just can't happen. So I was looking for ways in which I could convince myself that the 41 picocuries per day was, in fact, a plausible upper bound, and I have to say that I couldn't based on these kinds of calculations and the kinds of things we're talking about.

DR. NETON: We'll look at your write-up when it comes out.

Finding 3 I was reading, and I'm not exactly sure what the point is of this 15 percent versus 50 percent. Honestly, it makes no difference in the actual dose calculations whether we assume ten or 100 percent because it's based specifically on bioassay data.

DR. MAURO: Yes.

DR. NETON: It makes no sense to me what this is talking about.

DR. MAURO: I understand what you're saying. And when we put this together, we just looked at the assumption regarding the uranium concentrations, but you base it on the bioassay, it's irrelevant.

DR. NETON: Yeah, this is an irrelevant finding.

DR. MAURO: We could delete Finding 3.

DR. NETON: We'll delete Finding 3.

DR. ANIGSTEIN: Excuse me, but doesn't this feed into the 41 picocuries per day? Wouldn't that be influenced?

DR. MAKHIJANI: Right, I think we'll take Jim's comment and go back and look at it.

DR. WADE: Let me just pause for a minute just in case. If there's someone on the phone

who's putting this call on hold periodically and being disconnected and having to dial in, and if you're in Arizona, it seems like, stop that. Don't put this call on hold.

When you do, music plays, and we can't continue our business. So if you're hearing me, and you are putting this call on hold periodically, being disconnected and dialing in, you need to stop that. Don't put this call on hold. If you can't conduct your business otherwise then just leave this call because you're being terribly disruptive. We sense it's in Arizona somewhere.

Thank you, guys. Go ahead.

DR. NETON: I don't think that affects the 41 picocuries per day because that's generated based on the pure uranium intakes --

DR. ANIGSTEIN: Yeah, okay.

DR. NETON: -- and for the air concentrations.

DR. ANIGSTEIN: Okay, I withdraw my comment.

DR. MAURO: Yeah, you're right. And I think we should withdraw Finding 3.

DR. MAKHIJANI: Yeah, I think that's right. I just seem to get uncomfortable when it

happens on a conference call. I think Jim is right though. We should look at it.

DR. MAURO: We'll look at it, but I understand what you're saying, Jim.

DR. NETON: Well, I think that's all that we can, unless Tom Tomes sitting here or Larry has anything else to offer. I don't think we can really do any more until we get a hold of some of the assumptions and look at them.

DR. MAURO: Well, we still have the fourth item which has to do with Type M.

DR. NETON: Yeah, that's another issue that --

DR. MAURO: Well, let me just go ahead and say one point. If the working group, we would fully concur that the Type M-Type S issue would not normally be characterized as an SEC issue. But nevertheless, we do have some question as to whether or not going strict Type M is the most claimant favorable strategy for the reasons given here.

If this is something that the working group would like to explore or discuss further even though probably, and, of course, that's your judgment to make, but it doesn't appear

to be something that, it's certainly something that's resolvable in terms of which model do you think is the most appropriately conservative. But in the end it's certainly tractable.

(Whereupon, a personal, private phone conversation ensued.)

DR. WADE: Yeah, someone's on the phone talking right now. You need to hang up. You don't belong on this call.

Can you hear me speaking? No, you're not on hold. You're disrupting this call. You need to hang up. Who's ever speaking now, whoever they're speaking to, this call is being disrupted by you. You need to hang up. We're telling you to hang up.

You're disrupting the call. If you hear me whoever's just been speaking, you're disrupting the call. You're talking over the call. You're putting the call on hold and disrupting it with music. You're destroying the ability of this work group to conduct its business. You need to hang up.

Okay, let's try again.

MS. MUNN: We're on Finding 4.

DR. MAURO: Yeah, I was just asking the working group whether or not you'd like to discuss the Type M-Type S issue. I think we do have some differences of opinion on the degree of conservatism imbedded in the model selected. But at the same time I'd say this is a tractable question. It's certainly one we could decide to go with the more liberal approach whereby you would have the dose reconstructor use either Type M or Type S, or, of course, NIOSH could make a case why Type S is really ruled out. What I mean by tractable, it's something that could be resolved, and I guess in my opinion I don't see that as an SEC issue.

MS. MUNN: I thought we had put this to bed at our last meeting. I was a little surprised to see this. I would have to ^ what was actually said, but I thought we had agreed that NIOSH had a process that was agreeable to SC&A. Am I the only one who had that impression?

(no response)

MS. MUNN: No one else is speaking to it.

DR. MELIUS: It wasn't my impression. I

can't say that you were the only one, Wanda.

DR. ROESSLER: I thought that we had agreed that it was not an SEC issue.

DR. MAURO: No, I think we did agree to that, but we still had, we did look at it after the meeting as something that, to see whether or not we felt that using M alone is defendable. And I guess we still had some reservations for the reasons explained in the write-up.

And again, I'll say this, if you feel that it's something that really don't need to discuss, it would be what we'd call more of a site profile issue than an SEC issue, then there really is no need to go further on it, but that's your choice.

MS. MUNN: My only concern would be that this question resurrect itself at some other point, leaving us in a lurch in another part of the forest rather than clearing it here. What's the feeling of the other work group members?

DR. ROESSLER: Wanda, I have a question, kind of a general question, of John Mauro.

John, are you on?

DR. MAURO: Yes, I'm here, sure.

DR. ROESSLER: With regard to all of this but in particular the thorium issue, I'm wondering if you had Chick Phillips review this new information, the new hypothetical calculations that you've made?

DR. MAURO: The last set of, yes, Chick did review the -- I guess the answer to your question is no. What Chick did review though was the Elzermann Report, and he did concur, he concurred that the Elzermann Report was a fair characterization. However, the scoping calculations that we just talked about he was not involved in that.

DR. ROESSLER: I think I'd feel more comfortable if, since there are two different approaches in the hypothetical calculations and since we're asking questions about it, I'd feel more comfortable if Chick did take a look at it. I know he has the appropriate background and could also report.

DR. MAURO: Absolutely, I'd be glad to do that.

MS. MUNN: With respect to Finding 4.

MR. CLAWSON: This is Brad, Wanda. One of

my questions that I worry about, you know, we're bringing this question up now and at some point we've got to put this to bed because what I don't want to see is we get down the road, and then all of a sudden it rears its head again. I'd like to be able to make sure that we're doing as thorough a job as we can on this. That's just my opinion though.

DR. NETON: This is Jim Neton. If I could chime in though. If we can't get past this Thorium-230 issue, the solubility issue is not an issue. I mean, it all goes away. I would prefer from a resource management point of view if NIOSH could focus on the Thorium-230 issue to put this to rest and then it's a matter of picking one side or the other on the M or S. But for us to go back and do more literature research and such at this point would take away from our ability to respond to this most latest --

MR. ELLIOTT: Let me echo Jim. This is Larry Elliott. The solubility issue is a site profile-related issue. It is not an SEC-related issue. The working group has been

down this road, I think this is by my count the third time where I've heard those words stated by John or others at SC&A as far as work group members. And we really need to focus on what are the SEC-related issues so that we can move to closure on this SEC petition.

MS. MUNN: John, is SC&A comfortable with removing Finding 4 at this time based on the fact that we have earlier agreed that it's not an SEC?

DR. MAURO: That's certainly fine. I agree 100 percent that it would be more appropriately categorized as a site profile issue, but I just wanted to make sure that everyone, that I'm not making that judgment. If everyone's comfortable with that, that's fine. I do believe it's a site profile issue and not an SEC issue, and I believe all of SC&A feels the same way.

MS. MUNN: And I feel quite sure though memory is sometimes tricky that we agreed to that at our early October meeting in Naperville. I believe that's in the transcript that we all concurred it would be

an SEC issue. Although like Brad I have some concern that the entire thing will rise again and create some problems. I hope that doesn't occur.

Nonetheless for our current purposes and especially based on what Jim and Larry are saying right now, resources being of the essence, am I hearing correctly that your focus now needs to be on item three?

DR. NETON: That would be our preference.

MS. MUNN: Items one and two actually, item three --

DR. NETON: I'm sorry, yeah, the Thorium-230 issue.

MS. MUNN: Can we, an overriding concern here, we get this wrapped up in time for us for our next full Board?

DR. WADE: Wanda, I think you might have cut out, so please repeat.

MS. MUNN: An overriding concern is that we put this thorium issue to bed prior to our next full Board call which I believe is in early December. Is that correct?

DR. WADE: The next Board call is November 27th.

MS. MUNN: November 27th. Is the timing such that we can take care of the technical issue here and get back together very briefly to verify that we are ready for a report to the Board?

DR. NETON: This is Jim. We can certainly, once we receive Arjun and Bob Anigstein's write ups, we'd be prepared to turn this around as quickly as we could. And I'm thinking somewhere on the order of two weeks or less.

MS. MUNN: Given the fact that Chick Phillips is involved here do we have any --

DR. MAURO: Yes, I'll get Chick, I will certainly have Chick Phillips look at this immediately. In other words when we send this out to Jim, this material that Bob prepared, and I guess later, perhaps over the weekend or Monday, we will forward Arjun's. He had a separate calculation which was completely independent but of the same ilk to explore the same kind of question. We'll send that to you, also, Jim, as soon as it's ready.

Unfortunately, Arjun is on travel, but I think you'll get it by Monday. And we will

simultaneously send it off to Chick and have Chick look at it. I suspect, I know what these calculations are. I suspect, at least on our end, Chick will be able to review it. It won't take very long, and we will be prepared for the next round of discussions whenever it's convenient for NIOSH.

MS. MUNN: It's agreed then to tentatively say we will have another call like this one to be the 16th of November? Is that a reasonable timeframe for everyone?

DR. WADE: Let me check calendars. That will not work for me although that's not essential. I can have someone else fill in for me.

DR. NETON: I'm out of town that week, Wanda.

MS. MUNN: Monday, the 19th?

DR. ROESSLER: It works for me.

DR. MAURO: I hate to be a problem, but I do have a doctor appointment that day, and I would like to be on the call.

DR. WADE: Is there a time on that that would work for you, John?

DR. MAURO: Yes, I would be available in the

afternoon like after two o'clock.

DR. NETON: I'm sorry, what date are we now talking about?

DR. WADE: November 19th, a Monday at 2:00 p.m. is what's on the table.

DR. NETON: I think we're okay from NIOSH's end.

MS. MUNN: Good. If that's okay with NIOSH, then that's okay with SC&A at issue here so 2:00 p.m. eastern time, Monday, the 19th, same time, same station?

DR. WADE: I'll set it up if that's agreeable with the work group.

DR. ROESSLER: Wanda, then you're expecting the work group to be listening in?

MS. MUNN: I hope so.

DR. ROESSLER: Okay.

MS. MUNN: I'd like to follow this pattern that we had of being ^ work group ^. I think it's crucial at this point that the work group members hear these deliberations so we don't have to go through this entire thing.

DR. MAURO: Wanda and Lew, would it be inappropriate if for any reason Jim and I or some of the other folks at NIOSH and SC&A

exchange information or even talk to each other over the phone in the interim while we're exchanging this -- my guess is we'll send some material to Jim. Jim will have some observations. And some iteration might be useful to get us to a point where it would be more productive on the 19th or would you rather us not do that?

MS. MUNN: Oh, I encourage that. We really would like to have as much technical exchange as is necessary so that we can come as close to a meeting of the minds as possible by the time we have this phone call.

DR. MAURO: Okay, thank you.

MS. MUNN: Other comments?

(no response)

MS. MUNN: We have a request for the good of the Order.

DR. WADE: Well, thank you for your perseverance. I'll schedule something for November 19th at 2:00 p.m. eastern time.

MS. MUNN: Wonderful, thank you all.

(Whereupon, the working group adjourned at 12:05 p.m.)

CERTIFICATE OF COURT REPORTER

STATE OF GEORGIA

COUNTY OF FULTON

I, Steven Ray Green, Certified Merit Court Reporter, do hereby certify that I reported the above and foregoing on the day of November 2, 2007; and it is a true and accurate transcript of the testimony captioned herein.

I further certify that I am neither kin nor counsel to any of the parties herein, nor have any interest in the cause named herein.

WITNESS my hand and official seal this the 19th day of May, 2008.

_____

STEVEN RAY GREEN, CCR, CVR-CM

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