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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SPECIAL EXPOSURE COHORT ISSUES WORK GROUP

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FRIDAY,
JULY 24, 2009

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The work group meeting convened via teleconference at 3:00 p.m., James M. Melius, Chairman, presiding.

PRESENT:

JAMES M. MELIUS, Chairman
JOSIE M. BEACH, Member
MARK GRIFFON, Member
GENEVIEVE S. ROESSLER, Member
PAUL L. ZIEMER, Member

ALSO PRESENT:

TED KATZ, Acting Designated Federal Official
HANS BEHLING, SC&A
ANTOINETTE BONSIGNORE, Linde Ceramics
LARRY ELLIOTT, NIOSH OCAS
EMILY HOWELL, ESQ., HHS
BONNIE KLEA, Participant
MIKE MAHATHY, NIOSH ORAU
ARJUN MAKHIJANI, SC&A
JOHN MAURO, SC&A
ROBERT McGOLERICK, HHS
DAN McKEEL, Dow Petitioner
JIM NETON, NIOSH OCAS
CHICK PHILLIPS, SC&A
LAVON RUTHERFORD, NIOSH OCAS
MUTTY SHARFI, NIOSH ORAU
BILL THURBER, SC&A

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P-R-O-C-E-E-D-I-N-G-S

3:04 p.m.

MR. KATZ: Let me get the ball rolling then, starting with roll call.

This is the Advisory Board on Radiation and Worker Health, Special Exposure Cohort Issues Working Group, and beginning with roll call, we are going to be discussing two sites as part of this meeting, both the Dow Madison site and the Met Labs site, so I would ask, I'm not sure that there are any conflicts, but I would ask that everybody address conflict of interest as they go through roll call, starting with the Advisory Board, with the Chair, Dr. Melius.

CHAIRMAN MELIUS: Jim Melius. I have no conflicts.

MEMBER ZIEMER: Paul Ziemer, no conflicts.

MEMBER GRIFFON: Mark Griffon, no conflicts.

MEMBER ROESSLER: Gen Roessler, no

conflicts.

MEMBER BEACH: Josie Beach, no conflicts.

MR. KATZ: Great, and then members of NIOSH and its contractors, ORAU, and so on.

DR. NETON: This is Jim Neton. I have no conflict with the Metallurgical Laboratory, but if the discussion rolls into any Argonne National Laboratory I do have a conflict there.

MR. ELLIOTT: This is Larry Elliott. I have no conflicts.

MR. RUTHERFORD: This is LaVon Rutherford. I have no conflicts.

MR. SHARFI: Mutty Sharfi, ORAU team, no conflicts.

MR. KATZ: Okay.

MR. MAHATHY: Mike Mahathy, ORAU team, no conflicts.

MR. KATZ: Okay, that does it for NIOSH ORAU staff, okay then, SC&A staff, please.

DR. MAURO: John Mauro here, no conflicts.

MR. THURBER: Bill Thurber, no conflicts.

MR. PHILLIPS: Chick Phillips, no conflicts.

DR. BEHLING: Hans Behling, no conflicts.

MR. KATZ: Other federal staff, whether it's NIOSH, HHS, DOL or DOE.

MS. HOWELL: Emily Howell, HHS, no conflicts.

MR. McGOLERICK: Robert McGolerick, HHS, no conflicts.

MR. KATZ: Okay. And then any members of the public or staff of congressional offices who would like to identify themselves for this call.

DR. McKEEL: This is Dan McKeel. I'm a co-petitioner for Dow.

MS. BONSIGNORE: This is Antoinette Bonsignore for the Linde Ceramics

facility.

MS. KLEA: This is Bonnie Klea, California Santa Susana Field Lab.

MR. KATZ: Welcome to all three of you. Okay.

DR. MAKHIJANI: Ted, excuse me, this is Arjun from SC&A, I just joined. No conflicts.

MR. KATZ: Oh, great, welcome Arjun, too. All right, then, that's it for the roll call.

Let me ask everybody on the line, please, who -- when you are not speaking addressing the group, to put your phones on mute, *6 if you don't have a mute button, and to take it off mute you just hit *6 again. Please do not put the call on hold, just hang up and dial back in if you need to go away for a bit, and I think that takes care of that, Dr. Melius.

MEMBER ROESSLER: Ted, let me ask, this is Gen, I didn't hear was that *6 or #6?

MR. KATZ: It's *6.

MEMBER ROESSLER: *6 okay, thanks.

MR. KATZ: Yes.

CHAIRMAN MELIUS: And, I believe it's *6 to turn it back on, too.

MR. KATZ: right.

CHAIRMAN MELIUS: Turn off mute, which is not the right keys on other phone systems, as I have found out the difficult way by trying to talk and not being able to.

The meeting today is a focused meeting. We are only going to cover two sites. One is the -- the first is the Dow site, and the second is Metallurgical Labs. Both of these we have discussed in the past at the Board level, and, actually, have approved these being added to the special exposure cohort for specific time periods. For the Dow site there's a question for later time periods. We've already added 57 to 60, and for Metallurgical Labs it's a question of the issue of 250 days of exposure.

So, we'll start with the Dow site. We had a work group meeting that discussed the Dow site in November of last year. At that time, there were still a number of issues outstanding, where we didn't have complete information on, and the petitioner, Dan McKeel, had been, at that point, waiting a long period of time to get some of the documentation relevant to that time period, and we've finally, more recently, received at least some of that information, I know not all, Dan, and we'll talk about that a little bit later.

So the purpose of the call today is to just, I think, try to identify sort of key issues and see if there's anything else that is still outstanding before we can have full deliberations on that -- on the site, that there are still some issues I know we at least need to address.

The first thing, and I don't know if, Larry, you or Jim, or who can do this, but

is probably give us an update on sort of the covered period, residual period issues with this site.

MR. ELLIOTT: Yes, this is Larry Elliott. I can speak to that.

The question revolves around the Dow Chemical Madison site's residual contamination period, which on the report that's currently shown on our website covers a period of 1961 through 2000 -- it shows a period of 1961 through 1998, and the new report that we have going through the clearance process for issuance, and I can't say -- it's just in that process, it is, you know, imminent, I hope, to be delivered and issued to the Congress. It will be a Federal Register notice and certainly be posted on our website and notified through our web update, as to when it is issued.

But the new residual contamination period for Dow, from this new update, will cover 1961 through 2007. So bottom line, I

don't have the report to share, but I can share what it says, I hope will say, about Dow Chemical.

CHAIRMAN MELIUS: And, Larry, can you just describe sort of, what's the process once that report is formally issued?

MR. ELLIOTT: The Department of Energy and Department of Labor will receive a copy of the report, and they use the report to, primarily DOL will use this report for Dow to extend the covered period for the residual contamination through 2007.

CHAIRMAN MELIUS: And so we really have two time periods we are waiting on, one would be for your report to get reviewed and formally issued to Congress, and secondly for Department of Labor to, in effect, process that report.

MR. ELLIOTT: Yes, it's in the -- it's in the CDC secretarial clearance process.

CHAIRMAN MELIUS: Okay.

MR. ELLIOTT: That's where it's

at. It's beyond NIOSH.

MEMBER ZIEMER: Jim, this is Ziemer. Could I ask a question?

CHAIRMAN MELIUS: Sure, go ahead.

MEMBER ZIEMER: I guess, Larry, I'll pose it to you, or, perhaps, Dr. McKeel also can help me answer this.

Are there documents related to that report, in terms of the decision to extend the residual contamination period, are there documents that the petitioners are still awaiting that have any bearing on that decision?

MR. ELLIOTT: I don't believe that the petitioners are waiting on any documentation that was used to make this determination.

MEMBER ZIEMER: Okay.

MR. ELLIOTT: I believe that information is out there. I believe, in fact, they provided some of that information, or they've provided duplicates of the information

we had.

MEMBER ZIEMER: Okay.

MR. ELLIOTT: So I can't speak for Dr. McKeel's perspective. Certainly he should do that, but from my perspective, and on what we see, and how we arrived at the determination on Dow Chemical, the documentation is there to support it, and DOL will likely use that, look at that, if they don't accept ours on the recommendation of the determination.

MEMBER ZIEMER: Thank you.

Dan, did you have anything to add to that?

DR. McKEEL: Yes, sir, just one thing. I believe I have all the documentation, but what I'm not sure about is what documentation NIOSH sent to Department of Labor and Department of Energy. And what I believe it should include is the final clean-up report from the Pangea Group, which gives the date for when the residual contamination

was actually cleaned up.

But I also think that letter that went from Illinois Emergency Management Agency, which I think is dated June 8, 2008, Dow Madison or Spectralite, and Chris Barnes, who is the CEO there, stating the site was finally released from unrestricted use.

So, you know, DOL should at least be aware of the fact that there were some months from the time that Pangea Group said that it had finished cleaning up the residual contamination until the time that the agency in this agreement, State of Illinois, IEMA, actually agreed that the site was completely cleaned up for unrestricted use.

MEMBER ZIEMER: Well do we know which of those dates is used as the official end of the residual contamination period? Is it the final clean-up date or the date that it is declared open for general use?

DR. McKEEL: I understood from Mr. Elliott that the date that NIOSH wanted to use

or has proposed is the November, 2007 time frame, but I am not exactly sure of that fact. I actually asked Laurie Breyer if she could release to me the exact date in the new congressional report for the end of the residual period, and she said, at that time, that was several weeks ago, was unable to do that.

So Larry --

MR. ELLIOTT: I've given you all I can tell you until this report is cleared for distribution. I'm sorry, but this is a report that gets issued from the Office of the Secretary to Congress, and so, you know --

MEMBER ZIEMER: Once the report is out we'll know.

MR. ELLIOTT: I've got clearance to tell you what the report says on Dow Chemical. I think the clear indication by saying it goes through -- the residual period goes through 2007, covers the issue that Dr. McKeel has raised, but, you know, I'm going to

stop short of that in speaking specifically about documentation that is used to make this determination.

I don't want to be -- I don't want to sound obstinate in that regard, but I just -- I can't go farther than that at this point in time.

MEMBER ZIEMER: That's fine. I'm okay with that. I just wondered if it was known at this point, but we'll wait until the report comes out.

MR. ELLIOTT: Thank you.

CHAIRMAN MELIUS: Thanks, Larry and Dan, for that.

Now my understanding is there's also questions on other operations at that site that may extend, not the residual period, but the overall sort of covered period or covered time periods.

Larry, do you have any comment on that at this point?

MR. ELLIOTT: I don't have any

comment on that. I don't know if LaVon Rutherford or Jim Neton have anything that they are prepared to offer at this point or not.

MR. RUTHERFORD: Well, this is LaVon Rutherford, and are you -- Dr. Melius, are you speaking to, or has there been things provided to the Department of Labor to extend covered activities or covered period based on activities, or are you asking if there were new things that we had determined recently? I'm kind of confused.

CHAIRMAN MELIUS: Both.

MR. RUTHERFORD: Okay. As far as I know, that all the information that we've received from [Identifying information redacted] on potentially extending the covered period for -- based on, you know, the thorium work, beyond the 1960, we have provided -- we provided all our information, she provided all her information to Department of Labor, and Department of Labor, the last I had heard, had

issued their memo stating that they weren't going to extend the covered period.

CHAIRMAN MELIUS: So since that time you've heard nothing? That was really my question.

MR. RUTHERFORD: Right. I've heard nothing since that time.

MR. ELLIOTT: This is Larry Elliott. I know that maybe LaVon didn't have this, but I see that [Identifying information redacted] has submitted a new request to Department of Labor just this afternoon. I haven't had a chance to read through it, but I know that that came in today. Is that what you are asking about?

CHAIRMAN MELIUS: Well, I didn't know about that, so that's what happened this afternoon. So that is news, I guess.

DR. McKEEL: Just for the record, this is Dan McKeel. I didn't know about that either.

CHAIRMAN MELIUS: Okay.

MR. ELLIOTT: So I guess we are not clear on what you are referring to, Dr. Melius, in your question.

CHAIRMAN MELIUS: I'm just trying to get an update for everyone involved in the work group about the Dow site.

DR. NETON: This is Jim Neton.

I guess I'm a little confused as to the relevance. The SEC has already been established for 57 through 60. I mean, so we -- I thought we were engaged in a discussion of whether or not thorium could be reconstructed in the residual period beyond the 1960 covered dates.

I mean, so --

DR. McKEEL: This is Dan McKeel.

I think the relevance that Dr. Neton asked about is that [Identifying information redacted] 2008 information stated -- at least her comments to the Board stated that there was a new Dow Madison AEC contract that she had discovered, which indicated that

the same thorium that Department of Energy acknowledged in January, on January 8th of '08, was used in nuclear weapons and was responsible for making Dow Madison an AWE based on the thorium work, that that same -- that that new contract indicated AEC thorium contract at Dow Madison she said extended beyond 57, 58.

So I gather that in the letter that Rachel Leiton did share with me, and I assume with all of you, dated March 10, 2009, that Department of Labor looked at all that information and decided that it was not convincing enough to extend the covered period.

However, there has been no consideration of that information by anybody other than the Department of Labor that I'm aware of. Department of Energy got the same packet and the same information, and they have not given their opinion on those documents yet.

So my own opinion is that even though it's up to Department of Labor to make the determination about changing the covered period, that there are -- there is a request in from [Identifying information redacted] from late 2008 and, apparently, a new one from today which indicates that, perhaps, the thorium AEC contract period at Dow Madison should be extended over a wider period of time.

And my understanding is that the contract she found for the thorium work for the AEC was earlier than 1957 and extended later than 1958. And in Glen Podonsky's letter of January the 8th he said that Department of Energy had determined that thorium alloy HK-31 was actually used in nuclear weapons between 1956 and 1969, and he was talking about, you know, complex-wide, whereas the only two purchase orders to Mallinckrodt for that material were from 1957 and `58.

But as the work group well knows,

there are still on the table, from the petitioner's point of view, affidavits from 11 Dow workers at the Madison site that said they also shipped the same type of HK-31 alloy, magnesium thorium alloy, to Rocky Flats, and they are absolutely 100 percent adamant that it was not sent to the Rocky Mountain arsenal but to Rocky Flats. So that's where that stands that I'm aware of.

CHAIRMAN MELIUS: And, Jim Neton, to answer -- directly answer your question, I mean, what I was asking for was an informational update that I think NIOSH would be aware of any actions or, you know, possible actions by Department of Labor before we would that, you know, could affect the schedule for this, you know, work group to complete its work.

And I understand, I think we all understand that it is not -- you are not empowered to make those decisions on covered activities and so forth.

DR. NETON: Understood.

CHAIRMAN MELIUS: Yes, that's all for that. Okay.

Anything else on that subject? If not, I'd like to move out to identify any other unfinished sort of technical issues and so forth. And I know we do have one that I've actually asked John Mauro and his staff to at least address verbally at this meeting today, and that concerns the review of TBD-6000, the appendix that covers Dow, which I believe is Appendix C, which was issued after the last review that SC&A had done. So it was not included in their last report to us, which is called Appendix 2. So we have different appendices here.

John, do you want to speak to update us on that?

DR. MAURO: Yes. After I received your inquiry, I read -- we had not reviewed that. I did read it, 13 pages, but I can say, you know, right now the -- SC&A's work does

not include a review of that appendix.

If you'd like me to comment briefly, when I did read it, I'd certainly be glad to, but it really was just a quick read, just to make sure that I understood what was in it, and also to make sure that there wasn't anything, you know, is there any new material. And there is some new material, so there is some new material related to methodology for reconstructing doses during the covered period, and right now my observations of that work is that it does not have too much effect on the uncovered period, except that as I understood it when I read it, because of the extension of the time period, I guess, one of our concerns was that dust loadings that were used from I guess surveys collected during D&D, we felt that that information was part of the residual period analysis for coming up with the exposure model, and our only comment was that at the time of our review that dust loading was associated with D&D, but the time

period of interest at that time did not include the D&D operation.

So I think that that was the one observation I found that may now have been resolved, because it's been extended.

DR. NETON: This is Jim Neton. I'd like to make a comment, if I could.

DR. MAURO: Sure, please.

DR. NETON: Again, my understanding is that we were down to examination of the residual -- reconstruction of thorium dose in the residual period, and if you look at Appendix C, I mean, I'm reading from the last paragraph on page six of the document, it says, "The thorium and thoron intakes during the residual contamination period are estimated using the technique described in Addendum 2 of the SEC evaluation report."

So in essence, what we've done is formalized what was written up in Addendum 2, so that we would have a procedure to refer to

when we use that methodology, not an SEC evaluation report. So that, in essence, is the crux of what happened, and Appendix C is relevant, I think, to the residual period.

CHAIRMAN MELIUS: Thanks for that clarification. I mean, I was aware of that, and I think John was also, from his quick reading. I just think we, you know, just need to sort of directly address that, and if there's any additional information in there that is relevant to SC&A's review they should, you know, bring it forward. If not, then there's no need to do that. My communication with John has all taken place, I believe, since Wednesday of this week, so to be fair to him I don't think they've had time to, you know, sort of fully review the documents and so forth.

Are there any other outstanding technical issues that anyone has that we haven't addressed or are not addressed in the NIOSH reports or the SC&A reviews of those

reports that people believe that we do need to address?

DR. McKEEL: Dr. Melius, I have a couple.

CHAIRMAN MELIUS: We'll get to you, Dan. Let me just start with the work group first.

DR. McKEEL: I apologize.

CHAIRMAN MELIUS: And then, we will get to you.

DR. McKEEL: I apologize.

CHAIRMAN MELIUS: Yes. Anybody on the work group have any comments?

MEMBER ZIEMER: Well let me just ask. SC&A did a focused review on what was called Addendum 2.

CHAIRMAN MELIUS: Correct.

MEMBER ZIEMER: And it wasn't clear from what Jim Neton -- I think, Jim, you were just saying that you now have just formalized that procedure, right, in terms of --

DR. NETON: Correct.

MEMBER ZIEMER: So in that sense it's already been reviewed. Has anything changed?

DR. NETON: Well, you know, I have not gone through all the calculations in Appendix C, but based on the statement in there, the intent was that it formalized all the discussion that we had, you know, in Addendum 2 as to how we would reconstruct doses during the residual period.

There's more to it -- there's more in there than that. As John mentioned, there's, you know, some reconstruction information during the covered period, as well as the residual period.

MEMBER ZIEMER: Right. And, John Mauro, you folks had a number of observations, or I guess they were findings.

DR. MAURO: Yes, we --

MEMBER ZIEMER: -- on Addendum 2.

DR. MAURO: Yes.

DR. NETON: Yes, this is Jim. I think where we are at, and correct me if I'm wrong, John, but I think SC&A issued a brief report in March.

MEMBER ZIEMER: That's correct.

DR. NETON: That commented on our comments.

DR. MAURO: Yes.

DR. NETON: And, in essence, my take on this, and this might be over simplistic, but, in essence, there's agreement that we -- you know, that the approach is bounding that we've put forth. However, there remains some, I would consider, tweaking issues, as to which samples are included or not included in the analysis to get the final numbers for exposure during the later years of the residual period.

DR. MAURO: I agree with that characterization.

DR. NETON: That's where I believe we are at.

MEMBER ZIEMER: Yes.

CHAIRMAN MELIUS: And just as I understand it then, Appendix C of TBD-6000 was issued after that report, after that March report, and after the review, and then I brought that to John's attention this week as, you know, a potential issue, and asked him to take a quick look at it.

I actually think it would be appropriate for them to allow them time to take -- you know, sort of do a focused review, which I don't think will involve a lot of time or effort, but at least to, you know, read it through in more detail and compare it with what they did for their earlier review, and then report back to the work group on that.

Is that satisfactory with everybody? Again, I don't think it involves a lot, but, again, I think it's important that, you know, they do take a look at this since it does have -- potentially have some impact on the review.

DR. MAURO: Yes, Jim, this is John, yes, and from my read of it, it's something that will take a marginal amount of work, it would not be a big -- we'd issue a memo to the effect to see how things changed and what their potential importance are. I don't see it being a large effort, a few work days.

CHAIRMAN MELIUS: Anybody in the work group have any objections or agreements, disagreements with that?

MEMBER ZIEMER: No. If we need to formally task that, you know, we are going to meet in a couple days, so we can take that in the framework of the total picture.

CHAIRMAN MELIUS: Yes, I'm not sure --

MEMBER ZIEMER: But this won't be a big ticket item.

CHAIRMAN MELIUS: -- right. I'm not sure, we've tasked -- I can't remember what we specifically tasked SC&A for the first

time on this one, or last time, but we can check and then finish it up next week, finish the tasking next week. Any other issues that people in the work group have or, John Mauro, you have?

DR. MAURO: I don't. I have Bill Thurber and Chick Phillips on the line. Is there anything about the discussion we just had that you'd like to comment on?

MR. THURBER: No, I think that -- I believe it was Jim Neton, pretty much hit the nail on the head, that there is -- we felt there is some transparency in some of the comments that NIOSH had made that would improve the story and make it easy for people to follow and understand.

COURT REPORTER: I'm sorry, this is the court reporter. Can I ask who is speaking?

MR. THURBER: I'm sorry?

COURT REPORTER: Could you identify yourself, please?

MR. THURBER: Oh, Bill Thurber, sorry.

COURT REPORTER: All right, thank you.

MR. THURBER: So, yes, I think that some clarification of some of the things, as Jim mentioned, showing what samples were used and what samples weren't used and why, that sort of thing. But, again, they are not show stoppers.

MR. PHILLIPS: This is Chick Phillips. I don't have anything else to add, John.

DR. MAURO: Thank you.

CHAIRMAN MELIUS: Dan, you had some comments you wanted to make or issues to bring up?

DR. McKEEL: Jim, thank you very much, yes.

I guess my comment about Appendix C is that I'd be very happy if SC&A did a focused review, and I think they should

because -- just to reiterate what I think this represents. The first SEC was awarded to Dow Madison because they -- because NIOSH admitted it could not reconstruct the thorium doses during the production period, the AEC contract period, and they issued an 8314 SEC. So that really wasn't at issue.

By now, NIOSH claims that, in fact, they can do the thorium reconstruction of intakes during the residual period, and one of the issues that I brought up when the SEC was in my two addresses about the original SEC and then extending the SEC to the Board, was that I had questions about whether the data that was attributed to Dow Madison and used as new data that came in after the SEC determination was really all from Dow Madison.

If it were not from Dow Madison but from other Dow plants and facilities, then in my opinion, since there was no such data from Dow Madison that the Board's surrogate data criteria and NIOSH's surrogate data

criteria in OCAS IG-004 should be applied and to see whether NIOSH had justified the use of surrogate data properly.

So I think my own opinion is that issue is still out there and, you know, needs to be resolved.

The other issue is that to my knowledge, except in the discussions in the work group, there has never been a formal resolution -- dispute resolution statement that all the findings that NIOSH -- I mean, that SC&A had in the Addendum 2 had actually been fully resolved and were now off the table. So I think that ought to be done.

The remaining technical issue that I know of is, in a drawing of the plant, a floor diagram that I obtained from the Dow workers and presented to the Board in, I think, the last presentation I gave them about the residual period. There was drawn on the plan, near what was called the NDT, or the non-destructive testing room at Dow Madison, a

little red box that was labeled "batatron," B-A-T-A-T-R-O-N, which I think is a misspelling for betatron, and the workers have testified that that betatron unit was manufactured by a company named Kelly-Koett, K-E-L-L-Y dash K-O-E-T-T.

And as I think I mentioned to the Board, Kelly-Koett did manufacture betatron, and, you know, that's easy to establish. And so if -- and I think OCAS IG-003 guidance is still operative here, and that guidance is that such devices should be considered during the AEC, all radiation source terms should be considered during the production period.

Now I understand that an SEC has been awarded for the uranium production period 1957 to `60, and I suppose you could say that the fact that the betatron by Kelly-Koett was not considered in that decision, is kind of, you know, water that's passed over the dam.

But I think that it at least should be mentioned in Appendix C because

Appendix C does not just cover the residual period, it also covers the production period, and, as a matter of fact, that is the sole site profile type document that exists for Dow Madison.

So I think that's a very important document, and if it's used as guidance for dose reconstructions, which have accelerated at Dow Madison recently and fortunately and all to the good, then the fact that there was a betatron at the plant operating during the production period should be at least factored into dose reconstruction. So I realize that this group is primarily focused on the SEC, but that's really an unresolved, in my opinion, technical issue.

So, you know, I think that that is -- I guess that's what I would say. I think the final issue that I would like to say about the Rocky Flats shipments is from everything that I can gather from the workers those shipments, if, indeed, they took place, may

have extended before and after the period of `57 to `60.

So one of the things that I think has -- should be pursued has not really been fully pursued, is to go back again to the Department of Energy and ask them to look for those records and search their files, including the unclassified ones, to see if they can confirm that fact or not.

And I merely remind everybody that although for many years Department of Energy, the Army Corps of Engineers, absolutely, and during the FUSRAP clean-up, the Army Corps of Engineers maintained steadfastly that all thorium work at Dow Madison was commercial and not related to AEC.

Then lo and behold, in 2008 now, eight years later, or ten years after the clean-up, DOE acknowledges with documents that were obtained through Dow Headquarters in Michigan that, in fact, Dow Madison HK-31 was used in nuclear weapons. So that would be my

justification for saying that there is a significant possibility that DOE still maintains those confirming records. I believe that additional efforts should be made to try to obtain them.

So anyway, that's where I am on the technical issues, and, again, I very much appreciate having you all allow me to give that input.

MR. KATZ: Dan, this is Ted. Would you just do me a favor for the transcript and spell out the manufacturer of the betatron that you spoke of there?

DR. McKEEL: Well, I already did that, but I'll do it again, and the name of that manufacturer is Kelly, K-E-L-L-Y, then there's a hyphen, and K-O-E-T-T.

MR. KATZ: Thank you.

DR. McKEEL: Kelly-Koett. I don't know how you pronounce it, but that's the way it's spelled.

MR. KATZ: Thank you.

CHAIRMAN MELIUS: And, NIOSH, do you have any response to that or comments you want to make on those issues, or anybody from the work group?

DR. NETON: Well, this is Jim Neton. I certainly understand what Dr. McKeel is talking about. That was an issue that was raised in the affidavit for the SEC petition, and it's something we do need to consider.

And I also agree that it's not necessarily related to this SEC working group's task at hand, but it is something that does need to be -- we need to close the loop on that as a dose reconstruction issue.

CHAIRMAN MELIUS: Thanks.

MR. ELLIOTT: This is Larry Elliott. The only thing I would have to offer a comment on here is, I believe we can check, but DOL, or DOE will say, I believe, that they have searched the record systems applicable to try to determine whether or not there were shipments to Rocky Flats. And the other thing

I would point out is that the Podonsky letter says this is not an established fact but it may have been possible, is the way it reads, may have been possible.

So, you know, I think good to Glen's word that he's trying to make DOE gain some humanity and make some good decisions, he's really given, you know, some benefit of the doubt here. So I just don't think that ought to be misrepresented.

DR. McKEEL: This is Dan McKeel. I'm not trying to misrepresent it, I appreciate it, but he did weigh the evidence and came to the conclusion that Dow Madison should be designated an AWE site for thorium, and did so. So I'm not misrepresenting what he did.

He did send part of the Livermore documents that led to that conclusion, and there was clearly, there was -- the first page of those notes was most interesting because it said that the Department of Energy had

actually looked at a number of nuclear weapons parts pictures that used thorium HK-31A as part, and the issue they had was that they didn't have sufficient records to determine exactly where those parts were manufactured. And they speculated that they could have been Oak Ridge, et cetera.

So, again, and I'm not being critical of individuals, but after all, one could say that Department of Energy predecessor AEC should have maintained really great records on who supplied them with parts for nuclear weapons that could have devastating effects on humanity. And, you know, it's certainly not my fault that they don't have those records.

So I think the DOE, you know, what they did is on the record, and it was pretty clear from that letter that despite the fact that it had taken two years to get that information, that they did have information that HK-31 thorium alloys were used in nuclear

weapons parts. So I don't think it's an unreasonable thing to ask them to go back to look again harder, in light of the previous performance.

So thank you.

CHAIRMAN MELIUS: Okay. I thank everybody.

What I'm going to propose we do, relative to this work group and trying to complete our work, is that we will have -- we'll task SC&A to do the Appendix C TBD-6000 focus review, and then we will hold another work group meeting, hopefully between now and -- or our next Board meeting and the following meeting in October, I believe it is, and at that Board meeting try to bring closure to a recommendation on this particular SEC.

DR. MAURO: Jim, this is John Mauro. I just wanted to make sure, so we are being authorized, as of this phone call, to proceed work on that.

CHAIRMAN MELIUS: I'm not sure

whether we have to -- Ted, maybe clarify, you might want to wait until next week.

DR. MAURO: Okay.

MR. KATZ: Jim, it's fine. I mean, I can task them at any time, and so you can task them now on this call.

CHAIRMAN MELIUS: Okay, so you are tasked, John.

DR. MAURO: Okay, one more question. I noticed that there was a question that came up regarding the use of surrogate data that might have been part of the protocol used for the residual period. I don't recall, thinking back, whether or not any surrogate data was used or not. Do you want us to look into that aspect of the work also or just limit our work to Appendix C?

CHAIRMAN MELIUS: I don't -- I'm trying to recall myself whether -- I don't believe it was.

DR. MAURO: Yes, I don't recall any surrogate data either, but certainly if

you'd like that to be part of what we look into, we can do that also.

CHAIRMAN MELIUS: I mean, I think in preparing for our discussion at the next work group meeting I think we ought to clarify that.

DR. MAURO: Okay.

MR. THURBER: This is Bill Thurber. I would note that in Appendix C that Bay City film badge data was used for the external dose pathways for thorium.

CHAIRMAN MELIUS: Okay.

MR. THURBER: Which would meet the surrogate data --

CHAIRMAN MELIUS: The review -- the work group review at the next meeting would be, in a sense comprehensive, we would go back through and review all these issues in the sense of a discussion and update.

DR. MAURO: Okay. Now, I presume, given the action item to do the review of Appendix C, we should put out a brief white

paper on that review and send it to the work group as soon as possible.

CHAIRMAN MELIUS: Correct.

DR. MAURO: Very good.

DR. NETON: This is Jim Neton. I've got a question of clarification, I guess. Appendix C covers both the residual and the covered period. If the covered period is already in the SEC, is the scope of the review going to be limited to the residual period in Appendix C or the entire operations at Dow Madison?

CHAIRMAN MELIUS: I'm at a little loss remembering what earlier reviews there had been done at Dow.

I think, well, John, do you recall --

DR. MAURO: Yes.

CHAIRMAN MELIUS: -- whether --

DR. MAURO: I may be able to help out a little. I think that there are always, even though 1957 through 1960 is designated as

an SEC period, there are always issues regarding dose reconstruction for those workers who may have a cancer that is not covered by the SEC. So there's always an interest to make sure that the methodologies described -- for example, reconstructing the uranium exposures during the covered period, which NIOSH's position is they can do those.

So I would say that it makes sense for SC&A to not only look at the residual period, but also the covered period, too.

DR. NETON: I might argue, though, John, that to keep the scope that broad would just add more to the task of the focus of this SEC evaluation. I mean, we are really trying to focus on the SEC.

DR. MAURO: I understand.

DR. NETON: Whether we can reconstruct -- I mean, I don't disagree that that shouldn't be reviewed at some point, or is not up for review, but to bring that into the mix with another host of subset of

potential findings is maybe more problematic and adds more work to the SEC group that doesn't need to be there at this point.

That's my opinion.

CHAIRMAN MELIUS: This is Jim. I mean, my sense is that --

MEMBER ZIEMER: Yes, I'm not sure that the -- this is Ziemer -- I'm not sure the SEC group should be tasking outside that framework, Jim. I guess we could do it on the TBD-6000 group at some point anyway.

CHAIRMAN MELIUS: I would think if they identify issues during the covered time period that -- sort of site profile issues that should be addressed, that would be -- I mean, I would just hate at the same time to be inefficient, have them to have to go back a second time or whatever.

I certainly think in terms of discussion among this work group, we are going -- the next meeting we are going to focus on the SEC issues.

MEMBER ZIEMER: Right.

CHAIRMAN MELIUS: With the residual time period, and we wouldn't be spending time on that. Whether those issues, you know, you are right, Dr. Ziemer, they may very well should go back to the TBD-6000 work group. Maybe, John, why don't you start the review and then consult with Dr. Ziemer and I.

Is that okay with you, Paul?

MEMBER ZIEMER: Yes.

CHAIRMAN MELIUS: I think the main issue is not to get bogged down in a long process, but at the same time, you know, to flag issues that might require further review at some point, and we can decide what's an efficient and fair way of doing that.

DR. MAURO: I understand. We'll go forward on that basis.

MR. KATZ: And, John, if you would just keep me in the loop on that, whatever discussions you have with Paul and Jim, so I know what the task is at the end of the day,

that would be great. Thanks.

DR. MAURO: Will do.

CHAIRMAN MELIUS: Good, thanks. Thanks everybody, and thanks, Dan, for your input.

In terms of a schedule for this SEC review work group to look at Dow, that will be most likely determined, we'll have some better idea of that next week at the Board meeting, when we start talking about our schedules going forward and so forth, do that.

MR. KATZ: Okay.

CHAIRMAN MELIUS: So I'd like to finish -- end up Dow and move on to Metallurgical Labs, and Metallurgical Labs we had asked SC&A to review from a 250-day issue perspective. We had approved the SEC, but there were issues raised in our discussions about whether people with less than 250 days of exposure should be included in the special exposure cohort.

SC&A completed their report on

this last month and distributed it to the Board and to NIOSH. I don't believe it's cleared Privacy Act review, so remind everybody, I guess we need to be somewhat careful in discussing any details in it.

I talked to Jim Neton before he went away to the health physics conference two or three weeks ago, I can't remember exactly, and asked him if he would have time to at least read through the report and be able to respond at the time of this conference call, since we established the time for the call.

He said he would, would have the time, so what I would ask is for SC&A to do a brief summary of their findings, and then we'll follow it with some response, at least preliminary response, from Jim Neton or from NIOSH. I don't know who else has looked at it for NIOSH. And then we can take it from there.

John, I believe you are on. I don't know.

DR. MAURO: Yes, we'll keep it brief, and maybe I'd like to ask Hans, who is the author of the report, if he's still on the line, Hans, are you there?

DR. BEHLING: Yes, I am.

DR. MAURO: Could you give us the, you know, five-minute overview of the report and your conclusions?

DR. BEHLING: Okay. I hope I can stretch it a little bit beyond five minutes because, as was already mentioned by Dr. Melius, this has not undergone the Privacy Act issues, so it's clear that not everyone has had access to the report and may not be necessarily familiar with some of the issues that I'd like to bring up.

But let me try to get us quickly through a summary of the report and the intent of the report. What I tried to do was to look at the available data to gain a general understanding of the processes, the conditions, and the operating protocols under

which the Metallurgical Laboratory was operated, and then assess the applicability of the 250-day criteria for SEC eligibility in context with that knowledge.

So in order to achieve that objective, I reviewed more than 500 separate documents and reports that were listed on behalf of the Met Lab in NIOSH's site research query database, and let me just quickly summarize.

Consistent with NIOSH's conclusion as cited in their evaluation report, I also concluded that there was little or no data pertaining to external/internal monitoring of individual workers.

Yet among the available documents there was ample evidence that suggests that many of the Met Lab workers may have been subjected to external and internal exposures that by today's standards would be regarded as very high.

And of greater relevance to the

250-day issue is that the potentially high doses that may have been received as a result of discrete incidences, in other words, a very, very brief period of time, perhaps a day, a few hours, or exposures that occurred under relatively brief time periods, and by that I mean time periods that were considerably less than the 250-day, and let's briefly think of 250-day as really the equivalent of one working year, in other words, five days a week, 50 work weeks a year.

So in order to support the above-stated conclusions, let me just briefly go through various portions of the report. For those of you who may have access to the report, either by hard copy or, perhaps, on your computer, I will point to certain things.

In Section 2 of the report, I discuss briefly some relevant background information which I believe are very critical here, and one of the key issues is one has to understand the time frame. We are talking

about the early 1940s. This is really, and this is the beginning, the birth of the Manhattan project, this is the beginning of the nuclear age, and at that time we had never had a reactor, which means that for the first time with the operation of CP1 we encountered certain radiologic conditions that were totally unprecedented, unprecedented in a sense where we were dealing with high radiation fields produced by fission products that had never been produced in significant quantities. For the first time we encountered neutron fields that had never been encountered, and activation products.

There was also, up to that period of time, very little understanding about radiation effects on humans because up until that moment in time our experience with radiation was pretty much limited to x-ray machines, which were produced early on in the '30s, after Dr. Röntgen had discovered the use of x-rays for medical purposes and, to a

limited extent, a handful of radionuclides, predominantly radium-226.

So there was a very limited understanding of, specifically of fission products, and when they are ingested or inhaled what happens to them. We didn't have any clue about the genetics. How long do they stay in the body? Where do they concentrate and so forth?

So in essence, there was very little information available to the people at the time of the Manhattan project that would allow them to really establish an understanding of how to curtail and control worker exposure, so that, in essence, the operations at Met Lab represented the very beginning of the nuclear era, and there was little information and few existing standards and methods for both monitoring the worker, for protecting the workers against unprecedented radiological environments, and, of course, the issue of how to safely operate

the nuclear reactor, because this is the very first nuclear reactor that had the ability to a sustained chain reaction.

So the unprecedented radiological hazards associated with the operation of CP1, with its high photon fields, neutrons, fission products, activation products, mandated a whole bunch of new things. First, it mandated development of new instrumentation that was needed to monitor individuals. Up in that period of time, there was very little understanding of how to even monitor. We had some very crude instrumentation, such as the pocket ionization chambers, which were proven to be, obviously, not very useful in monitoring for neutrons, and it was really the beginning of developing the film dosimeter for monitoring individuals.

There was also a very limited, I already alluded to, understanding in the dose response relationship to the various types of external and internal sources of radiation.

In other words, we didn't really have a lot of biological data to work with that would say how much radiation is acceptable or how much is too much for workers to be exposed to, and lastly there was, obviously, in context with the understanding of the dose response relationship, there was a need to now establish exposure limits for the workers, which had never been before a major issue. In other words, up to this period of time most of the radiation that people had access to were controlled sources of radiation, such as an x-ray machine, where you could shut it off and turn it on, where there was the ability to shield, and the same thing with radium. For the first time we had radiation environments that were unprecedented in the sense they created environmental and working conditions, radiologic conditions, that were the result of airborne contamination, contamination that was spread around the laboratory, and so on.

In Section 3 of the report, I

describe the evolution of what is referred to as tolerance level for external and internal exposures, and in brief, the term "tolerance level" was generally defined as that amount of exposure below which deleterious health effects were unlikely, and one has to recognize what that means in context with the time.

We were mostly concerned, during that time, with acute effects, short-term effects. We were not, at that time, concerned about the induction of cancer as we are under current conditions, where radiation protection really focuses on the long-term or latent effects that are dominated by cancer induction.

At the time, the tolerance levels, as I said, were based on extremely limited historical data and had to be hurriedly supplemented by a lot of animal experiments. So much of the Metallurgical Laboratory and the Manhattan Project focused on actually

filling in a lot of gaps. They worked feverishly with animal models trying to establish what happens to develop biokinetic models that might be applicable to humans, and lastly, they worked with human subjects, patients who were terminally ill, patients who had cancer, and, in essence, they became surrogates for animal studies in order to establish how much radiation can humans tolerate and still survive.

So this is basically the backdrop of how these tolerance levels were developed. And so in Section 3 I talk about the tolerance levels that were developed for various different areas. In Section 3.2 I talk about tolerance levels for external exposures, from photons, from betas and neutrons, and, again, when you look at those in context today they were considerably higher. At the time, it was considered okay to expose individuals to 100 millirems per day, which translates to 30R per year. For

beta, the tolerance level was considered okay for 150R per year for the skin or extremities, and for neutrons they had some very unusual criteria for judging the levels of neutron exposures, and at the time that involved a quality factor of 4, which is considerably lower than the quality factors we currently assign in converting a dose of neutrons to equivalent values in units of rem.

In Section 3.3, I talk about tolerance levels for airborne contaminants, and one of the unique features there was that at the time they actually looked at radium as a reference value, and at the time they considered that the tolerance level for plutonium was based on an assumption that radium per unit activity was actually ten times more hazardous than the same amount of plutonium. And, of course, one looks at dose conversion factors today and realizes that that is, obviously, in stark contrast with current-day DCS and to the DAC values with

regard to those two nuclides.

In Section 3.4 I talk about tolerance levels for absorbed radionuclides in the body, and again, they focus on radium, polonium and plutonium, and provide specific levels of how much could you at any moment in time maintain a body burden of these radionuclides?

And in Section 3.5 I describe tolerance levels for urinary excretion, and at the time they only developed it for polonium, and their tolerance level for daily, 24-hour excretion level, was based on 5,000 dpm in a 24-hour urine excretion.

And lastly, in 3.5 I talk about tolerance level for the ingestion and inhalation, and for those of you who may have access to the report, either online or on hard copy, I just wanted to basically go back because it's quite important to look at the actual numbers.

In Exhibit 1, which is on page 16

of my report, I would just like to draw attention to, for instance, one particular isotope, iodine-131, and tolerance levels were not necessarily defined on behalf of a chronic exposure. If you do have access to Exhibit 1, you will see that for iodine they also had tolerable amounts of microcuries to be taken on a one-time basis. In other words, you could expose yourself on a single moment in time or a single day, to as much as 135 microcuries of iodine, which, in fact, when I convert the airborne concentration in the next column over, which is defined in terms of 0.028 microcuries per liter, if you convert that into microcuries per cubic meter you realize that the one-day exposure could involve as much as 28 microcuries of iodine-131 in a single cubic meter of air.

And so if you assume a person may have worked for, let's say, eight hours, and breathing at 1.2 cubic meter per hour, what that translates to is that in a single day a

person could have potentially inhaled as much as 280 microcuries of iodine-131, which based on dose conversion values would translate to over 300 rads.

In other words, what I want to point out here is that the tolerance levels were not necessarily defined strictly for a chronic exposure, but they also made allowance for a single-day exposure that for the case of iodine would have allowed a single person to inhale as much as 280 microcuries in a single day.

Not surprisingly, when you look at all of these tolerance levels, that the limited knowledge, and, of course, the availability of -- the limited availability of data pertaining to the latent cancer cause and effects, we are not talking about the understanding of cancer induction, which at that time was really not an issue of concern.

And, of course, the complex biokinetic behavior of internalized nuclides,

all these combination of deficiencies in knowledge or the absence of data led to tolerance levels, as discussed in Section 4, that were significantly flawed and inadequate for protecting the health of workers.

And when we compared these values to present-day regulatory standards, tolerance level of external doses, air concentration, intakes by inhalation or ingestion, or sustained body burdens, were many, many times higher than they are today. And these are -- these ratios are defined in Section 4 of my report.

And, if, for instance, for those who have it, turn to Table 3 on page 18 --

CHAIRMAN MELIUS: Hans, could you try to sort of hurry up a little bit?

DR. BEHLING: Okay. You will see that, obviously, we are talking about ratios of what would be allowed today versus what was allowed back then in some instances were in the thousands of times higher.

And I bring up the tolerance levels for the single reason that in Implementation Guide 1, which defines the basic core document for NIOSH and OCAS on how to deal with external radiation, we realize that in Section 3.1.4 we talk about photon dose reconstruction with regard to control limits, and I will quickly just read it.

That section says the following, "Dose reconstruction based only on administrative of radiologic controls will result in gross over-estimation of the claimant's dose. Unfortunately, if no monitoring records of any type can be found and the source term is unknown, an upper external dose estimate can be developed using occupational radiation protection limits."

And so this would be one option for looking at these tolerance levels and saying we will use them as a surrogate or as a last resort effort to reconstruct doses.

However, in the same paragraph the

Implementation Guidance also says that, "This, of course, assumes that appropriate controls were in place in order to prevent exposures in excess of occupational limits."

Now, as I said, when I looked at the reports there were plenty of data that would suggest, not only were these tolerance levels very, very high, but, moreover, there is evidence that many instances these tolerance levels were exceeded, and those are defined in Section 5. I won't go into it, you can read for yourself. Section 5.1 gives examples of external photon doses in excess of tolerance level. Section 5.2 gives examples of potentially high gamma and neutron doses received by operating the reactor. Section 5.3 gives air concentrations well in excess of tolerance limits. There are examples, and these are actual documents. And in the last section we talk about plutonium contamination levels that were identified in the private residences of three individuals.

The most relevant of all these things is that these radiation exposures that were, obviously, very, very high, can also be assumed to have been the result of an acute exposure because, for instance, when we talk about positive fecal samples, we can reasonably conclude that these are likely the result of a very recent inhalation or ingestion exposure.

Similarly, when you have significant changes in the cellularity of circulating blood, you usually conclude that these are the result of an acute exposure or a very short or brief exposure, and I talk about this to a large extent in the last section, when I talk about the issue of the fact that among the Met Lab workers there was a substantial number of people who were identified as having been exposed to excess amounts of radiation based on hematologic changes which have been the very topic of a discussion previously by the working group and

the Board as a whole, and in Section 6.3 I talk about what these doses might have been, and I conclude that on the basis of the fact that these observed hematological changes were observed among Met Lab workers, and then it describes in context with, for instance, the Y12 accident, we can conclude that some of these workers may have been exposed to doses in excess of hundreds of rads and resulted in these observed hematological changes.

So I will stop at this point.

CHAIRMAN MELIUS: Thank you very much, Hans. I thought it was a very interesting and helpful report.

Jim, do you have --

DR. NETON: Yes, that's a hard act to follow, but I'll try to be brief and summarize. I had a chance to look at this in some detail, but not nearly as much as I would have liked.

CHAIRMAN MELIUS: And that's understood.

DR. NETON: But I would comment that SC&A -- compliment them on a well written, scholarly review of work conditions and exposures during the Manhattan Project. It's an excellent resource document from that perspective.

That compliment notwithstanding though, I do have some comments based on the brief review I've had. My first one is I was generally kind of surprised how very little focused on the CP1 exposures, which I thought was the basis for this review in the first place.

If you look back at the transcripts that were provided as an attachment to the report, as well as the memo from Ted Katz, or email, it was clear in my mind that the issue arose at the meeting that this was an unshielded reactor, and would this be one of those situations where less than 250 days might apply. In reality, there's almost nothing in the report that deals with

exposures at CP-1. In fact, it goes into great length on internal exposures, which we've kind of heard similar scenarios painted before.

DR. BEHLING: Can I make a comment to that effect?

CHAIRMAN MELIUS: Yes, go ahead, Hans.

DR. BEHLING: In looking over Appendix A, which is really the transcript for the working group, and I summarized those on page 6 of my report, and I itemized four bullets, and I said I think they summarize the transcript that is contained as Appendix A in our report.

First it says there were a substantial number of workers at Met Lab who were there for less than 250 work days. I think we agreed on that. Secondly, the operation of Chicago Pile-1, CP-1, was a planned event and not an uncontrolled critical event or operation.

But, thirdly, in addition to the start up and operation of CP-1 as a plutonium production reactor however, the Met Lab was engaged in numerous other radiochemical operations which is why NIOSH established the SEC plan in the first place, and that third statement really was the reason why I focused a lot on tolerance levels and internal exposures because of the uncertainty that governs the internal exposures and the limited data that was known at the time to protect radiation workers.

DR. NETON: Again, I don't see that in the charts, but, anyway, that's another discussion for another meeting maybe.

But, given that, I did go and review the rest of the document, and Hans is right, there is evidence of very high acute external exposures, but in reality it appeared that the cases that are cited in the reports, and I went back and reviewed the reports that Hans based a lot of this on, was the medical

department's own self-identification of these elevated cases, these workers were selected for investigation because the existing monitoring program detected the exposures.

And they were, for the most part, not based on what the regulation would qualify as a discrete incident, but rather on what I would characterize as chronic. Now you can argue chronic may be less than 250, but they certainly weren't discrete incidents.

DR. BEHLING: Well, again, if you look at --

DR. NETON: Maybe I should just finish, and then we can talk about it.

DR. BEHLING: Okay, I'm sorry.

DR. NETON: Please.

In the internal exposure evaluation, we've seen similar analyses by SC&A at other sites, Ames in particular, where they do these hypothetical existence of large acute exposures that produce PoC values greater than 50 percent, and we discussed this

before, that is not in and of itself a basis for defining a class.

You know, we talked about this before, it's not a litmus test. In fact, that was intentionally avoided during development of the rule. It was avoided in part, as we discussed before, because there are, essentially, an infinite number of parameters to consider, for example, exposure magnitude, radiation type, cancer, target organ, demographics. It has to be evaluated to determine if, in fact, a PoC of 50 percent can be exceeded. So that calculation, in and of itself, doesn't establish it.

And then there's this contention by SC&A in the report that talks about the congressionally-established SEC class was based on modern -- possibly based on modern-era exposures and not necessarily applicable to Manhattan-era project exposures.

I'm not sure of that. I think it's conjecture at best, and, in fact, it's

quite simple, once you go back and demonstrate that there are acute internal exposure scenarios at the covered gaseous diffusion plants that could also produce PoCs of greater than 50 percent for a very short period of time, such as exposure to highly insoluble very enriched uranium doses to the lungs. So I'm not sure that argument holds water with me.

In some ways, too, I believe the report mischaracterizes what the tolerance level was. There were some excursions allowed. But in one of the reports that Hans cited there's a paragraph that reads as such, "It must be continually borne in mind that the tolerance dose is not the assumed maximum that can be endured without effect" -- or "is the assumed maximum that can be endured without effect. It is not to be taken as the optimum to which one should expose them self. The less exposure anyone gets the better it is for him." So it's pretty clear that, you know,

the ALARA concept, at least to some degree, was in place in the early 40s.

Let's see, what else. I won't go into the high exposures in the internal. I think I've covered that. And finally, I've not had a chance to evaluate all the numbers and technical calculations in this document, but I did find what I think is an error in Table 10, where the case is being made that the potential exposures were as high, if not higher, than 300 rem, based on a comparison of the Y12 criticality incident.

The table has two columns transposed. One for neutron dose, the neutron and photon dose columns are transposed. In fact, the neutron doses were much higher than the photon doses, and those high neutron doses are reported in units of rem, which is a stochastic base value, it's based on the risk of developing cancer and should not be used to quantify a deterministic effect.

And with that I'll stop.

CHAIRMAN MELIUS: Thanks, Jim, and we understand the limited time period you have. Any of the Board members have questions for either Jim or Hans at this point? I realize the Board members have also had limited time.

MEMBER ZIEMER: Well, this is Ziemer. I think one of the -- one of the things we were trying to get a handle on initially was whether or not one could bound the doses on the CP-1 operation.

I mean, our focus was on that initially, and we had that issue. It really -- in fact, I think it was a meeting you weren't actually there, Jim, and we sort of had to fill you in later, but it was the issue of -- it was a planned criticality, certainly, the first one was, and I don't know how much they operated that CP-1 after that.

Do we know that? How many -- because once they established criticality then went on and built the Argonne reactors and so

on, but do we know how much CP-1 was actually operated?

DR. BEHLING: Well, it only operated for a period of about less than three months.

MEMBER ZIEMER: Yes, but I mean, during that period --

DR. BEHLING: Yes.

MEMBER ZIEMER: -- like the first -- the first criticality was, obviously, just very brief. Once they went critical, they shut her down. It's not like they had it operating for days after that. I mean, they shut it down, and they all had a glass of wine and so on. But how much was it actually operated after that, and can the doses from the reactor actually be bounded?

I think Jim Neton also talked a little bit about that. We know something about, we know the enrichment and the configuration, and, actually, we know distances pretty well, from pictures and so

on.

DR. NETON: Right, LaVon, you are on the phone, I don't know if you have any more to add on how -- the operation period of the CP-1, but -- and I do know that we had talked about, you know, bounding the external on neutron exposures based on first principal type calculations, which we've done for other reactor configurations in the past. So it wouldn't be an insurmountable task to do that.

MEMBER BEACH: Well, Jim, this is Josie. Dr. Ziemer, on page eight it said that the CP-1 was terminated in February of 1943.

MEMBER ZIEMER: Yes, I understand that. My real question was, do we have -- do we know exactly, like did they operate it every day? It was a big job stack, and they spent a lot of time stacking graphite and uranium in different configurations and trying to get a critical configuration.

Once they reached that, did they operate that, you know, like every day, or do

we know much about that because I would -- I would think, this is intuitive now, and, Hans, maybe you have better information on this, but I would think intuitively they could not have gotten very much exposure if, like, a critical assembly where you just go barely critical. They are certainly not up to a high power. This is natural uranium. They are some distance away, and they operated it, apparently, for a few -- long enough to get the count rate on the instruments and show that they got multiplication.

DR. BEHLING: That --

MR. RUTHERFORD: I'm sorry, Hans. Dr. Ziemer, this is LaVon Rutherford.

I think we do have the information on how -- generally, how much it was operated. I don't have it in front of me right now or recall exactly, but it was learned relatively quickly that they were going to have to move it and establish CP-2, and the reason why they moved it and established CP-2 was because they

wanted to add shielding. So I think we have that information.

MEMBER ZIEMER: Yes. Anyway, I think the impetus for looking at this initially was, in fact, would there have been exposures during those initial experiments that were high enough to be considered like an incident, or do we have enough information that they can be bounded? If you can bound them, then the incident issue goes away, I guess, or does it?

CHAIRMAN MELIUS: It sort of depends on how plausible you can bound it, I guess. The criteria we continue to wrestle with now. How good does the bounding have to be?

DR. NETON: This is Jim Neton. I was kind of hoping that's what the SC&A report was going to flesh out a little bit in their evaluation of that process, and of course we didn't see that. We can certainly put our calculations on paper and come to some

conclusions based on this. I am not sure, I am not trying to direct the working group, if the working group wants to take up this entire SC&A 52-page report that covers the waterfront of all exposures for Met Lab and beyond we can certainly discuss that, too.

DR. MAKHIJANI: Well, Jim, this is Arjun. Let me throw my two cents worth in, since I've been kind of not on this report but on the 250-day issue with you in general on behalf of SC&A.

I think Hans's report does raise, you know, a lot of questions about acute doses. We've talked about internal doses in terms of, you know, the committed doses, and how that might be equivalent to criticality. But here, you are -- Hans is talking about doses where there were hematological changes and so on. We've not done that before. It seems like, you know, whatever merit it might have in relation to the CP-1 experiment, it does raise some 250-day issues that are

worthwhile.

DR. MAURO: I'd like to add a little bit to that, too. This is John Mauro.

Jim, you had mentioned something that struck me as important. When I saw the white blood cell depression amongst some of these workers, you know, right off the bat, you know, we are talking about doses that are considerable, perhaps, on the order of 100 rem delivered acutely, in order to cause that kind of depression.

But, and certainly if that occurred, and there might have been some other workers who were not, actually, brought into the hospital for a blood count, et cetera, et cetera, that could have experienced those doses, it's almost prima facie evidence that what we have here is something that is equivalent to a criticality in an uncontrolled circumstance.

But you had said something I think is important for everyone to consider, is the

people who did get those exposures were -- it was known, and they were brought into the hospital, and that they were dealt with, and in theory it's somewhat controlled. I'm not sure if that's controlled or not.

But there's a possibility, notwithstanding if it occurred during the CP-1 criticalities or under other circumstances, if the situation existed in those years where there were workers that might have experienced exposures that could have caused white blood cell suppression and they went unnoticed, you know, it seems to me that is the definition of defining a group that might need to be included in the cohort.

DR. NETON: I don't disagree with you, John. I mean, I think that is the definition, were there incidents that were unrecorded that -- well, were there incidents out there that could have risen to these levels? And I think, you know, in reading through the documents that Hans relied on for

his information, you get the sense that there was a lot of attention paid to exposures.

I mean, yes, the levels were high, but they reacted very strongly in those cases to situations where there were like blood cell -- you know, these workers were restricted from work, or, you know, they changed source configurations, that sort of thing.

So it's not like there was a failure of radiation protection programs, almost, I mean they did acknowledge them and they dealt with them. So --

CHAIRMAN MELIUS: But did they identify all of them?

DR. NETON: Well, that's a hypothetical question. Can we make that case? I don't know.

CHAIRMAN MELIUS: No, it --

DR. NETON: It's almost like proving the negative situations again, like was the program sufficiently robust to identify all possible workers. Could there

have been one person, and we don't have that anywhere right now that I see.

CHAIRMAN MELIUS: Well, my argument would be that we need to take a closer look so we can make some sort of judgment on what went on there, I mean, I think we have to recognize, one, is that our criteria for health endangerment is not very rigid, and to me it's problematic. You know, we've arbitrarily set 250 days, we've struggled and we've discussed at length the issue for less than 250 days.

I would, you know, rather than try to get into the legalistic argument about that now, is let's go back and look at what happened there, given how long ago it was, given the fact that we know there were many people that worked a short period of time, let's try to get the facts together and see what information we have that would, you know, where does that lead us, and then we can make an assessment, what's the right and fair thing

to do for these people, and maybe it sheds light on how we deal with similar situations.

DR. MAKHIJANI: Jim, this is Arjun again. I agree with you. Just a couple of other comments. I think NIOSH has already said they cannot reconstruct dose. I think the records show that the project was solicitous of extreme exposures and radiation protection and so on. I mean, after all, they established a health physics program, a lot of the people came from the Met Lab.

But since an SEC has already been established on the idea that NIOSH cannot reconstruct dose, we are only talking about health endangerment, and in health endangerment it's not whether it's controlled or uncontrolled, it's whether something equivalent to that occurred to endanger the health.

I don't think it matters whether it was a planned thing or an unplanned thing. The question, it seems to me, is whether the

health was endangered.

DR. NETON: Arjun, I would agree with you, except that if it was known and evaluated, then one could reconstruct that dose theoretically, right?

DR. MAKHIJANI: You've said that you can't reconstruct dose.

DR. NETON: We said we couldn't reconstruct exposures that occurred over chronic situations, over 250 days. If there were incidents that were known and identified and evaluated, we would certainly look at it critically to see if it could be reconstructed.

I mean, it doesn't mean -- just because a high -- a high exposure, in and of itself, does not equate to health endangerment. You have to have an inability to put an upper limit on it.

DR. MAKHIJANI: We don't even know how long this -- how many times this reactor was operated.

DR. NETON: We know the extent of the total operating period, and, according to LaVon, we have indications as to how much it was operated.

DR. MAURO: There's one more -- Hans, when we were talking about this report, you had mentioned that the number of people that worked there during the time period of interest, a very large number of them worked there for less than 250 days. In other words, the staff sort of cycled in and cycled out. It's not like a production place, where you have a baseline staff that's there for many years.

What was the number of people that you estimated were there for less than 250 days?

DR. BEHLING: Well, one of those is right in the report, if you look at page 33, you will see, as Exhibit 8, people who were defined as resigned or cut off. And if you realize the date for that particular

document, this occurs within seven months of the start up of the Metallurgical Laboratory, and the total number of people 167.

So by definition these people all, even if they started on day one, would have worked for less than a 250-day period.

MEMBER ZIEMER: Many of them got reassigned once they decided to go to -- you know, build the reactors elsewhere, so that's sort of a given.

I really think one of the sort of interesting philosophical questions is, maybe it's the one Arjun raises, and it's sort of what we bump into over and over again, the sort of arbitrariness of saying that 250 days is the sort of cutoff point for health endangerment, and I guess philosophically, I think what Hans is arguing for is to say that we sort of accept that in a sense based on the way things are today, and if they were very much different 50-60 years ago, should the health endangerment period, in essence, be

shorter than that. That's kind of the argument, and that's very tough to deal with. I kind of am sympathetic toward that. I don't -- I don't know how to --

DR. BEHLING: I think we actually did -- we concluded that on behalf of people, for instance, like in the case of the Marshall Islands, which we, obviously, shied away from, but we said since these people there are on location 24 hours a day --

MEMBER ZIEMER: Well, yes, but see that's a 250-day equivalent. I think what we would end up arguing here would be that it didn't take 250 days worth of sort of normal exposure then to get the same -- I think you are arguing that it doesn't take -- it wouldn't take as long to get whatever it is to get to the same level of "health endangerment," as it does nowadays, based on very much different operating criteria.

DR. BEHLING: Exactly.

MEMBER ZIEMER: If one argues that

-- and, again, who knows what the 250 day is really based on, it seems to be a working year, and it's in the legislation, and no one really ever said that if you work a year at current levels that that's, you know, the argument. But sort of intuitively it seems like you are arguing for considering that it was very different in those days.

CHAIRMAN MELIUS: And Congress at least recognized that, that there were different circumstances because the -- of how it handled the --

MEMBER ZIEMER: Well, I just think we are going to have to have some more discussions on this.

CHAIRMAN MELIUS: Yes, and I'm not trying to -- I agree, and I guess my question, and maybe this is a question -- this is sort of a tasking issue going forward, and maybe people should think about it, and we can talk about it at the meeting next week, but I guess one is to give NIOSH time to more, you know,

formally and in more detail respond to the SC&A report, and then I think we could, based on this discussion and on that response, we could sit down and have a more fruitful discussion of this topic and this site, and then I guess the question on that is about trying to bound the exposures from the reactor as to who should do that.

I guess, Jim, you expected SC&A to take a shot at it, and they didn't, and does NIOSH want to do that and come back, or should we have -- task it to SC&A to do?

DR. NETON: I don't know. I'd like to think about this a little more because I don't necessarily disagree with what Dr. Ziemer stated, is that, you know -- I don't -- you know, it's clear that these exposures were higher --

CHAIRMAN MELIUS: Yes.

DR. NETON: -- than what we would have experienced in today's workplace.

But the issue then becomes, you

know, you know, rather than to point-by-point sort of have NIOSH respond to all the issues that were raised in the SC&A report, it seems like there's more of a philosophical thing that, you know, we could address it from a more philosophical argument, as Dr. Ziemer was alluding to.

MEMBER ZIEMER: Yes.

DR. NETON: And maybe approach it from that perspective, rather than get balled up in these 50 percent PoC calculations and all that kind of stuff because that doesn't go anywhere --

MEMBER ZIEMER: No, no.

CHAIRMAN MELIUS: That's fine, Jim, and I agree, but I guess it would be helpful if you could organize -- you think other information that should be considered in that discussion, you brought up some issues today, so that we all have all the facts there.

So if you think there are other --

it may not be, you know, calculations, it may be something else, but other things that need to be considered about that site that would be helpful as to that.

DR. NETON: Right.

CHAIRMAN MELIUS: Because I think we are having trouble how to frame the decision on this.

MEMBER ZIEMER: Exactly.

CHAIRMAN MELIUS: On all these sites, and so, it's getting that --

DR. NETON: And I know you wanted to shy away from the regulatory issue, but at the end of the day we have two choices, 250 days or present, and that's, to me, one of the biggest rubs in this issue, is I would agree that it might take less time to get to the endangerment, but we have to then go all the way to the other end of the spectrum and say just presence for one day at the site constitutes health endangerment, and that's not very, you know, palatable in my mind.

So I don't know.

CHAIRMAN MELIUS: I don't think all of us would agree on that formulation of it, but if you want to think about it, and let's talk next week about what should be an appropriate way of, you know, sort of NIOSH reporting or responding on that, or how we would then set up a work group discussion to go into this sort of appropriate level of -- sort of frame the discussion in a framework for dealing with this issue overall.

So --

DR. NETON: And I would say these high external exposures at the Met Lab are probably the closest we've come, at least in my mind, to get our heads around where to go with it. I think these were very high exposures, there's no doubt.

CHAIRMAN MELIUS: And they are -- yes, they are hard to ignore for that reason and feel that we are still being fair to claimants. I think to me that's the --

DR. NETON: The internal issues, I think, that we tried to deal with for internal exposures are difficult for me because, like I said, we can come up with very high internal organ doses for even the congressionally mandated SEC, so, you know, that doesn't work real well for me. And those are chronic exposures at the end of the day anyway.

But this external thing, I'd like to think about some more.

CHAIRMAN MELIUS: And I think we all will, the work group will also, and SC&A, and maybe we can do some site evaluations next week and come up with a way to move forward.

MR. RUTHERFORD: Dr. Melius, this is LaVon Rutherford. I wanted to point out one thing just briefly, just so everyone knows.

I did happen -- and this has nothing to do with the overall decision, but I did look at the cases that we have, and we do only have two cases that had short duration of employment at the Met Lab during that period.

So I just thought that would be useful information.

CHAIRMAN MELIUS: It is useful, and I'll point out my usual counterpoint that, you know, people, they know if they have short periods of employment they are not eligible, so they often don't apply.

MR. RUTHERFORD: Okay.

CHAIRMAN MELIUS: And I'm sure they are advised that way by Department of Labor and others.

MR. RUTHERFORD: I just wanted to --

CHAIRMAN MELIUS: No, no, no.

MR. RUTHERFORD: -- point it out just so you knew that we weren't holding up a bunch of claims or anything that way.

CHAIRMAN MELIUS: That's fair, LaVon.

MR. RUTHERFORD: Okay.

DR. BEHLING: Dr. Melius, this is Hans. Can I just make a comment that goes back

to an earlier statement by Jim Neton that contested the issue No. 3, where I had quoted on page six of my report that part of this issue involved the Met Lab, where I quote, "The Met Lab was engaged in numerous other radiochemical operations, which is why NIOSH established the SEC class in the first place."

And I took that particular statement out of Appendix A on page 47, which is the transcript that involves the previous meeting of the work group, in which Dr. Ziemer made the following statement, Chairman Ziemer, "I think a little more discussion needs to occur because it's not clear to me how all these pieces fit together, the reactor versus the radiochemical operations that occur, which is why the class was added in the first place. And there's another class possibly there, so we need to talk through this." And that's the statement that I extracted in making reference on page six.

CHAIRMAN MELIUS: That will teach

Dr. Ziemer to say anything.

MEMBER ZIEMER: Keep my mouth shut, huh?

CHAIRMAN MELIUS: Yes, right. I'm always taken back when I'm quoted in a report from a transcript.

MEMBER ZIEMER: Hard to argue that, right?

CHAIRMAN MELIUS: Yes, right, exactly. Did I really say that?

DR. BEHLING: Well, take a look on page 47.

CHAIRMAN MELIUS: No, no, I actually read those in the report, I came prepared. Thank you.

Okay, well, let's all talk next week, unless anybody else has any comments they feel necessary or would be helpful.

It's 4:45 on a Friday, at least on the East Coast.

MEMBER ZIEMER: Yes.

CHAIRMAN MELIUS: If not, then I

think we'll adjourn, and we'll see everybody early next week.

Thanks everybody.

(Whereupon, the above-entitled matter went off the record at 4:47 p.m.)