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

NEVADA TEST SITE

The verbatim transcript of the Working Group Meeting of the Advisory Board on Radiation and Worker Health held at the Marriott Airport, Hebron, Kentucky, on July 25, 2006.

C O N T E N T S

July 25, 2006

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)/ signifies speaker failure, usually failure to use a microphone.

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P R O C E E D I N G S

(10:00 a.m.)

WELCOME AND OPENING COMMENTS
DR. LEWIS WADE, DFO

DR. WADE: Good morning, everyone. This is Lew Wade. I'm the Designated Federal Official for the Advisory Board, and I'd like to welcome you all to this working group meeting of the Advisory Board. This is a working group that's ably chaired by Robert Presley, has as its members Brad Clawson, Wanda Munn and Gen Roessler. And this working group is focusing upon issues related to the Nevada Test Site site profile and the review of that document by the Board. Before I make some opening comments, I'd like to go around the table here and identify everyone who's here, and then I'd like to have members of the federal government who are on the line, other Board members, if there are representatives of SC&A on the line I'd like them to identify themselves, then anyone else who's on the line who would like to identify themself, that would be fine. And please, as we go through our deliberations, anyone on the

line, if you have trouble hearing us at any point, please just shout out. You know, positioning the microphones and maintaining a high volume is something we'll focus on, but please don't let us go too far without reminding us that we need to make some adjustment.

Again, this is Lewis Wade. I work for NIOSH.

MR. PRESLEY: Robert Presley, Board member.

DR. ROESSLER: Gen Roessler, Board member.

MR. ROLFES: Mark Rolfes, NIOSH.

MS. MUNN: Wanda Munn, Board member.

MR. HINNEFELD: Stu Hinnefeld with NIOSH.

MR. ROLLINS: Gene Rollins, DMA, subcontractor for NIOSH.

MS. BRACKETT: Liz Brackett, ORAU team.

MR. MCFEE: Matt McFee, ORAU team.

DR. MAURO: John Mauro, Sanford Cohen & Associates.

DR. MAKHIJANI: Arjun Makhijani, SC&A.

DR. WADE: And Brad Clawson, a member of the Board, has just stepped away from the table. Brad will be with us in a moment.

Might I have other members of the NIOSH or ORAU family introduce themselves? On the tel-- on

the telephone line.

MS. THOMAS: This is Elise Thomas and I'm with the ORAU team.

DR. WADE: Okay. How about other Board members who are on the line?

(No responses)

Members of the SC&A team?

(No responses)

Any other SC&A members on the line?

(No responses)

Are there other federal employees that are on the line participating in this as part of their work?

(No responses)

Okay, I assume that there'll be others that'll join us through the course of the call. Again, as a working group we cannot have a quorum of the Board present; otherwise it becomes an official Board deliberation and, by my count, we do not have a quorum of the Board present so I think we're in good shape to continue.

Let me make some -- some opening comments. We will, once I finish my opening comments, go around and have Board members, NIOSH/ORAU team members and SC&A members identify whether or

not they have any conflict with regard to the Nevada Test Site. As you know, the Board's procedures with regard to conflict of interest, if there is someone who's conflicted -- a Board member conflicted relative to a particular site, they can participate in discussions concerning that site but they cannot make motions or vote.

With regard to ORAU, NIOSH and SC&A, we would want anyone with a conflict to disclose that conflict before we have our discussion so that everyone can realize the nature of the conflict and can factor that in as they would like to their consideration of the words spoken by the person with the conflict.

Again, this is a deliberation -- a meeting to discuss the Nevada Test Site. I thought I'd just give you a little bit of context of what's going on with regard to the Nevada Test Site overall. At the last Board meeting the Board took action on a petition that NIOSH had generated. This is an 83.14 petition for the Nevada Test Site that, as my notes show, went from 1951 to '62. The Board recommended approval. The Secretary has acted consistent

with the Board's recommendation. The Secretary's recommendation is before Congress, and I think the 30 days runs out, if I'm not mistaken, the 26th of July. I can't imagine that the class will not be added to the cohort, but again, it hasn't happened yet. I think we're just days away from that.

If you recall, there was an open issue that surrounded that petition that the Board still is deliberating upon, and that is -- the petition dealt with the 250 days as criteria for -- for a membership in the class. We have heard from the Department of Labor that they're prepared to do the arithmetic that would say 250 days at the Nevada Test Site quite possibly means 250 divided by three because there were people who lived at the Test Site. So I think that issue has been resolved.

The Board still is looking into the issue of whether it should be something less than that, 250 days divided by three, should it be presence or should it be something between presence and some number, and that issue remains to be discussed. The Board has a working group chaired by Dr. Melius that is

slated to look at that issue. That working group is supposed to work in close harmony with the working group chaired by Robert Presley. I don't believe that working group has held any discussions to this point.

I was told by Stu Hinnefeld this morning that NIOSH is just in receipt of another SEC petition -- this is a petitioner filed petition. It has not qualified. It is in the process of being reviewed. I assume it deals with a period later than the '51 to '62 petition that the -- the Congress is to act upon this week.

Another issue related to Nevada Test Site is several Board meetings ago SC&A informed us that a part of their corporation had taken on some contract work to do dose reconstructions for DTRA, and this created an issue of a potential conflict of interest with regard to SEC petitions or dose reconstructions or site profiles. And we were -- we were keeping SC&A from any work with regard to the Nevada Test Site and Pacific Proving Grounds until those issues were resolved. The short of it is, the issues have now been resolved.

The -- the middle of it is that the contracting officer, David Staudt, asked SC&A to make certain proposals. SC&A made a number of proposals. David found a proposal that SC&A made to construct a firewall between the aspects of their business acceptable. SC&A has implemented that to the satisfaction of the contracting officer and now SC&A is not conflicted in the eyes of the government. The Board could have a different view of that when the Board meets in August or September, but right now the contracting officer has given SC&A freedom to participate in this meeting, and therefore SC&A is with us at the table. I don't think I have any more notes to speak to. Sorry about that long introduction. What I'd do now is I'd ask any Board member who's on the line or present at the room that has a conflict with regard to the Nevada Test Site to so identify themselves.

(No responses)

Okay. Hearing none, John Mauro for SC&A?

DR. MAURO: I have no conflict.

DR. WADE: Is anyone from SC&A on the line now?

DR. ANIGSTEIN: Yes, Robert Anigstein.

DR. WADE: Okay. Robert, are you conflicted with regard to the Nevada Test Site?
DR. ANIGSTEIN: Say again?
DR. WADE: Do you have a conflict of interest with regard to the Nevada Test --
DR. ANIGSTEIN: No, I do not.
DR. WADE: Okay. Anyone else from SC&A on the line?
(No responses)
Stu, could you lead us through any disclosures that need to be made for ORAU or NIOSH?
MR. HINNEFELD: Right. Neither Mark nor I from NIOSH have a conflict at the Nevada Test Site. But from the contractor personnel present, Gene Rollins is not conflicted at the Nevada Test Site. Liz and Matt, who are not personally conflicted but there is a corporate conflict with --
MS. BRACKETT: I was involved with recent --
MR. HINNEFELD: Oh, okay, so Liz is personally conflicted. Matt is organizationally conflicted. MJW has done work for -- at Nevada Test Site, so the corporation MJW is conflicted. Liz participated in that and is personally conflicted. Matt is not personally

conflicted.

DR. WADE: Liz, could you tell us just briefly as to your involvement?

MS. BRACKETT: I reviewed their technical basis document for internal dosimetry and I was involved in -- I don't recall, I -- I --

THE COURT REPORTER: Could you speak up, please?

MS. BRACKETT: Sorry, I have a cold. I can't speak very loud right now. -- and I did one or two dose assessments for them.

DR. WADE: Anyone else on the line from NIOSH or ORAU that has a conflict?

(No responses)

Okay. The last thing I'll bore you with in terms of my words are that, if you recall, at the last Board meeting Professor Lynn Anspaugh with the University of Utah made comments to the group. I've been in contact with Professor Anspaugh and he very much wanted to participate in this call. But on Sunday I received an e-mail that I'll read to you from the Professor. It says (reading) Dear Dr. Wade, as discussed with you previously, it was my plan to be on the conference call tomorrow. Now however I

will be driving in the boondocks of Utah so I will not -- it will not be possible. I continue to have a keen interest in the Nevada Test Site dose reconstructions, et cetera, and I do not think that the current site profile adequately captures the nature of the activities and the potential for episodic exposures. Regards, Lynn Anspaugh.

I'll read that last part again -- let me find it. (Reading) I continue to have a keen interest in the Nevada Test Site dose reconstructions, et cetera, and I don't think the current site profile adequately captures the nature of the activities and the potential for episodic exposures.

I only read that because, again, the Board and the working group has always felt it better to be informed by the opinions of anyone who might have them. That's the Professor's opinion and now it's on the record.

That ends my long introduction. Robert, it's all up to you.

INTRODUCTION BY MR. PRESLEY, CHAIR

MR. PRESLEY: Lew, thank you very much. What I thought we'd do today is start through these --

start through the comments first. I'm not one to make a long matrix. We agreed to comments. If SC&A would like to comment first and then NIOSH, what we'll do is go off of NIOSH's document. John, if you've got a comment, you want to go first, and then Mark, and go through NIOSH's comments.

DR. MAURO: Yes. John Mauro, I'll be very brief. First of all, I appreciate the package that was put together. It was extremely helpful. I went through it and my first impression -- and I'd like Arjun also to weigh in -- is that it looks like that we're pretty close. That is, by and large, out of the many issues that are -- I didn't really get a count -- that the developing -- the -- between the fact that the -- the SEC petition is pending for the pre-19-- 1962 and earlier, that resolves a lot of the concerns that we raised earlier. Except I believe for skin dose and prostate cancer, the other cancers. I think we -- I think we -- we do need to discuss what the implications of that is for the time period covered by the SEC.

For the time period following 1962, my sense is

that two issues have struck me as -- as areas where we do need to have some discussion and perhaps some protracted discussion. That has to do with one of the issues Dr. Anspaugh had raised related to mainly reconstructing the doses from deposited radioactivity on the ground to workers, using the data that currently is available, with the special consideration of a resuspension of particulate material, perhaps the episodic venting of radionuclides from underground testing, and the -- so those two sort of struck me as areas that it looks like we're a little fuzzy on on how in fact they will be dealt with. We -- we do have some questions regarding that.

And the other area that Arjun actually reminded me of was that -- a result of the interviews with Mr. Brady and others having to do with some questions on data reliability. So I guess in a nutshell, that sort of captures my sensibilities regarding where we are on this site profile.

And Arjun, please, if you have anything you'd like to add...

DR. MAKHIJANI: No, there are -- those are --

those are the big ones, I think. There are a number of smaller issues, like beta dosimetry until 1966. But a large number of the areas where -- where NIOSH has said that they're going to revise the TBD or have a new procedure or look at the Naval Radiological Defense Lab literature and come up with a method -- essentially, for -- so far as we're concerned, the issue is resolved until we see the new procedure and if the Board wants us to review that new procedure. There -- there are a few -- few items outstanding.

MR. ROLFES: All right. Well, I'd like to thank Gene Rollins, as well. The credit goes to him and his team members. They put this together and I was merely the go-between, so I guess what we can do is go ahead and, if you would like to identify your comment and we can identify our response, and then we can open it up for discussion if necessary.

DR. MAKHIJANI: Would you like me to go down the list one by one 'cause I kind of made a little table as to where we're basically saying, for now, resolved until -- or resolved or some outstanding issue. Would you like me

to do that?

MR. PRESLEY: What I -- what I would love to do is when we have an issue today that is complete, that we mark that issue complete and we don't go back and revisit it unless somebody's got something that's dire wrong with it. I'd like to get as much done as we possibly can.

DR. MAURO: Procedurally, one of the things we've been talking about is -- as you know, we work off a six-step process and right now we are in step six in terms of issue resolution. One of the things we're not quite sure of is whether or not you folks would be asking for a seventh step, that being once the -- right now there are commitments made. Basically yes, we're going to revise the TBD to reflect X, Y and Z. At some point in the process the TBD or a TIB will be issued to address an issue. By the way, this is a recurring theme. This is happening with Bethlehem Steel and others. Whether or not once that is done and the new material is now on the web, in place and is functional, whether or not there -- you envision that there will be a step -- I guess

it's a judgment call once it happens -- a step involved -- okay, yes, that in fact does meet the intent of our concerns; or yes, it looks like the issue has in fact -- now can be closed out. So in other words, some of those -- where do we -- at what point do we close out an issue, when the commitment is made to address an issue and we all agree with the basic strategy and principle upon which that issue resolution is to be implemented, or until it is in fact implemented?

MS. MUNN: This is Wanda. I thought that was one of the issues that we were dealing with in the other working group, also, the -- the issue of when is done done. And I -- the concern that we had been expressing in that other group was that, to our -- to the best of our knowledge, NIOSH did not have a specific process or a specific person who tracked outstanding issues and when they were complete. Now whether that's been resolved since our last other working group meeting, I don't know. But does -- does anyone here --

DR. WADE: I can speak to that. I can speak to it generically and then specifically I think as

well, if we take Bethlehem Steel as an example. I think that there is a six-step process and then John defines a seventh step. I think in the Bethlehem Steel case NIOSH is reporting to the Board on a regular basis the closing out of issues. And I think then it falls to the Board to decide if it accepts NIOSH proposal or -- or NIOSH's statement, or if it wants SC&A to look into an issue again.

MS. MUNN: That was my understanding, was that step seven, as I understood John to define it just now, was a Board action, not an SCA action.

DR. WADE: But it could be -- it could be --

MS. MUNN: That was my understanding from the other working group.

DR. WADE: That's my understanding from --

MS. MUNN: Whether we accept that here as being our definition in this group is another thing.

DR. WADE: But it doesn't preclude the Board, though, saying to SC&A that this is a very complex --

MS. MUNN: No.

DR. WADE: -- issue, could you look into it and report back to us --

MS. MUNN: Yeah.
DR. WADE: -- so I think at the end of the six-step process the Board sits with the information and has to decide the final word. It could well, you know, extend the process by going to SC&A.
MS. MUNN: And -- and my understanding was that the Board wanted to see from NIOSH a prescriptive method for identifying this outstanding item, this outst-- that you said you'll do this; when do we know that it's done.
DR. WADE: Right, and I think NIOSH is intending to follow up with the matrix carried out to the extent that items fall away and then there's these precious few left, and then NIOSH will bring that to the Board and when it's all done the Board can decide whether it accepts it or wants some further issue looked at.
MS. MUNN: Yeah.
DR. WADE: Robert, is that your understanding?
MR. PRESLEY: That's my understanding.
DR. WADE: Thank you, Robert.
MR. PRESLEY: I like that. Do you want me to read the comments to start with, or --
MR. ROLFES: Either way, that'd be fine -- you

or -- or John or Gene.

MR. PRESLEY: Have you got -- you've got -- you've got it. Why don't -- why don't you read the comments.

DR. WADE: Could I just make one other comment, just to complete the record? The Board has -- really gives the latitude to the Chair of the working group as to -- you know, when to make that call or -- or the Chair of the working group can well work with me to assign SC&A further tasks, so each Chair of the working group will be able to exercise that prerogative, as well as the Board as a whole when it meets.

Okay. Sorry.

INCOMPLETE RADIONUCLIDE LISTS

DR. MAKHIJANI: These comments are from the matrix that SC&A prepared and which was a summary of our site profile review, and I think submitted to the Board and NIOSH in January of 2006. And the first comment is some radionuclide lists are not complete. This is especially important for atmospheric testing and for early re-entry workers.

And then NIOSH broke it down to four -- four

categories. Mr. Presley, should I just go through the four categories?

MR. PRESLEY: Yes, please.

DR. MAKHIJANI: In -- in the first category, which could more broadly relate to atmospheric testing and re-entry workers, NIOSH agreed that it's going to revise the table of radionuclides so that it would be more complete and republish it. So this is one of those items where NIOSH will take an action and the Board could decide whether it wants further review. For now, so far as we're concerned, NIOSH's response is fine. We think it needs to be revised and NIOSH agrees.

The second response of NIOSH is there's a problem table that needed adjustment, Table 2-8, and they're going to remove that from the TBD, which is fine with us 'cause it was somewhat duplicative anyway and did not show time dependence, where the other tables do show time dependence, which are more complete.

And then the third and fourth responses related to atmospheric testing workers, which have been rendered moot by the SEC recommendation of the Board and of NIOSH.

So I think the summary of the first comment is basically we agree with the way that NIOSH has decided to deal with it. There's one pending action item for NIOSH.

DR. WADE: Arjun, could I ask a question? It's really never my role to ask technical questions, but just sort of as the gatekeeper for the Board, I did mention that we have this issue of the 250 days or presence left for the Board to consider. Does 1c in any way impact upon that?

DR. MAKHIJANI: Yes, Dr. Wade, some of the radionuclide issues that are involved in this table involve very short-lived radionuclides, so the amount of dose highly dependent on time of tunnel re-entry, for example, or for atmospheric testing workers, when exactly they went in because there are some -- some radionuclides that have half-lives of hours or a few days, and it's -- it's in relation to those that there are some important questions.

DR. WADE: Okay. Thank you.

MS. MUNN: And that raises a question for me. Are our -- are the personnel records adequate for us to be able to determine who actually

went in when? Can -- can we do that?
DR. MAKHIJANI: Ms. Munn, I have -- I have not looked at personnel records --
MR. ROLFES: I can answer that. Yes, they are.
DR. MAKHIJANI: -- in that much detail. Perhaps --
MS. MUNN: They're -- they're --
MR. ROLFES: They keep logs of all re-entries.
MS. MUNN: I know that they did, but I wasn't sure whether we could identify by employee. We can.
MS. BRACKETT: I knew they had information.
MS. MUNN: Good, that helps so that we don't have to wonder whether this individual was or was not involved in re-entry. Yeah.
DR. ROESSLER: So back to the second comment, that table that's been removed is not -- not a useful table, it was --
DR. MAKHIJANI: Well --
DR. ROESSLER: -- duplicative and...
DR. MAKHIJANI: Yeah, well, I'd have to go back to the TBD, but I think that this table did not -- did not show any time dependence at all, so -- in my opinion -- from the kinds of issues that we're discussing in terms of dose

reconstruction, not a useful table. If there's a consolidated table that shows time dependence of all radionuclides that are involved, then that will be a good point for dose reconstruction and not be confusing and having too many tables of the same thing.

DR. ROESSLER: Okay. Thanks.

DR. MAKHIJANI: So I'm okay with that.

DR. ROESSLER: Okay.

MR. PRESLEY: I had one comment on 1b (sic) myself about -- where it says concentrations should be estimated by hour for the first day and by day after that. Where do we -- huh?

DR. MAURO: Yes, you're correct, that was further comments, not the main body.

DR. MAKHIJANI: Oh, that's 1c, you mean.

MR. PRESLEY: Right -- no, 1b.

DR. ROESSLER: 1c.

DR. MAKHIJANI: 1c.

DR. ROESSLER: It's right under --

MR. PRESLEY: I'm sorry.

DR. MAKHIJANI: Yeah.

MR. PRESLEY: Yeah, yeah, I'm sorry, it is 1c. Do you mean there that -- that the first day you would do dose reconstructions on something

by the hour and then by the day thereafter?

DR. MAKHIJANI: Well, if there were people who went in on the same day or in -- after one or two days you would have to do that because as you see from -- even from the table that's published up above, Table 1, neptunium half-life, 2.36 days; sodium-24, 15 hours -- so for very early re-entry workers you do have to know the time. I think it -- it will make a pretty big difference.

MR. PRESLEY: Okay. It's just that I don't know how you're going to say that -- you know, if they start at 6:00 o'clock in the morning, if they went in at 7:00 o'clock or whether they went in at 9:00 o'clock, I don't think the records out there are going to be anywhere near that good.

MR. HINNEFELD: Well, Bob, I'd just offer -- in a situation like that, we -- we had to do that.

MR. PRESLEY: Okay. All right.

MR. HINNEFELD: If we had -- if we had to do that, we would probably take a maximum level on that first day. You know, when -- when did they --

MR. PRESLEY: Okay.

MR. HINNEFELD: -- enter, what was the earliest entry, and then we would probably not decay it over the course of that day.

MR. PRESLEY: All right.

MR. HINNEFELD: I mean just as a practical matter of the dose reconstruction --

MR. PRESLEY: Okay.

MR. HINNEFELD: -- we'd take the highest level and that would be the first day, and then we would work -- worry day by day thereafter if we had to do that. But that's pretty tedious for a dose reconstruction. We would try -- we would try to come up with a bounding approach that would essentially bound the person's intake from his entry, rather than try to do an hour by hour evaluation.

MR. PRESLEY: That's great. Thank you.

DR. MAKHIJANI: And we would agree with that. When you're trying to do an accurate job, it would be impossible. But in the context of a compensation program I think you can come up with something.

MR. PRESLEY: All right. Does anybody have any other -- other comments about comment 1?

DR. MAKHIJANI: The only other thing I'd like

to note is in 1b where that table is being removed, there are some issues that'll be covered under environmental dose, so that's part of the reason it's okay to remove that, and then pick up whatever part of that discussion is under -- under the resuspension question.

MR. PRESLEY: 1b then we want to note that we do have some comments coming on that.

DR. MAURO: Could I bring in a -- I guess a different facet of this discussion in light of the SEC. In effect what I'm hearing is we're really talking about the -- the period that's currently covered by the SEC, that is the -- this would be aboveground testing. It would be during the time period of '51 to '62, and the concern, I presume -- please correct me if I'm incorrect -- it would be that there were some folks who were asked to go forward shortly after the test, maybe within a matter of hours to days.

Now as I understand it, what we're really saying here is -- I guess a couple of things. One -- well, first of all, by and large, for most cancers we're not going to be confronted

with that issue because most cancers will be compensated, but we will be confronted with it for cancer such as prostate and skin cancer. I guess my question is to what -- in fact, this struck me as -- as the conversation started. To what extent are we going to engage that question as part of the site profile? Because I believe a lot of the responses that came back here had this -- well, really we feel that this is -- yes, we understand the issue, but we don't really need to engage the issue because of the pending SEC. But then I see that the responses in the summary are silent on well, what about the cancers that are not covered under the SEC. To what extent do we want to engage that issue as part of this working group, or is this something that's more appropriate -- I mean I guess it is part of a dose reconstruction. It's not part of the SEC, so it does really fall within our area of responsibility, and I don't think we've really engaged that.

MR. HINNEFELD: Well, I can speak to the issue. In fact, I -- I spoke to the Board about this issue at the last meeting. Our approach has

been that a finding of infeasibility, like the infeasible -- the infeasible part of the dose at Nevada Test Site before '63 was internal dose.

DR. MAURO: Yes.

MR. HINNEFELD: It's not feasible to reconstruct. And since it's not feasible to reconstruct the internal dose, we don't think it's feasible to reconstruct it for any organ and so the prostate cancers or other non-specified cancers we say -- we just write what we call a partial dose reconstruction and say that we have reconstructed what we can reconstruct, and this is all we can do. And then that's what we send to the claimant, and if it's -- it doesn't reach 50 percent, it doesn't reach 50 percent and the person doesn't have the compensation remedy.

DR. MAURO: But then let's say we move on to the other cancers, we'll talk -- let's talk -- talk skin, which will be external, and internal, which will be prostate, two different examples, where the reconstruction of the external dose plays on both.

MR. HINNEFELD: Yes.

DR. MAURO: And -- and how we would deal with such issues as the early mix of radionuclides, the resuspension, the direct fallout -- I mean -- in other words, I think that the current version of the TBD -- and please correct me if I'm wrong, I did read it again, you know, in preparation for this meeting, but -- is silent on how we're going to recon-- can we or how are we going to reconstruct a dose to the skin and the prostate gland during the -- the SEC period.

MR. HINNEFELD: That's correct. It is silent on that.

DR. MAURO: That -- now it is silent on that.

MR. HINNEFELD: It is silent on that point.

DR. MAURO: Okay. And is that a matter that we need to embrace as part of this working group?

MS. MUNN: I'd really like to see us put that to bed once and for all, because it's going to come up in every single SEC petition that we have. And I -- I have mixed emotions on it when I think about it, personally, and I -- I don't think the Board has been clear as to how they view it. I'm not even sure that folks who aren't on a working group looking at one of

these SECs has recognized that this -- it bothers me to say we're not going to look at this now because it's not an SEC issue. Well, if it's still an issue, then when do we look at it and how do we address it?

DR. MAURO: Is this a site profile issue.

MS. MUNN: Yeah, is this a site profile issue.

MR. HINNEFELD: Well, to the extent that this issue relates to the external dose reconstruction, if this is necessary for external dose reconstruction, then we need a resolution of it.

MS. MUNN: Yeah.

MR. HINNEFELD: Okay. This kind of -- it's kind of couched, though -- I mean the -- the radionuclide inventory and depend -- if it depends on the monitoring regime and there are other external dose issues that we're going to later on, but the -- the radionuclide mixture is normally conceived of as an internal dose issue because you don't know what the person ingested or swallowed if you don't know their radionuclide inventory, whereas if the person was monitored --

DR. MAURO: Yes.

MR. HINNEFELD: -- and you know, if they were with a badge and putting aside all the shortcomings of badge monitoring, but they were monitored for external exposure, which everyone was after about 1957 --

DR. MAURO: Okay.

MR. HINNEFELD: -- then you have an exposure record for external exposure.

DR. MAURO: Okay.

MR. HINNEFELD: So the way it's couched, it's kind of -- it's brought up as an internal dose -- you know, it's -- it's dismissed as an in-- as an issue from an internal dose component standpoint. To the extent that it relates -- if it relates -- to the external dose to these people, then we would have to resolve it and -- and we would try to -- certainly try to arrive at a technique to do external dose reconstruction for those people because, you know, if you can't do internal and external's all you've got left, and you can't do that either, you've left another -- another population of people out of potential compensation.

DR. MAURO: And I guess that goes toward my

question. Right now do we -- do you feel that we have a site profile that provides the guidance to the dose reconstructor to deal with just that issue, the external dose early years, skin -- well, the external dose?

MR. HINNEFELD: Well, absent issues we're going to talk about today --

DR. MAURO: Yes.

MR. HINNEFELD: -- I certainly think we do from the monitoring period forward. Now if you get back before the time when everybody was monitored, I don't know specifically if I can say that. I'm not familiar enough with either NTS or the site profile, to be completely frank, so I don't really know today. But it certainly has to be part of what we resolve as we move forward, is do we have a technique for external dose reconstruction throughout the period, or if -- you know, and try to arrive at one. I mean realistically, we should really be working very hard to try to arrive at one in this pre-'63 period because we -- we do -- there's no advantage to anyone by saying well, it's not feasible to reconstruct external dose before '63. That's no advantage to anyone

except we do less work.

DR. WADE: I mean let's have a generic procedural discussion on Wanda's point because I think it's a terribly important point. NIOSH presents a site profile to be reviewed by the Board. The Board normally spends a great deal of time saying we disagree with that provision and we disagree with that provision, we disagree with that provision -- we spend all our time. It's also very legitimate for the Board to say, as part of its review, we don't think the site profile is complete enough to allow for external dose reconstructions for people with non-presumptive cancers. I think that's a perfectly reasonable comment for the Board to raise and -- and should raise such -- such questions. And then SC&A, as the Board's contractor, can also raise such questions, but it would be in the context of saying the site profile is not complete enough to do all that we think it needs to do. And I think those questions need to be raised.

DR. MAKHIJANI: In this -- in this specific instance, I really agree with Stu's construct -- just for this instance, not the generic

problem -- that there are monitoring data from I think April '57.

MR. HINNEFELD: I don't know, I don't...

DR. MAKHIJANI: And so for that, leaving aside the question of the adequacy of the film badge record, since there was universal monitoring, it should -- in principle -- be okay. And I think the main unresolved question will be then can you construct a coworker model up to the time of universal badging that's adequate, do you have enough there -- because there was external monitoring before that period. And so I think -- I think for the -- for the SEC-covered workers, that would be the main technical outstanding issue, just in regard to the completeness of the badge.

DR. WADE: And again, it's just not the accuracy of what's in the site profile, it's is the site profile sufficiently broad to do what's -- what it's intended to do. I think the Board can comment upon that as it likes. Working group as well.

DR. ROESSLER: I have one additional comment on what John brought up, and that's -- the wording in here that says (reading) because of the

pending SEC petition.
When I first read that, that was confusing to me because I didn't know -- did that mean the '51 to '62, which apparently still is pending, the Board approved it; or did it mean a potential petition beyond that time? I think we need to clarify that it does mean the '51 to '62.

MR. HINNEFELD: Yeah, it means the one through '62.

DR. ROESSLER: Yeah.

MR. HINNEFELD: That was the one that was pending --

DR. ROESSLER: On first reading it --

MR. HINNEFELD: -- when the work --

DR. MAURO: That's how we interpreted it.

DR. ROESSLER: -- it wasn't clear to me.

MR. PRESLEY: I don't know whether we're going to -- this is Bob Presley. I don't know whether we're going to be able to get this settled down for all SEC petitions or not, because I think each one of the larger sites especially are going to be different in what they did in the early years. I don't know whether we're going to be able to settle this

off as a -- as -- you know, writing a procedure for all the sites or not.

MR. CLAWSON: I think it'd almost be impossible, to tell you the truth, looking at each one of the sites. They have their -- their own unique set of problems in doing that. I think it's something we're going to have to address each time.

DR. WADE: NIOSH is supposed to address it in making their site profiles adequately broad. The Board can certainly ask questions and critique them.

MR. PRESLEY: Okay.

DR. MAKHIJANI: In this specific instance, I think the main site profile issue that would be outstanding would be a coworker model up to the time of universal badging.

MR. HINNEFELD: Right.

DR. MAKHIJANI: For external dose.

DR. MAURO: I would add on, also, the special circumstance of skin dose. Skin dose is a very difficult challenge, even with monitoring -- universal monitoring -- there's still going to be difficulty, even though you may have some monitoring, whether or not you could adequately

characterize the nature -- the extent of the skin dose during the testing period. That's a challenge and it's a very difficult challenge.

MR. PRESLEY: Okay. Anybody else have any comments about comment one?

(No responses)

Ready to go to comment two, Arjun?

EARLY REACTOR TEST RE-ENTRY PERSONNEL

DR. MAKHIJANI: Comment two related to the early re-entry workers for reactor test personnel, and reads (reading) TBD does not provide adequate guidance for dose estimation to gonads, skin, and gastrointestinal tract for early reactor test re-entry personnel. Large hot-particle doses to skin and GI tract have not been evaluated. Naval Radiological Defense Laboratory (NRDL) documents and models have not been evaluated, though one document is referenced.

And this is comment two, and NIOSH broke it down into six different comments. Overall, we agree with NIOSH's response. Basically NIOSH agreed to look at the NRDL archive and to look at large hot-particle doses and modify the TBD. This is -- this is not covered by the SEC.

This is a completely separate issue involving -- as I understand it; there may be some overlap personnel, but it's a completely separate issue and -- so basically we agree.

There are a couple of areas that I'd like to flag. There is -- NIOSH raises the question of the sparseness of fecal data, and this -- this could be an issue in -- in how the gastrointestinal tract dose estimations are going to be made because it's a very unusual type of problem in that you have a surficial high dose, but only to a very limited area. And so there's some kind of concern, reading NIOSH's response, as to how -- how these shallow doses that don't go very deep but -- but -- internal shallow doses to the GI tract, which are very localized, are going to be addressed. We had that concern, especially in regard to comment 2f -- response 2f, in that -- NIOSH agrees that additional investigation into the subject of large particle doses -- ingestion doses is warranted. But it's not -- it's not really clear to me how -- how this is going to be approached, based on the response.

MS. MUNN: What response number again, please?

DR. MAKHIJANI: Well, there's -- there's 2d, I think, and 2f especially.

MR. HINNEFELD: 2d as in dog?

DR. MAKHIJANI: Yeah, D as in dog. No, not 2 -- not 2d, 2c. I'm sorry. This is the -- in reference to the GI tract doses.

MR. PRESLEY: On page 5?

DR. MAKHIJANI: Yeah, page 5 -- the first one is on page 5 and the second one is on -- starts at the bottom of page 6.

MR. HINNEFELD: Is your concern that if there's -- if the data's not robust enough or too sparse, there may not be any meaningful guidance to develop?

DR. MAKHIJANI: Yeah, that's part of the concern, and then the other concern about how does this all relate to what you do in IREP. I mean does IREP -- is -- is the risk estimation model at all set up -- set up to handle this kind of input, very large localized doses?

MR. HINNEFELD: For GI tract we're talking --

DR. MAKHIJANI: Yes.

MR. HINNEFELD: -- not skin.

DR. MAKHIJANI: Yes.

MR. HINNEFELD: So the GI tract dose would be

due to the contents passing through and you have about --

DR. MAKHIJANI: Yes.

MR. HINNEFELD: -- two days' worth of exposure, essentially. So I believe IREP and IMBA, in combination, could do this. Liz, am I overlooking some --

MS. BRACKETT: Well, I don't know about IREP. I mean --

MR. HINNEFELD: IMBA could –

MS. BRACKETT: (Inaudible)

DR. MAKHIJANI: I -- I can't --

MR. HINNEFELD: Yeah, he can't hear. You need to speak louder, Liz.

MS. MUNN: He can't hear you at all.

MS. BRACKETT: Sorry.

MR. HINNEFELD: That's all right. We'll put the microphone over here.

MS. BRACKETT: It's pretty loud in my head.

MS. MUNN: Not loud out here.

MS. BRACKETT: I said I don't know what IREP does. I don't know what -- how that would --

MR. HINNEFELD: I don't know the issue with IREP, though. What would be the -- what would be the issue with IREP?

DR. MAKHIJANI: One -- one suggestion might be to ask the NIOSH consultant, Owen Hoffman, who -- and his team, that's very familiar with this, to -- because I -- I don't know whether there's an issue with IREP. It's just a question in my mind as to whether IREP can handle this kind of input.

MR. HINNEFELD: Well, there's a -- there's a GI tract model. I mean -- or -- or at least one that models the GI tract -- I mean the dose risk model -- in IREP, and theoretically we would be able to arrive at a dose to the GI tract if we had -- you know, the whole issue here is can you get the -- the intake or some other method for determining essentially what was the activity resonance time in the GI tract from -- and then the dose will fall out of that directly, and IMBA would take care of that. And so I -- I just don't -- I don't see the technical -- technical issue here.

DR. MAKHIJANI: Okay.

MR. HINNEFELD: I must be overlooking something 'cause I don't see the technical issue.

DR. MAURO: I -- I'm -- I guess I looked at it as a different -- had to do with the fact that

you're going to -- whether the particle's deposited on the skin, the beta emitter is on the skin, or it's swallowed, which can still be a fairly insoluble particle, it's not as -- it's not as if you're going to be develo-- delivering a uniform dose to the GI tract --

MR. HINNEFELD: Gotcha.

DR. MAURO: -- or to the skin. You're going to be delivering -- and I wasn't aware of this until I guess you prepared it, this idea of what -- the Krebs dose, which is this particle sits on the skin or in the GI tract and delivers this very high localized dose where it sort of sits, on the order of 1,500 rads, which is, you know, lethal to the cells. I don't know whether this creates something new.

MR. HINNEFELD: Okay. Okay, as far as the issue, then, of that -- that specific issue, we're aware of that and it'll be part of what we have to deal with -- in fact it's mentioned, you know, specifically in -- in the report. And there is a body of literature out there about, you know, hot particle dose and impact on the cells. You know, certain cells are -- are -- it's fatal to certain cells so those

don't become cancer and so it's -- it's perturbed in that fashion. There is a body of literature out there. But you're right in that that will have to be an issue that's -- that's addressed and if -- if not on this specific finding, it occurs elsewhere I know for sure.

DR. MAURO: But that would be outside of, right now, the way IMBA deals with -- it doesn't -- doesn't come to grips with that type of exposure setting.

MR. HINNEFELD: IMBA does not -- as far as I know, right now -- well, IMBA would probably give average dose over the organ.

MS. BRACKETT: Right, it wouldn't calculate to --

MR. HINNEFELD: It wouldn't -- it wouldn't calculate to a particular.

DR. MAURO: And -- and whether or not that's -- I know where it goes down -- the lung, for example -- the hot particle issue has been put to bed. This is the first time I guess I've seen it come up in the context of the GI tract or skin, and how do you -- how do you deal with whether or not that poses a different kind of risk.

MR. HINNEFELD: Well, certainly it'll come up in the skin does discussion and during that portion, you know, we tried to deal with it there. I guess by extension we'd have to worry about is there -- is the same effect -- occur in the GI tract as well. So it is an issue that will have to be addressed in -- in the -- the continuing work we're going to be doing.

DR. ROESSLER: Isn't that -- when you look at the dose and you assume it's distributed evenly over the tissue, isn't that risk higher than if you assume it's --

DR. MAURO: That's without -- with the lung, so it may turn out to be the same thing here.

DR. ROESSLER: So if -- that would be an overestimate, it would seem like.

DR. MAURO: Uh-huh.

MS. BRACKETT: But because -- and also in the GI tract it could be -- it could have a lot of shielding around it. It would be part of the contents, so it would be overestimating from that standpoint also.

DR. MAURO: Uh-huh.

DR. ROESSLER: From -- for the somatic effects.

MS. BRACKETT: Yeah.

DR. MAKHIJANI: Just from -- from -- from the way I read the NIOSH response, we're -- we're in basic -- I think we're in basic agreement that -- that some technical work here -- it's what -- my comment was simply flagging a little detail on a couple of items where, you know, it -- it looked to us that significant amount of work, or there may be a data deficiency in regard to fecal monitoring, and I just wanted to flag that. But basically we're in agreement with NIOSH's response.

MR. PRESLEY: So there's really no -- no problem with 2c then. Is that correct?

DR. MAKHIJANI: Well, there's no problem -- there's no problem in NIOSH's response. It's just -- I'm just flagging it in the sense that -- as distinct from item -- comment one where -- well, I think it's a very straightforward job. We basically agree. NIOSH has flagged the character of its response and it should be very straightforward to do it. I just wanted to call your attention to the fact that there are some sufficiency of data issues and some modeling issues, IREP issues -- I mean this is much more complex than -- to resolve than

comment one. But yeah, no, we have no issue with NIOSH's response as such.

MS. MUNN: So I want to be clear. With respect to our hot-particle theory, the process that's currently used for dose reconstruction is such that the hot-particle theory does not create an additional dose over and above what we currently do with IMBA. Right?

MR. HINNEFELD: Well, currently --

MS. MUNN: Didn't -- didn't we -- didn't --

DR. ROESSLER: Maybe "dose" isn't the right word. It's more like overall effect or risk.

MR. HINNEFELD: The overall risk, and that was evaluated with respect to somewhere, if not necessarily GI tract. You know, would it be different -- GI tract -- it require I think a little bit of a literature search on our part in terms of the information that was available from the -- the hot-particle controversy from 20 years ago.

MS. MUNN: Yeah, I just don't want this hot-particle theory business to be coming up again and again if we can identify this is the way we address it and it is claimant friendly, as a generic response, then that would put this to

bed. Not just for this issue, but again and again.

DR. ROESSLER: Not just for this site, but --

MS. MUNN: Exactly.

MR. PRESLEY: Yeah, all --

DR. ROESSLER: -- across the --

MR. PRESLEY: -- all the other sites, too --

DR. ROESSLER: That's a big --

MR. PRESLEY: -- 'cause you're going to have that.

DR. ROESSLER: That's a big point that would be addressed, I think, for everything.

MS. MUNN: This comes in the same category, in my mind, as the -- the heavy breathing issue.

MR. HINNEFELD: Uh-huh.

MS. MUNN: You know, if -- if we can't make a generic statement as to how we're going to deal with that and ac-- the Board accept that, then we have to keep reinventing this wheel every time we go to a new site --

MR. HINNEFELD: Right.

MS. MUNN: -- and it seems much more fruitful for us to come to a -- an agreement about how it will be addressed, and address it that way.

DR. MAURO: Could I couch it in a different

way? 'Cause I'm -- this has been one of these nagging problems for me. I visualize a worker, claimant, at the Nevada Test Site -- skin cancer, localized skin cancer develops. Okay? And an attempt has to be made to try to reconstruct his dose for compensation purposes because he falls outside of the presumptive range. Okay. Now we have that person.

Then we say okay, well, we have a two-step process. One is first, what is the dose that was delivered to his skin. Now when you speak in terms of trying to reconstruct the doses to a person's skin, you always -- you're always confronted with the easy problem and the tougher problem. The easy one is that the external dose from the radioactivity that's on the ground and the beta emission coming from it. There's a way to deal with that. That's an easy -- that's the easy one to fix.

The tough one is -- has to do with direct depositions from either fallout or resuspension of these particles that we're talking about landing on the skin and delivering one of these localized doses. What I'm troubled with -- if I was -- you know, if someone came to me, said

well, how -- how do I know that cancer that I got on the back of my hand wasn't because I was working in an area and one of these little small particle landed on my skin and delivered this high localized dose. I have to say I find that an intractable problem. I wouldn't know whether or not we could do that. I mean if someone were to ask me that, how would I come to grips with that.

I could certainly tell you whether or not -- what your dose would be, let's say to your skin throughout your whole body, or from the -- from the feet up, 'cause it gets lower as you go higher 'cause a person's standing up on top of this field. But from the direct deposition problem, I say I don't know whether I could help this guy. And so I guess I'd like -- put that on the table. This is a nasty problem be-- for the two reasons. One is -- one is, how do you predict what the dose is. And then second is, once you know the dose, it goes back to the lung issue. Given that yes, 1,500 rads were delivered in some kind of comp-- localized -- you know, there's a -- there's the -- the dead skin, then it gets lower as you get a

millimeter or so away. The -- I guess the radiobiology of that -- radiocarcinogenicity of that, I'm -- I'm not sure if there's literature on that or not. So we've got two parts of it and I don't think IREP come -- you know, engages that issue. I'm not sure.

MR. HINNEFELD: IREP does average dose over the organ.

DR. MAURO: Average dose over the -- now that turn -- may turn out to be sufficient, the way it was demonstrated to be sufficient in the cases of law, and that may be the answer to the second half of this problem. But the first half of the problem is a nasty one, you know, because it's almost a stochastic process --

MS. MUNN: Well, it is.

DR. MAURO: -- where the particle -- you know.

MS. MUNN: It is, and -- and the resuspension issue is always a question of what's resuspended and what's in it, and the other issue is how long does it stay on the skin. Now how long did this guy go before he washed his hands, for goodness sake, and that's a -- I'm -- I'm not sure that one could ever be that specific, but you can certainly make some

reasonable assertions in that regard. And I don't know how many cases -- I guess that's -- that's the other question, and how many cases are we talking about here where that might even be an issue? It would be a shame if we got into a situation where we were spending three weeks of somebody's time working on an issue that affected two claimants. That's not to in any way disparage the effect with respect to the two claimants, but in practical terms, you have to decide whether these issues that we're talking about are purely theoretical issues or are these real issues.

MR. HINNEFELD: Well, in terms of the number of claimants, it's probably worth it to do the effort for the number of claims. There -- I only know this because we just ran the report. There are roughly 135 non-presumptive cancers from Nevada Test Site and PPG in their class --

MS. MUNN: Uh-huh.

MR. HINNEFELD: -- in those cla-- designated classes, and so of those -- you know, the majority of those non-presumptives are going to be skin cancers, probably the majority. There'll be a lot of prostates in there, too.

Prostate and skin will account for the vast -- the vast -- overwhelming majority , so there are -- so it's probably enough cases that it's worth the effort to try to determine what -- what should be done in these cases and --

MS. MUNN: Certainly --

MR. HINNEFELD: -- what the right answer is.

MS. MUNN: Certainly on this site.

MR. HINNEFELD: And that's strictly -- and I'm just talking about the number of cases at Nevada Test Site.

MS. MUNN: Right. Right, that's just there.

MR. HINNEFELD: And this -- this issue's going to be addressed in several other sites as well.

MS. MUNN: Yeah, it would be.

MR. PRESLEY: Okay.

DR. ANIGSTEIN: This is Bob Anigstein. I'd like to make an observation on John Mauro's question. I -- I didn't quite hear the last response, so forgive me if I'm duplicating something that was said. It seems to me the issue is tractable -- I don't know if the data exists -- and that would be to find out what are the statistics on hot particles in a comparable situation and then they could plot a

probability distribution of any given location on the skin having a hot particle land on it and what are the probability that that particular cancer site did receive a hot particle. And then from there, true, the very, very near cells actually are spared becoming cancerous 'cause they're killed. But then there must be a halo around that area where the dose falls off, whether it's gamma or -- or beta, I think the -- the range that is not exact, they're straggling. So there would be a region where there would be intermediate doses that are not lethal but that would be carcinogenic.

DR. MAKHIJANI: The Naval Radiological Defense Lab actually has some statistical analysis of this hot particle problem, and since NIOSH has said they're going to look at that ar-- I mean there's a big archive there. I only looked in detail at one report and -- just for the purpose of the review, but I think since NIOSH is going to look at that archive, you'll -- you'll just come up with all of this stuff. They -- they do have some statistical analysis there.

MS. MUNN: And your mention of the -- of the Naval Radiological Defense Lab information brings another issue to mind. Twice in the SC&A comments there was a reference to that particular body of literature and the assertion that it should be further analyzed. And since I'm not familiar with the -- the documents, it raised the question, to me, analyzed for what? Certainly the accuracy of the data is not what you're being requested, is it? Is -- what -- what -- can you be more specific as to what you meant really when you said analyze that data?

DR. MAKHIJANI: Well, NRDL actually had measurements of hot particles, number of hot particles, deposition, so you can actually get --

MS. MUNN: Yeah, I understand that.

DR. MAKHIJANI: -- information about doses. They also --

MS. MUNN: I thought you had said --

DR. MAKHIJANI: -- have analyses about probabilities of -- of deposition and so on, so -- and they have these dose calculations. So I think -- I think that needs to be made part of the -- of the site profile so there's a method

to actually calculate these doses. And a lot of that work was done by the NRDL. Now you might not agree with how -- I didn't do an independent evaluation of whether they were right or wrong or whether the statistical analyses was correct, but it seems to me that there's a body of literature there that, if NIOSH on analysis feels is valid, could be just incorporated into the TBD largely as guidance for dose reconstruction.

MS. MUNN: That really is my question. Are you asking for NIOSH to evaluate the process in that body of literature, or are you just asking that they incorporate it? If I understand what you just said, you're asking that they incorporate it. Is it --

DR. MAKHIJANI: Well, I think -- I think some -- at least a modest amount of critical evaluation would be necessary before -- you know, this was done a long time ago and we're -- we're operating 50 years from the time these documents were written. And so some -- some evaluation as to compatibility with the existing guidance and the regulations and the models that are being used will be necessary.

On -- on reading it I didn't find any -- any flags went up for me that would say I don't think that this can be used or -- it seemed -- it seemed that the methods used were sound and can be incorporated. But at least a modest amount of evaluation should be done before incorporating it, I think.

MS. MUNN: Any problem with that --

MR. HINNEFELD: I think that's what --

MS. MUNN: -- Stu? I would expect --

MR. HINNEFELD: -- we'd do anyway with a body of knowledge like that.

MR. PRESLEY: Okay. You had a comment on response 2f?

DR. MAKHIJANI: No, it's not -- I think -- I think Stu addressed it.

MR. PRESLEY: All right. What about -- let's go back to the top on two. Anybody have anything with A on that? We didn't -- we didn't say anything about 2a. I want to make sure we don't leave anything out.

MS. MUNN: I think that's sort of covered in the discussion we just had with respect to that data.

MR. PRESLEY: Okay. And then b and c? B has

to do with the large particle ingestion and skin disposition (sic) and that's what we've been discussing. Got no problems? With c we did.

MR. CLAWSON: But -- help me out here for a minute. Maybe I got a little bit lost in this, but c we were saying that it was okay, but we had some questions on it, so how are we -- how are we going to track that?

MR. PRESLEY: NIOSH is going to go back and look --

MR. HINNEFELD: We -- we propose to provide a revision that will resolve this. Now that's what we're saying we will do. And so at that point it'll be a working group or Board question about is the resolution good, is it a valid resolution. You may engage your contractor to assist in that evaluation or whatever.

MR. CLAWSON: I just kind of got confused between -- dealing with...

DR. MAKHIJANI: Now I'd really like to say that NIOSH did a wonderful job in preparing a thorough set of responses. It was -- it was really easy to go through, very clear --

MR. HINNEFELD: You're saying something nice about our contractor who's sitting right here in the room. Now how am I supposed to go beef up -- which is our normal mode -- when you go and say nice things about him.

DR. MAKHIJANI: We should say nice things when warranted.

MR. PRESLEY: Let me tell you what, it's easier for somebody that's -- like me -- that built these things and not work with the scientific end of them, to understand and I -- this was easy to understand.

Anybody have anything with d? -- e? -- d deals with beta-gamma dose to the gonads, e is continuing development of efficient methods to facilitate dose reconstruction.

(No responses)

Okay, f we talked about, everybody agrees on that.

DR. ROESSLER: How can we get the NRDL report? Is that on the web somewhere?

DR. MAKHIJANI: Well, the report I reference is on the site database of NIOSH. I didn't make any attempt to get the rest of the archive.

MR. HINNEFELD: Right, site research database,

I believe you probably can access our site research database. There's --

MR. ROLLINS: Or you can ask me and I'll e-mail it to you.

DR. ROESSLER: I ask you. I'll give you my address later. Okay?

MR. HINNEFELD: We can -- I can get your address.

MR. ROLLINS: That's the easiest way, Gen. I'll just send it to you.

MR. PRESLEY: Okay, anybody else have any more -- anything on --

MR. HINNEFELD: Anybody else want it? Any other Board members want it?

MS. MUNN: How long is it?

MR. ROLLINS: I'm trying to remember -- it's not that long, and it's got some test cases in the back that work you through the calculations. It'd take you about a day to read it -- and to absorb it. Maybe -- you, maybe half a day.

MS. MUNN: Yeah, send it to me.

MR. PRESLEY: Okay, anybody else have anything else on two?

(No responses)

Let's move on to three, comment three -- Arjun?

ATMOSPHERIC TEST PERIOD

DR. MAKHIJANI: This relates to the same issue as abo-- but for atmospheric -- for testing workers. (Reading) Doses from large non-respirable particles to GI tract and skin for workers in the early atmospheric test period have not been evaluated. Those doses could be high. Hot-particle doses also need to be evaluated for early drillback and other re-entry workers during underground testing periods.

And basically the response is split up because of different types of worker. One is that for -- for the atmospheric testing workers, I think the -- part of the issue, at least so -- is resolved because it's covered by the SEC. So far as the external dose is concerned it would seem to be approximately the same as for -- as for the reactor -- reactor test workers, except for reactor test workers there's actually a body of data there that you don't have, so far as I know, a comparable body of data for the external dose for atmospheric testing workers. Am I right about that?

MR. HINNEFELD: Gene, for the reactor?
DR. MAKHIJANI: No, you don't -- for the reactor -- for the reactor areas you actually have some empirical data and some measurements that were made by NRDL.
MR. HINNEFELD: Right.
DR. MAKHIJANI: But you don't have comparable hot-particle data for --
MR. ROLLINS: No, not -- not to my knowledge.
DR. MAKHIJANI: To my -- yeah.
MR. ROLLINS: There's a -- there's a lot of data out there and I'm not saying it doesn't exist, but I haven't seen it yet -- nothing to the degree that they did for the reactor test.
DR. MAKHIJANI: Okay, so -- the -- this is kind of a complication of the external dose calculation, but basically we agree with the NIOSH response that it's largely covered by the SEC issue, and to the extent that you can extend your external dose calculation to cover it, it would be good.
NIOSH also agreed that in regard to accidental venting they're going to evaluate the hot-particle question. And accidental venting did occur up to 1970 December, significant ones,

which the last one was the Baneberry test. And the last one is in regard to tunnel re-entry workers, and NIOSH is going to look at that issue. And so far as we're concerned -- let me look at my comment here -- this -- yeah, basically the main issue for the non-SEC workers will be the ventings and the early drillback re-entry, and NIOSH has agreed to revise the TBD. So until then, we're kind of in agreement with the NIOSH comment.

MR. PRESLEY: Talking about early drillback, to my knowledge drillback didn't start till we started the underground testing.

DR. MAKHIJANI: Right.

MR. PRESLEY: Okay.

DR. MAKHIJANI: And I -- I do not know the extent to which this might affect those workers. I think that would presumably be the first step in evaluating whether this is an issue that materially affects that set of workers or not.

MR. PRESLEY: I've seen the drillback operations. I have a DVD with me that shows one of the drillback operations and how it was done. They were very, very careful when they

did bring the samples to the surface in the way that they handled them and monitored, and I would presume it was done in the early days just like it was in the later years 'cause they did have the equipment when they started doing that. Yeah, that stuff when it came out was hot, handling it long distance and immediately put into (inaudible) and things of this nature and a monitor. I'd say you all ought to have all -- there ought to be all kinds of monitoring data.

MR. HINNEFELD: Chances are there's quite a bit of record about that. There is a --

MR. PRESLEY: If you can find it. That's the only problem. I know there was people there doing the monitoring every time I was there.

DR. MAKHIJANI: And they had -- at least at a certain period they had protective equipment and --

MR. PRESLEY: Oh, yeah.

DR. MAKHIJANI: -- air -- air line, so -- so it's just a --

MR. ROLLINS: But during the early drillbacks they didn't have blowback preventers.

MR. PRESLEY: No -- no, they didn't. Now that

they didn't. They didn't start the blowback preventers until --

MR. ROLLINS: '66 I think.

MR. PRESLEY: Yeah, somewhere along in there, and they just stuck the drill in the ground on an angle and said (indicating), and I'd say that there was some venting -- had to be.

MR. CLAWSON: Well, you'd have to think that because that's probably why they put the blowback --

MR. PRESLEY: Blowback preventers on, that's exactly right.

MR. ROLLINS: They had a couple of eruptions. I don't know what this stuff is coming up, but I don't want to be around it.

MR. PRESLEY: Yeah, something starts coming out the hole, y'all run.

Okay. Mark, do y'all have any comments?

MR. ROLFES: I don't believe so.

MR. PRESLEY: Okay. Anybody else have any comments on three?

(No responses)

Lew, you have anything?

DR. WADE: No.

MR. PRESLEY: Arjun, you want to go to comment

four?

ORONASAL BREATHING

DR. MAKHIJANI: (Reading) Ingestion of non-respirable hot particles by reactor testing and nuclear weapons testing workers due to oro-nasal breathing needs to be evaluated.

And it's a little bit different than the oro-nasal breathing issue that we raised before in that it's sort of direct ingestion of large particles, not ingestion via the respiratory route. And NIOSH has agreed to evaluate that and warrants further consideration. So we would just await that response.

MR. PRESLEY: So that -- that will be forthcoming down the road.

MR. HINNEFELD: Right.

DR. MAKHIJANI: I have a question. Are you going to cover this -- sort of meld this together with a module oro-nasal response? It seems to be somewhat of a distinct -- particular issue. Are you going to do a special thing on this?

MR. HINNEFELD: The difference here being hot particles present in the non-respirable portion of the airborne.

DR. MAKHIJANI: Right.
MR. HINNEFELD: So that essentially an average concentration measurement then would not adequately represent if there were hot particles present.
DR. MAKHIJANI: No.
MR. HINNEFELD: Well, I would suggest it could be -- we'd have to have it consistent with whatever the oro-nasal solution is, but you're right, it would be a bit of a special case when there's a potential for hot particles, which would then not be -- you know, they would not be adequately represented by the average airborne concentration. That's the problem.
MS. MUNN: It would not, no.
MR. HINNEFELD: So that -- that would have to be something of a special case and so there would probably have to be an addendum of some sort to the oro-nasal solution.
MR. ROLLINS: That would work back to the probability -- sort of NRDL sort of thing.
MR. HINNEFELD: Right, probably in that sense.
MS. BRACKETT: How does this differ from number two? I mean this is --
MR. PRESLEY: That's what I'm wondering.

MS. BRACKETT: -- get into the GI tract?
DR. MAKHIJANI: Well, it's how the -- how many -- it's simply how many particles -- the route of getting into the GI tract. Number two is sort of the broader issue for reactor workers only in regard to evaluation of the doses, and this just raises -- two, three and four are really elaboration of the same issue, just -- they could have been 2a, b and c, it just was written up that way.
MR. PRESLEY: I was going to say, this -- that report ought to be -- I think it probably ought to roll comment two all the way through four as --
DR. MAKHIJANI: Yes.
MR. PRESLEY: -- one comment.
DR. MAKHIJANI: Right.
MR. PRESLEY: Okay.
DR. MAURO: Regarding the oro-nasal breathing, I -- it's been a while when it came up and we discussed it at Bethlehem Steel, and -- and I -- as I recall, I felt as if it was -- we're still a little bit in a fuzzy area about the -- the degree of agreement on that issue. As I understood it, ICRP has a standard model where

-- regarding how people breathe. The idea, though, that was brought up -- and I -- and I think it's a legitimate question -- is apparently there's a significant faction of the general public that breathes entirely through their mouth. Okay? And -- and please correct me again if I'm wrong, but I thought the issue had to do with when you're doing dose calculations for people that are inhaling radioactivity, do we simply adopt the default ICRP methodology on -- on the kinetics and behavior of particles and the breathing patterns of typical people, or do we take into consideration -- and the number I recall is something like 20 percent of the population actually breathe entirely through their mouth all the time, not just when they move into heavy lifting. And ag-- so -- and as I recall, there was still a -- almost a policy question that was at play here.

Since the rules say use ICRP, in effect when we raised the issue -- hold the presses. There are a lot of people that breathe only through their mouth and that's going to change things, and I think it had a factor of two to five-fold

effect. I think that's the number -- depending on the particle size.

MS. MUNN: It was larger, though.

DR. MAURO: Yeah, it was -- it was relatively sm-- now --

MS. MUNN: Significantly.

DR. MAURO: -- are we back to that -- I mean are we still engaged in that and has that become subsumed and are we going to try to -- in other words, okay, we have that. Now we're going to fold into that the fact that now we're dealing with these large particles that will be coming in, and instead of coming in through the nose and behaving the way they behave, they'll be coming in through the mouth and behave the way they're going to behave, which changes the kinetics, I presume, and where they're going to be deposited and what the potential risks are. So I -- I guess I -- I'm putting something out -- rather than sort of like avoid it, not go back there again, I'd like to get everyone's sense about where we are and do we still have before us this matter -- are we going to deviate from the standard ICRP methodology for the way people breathe and explicitly take into

consideration the fact that some percentage of the American people breathe entirely through their mouth, or is that off the table?

MS. MUNN: That's exactly the issue that I was trying to raise earlier when I mentioned it. I -- I have the same questions, and I would like to see us put it to bed, as a policy matter, once and for all. Unless one of the working groups, in accordance -- in agreement with NIOSH and with SC&A can bring such a recommendation to the Board, we're going to have to deal with this every time we come into a situation where airborne or resuspension is a significant factor in dose calculations.

DR. MAURO: And this may be especially relevant here because we are dealing with a situation -- we're not just dealing with five micron AMADs and how they behave. Now we're dealing with the possibility that we have lar-- relatively large particles and -- and so it sort of gets confounded. And so until we put the first issue to bed, we really don't have anything to stand on. You see what I'm saying?

MS. MUNN: I agree. And in NTS, and I'm sure the same is true in Pacific Proving Grounds,

other cases of that sort particularly, you have this double whammy that if -- if we keep beating this issue to death without identifying exactly how we're going to approach it, then I don't see how NIOSH can approach it in the absence of a real decision on the part of the Board because it is an unusual circumstance and we -- we probably all have different view of it. My personal view is to accept the ICRP data as being the standard from which we operate, but when we have special situations like this, an addendum of some sort is necessary to say in these cases we will do something slightly different. But in terms of trying to identify how many people are mouth breathers and how many aren't, I don't know how we can possibly do that with -- with this population that we have.

MR. PRESLEY: This is Bob Presley. I thought we put that to bed at the last meeting and -- and we said we would go with ICRP except on special occasions then that -- that NIOSH would go in and -- and take a look on a -- you know, a case by case basis. I thought that's what we decided to do.

MS. MUNN: On a site by site basis rather -- yeah.

MR. HINNEFELD: I don't -- I don't recall. I don't recall the Board action. I don't -- I don't -- I am not really up to date on the discussions on oro-nasal breathing so I don't recall today.

DR. MAURO: I'm sort of inclined to re-- I think this was actually during a full Board meeting --

MR. PRESLEY: Yeah, yeah.

DR. MAURO: -- and -- and I think that that -- but it for some reason is still a little fuzzy and whether or not that's -- okay, that's how it -- policy decision, this is ICRP, we're going that route. Arjun, I know that you're very interested in this, do you have recollection on where we are?

DR. MAKHIJANI: I have my notes from the Bethlehem Steel -- the discussion where this came up, and I could -- I have to find them. I believe I have -- I have them in my file somewhere here. As I recall, the resolution of the Bethlehem Steel oro-nasal breathing was that basically it wasn't going to be resolved

in the context of Bethlehem Steel, but NIOSH was going to prepare a generic assessment. And what I heard Stu say in -- in the present context of Nevada Test Site that you'd put some kind of addendum for the larger non-respirable particles 'cause this issue only came up in the context of respirable particles before and as it affected lung dose. And what we're talking about here are non-respirable particles as it might affect GI tract dose, so it's a little bit of a different question that needs special attention, but -- but I think can be covered in -- in the con-- general context of the same issue of oro-nasal breathing.

DR. MAURO: It seems to me you have to resolve the oro-na-- I mean if the decision has been made as a poli-- because the science is there. There's no dou-- I don't think there's any disagreement around the table that yes, if you assume a person breathes solely through their mouth, and we all agree that there is some fraction -- I don't know if we'll agree on what that fraction is -- that this is what happens. We all ran the numbers. We know what the doses -- the differences are. They're not large, but

they're a factor of two. So it's not that we have a scientific disagreement here. We really have a disagreement on policy. Do we -- do we say well -- do we say now there's enough people out there in terms of percentage of population that breathe through their mouth solely that maybe we should deviate from the standard method and take -- give the benefit of the doubt and assign that to everyone, or no, ICRP is pretty clear. You follow ICRP. If we follow ICRP, it's the standard breathing and I think that we've got to put that to bed. Once that's put to bed, then we can go ahead and move on to this one. We can't move on to this until we put that to bed.

DR. MAKHIJANI: Here's what the Board and --

DR. ANIGSTEIN: This is Bob Anigstein. I'd like to make one -- a couple of comments on this. One is -- excuse me if I'm preaching to the choir, but ICRP models, the ICRP dose coefficients, are specifically designed, to my understanding, for regulatory purposes, to allow government -- governmental and other agencies to set dose limits, to set exposure limits to protect the general population. And

the usual criterion is it's the dose to -- the average dose to the critical group. And the critical group would, for instance, include mouth breathers and normal nasal breathers on say eight -- eight to ten -- eight to two ratio. So the average dose would not be strongly affected. But if we're dealing with individuals, then the model may not necessarily apply to all individuals and it would seem not unreasonable to make an exception. It's not questioning ICRP. They -- they did it for a different purpose.

DR. MAURO: Bob, I'd like to add to that. I think when I-- when you look at ICRP, there are lots of compromises. They built a reference man. They have default kinetics for various transfer factors -- and I look to Liz because she probably knows more about this than anyone that I know of -- and there's uncertainty in all these parameters. And there's individual variability in all the parameters that go into the default respiratory tract model that's basically part of the I guess ICRP-68, 66. So the question becomes is this just one more parameter, perhaps a dozen parameters that --

that define a reference man and woman, and are we sort of trying to tweak one particular parameter while ignoring all the others? You see -- because -- or is this one that's special?

MS. BRACKETT: I was going to make that exact point, that nobody -- or very few people are a reference man and that's what we're using to assign all these doses, so that the question then becomes where do we draw the line --

DR. MAURO: Where do we stop.

MS. BRACKETT: -- right, where do you stop.

DR. WADE: One very procedural issue. I've been given a note by some people who are listening on the line and -- and the request is that everyone who can, please mute your -- your phone so that your breathing and the background noise isn't heard by all. Apparently some people are having difficulty listening to us, so anyone who can, please mute, and then unmute when you have a comment to make.

And then to the issue of what the Board has decided on oro-nasal breathing, that's something we can research over the lunch hour. I don't have the ability to do that right now -

- or Arjun, do you have it?

DR. MAKHIJANI: I do have my notes from the Bethlehem Steel resolution, and -- according to my notes, anyway -- it says SC&A and NIOSH agree that the effect of oro-nasal breathing would be small for Bethlehem Steel. So we decided to drop the issue in the context of Bethlehem Steel. And NIOSH will develop guidance with regard to this issue. That's how I think it was left by the Board.

DR. WADE: And Stu, are you -- are you aware of the status of NIOSH's development of --

MR. HINNEFELD: I am not. I am not in -- have not been involved in that issue and so I don't know the status of it.

DR. WADE: Maybe we can find that out over lunch and report back to the group.

MR. HINNEFELD: I could give that a shot.

MS. BRACKETT: Dave Allen told me that Jim Neton had assigned someone to work on it, but didn't know any of the details.

DR. WADE: We'll give you a status report after lunch on where that is, and then both Robert and I have captured this as an issue we need to bring to the Board, along with the hot particle

issue, to try and get resolved.

MR. PRESLEY: Okay. We've been going at it about an hour and a half. Does anybody need a break? It's now almost 11:30. Or do you want to continue and let's break at 12:00 or -- you could use a short break? Okay. I've got no problems with it. Ray said he needs a break. Why don't we break for ten minutes and come back at 25 till.

(Whereupon, a recess was taken from 11:25 a.m. to 11:35 a.m.)

DR. WADE: Okay, the working group's going to get back to business. Would the one person on the line identify that you can hear us?

UNIDENTIFIED: I can hear you guys.

DR. WADE: Okay, good. Thank you.

DR. ANIGSTEIN: Okay. Bob Anigstein. I'm okay.

DR. WADE: Anybody have any suggestions to make as to our etiquette in terms of conducting the conference call?

(No responses)

Again, I would ask that you mute if at all possible.

Okay, Robert.

MR. PRESLEY: Okay, we are through five; is that correct?

DR. MAKHIJANI: We're at five.

DR. MAURO: We're at five.

RESUSPENSION MODEL/FACTOR

MR. PRESLEY: We're at five, all right. Arjun, you want to go ahead and kick off with the comments on five?

DR. MAKHIJANI: Comment five reads (reading) Resuspension model and resuspension factor are not scientifically defensible or claimant favorable due to a variety of factors. Doses may be underestimated by an order of magnitude or more. Mass-loading approach would be preferable for internal dose.

And this is one of the areas -- so that's the end of the comment. But this is one of the areas where we do have a disagreement with NIOSH in terms of the NIOSH response. NIOSH did not agree that their dose estimates could be that much off. NIOSH again referred to the -- the paper by Anspaugh in *Health Physics* of 2002. We did look at this paper in the process of preparing the review and felt that it hadn't been appropriate -- the research in the paper

hadn't been appropriately used in the site profile in terms of guidance for dose estimation. So I'm going to -- I'm going to just stop my comment there because John was really the point person for us in terms of this issue so I'm going to just leave the rest to him.

DR. MAURO: Yes, the comment goes on quite a ways, and you captured basically it all. And you folks disagree, and we respectfully accept your disagreement. And I've been looking into this a bit. your -- in effect, what the -- what we're dealing with here is after 1962 you've got people working at the site and there is radioactivity on the ground. And there are some 26 or so different areas throughout -- gigantic areas, big areas. You know, 50 square miles here, 200 square miles there. And correct me as I try to step back and -- the big picture. I'm saying okay -- and -- and there's this radioactivity that has built up on the ground from the above-ground testing that took place from '51 to '62. Now you've got this inventory -- okay? -- in each of these major regions.

Okay, then -- now you move into the post-'62 time period. And now we have people on site doing all the different things that they were doing, including underground testing and -- and I'm visualizing that -- people go on site and, depending on the -- where they are, the amount of radioactivity that's in the soil could differ from one place to another. And the data are here, lots and lots of good data characterizing the activity in each of the different -- different regions. But remember, these regions are big. You know, 50 square miles or more.

And people go there and the -- now the approach taken was okay, we know it's on the ground. Aerial surveys, I guess they were at -- lots of different kinds of surveys performed to characterize the radionuclide distribution in these areas and in -- and in the entire site. There's also data collected I believe after 1971 on air sampling, I believe there may have been lots of air samples. Each region may have had its own sampler, and please correct me as I try to capture the big picture. So you almost could see as -- you got this gigan-- this -- an

area the size of a state, broken up into perhaps 26 or so different sub-areas. Each sub-area has been well-characterized in terms of -- by aerial sur-- flight surveys, also by I believe in situ jelly detection systems, and there's also an air sam-- I don't think it's a -- I think it's a low volume air sample, continually running all the time -- all the time -- collecting a sample of air. Okay? Now, there's your data. Okay? For -- okay, here's our start -- here's the rock we're going to stand on, and now we superimpose people, people are showing up now in these areas, and they're going to do whatever they do. And as I understand it, the way in which the dose is reconstructed to a given individual is to say okay, where was this person, as best we can tell, and on that basis -- and here's where I'm not quite sure exactly what was done. On that basis we're going to say okay, for this time period, this person -- and remember, this is after the SEC period so we are doing dose reconstructions now -- this person was located for this -- in this year at this location. And this location, remember, is this very lar-- by

-- when I say location, it's -- you know, 50 square miles. And they take their best estimate of what they believe is the airborne radioactivity -- average airborne radioactivity in that sector over that year and assign it as being the airborne concentration to which this worker was exposed. Then they assume some standard breathing rate -- 1.2 cubic meters per hour -- and they assume the appropriate chemical form, I believe, to give the maximum dose to the organ.

Now, the place I ran into a little bit of difficulty and -- in our commentaries has to do with averaging over this whole area, this big area, averaging -- just sort of sm-- as it was uniform area. And I'm not quite sure whether they depended primarily -- it -- it seems to me they had two sources of information for this guy. One is the air sampling that was collected, which was -- started I believe in the '70s. Of course now we want to reconstruct the dose to the guy from '62 to '70. Other words, there's this ten-year period where -- people were there, too -- where -- where I don't think you have the air sampling data.

And again, correct me as I go through my story -- so you really have really good air sampling data for these large areas, starting in early '70s. You don't really have it in the earlier years. So you have air sampling data.

But then they do something else. They say well, we also know what the activity is on the ground from the aerial surveys and we could use -- another approach is don't let's use the air sample. We could theoretically als-- also use the resuspension factor approach. Now the resuspension factor approach is where Lynn Anspaugh comes in and the work he's done. And he basically has an -- a ver-- an -- his work, his research over the years demonstrated that for fresh fallout, which doesn't really apply here, you start at a resuspension factor of ten to the minus five. For those folks who don't play in the world of resuspension factor, this means that if you know how many picocuries per square meter you have, you multiply by the resuspension factor and you get picocuries per cubic meter. So it's picocuries per cubic meter per picocurie per square meter. It's an empirical relationship so that it's expressed

in per meter. All right? So you multiply the activity on the ground by a resuspension factor and you get the activity in the air. All right. So -- and in principle, that -- that's great.

Now it turns out, though, that the resuspension factor equation changes as function of time. It starts at a very high level, on the order of around ten to the minus five for fresh fallout, because when it's fresh fallout it's very available for resuspension. As time goes on, the evidence is that it gets more and more worked in, then you go -- and this very nice curve going from one -- one times ten to the minus five -- this is a curve with -- the resuspension factor is a function of time. Okay? You -- all -- you can't see it, but you could -- you could basically visualize -- it starts at times zero, at ten to the minus five, then it drops like a rock over the course of days. Within a matter of ten, 20, 30 days, it drops down to ten to the minus eight, and then it goes down to ten to the minus nine, so the spread on the resuspension factor, based on this work done by Lynn Anspaugh, goes -- goes

from ten to the minus five to ten to the minus nine per meter. Okay? So we're talking four orders of magnitude.

Now -- I'm sorry for going on, but I want to paint a picture. So -- but now there's also the concern that -- there's a perturbation on these -- on this very nice, clean line, and that is if a truck goes by, if it's windy that particular day, if there was venting from a -- a test, what's going to be airborne. So in other words, I -- I think this represents sort of like a baseline of what your best estimate might be of the resuspension factor averaged over large areas.

But I'm more concerned about the fine structure. I think this is where my issue comes from is that well, if you go to any one worker who may have worked in a given location in a given year, averaging over this 50 square miles may not represent where he really was and his experience. Also, the -- in terms of the activity on the ground. And then on top of that, using the resuspension factor -- which I -- which is sort of like your baseline resuspension factor, but if there was a

perturbation or lots of perturbations, the concentrations of dust in the air could easily be two to three orders of magnitude greater than the sort of baseline. If in fact you had a wind, a truck going by, there was some excavation activity going on, if there was certain venting going on, this would have no applicability at all. So my -- my problem is -- it's almost as if -- where my criticism comes in is your -- your -- the view of the inhalation dose to workers from -- from resuspension is a macro view, as if things were averaged over very large areas. But in reality, when you get down to an individual worker, what he really experienced is a local view of what was going on during the time period he was working at a very specific location or locations, certainly not averaged over 50 square miles. And where there were transients from day to day, depending on the anthropomorphic activities that were going on, where that resuspension factor may not work. So what -- what troubled me is -- is -- now I -- I -- I just in a -- in a couple of minutes tried to capture the sense that's commu-- that

I understood from reading the -- the report. And I've tried to communicate to you in a general sense why I think that there is -- you may not really be giving the benefit of the doubt to this particular guy. Maybe in the aggregate, if you were looking at 1,000 workers that worked in the -- at the site in a given year, it would sort -- maybe it will average out around there. But I'm concerned that -- what about the guys who might be at the high end. And if -- and if there's a way to make a distinction between those, maybe we've got a tractable situation. But right now -- I mean that's the -- it's a very common sense kind of argument and concern that I just presented. And I guess -- and in fact what we -- what Bob Anigstein and I did over the weekend -- Bob is on the line -- is Bob helped out by writing this up as -- and -- and -- what our concerns are, so I was hesitant in distributing it, but why not. So we've got a very crude write-up that Bob Anigstein prepared last night -- until about midnight perhaps -- and e-mailed it to me at 4:00 o'clock this morning. I brought it with me. I read it on the plane and I like it.

I said this is good. This tells a story that I -- the story I just told is -- is here. And in fact, Bob, if you -- if there's anything you'd like to add that you think would add value to the very general picture I painted, please do so. But in the meantime I'm going to go ahead and distribute this write-up for -- for -- you know, so you guys can go ahead and take a look at it.

DR. ANIGSTEIN: Yeah. No, I -- I think -- I completely agree with what you said, John. But to expand on it a little further, not only is the issue about assigning a site-wide -- a area-wide intake to each individual in that area -- as you say, the areas go from anything to a fraction of a square mile to, according to the TBD, 148 square miles, area 19. And I think that this is in stark contrast to the work and the conclusions for Bethlehem Steel where there were many air samples for each location and there was a lot of discussion and final resolution of which of those air samples or which group of air samples for a specific work location would be the limiting ones, would be the applicable ones. And here -- so there

you go from say one rolling mill -- one -- one roller, excuse me, one -- one roller was in that mill, having a different dust concentration than another roller. And here we're talking about, as you say, tens and -- tens of square miles being assigned a single value. So that does not seem to be in the same spirit.

Furthermore, when the -- according to the TBD, if the area -- if the worker was not assigned to a specific area or it could not be determined which area he worked in, he's given this site-wide average, meaning this whole Nevada Test Site is going to be represented by a single value for intake. And that certainly seems not claimant favorable.

DR. MAURO: I'd like to add one more --

MR. ROLLINS: Excuse me, that was not -- part of our response was that we were going to change the instructions in the TBD about which value to add under which -- under which circumstances, and I believe we agreed that that was not claimant favorable to do it that way and in our response we had a proposal to do it a different way. And I'd like to know if

you have a problem with what we are proposing -- - the change that we are proposing to make.

DR. MAURO: I should take another look at that.

MR. ROLLINS: Okay.

DR. MAKHIJANI: If you could -- could you point me to a page? Sorry, I -- I didn't pay detailed attention --

MR. ROLLINS: Well, it's been a while since I wrote this so give me just a second.

MS. MUNN: I think it's page 11.

MR. ROLLINS: It should be very close to the end -- yeah, on page 11.

MS. MUNN: Page 11, I believe.

DR. WADE: Maybe you could just walk us through that approach.

MR. ROLLINS: I think -- I can -- could I have my -- my copy back there that I -- yeah, at -- at the very end of this discussion in the TBD, after the resuspension factor, there's a table down here that provides average and maximum intakes based on this resuspension factor and average and maximum concentrations in the soil across the site. And in my response I go through in some detail talking about how the -- the air sampling data supports this and is --

it's not too far off, it might be a slightly overestimate or slight underestimate, but I think if you read through my discussion, it basically makes -- it makes a case that says the average intakes given in Table 4.2.2-3 are reasonable underestimates. And I think -- number one, they don't ever give an organ dose more than one millirem every year for any organ, so that's got to be an underestimate because we would throw them all out anyway, we wouldn't use them. Okay? So it's not -- it's not claimant favorable to use those and we -- I say that in my response, that we're not going to do that anymore.

In fact, what I'm proposing in my response is that we will use the maximum intakes given in that table for -- and if the -- if the case goes compensable on that, then we will do a more detailed evaluation to determine if it's appropriate to give that level or some lower level, but only if it makes a difference in compensability, because for most cancers it would not.

DR. MAURO: So -- so there's --

MR. ROLLINS: There are a few that it would.

DR. MAURO: -- there's a -- there's a table. I know one of your tables has the ma-- the max numbers, yes.

MR. ROLLINS: That's it right there.

DR. MAURO: Yeah and -- now when I looked -- in fact I did some calculations. When I looked at the table, what -- in effect -- to convince myself the maximum numbers represented reasonable maximum numbers, you look -- you look at the activity that's on the ground, pick -- if you pick the americium that was in location number 20, which was the -- I think one of the worst locations, area 20 --

MR. ROLLINS: Area 30.

DR. MAURO: Area 30 it was? Looking at --

MR. ROLLINS: Which is a very small area --

DR. MAURO: Oh, yeah, okay, yeah, 20 was --

MR. ROLLINS: -- very -- very inaccessible, by the way.

DR. MAURO: Yeah, I -- I actually used 20. I -- I didn't even look -- see 30 down on the bottom there, I just saw 20. But any event -- and I did -- and I -- in fact I did some calc-- did some calculations to convince myself that we come in sort of in a way -- see, I'm not --

are you using the resuspension factor approach or the actual measured airborne dust loading when you -- when you come at -- come up -- in other words, for the maximum numbers.

MR. ROLLINS: What I did, I used the resuspension, and then I compared them to the actual air monitoring data.

DR. MAURO: Okay.

MR. ROLLINS: And in every case the resuspension, as I developed it, appeared to be claimant favorable 'cause it gave higher intake numbers than the actual air sampling data for those areas.

DR. ANIGSTEIN: That's -- that's using the resuspension of 1.3, ten to the minus eight. Correct?

MR. ROLLINS: Yes, I put in -- I put in a safety factor of ten.

DR. ANIGSTEIN: Right.

MR. ROLLINS: And that's in that table that shows the maximum value. So I already increased it.

DR. ANIGSTEIN: Are we still -- but -- but the comment made earlier still holds, that even for the maximum, it's simply the highest of those

20-odd areas, but it's still an area-wide value.

MR. ROLLINS: And I'll -- and I'll also make one more comment, and it's in my response, that if -- if someone were routinely exposed to those annual intakes, it would be detectable under the methods in use at the time by bioassay monitoring programs.

DR. MAURO: But you were only looking at plutonium at the time.

MR. ROLLINS: That's right.

DR. MAURO: And you're not going to see plutonium in urine unless it's really up there.

MR. ROLLINS: That will put it up there.

DR. MAURO: Oh, so in other words, high --

MR. ROLLINS: If you -- if you get those numbers every year, it will put it up high enough to where it should be detectable.

DR. MAURO: That was one of my other com-- high-fired plutonium?

MR. ROLLINS: Well, this doesn't -- this is not super S assumption.

DR. MAURO: Okay.

MR. ROLLINS: All right. We're not -- we're going there in the future, but we're not there

yet. Okay? Under the typical models now used in IMBA, my calculations are they would have been detectable at their MDAs in use at the time, so if there was a widespread problem, they should have seen it. They didn't do a great deal of bioassay, but they did do enough that if there was a widespread problem, it should have been -- it should have shown up.

MS. BRACKETT: This chapter --

DR. ANIGSTEIN: But that neglects -- see, you -- you make the -- the one hand is favorable -- the claimant-favorable assumption that plutonium is type M due to the safety tests where they didn't actually explode a weapon but just -- I mean they didn't detonate a weapon, they -- they dispersed it, what we today call -- what we'll today call a dirty bomb. However, claimant favorable if you know the intake, you know how many becquerels were taken in, more of it goes to the organs if it's type M. However, the opposite, where you're looking for it in urine, if it's type S or super S, you won't see it in the urine at all, and yet it could be in the lungs.

MR. ROLLINS: Well, they -- they did do chest

counting, as well. And we're not --

DR. ANIGSTEIN: What is the lowest -- I'm just curious what the lower level of detection for plutonium-139 and 140 -- 239 and 240 is.

MR. ROLLINS: Give me a minute and I'll tell you.

DR. ANIGSTEIN: With the -- with the chest count.

DR. WADE: Is there somebody on the line trying to ask a question or make a comment?

MS. BRACKETT: There -- I -- I just wanted to point out, I -- this is the environmental chapter, so this is only assigned to people who are not monitored -- unless this site is working differently than the rest, it's only used for people who were not thought to have had routine exposures to radioactive materials, just people who would have had background levels. And if the person had a job such that they would have routinely been exposed to radioactive material, then a full dose reconstruction would be done based on chapter five, the internal dosimetry chapter. So I just wanted to make sure that that was clear. And if they had bioassay, then this would not

apply. It would be based on their bioassay results.

DR. MAURO: Yeah, I was more concerned that the -- in the end, the point that was made that well, if it was in fact much higher, we would have seen it in the urine, that's sort of like the final word and I would agree with that. That is -- yeah, you know, if you have enough bioassay data for these workers that -- that demonstrates that yes, this model bounds it, I would say yes to that. But -- and then in the end, where I came out was do you have enough data and are we pretty sure it's not super S. Because if it's super S, then that is not a validator. In other words, I don't think -- I don't think you -- you'll --

MR. ROLLINS: Except -- except for the lung. Now --

DR. MAURO: If you did chest counting.

MR. ROLLINS: The chest count MDA for plutonium-239 was 7.3 nanocuries in 1993, and for --

DR. MAKHIJANI: You've got a maximum intake here of plutonium-239 per year of 20 becquerels, 20 times 30, that's about .6

nanocuries per year.

DR. MAURO: And there -- would you say below the limit of detection?

DR. MAKHIJANI: So that --

MR. ROLLINS: 7.-- well, for 239 is 7.3.

DR. MAKHIJANI: So I think it's well under the detection limit, at least on an annual basis, and then --

MR. ROLLINS: But then it's going to continue to accumulate unless it shows up in the urine.

DR. MAKHIJANI: Yeah, but it has to accumulate for a lot of years before you'll be able to see it.

DR. ROESSLER: What kind of doses do those levels give? Are we talking --

MR. ROLLINS: They're in the response. If you look in the --

DR. ROESSLER: When you talk about --

MR. ROLLINS: -- response, I have a table there that show.

DR. ROESSLER: The numbers here look so little to me that I'm wondering if we're talking about something that really is important or if it's just -- you know, with regard to the actual doses people get, which would then result in

actual compensation, is this something that -- that's a really big, important thing, or are the doses so low that --

MR. HINNEFELD: I think there are a couple -- there are a couple of things to think about in terms of how much time do we want to spend hashing this out. One is exactly that, how high will these doses be. And the second is the point that Liz made, from a dose reconstruction standpoint, the environmental dose is applied to someone who is correctly not monitored. Okay? Not only not monitored, but correctly not monitored. And so that's when this kind of a dose would be added to that. So a person theoretically who is a -- and hands-on worker, whether it be a construction worker or whatever, working in a contaminated area would fall into the category of an exposed worker. And whether you had bioassay data for that person or not, you would have to do some sort of internal dose assessment for that person, either based on their bioassay record or some sort of coworker approach rather than an environmental approach.

DR. MAURO: What about this time period from

'62 to '71 when -- and here's where I have to admit I'm not quite sure if I understood what was being said. There's -- wasn't there about a ten-year window where the data for these workers and -- not only air-- airborne samples but bioassay data for the workers outdoors, you didn't -- you have to somehow go with a surrogate, or do you have direct data? Other words, were all these -- there was something about sixty -- seven -- '62 -- '63 to '71 that was this hole, and I was worried that how -- you know, even with these methodologies and some of the limitations that I expressed concern about, then you were going to somehow apply that to the ten-year period before and -- so -- you could see that -- there were these confounding questions that -- that popped into my mind as I read it, and I'm hoping that the write-up that I distributed does a better job than I just verbally explained. And it may turn out that we're dealing with a problem that's a non-problem.

DR. ROESSLER: That's what -- that's what I think we need to clarify --

DR. MAURO: And I'll be the fir-- I'm not sure,

'cause I didn't check -- although I noticed in your write-up you did mention a couple of places we're talking about less than one millirem and -- and --

MR. ROLLINS: In the response there's a -- there's a table. Now that table represents integrated doses --

DR. WADE: Could you point out the table?

MR. HINNEFELD: 13?

MR. ROLLINS: 13, yeah, the --

MR. HINNEFELD: 13.

MR. ROLLINS: In fact the -- where we change our position on how we're going to apply those intakes is in the last paragraph on page 11, the last two sentences, which I agreed that it was not necessarily claimant favorable to give so we're going to give maximum, unless it affects compensability.

MR. HINNEFELD: And we may still at that point.

MR. ROLLINS: And we may still at that point.

MR. HINNEFELD: If we can't -- if we can't -- further than the maximum -- we'll use that, yeah.

DR. MAURO: And your -- and your -- now the reason --

MR. ROLLINS: Now if you want to see -- excuse me. If you want to see what the impact of the doses would be, you go to these tables. Now understand what these tables are. These are 30-year integrated doses based on ten years of intake at the concentrations given in these average and maximum table.

DR. MAKHIJANI: Which tab-- which page --

DR. MAURO: He's on page 12.

MR. ROLLINS: This is page 13.

DR. ROESSLER: Table 2 is what you're talking about?

MR. ROLLINS: This is -- these are the maximum values and those are given in -- what's the number of the table?

MS. MUNN: Table 2.

MR. ROLLINS: 4.2.2-3, right. And so you can see by looking at these that -- there are only a few organs that are potentially affected that it could potentially affect compensability.

DR. ROESSLER: In fact one of them's -- under plutonium-239 is ET, and I have to admit my ignorance of biology, what is that?

MR. HINNEFELD: Extra-thoracic, respiratory tract.

DR. MAURO: Up here.
MR. HINNEFELD: Back of your throat.
DR. ROESSLER: Okay.
MS. BRACKETT: It's always ET-1 or ET-2.
MR. ROLLINS: It's always ET-1 or ET-2.
MR. HINNEFELD: It's probably ET-2.
DR. ROESSLER: Okay.
MR. ROLLINS: And LNET is used for lymphoma.
MR. HINNEFELD: Yeah, LNET is --
MR. ROLLINS: LNET could be very important.
MR. HINNEFELD: -- thoracic lymph nodes, LN -- LNET -- actually LNET is the lymph nodes in the ET region.
DR. ROESSLER: Oh, and they're the bigger ones, yeah.
MR. HINNEFELD: LNTH is thoracic lymph nodes.
DR. ROESSLER: So that's -- that's --
MS. BRACKETT: That's over 30 years, so that's not the (inaudible).
MR. ROLLINS: That's 30 years of dose from ten years of exposure.
DR. ROESSLER: So it's a really maximum.
DR. MAURO: Yeah, it's up there.
DR. ROESSLER: So what does that --
MR. ROLLINS: That's a -- that's a reasonable -

- I wanted to get something that was -- okay, a guy worked out there for ten years, this is a 30-year dose --

DR. ROESSLER: What does that mean in terms of compensability then? I mean if you took --

MR. ROLLINS: Well, my experience, and I've done -- I've done a number of these cases. My experience is if you've got any kind of alpha intake and you've got a lymphoma that requires dose to the LNTH, it's almost always going to be compensable because the doses are so high. Doses to the lung, typically for a smoker, for it to go compensable, depending on if it has a reasonable latency period, you're talking 60 rem to get a com-- to get a compensable case.

DR. ROESSLER: And go back to the lymph nodes --

MR. ROLLINS: If it's -- if it's a non-smoker, it's going to be about half that.

DR. ROESSLER: And what does it take for the lymph nodes for it to be compensable?

MS. BRACKETT: It depends on the cancer type.

MR. ROLLINS: If it's a lymphoma -- I haven't done too many of these because usually -- usually when I've done them, the doses just go

astronomical. They go up in the hundreds and 200 rem, so --

MR. HINNEFELD: Yeah, the LNTH dose component is really high, so if you've got any kind of alpha internal exposure --

DR. ROESSLER: You're going to get a higher --

MR. HINNEFELD: -- chances are the LNTH will be high enough to make a lymphoma compensable.

MR. ROLLINS: And more than likely those individuals are going to be compensable before you -- before you even consider this.

DR. ROESSLER: So I'm just trying to evaluate the importance of how much time we're spending on this particular topic. Is -- is this really significant or isn't, and I haven't heard any --

DR. MAURO: Yeah, let me see if I could boil it down as I'm trying to see -- and looking at your numbers. What -- what I see is that the -- using the maximum concentration -- in other words, the maximum be -- in terms of what's out in the soil or whether -- and was -- air sample, reflects a particular location, whether either the air sample was collected for that year -- I mean in that reg-- 'cause I think it

was -- get this -- this 50-mile area, you got an air sample. Also you've got the 50-mile area and you've got these contours where, if you looked at the contours you see that if you average it there are going to be very large areas that are ten times higher. Okay? So -- now -- so we have that.

So we realize that within this box that we call the area of interest where we're going to do this maximizing dose calculation, you do -- you do have the potential for some locations to be ten times higher. Whether or not the workers spent a lot of time there may be unplausible (sic), or may be plausible, I'm not sure. As we understand about it, I believe the air samples were generally taken where the workers were is the way the text read, so -- sort of in support of your argument, so it's unlikely that you're going to have a worker spending ten years at the worst contour location on a given location within the site.

Then we have this -- okay, that -- that -- that's -- so we're talking about perhaps a factor of ten un-- using your method there may be a situation where a worker might have gotten

a factor of ten higher there. And then on the resuspension side, let's say we're talking the resuspension factor. You have to -- you -- now -- you went on the order of ten to the minus eight. Now I know that you're going to -- you know, that -- now -- I look -- I'm familiar with the resuspension literature and -- and it easily goes ten to the minus six under cert-- certain circumstances where there's anthropomorphic activities. And in fact you sort of get away from the resuspension factor approach and you go to the dust loading approach where you know the gra-- picocuries per gram. All I'm -- I guess all I'm really saying is that I've got all of these facets of the issue in my head right now. I'm looking at the doses and I ask myself is it possible that some of these doses for some worker might be a hundred times higher. And I guess if I could convince myself that no, that's not going to happen, and if it does happen it makes the do-- these are very, very small doses, they're still small, but the -- and the big doses that you have, they -- which are already compensable in accor-- to the lungs, the ET1 and ET2, they're

going to go -- if they go up by a factor of 100, they're going to be even more compensable. I'm just trying to get to grips is the -- the -- the machinery that you're putting in place for doing the dose reconstruction for these workers, whether or not in the end we're -- you know, there's a significant possibility that some of the people are not going to get a fair deal out of this. And I'm not entirely convinced yet, although the arguments you're making are very compelling. That's where I come out. Bob, I know you had -- you looked at this --

DR. ANIGSTEIN: Yeah, I'd like to add one comment to what was said about the lung counting. I did a quick calculation using the ICRP tab-- model, and the lung dose at 7.3 nanocurie, which was the lower limit of detection, that corresponds for say one micron -- as example, one micron type S slow plutonium-239 gives a lung dose of over two rem.

DR. MAURO: Yeah, we -- we -- we -- we're hearing --

DR. ANIGSTEIN: That is -- that is for a single

intake, of course, but that does not mean it's two rem per year, because it probably -- I don't know what the resonance time is, but I don't know how long those seven nanocuries would sit in the lung.

MR. ROLLINS: Is that -- is that a 50-year dose that you --

DR. MAURO: That's a committed --

DR. ANIGSTEIN: That's a 50-year --

MR. ROLLINS: Okay, well, divide it by 50 and that's a rough estimate.

DR. MAURO: Per year.

MR. ROLLINS: Yeah, per year, which is inconsequential to a lung cancer.

DR. MAURO: And you --

MR. ROLLINS: As far as POC is concerned.

DR. MAURO: And you're talking 60 is what you're looking for as a thre-- to -- to get -- to get you over.

MR. ROLLINS: Sixty total.

DR. MAURO: Tot-- total.

MR. ROLLINS: Between --

DR. ROESSLER: Say that again.

MR. ROLLINS: -- between the intake and the date --

DR. ANIGSTEIN: Actually --
MR. ROLLINS: -- of diagnosis.
DR. ANIGSTEIN: -- the one-year dose -- 50-year dose -- one-year dose is half of that -- if we're talking now about the overall, over one rem.
MR. ROLLINS: -- be possible.
MS. MUNN: I don't think so.
MR. ROLLINS: And you wouldn't have an acute intake of 7.3 anyway. It would be over a period of time.
DR. ANIGSTEIN: Yeah, but the question is -- I mean the -- we probably can't do this on line, but the question is this 7.3 nanocurie detection limit would have to be -- if there's a chronic intake, this would have to be a fac-- would have to factor in the resonance time and see what kind of a chronic intake correspond to an av-- to a 7-nanocurie lung burden, which is a very different question than if it was a single episodic intake and you would count it shortly afterwards before there was any clearance.
MR. ROLLINS: We're going to run those numbers right now.

DR. ANIGSTEIN: Excuse me?
MR. ROLLINS: We're going to run those numbers right now if you'll give us a minute.
MS. BRACKETT: Well, not what he just said.
MR. ROLLINS: Oh, oh, excuse me.
MR. HINNEFELD: Well, we could pro-- we could propose this. I mean Bob's -- or John has provided additional piece of information. We could kind of lay out -- I think Gene did a good job in his response. We'll kind of organize it maybe slightly differently, say average based on this approach, maximum based on this approach, dust loading approach -- you know, gives us these various numbers. Measured concentrations were this and, you know, and -- and then -- and looking at this, see where we are on that, do some, you know, organ dose numbers at the various levels, propose some dose reconstructor instructions that would go along with this.
DR. MAURO: I think we have a communica-- more of a communication issue here than a scientific disagreement.
MR. HINNEFELD: I think so.
DR. MAURO: Because the information that's

contained in this report is complex. There's a lot of different information related to how you come at the problem, what data are using -- be used for what circumstances, and -- and as a result of that, I wa-- I walk away with a degree of discomfort that I tried to capture -- Bob and I tried to capture in the write-up. I have a funny feeling the more we talk, the more we're going to converge and -- and see it the same way 'cause the -- the -- you know, so I -- I think we still have an unresolved issue, but I think that we have a path forward where I think as long as we can maintain our dialogue going on, I think we'll be able to be okay on this.

MR. ROLLINS: I agree. From a practicality point of view, what I was trying to do and -- I was trying to come up with something that everybody could agree was an underestimate and some-- and something that we could all agree was a reasonable overestimate that we could apply --

DR. MAURO: Uh-huh.

MR. ROLLINS: -- to keep -- to keep the dose reconstructions moving forward.

DR. MAURO: Uh-huh.
MR. ROLLINS: And then in the very small number of cases where it affected compensability, then we sharpened the pencil.
DR. MAURO: I guess the place where I'm coming out is I guess I'm not yet convinced that your representation of the max overestimate is in fact --
MR. ROLLINS: And that's what we have to go back and work on.
DR. MAURO: And -- and -- and by the way, you know, it may turn out you -- you did. But I -- I'd like to look at it a little bit more.
MR. ROLLINS: Right.
DR. MAKHIJANI: There's just one other issue --
DR. ANIGSTEIN: Also --
DR. MAURO: -- and I agree that the underestimate piece of it is actually an underestimate, so if you're -- like doing a minimum dose estimate, you add that -- that would be okay. But I think -- I -- I have an issue with regard to this -- the scientific of using resuspension at all and referencing the Anspaugh paper, because in his paper he says that resuspension coefficients should not be

used at times long after the deposition. And so we're -- we're talking about deposition during the atmospheric testing time, and then using resuspension coefficients for the underground testing time. So you know, many years and decades afterwards. And it doesn't seem very appropriate to do that.

MR. ROLLINS: I didn't disagree with that, after going back and reading what he wrote. I think I even quoted something in there, but he also said, you know, if you've got air sampling, pay attention to it.

DR. MAKHIJANI: Yes, right.

MR. ROLLINS: Which I did.

DR. MAKHIJANI: Okay. So there's -- there's somewhere in there -- there's -- there's a scientific issue to be resolved about exactly -- - justifying the resuspension approach that would be 'cause I think -- partly you did that in your response but --

MR. ROLLINS: In your response did you comment on the simplified mass loading model that I used? Like -- look -- it appears that you did. I haven't had time to digest that.

DR. MAURO: Yeah, we did.

DR. ANIGSTEIN: Yes, can I say something?
DR. MAURO: Yes, please.
DR. ANIGSTEIN: Yeah. Yeah, we did -- we did -- did some algebra writing it, and there is I think a conceptual error or maybe a communication error that even using -- the statement is made in the response that the mass loading model is consistent with a resuspension factor of 1.3 times ten to the minus nine. We don't find that to be correct because above 100 -- a factor of 100, and even used the upper 1.3 times ten to the minus eight, the mass loading model gives you a factor of about ten higher concentrations.
MR. ROLLINS: I'll take a look at that. I'll look -- look forward to reading it.
DR. MAKHIJANI: And that's in the write-up. You should be able to check that.
MR. ROLLINS: That's good.
DR. ANIGSTEIN: Yeah.
DR. MAURO: By the way, one thing I mentioned earlier, I spoke to Lynn Anspaugh 'cause it -- recognizing that I think the -- his contribution here could be very important, and his take on all this. I called him and asked

if he would be interested in participating, not realizing you had been in contact with him also. If it's acceptable to the -- to the working group, Lynn indicated that he would have no problem signing up as an SC&A associate and we could call upon him to participate in the ongoing dialogue and get his take on a lot of this. He -- his -- his reaction to me when I called was listen, John, you know, I read -- I read carefully the site profile and I read carefully your review of the site profile. And his reaction was I have some serious problems with the site profile, and I have some serious problems with your review of the site profile.

MS. MUNN: What an (inaudible).

DR. MAURO: So that's the man you want, you know, that's -- anyway, he's -- he indicated he would be more than happy to work with us, or if you'd prefer for him to work with NIOSH -- I mean I think it's important that he be part of this process.

MR. ROLLINS: I agree.

DR. ROESSLER: He should probably come to a future Board meeting.

DR. MAURO: Yeah, he -- he -- he asked is the

next meeting -- face to face meeting, is that going to be in Vegas? Yeah, he said I'll absolutely be there, but -- and the conference call -- I told him about the conference call meeting and certainly he said he'll try to be there, so -- you know, we're in the process of -- I wanted to first make sure the working group was okay with this -- like we brought Bob Bistline aboard as the expert on high-fired plutonium, Rocky Flats, I believe Lynn Anspaugh is the equivalent of that for resuspension factors at the Nevada Test Site and could help us bring closure to this particular matter.

MR. PRESLEY: Is that agreeable with the working group?

MR. CLAWSON: Yes.

MS. MUNN: Oh, yeah, he ought to be here.

MR. PRESLEY: Okay.

MS. MUNN: He's done so much work on it. Under whose umbrella, I don't know, but...

MR. PRESLEY: We'll let Lew worry about that.

MS. MUNN: Go worry, Lew.

DR. WADE: I will worry.

MR. PRESLEY: Okay, let's see, we're through -- anybody have any more comments on five?

DR. ROESSLER: Could you summarize where we are on five?

MR. CLAWSON: Well, we've painted a couple of pictures here.

MR. PRESLEY: What I wrote down is I have an issue, the fact that SC&A and NIOSH do not agree on the findings and that what I wrote down was that NIOSH will comment -- will come up with some new information on this issue.

MR. HINNEFELD: The next product is ours. We'll take what Bob has provided -- John has provided, Bob wrote -- and we will try to --

DR. ANIGSTEIN: I have one more -- there's one more comment that -- in my write-up, and this is -- I looked at some other literature the literature that I had available to me on surveys at Nevada Test Site, and there was a aerial survey done by the Remote Sensing Laboratory, and the latest report I have -- I don't know if they've done later surveys, but it would be applicable to this time period -- survey was done on area 11 -- it was called -- also known as plutonium valley -- in January 1982, published in June 1983. And they have this report. Mostly they just publish the

figures showing the isopleths of the -- of the activity concentrations, but for this particular one they went further and they did a analysis to estimate the total inventory on area 11, and they came up with a much higher value than what is reproduced in the TBD in section two in Table 2-8. Their value is higher by I think a factor of ten -- approximately a factor of ten for plutonium. Now, too, this is only one area.

Then also they use a smaller area -- a smaller number of square meters for the area than is in the TBD, so if you put the two together, you end up with more than a factor of ten higher concentration in terms of becquerel per square meter. Now this is only one report and one finding, but it should be examined in light of the importance of the assigning activity concentrations.

MR. PRESLEY: Mark, can you --

DR. ANIGSTEIN: The reference is provided at the bottom of my write-up.

MR. PRESLEY: Mark, can you go ahead and look at that with Tony and Mary and see the difference between that and then the rest of

the site and see if -- it may be that we do have a -- one site there that we need to break out.

MS. MUNN: Area 11, given the map that SC&A provided, looks as though it's a small area, but the site of a number of atmospheric tests.

MR. PRESLEY: It's a very small site.

MS. MUNN: Yeah.

MR. PRESLEY: Back over on the mountain, if I remember correctly.

MS. MUNN: Back over on the east side, right on the east border.

MR. PRESLEY: Yeah. It's actually at the foot of the mountain there, if I remember where it is.

MS. MUNN: SC&A page 53 shows it as several miles east of the control point on the east side of the Mercury Highway, right against the eastern border.

MR. HINNEFELD: Yeah, about mid-way up the range.

MS. MUNN: Right there, yeah, show a number.

MR. HINNEFELD: Well, the next -- but the next product is ours. We'll prepare and -- what's been discussed here and take in -- and the

paper John provided, try to lay out not only, you know, our view of where -- where the numbers came from, the validity and also maybe a summary of dose reconstructor instructions and kind of dose magnitude, 'cause it's not clear to me really that this is -- this issue warrants months -- you know, months of discussion. You know, it may not, so -- but we -- that'll -- next product is ours, to address those issues. We'll provide that to all the -- all the working group members, as well as to John and whomever he wants to specify on his side.

MR. PRESLEY: I have 26 after, do we want to -- and we're getting ready to -- does anybody have anything else on five?

(No responses)

Do we want to break for lunch before we start on this six?

DR. MAKHIJANI: Mr. Presley, can we dispense with six, because I think we've already covered it.

MR. PRESLEY: I think we have, too.

DR. MAKHIJANI: Because it's average air concentration when worker location is not known

is not claimant favorable. I think -- think we already covered that. Maybe we could go to lunch --

MR. PRESLEY: Yeah.

DR. MAKHIJANI: -- with one more under the belt.

MR. PRESLEY: Yeah. I have no problems whatsoever. Does anybody have any problem with dispensing with seven -- I mean with six, please, and starting with seven when we come back?

MS. MUNN: So is six going to drop off our matrix next time?

DR. MAKHIJANI: No, we've --

MR. HINNEFELD: No, it'll be part of...

DR. MAKHIJANI: -- covered it, because it'll be part of the NIOSH...

MS. MUNN: It'll be covered in five.

MR. HINNEFELD: Well -- yeah, it'll be covered.

DR. MAKHIJANI: I think, I don't know.

MR. HINNEFELD: It'll be covered.

DR. MAURO: Yeah, absolutely. Yeah, in fact I think that -- yes, absolutely yes.

DR. WADE: How long for lunch, Robert?

MR. PRESLEY: How long does everybody want?

DR. ROESSLER: Depends on how busy the --
MR. PRESLEY: You want to try it for 45 minutes?
DR. WADE: Okay.
MR. PRESLEY: Want to try to come back at 15 after 1:00?
MS. MUNN: Uh-huh.
MR. PRESLEY: Okay.
DR. WADE: Okay, we'll break contact with the line, but we'll dial back in at a quarter after and we'll resume the working group session then. Thank you.
(Whereupon, a recess was taken from 12:30 p.m. to 1:15 p.m.)
DR. WADE: ...the working group conference room. We're about to begin. Can I have at least one person identify that you're on the line?
(No responses)
Anybody out there?
MS. CHANG: Chia-Chia Chang.
DR. WADE: Okay, thank you.
(Pause)
This is Lew Wade again. Could I ask if there are any Board members on the telephone hookup?

(No responses)

Any Board members with us?

(No responses)

Okay. Stu, do you -- did -- were you able to get any information as to the oro-nasal breathing status?

MR. HINNEFELD: Yes, I -- I talked to Jim Neton, who's kind of the lead guy for this and we have actually placed a task order with the task order contractor to research the literature bases for the values in ICRP and other -- what other literature is there about, you know, oro-nasal breathing and the impact of that, with the idea that we should be able to develop some product from the available research about whether an adjustment is warranted or why the adjustment should be made. And that subcontractor -- that contractor's due date on their task is the end of August, so that would be -- now once we receive that, there may still be some work on our part before we feel like we even have a product able to deliver, so that's the time line we're on right now. We haven't set a schedule past the end of August for a deliverable back to the Board.

DR. WADE: So I mean on the September Board agenda we'll probably touch on science issues, so at a minimum maybe you could give the Board an update on the status of that. If there's something to report, fine. If not, at least, you know, put something on the Board's scope as to what's coming.

MR. HINNEFELD: I think that'd be a good place for it since Jim would have to give that and not me, so...

DR. WADE: Okay. Okay, well done, sir -- as always.

MR. PRESLEY: Are we ready?

DR. WADE: We're ready.

RESUSPENSION DOSES TO MONITORED WORKERS

MR. PRESLEY: Let's start with comment seven, that's at the bottom of page 15.

DR. MAKHIJANI: Comment seven is (reading) Resuspension doses to monitored workers, especially early re-entry workers, may be underestimated due to the presence of short-lived radionuclides and higher resuspension expected in the days and months after a test, including safety tests. TBD does not specify procedures for estimating environmental

internal doses in such cases.
Now here again -- let me see what our response is.
(Pause)
This is your baby.
DR. MAURO: Partially, yeah. Well, we're in -- bear in mind now we're in the -- the SEC time period during atmospheric testing.
DR. MAKHIJANI: No, I don't think so.
DR. MAURO: Yeah, early re-entry --
DR. MAKHIJANI: Yes, yes, yes.
DR. MAURO: -- so -- so -- so within that context -- and I believe the relevance of this has to do with okay, performing -- the internal aspect of it I guess is a non-issue, if it's during the -- so the only aspect of this would be dealing with external doses --
DR. MAKHIJANI: No --
DR. MAURO: No? Okay, help me out.
DR. MAKHIJANI: -- no, it's that -- it's the safety tests --
DR. MAURO: Oh --
DR. MAKHIJANI: -- aspect --
DR. MAURO: -- oh --
DR. MAKHIJANI: -- that is remaining, but maybe

we covered that already. Did we cover the safety tests aspect?

MR. HINNEFELD: Well, we -- we spoke briefly about this, but let's -- let's go down this issue a little bit. It sounds like the issue reads to me that you have -- for your -- 'cause it talks about monitored workers, so monitored workers who have bioassay, and the question arises were the bio-- was the bioassay done for the short-lived radionuclides or what -- you know, bioassay was done for a certain set of radionuclides, but there may have been short-lived components -- like for drillbacks -- am I getting this right?

DR. MAKHIJANI: Right.

MR. HINNEFELD: -- that wouldn't -- you know, the bioassay tests wouldn't be done for. Is that the nature of the comment?

DR. MAKHIJANI: Well, actually, you know --

DR. MAURO: Yeah, that -- the first bullet -- yeah, the answer is yes. I'm looking at the -- the summary, and that's what it says, that you would -- the relatively short-lived radionuclides such as sodium-24 and neptunium-239 could be missed.

DR. MAKHIJANI: But I think it relates to the atmospheric testing time.

DR. MAURO: It is the atmospher-- I guess I didn't -- does the SEC distinguish between exposures from aboveground tests from the nuclear weapons tests versus these other safety tests or --

MR. HINNEFELD: The -- the SEC -- any -- any internal exposure before the end of 1962 we don't feel reconstruction --

DR. MAURO: So it doesn't -- doesn't matter whether it's --

MR. HINNEFELD: -- so if these -- if these safety tests occurred before the end of 1962 --

DR. MAURO: Okay, so that's not a distinguishing factor then.

MR. HINNEFELD: -- then we would not be -- we -- not feel we could reconstruct those.

DR. MAURO: And -- so that being the case, I guess I'm not -- I have to say I'm not quite sure whether we have an issue here.

MR. HINNEFELD: Okay.

DR. MAURO: Unless I'm misreading your response, 'cause there is a response here that gets into some -- it mentions of course due to

the pending SEC, but then it goes on a little bit further during the safety tests and other radionuclides, and I guess my -- my question is, as long -- as long as it's universal, pre-'63 internal doses are off the table. Then the only issue would be external doses, and that would of course include skin dose and external whole body dose. So maybe we don't have an issue here. Help me out.

DR. MAKHIJANI: Yeah, I -- I think that you're right. I'm looking at our site profile review, just to see what -- what the detail of the matrix item was. Sometimes it's not clear from the one sentence what you were talking about. And we were -- we were referring to the atmospheric testing period --

DR. MAURO: Okay.

DR. MAKHIJANI: -- so the internal dose part of that is -- is a non-issue. I didn't actually go back and verify that.

MR. HINNEFELD: Yeah, okay.

DR. MAKHIJANI: So -- and then -- then the other radionuclide question doesn't enter into the safety test question 'cause there you've --

MR. HINNEFELD: Right.

DR. MAKHIJANI: -- primarily got plutonium.
MS. MUNN: So we can say SC&A accepts NIOSH's response?
DR. MAURO: That's my sense here --
MR. PRESLEY: For number seven?
DR. MAURO: -- for number seven. Now I mean I -- because it appears that we're -- the SEC era it's -- covers this and -- and this is all internal.
DR. MAKHIJANI: Except the safety test question is still sort of pending. In prior items five and six there was this question of resuspension factors and so on, and that's going to be covered. There's a safety test resuspension item under the prior, but not under this.
MS. MUNN: Not under this.
DR. MAURO: But -- but this --
DR. MAKHIJANI: No new item.
DR. MAURO: I'll say it again. But the safety tests, if performed pre-'63, are captured by the SEC. That's clear. It's only the external portion that's at issue here.
MS. MUNN: Right.
DR. MAURO: Okay.
DR. MAKHIJANI: Weren't there post-'63 safety

tests?

MR. HINNEFELD: There was one -- there was one, on the Tonopah Test Range.

DR. MAKHIJANI: So -- but that -- that one --

MR. ROLLINS: That's the one that we said we would -- we would pay attention to.

DR. MAURO: Okay, got it.

DR. MAKHIJANI: Yeah, that's why I thought it was still pending from the prior comments.

MR. ROLLINS: I haven't run into one of those cases yet, but I'm sure I will sooner or later.

MS. MUNN: Probably.

MR. HINNEFELD: And this is area 11?

MR. ROLLINS: No, no --

MS. MUNN: This is --

MR. ROLLINS: -- this is NTS.

MR. HINNEFELD: Okay.

MS. MUNN: Comment eight?

MR. PRESLEY: Any comments? Give Arjun just a minute, he's --

DR. MAKHIJANI: Yeah, I'm just correcting my notes here so.

(Pause)

1967 EXTERNAL DOSE DATA

MR. PRESLEY: Okay, issue eight?

DR. MAKHIJANI: Issue eight -- issue eight is (reading) Use of 1967 external dose data for 1963-'66 is not claimant favorable. There were no tests in 1967 with measurable offsite fallout. Relatively short-lived radionuclides, which were likely present in 1963 to '66, would have substantially decayed away by 1967.

So this -- NIOSH's response on this is that this would only apply to maximum dose reconstruction for non-compensable cases because everybody else was monitored.

MR. HINNEFELD: Yeah, I think from the -- from the theoretical basis, since everybody wore a film badge, you wouldn't necessarily include the environmental external 'cause they wore their film badge, it would capture that as well -- you know, all of it, so --

DR. MAURO: Now for unmonitored workers, you go with Proc. 60, which came out recently. Is that...

MR. HINNEFELD: Well, for Proc. -- there won't -- our belief is there won't be any unmonitored workers from '63 to '66 because universal badging started in about '57.

DR. MAKHIJANI: Yeah, external -- external dose

--

MR. HINNEFELD: Externally, right.

DR. MAKHIJANI: -- data you're -- well, the question I had about -- about the -- assigning a maximum dose, you know, for the purpose of compensability, there should be kind of a -- a scientific rationale for it. And I think the present rationale doesn't address the issue that you had no -- you had no tests with measurable offsite fallout. So '63-'66 was worse than '67, arguably, in terms of external dose. If you're going to assign something, you need to find a way to assign something from the time when there were -- when there were higher doses, rather than from '67. And I think it's the same thing in the next -- in the next comment, actually. Yeah, it's -- the next comment is similar.

MR. HINNEFELD: Well, the -- I guess the -- one thing we might propose is just changing the instruction to the dose reconstructor if it's after '57 since everybody was badged, that there's no need to put in environmental external. Which would be -- that's to be our normal approach --

DR. MAKHIJANI: Yeah.
MR. HINNEFELD: -- and say that, you know, regardless of whether you're doing a maximizing or not, just -- there's just no need to add it.
DR. MAKHIJANI: Yeah, I -- I actually think that it's better to have something that's scientific -- if you throw in something that's not scientifically defensible and has a problem in it, and then you're removing the dose when you're doing -- it kind of -- it's like the high-five thing, in some ways it gets messy. And if it -- I mean if we had data for 1967 and you were adding it, I would say okay. But in this case you've got a number that I don't --
MR. HINNEFELD: There's no --
DR. MAKHIJANI: -- I don't think is very defensible.
MR. HINNEFELD: But -- and -- but we all kind of -- we all agree, don't we, that there's no particular reason to add environmental external to someone who wears a film badge all the time 'cause they get their film badge at Mercury, everybody got their film badge at Mercury starting in '57, I don't see any particular reason to add external environmental.

DR. MAKHIJANI: I agree with that.
DR. MAURO: Yeah, but Proc. 60 says starting from '64 you add 123 millirem a year, and I wasn't quite sure what -- where this all -- how that mapped, how that merged. I was reading that. There's a table -- look at tables of -- of --
MR. HINNEFELD: Okay.
DR. MAURO: -- deal-- dealing with the -- you know, when you -- 'cause -- because whatever the monitored was on the worker, the record some-- for some sites they subtracted -- and you've got to add it back in. I was wondering whether -- I'm -- I'm not sure how mechan-- mechanistically it'll work, but it's rare you -- in other words, you've got mon-- you've got a worker, you've got monitor data before workers were monitored, but meanwhile I read Proc. 60, it starts in '64 or '63 -- '63, and it gives -- here's -- I think the number was 123 millirem each year --
MR. HINNEFELD: For NTS?
DR. MAURO: -- for NTS.
MR. HINNEFELD: Okay.
DR. MAURO: And I wasn't quite sure what, you

know, this -- given this conversation, how that sort of comes together. I may have it wrong, but I seem to recall that.

MR. ROLLINS: But that was captured -- what we're saying is yes, that -- that is some reasonable approximation of the ambient at the site --

DR. MAURO: Yes, sure, 123 millirem a year.

MR. ROLLINS: -- but -- but what we're saying is that was captured by the film badge.

DR. MAURO: Okay, and there's no need to add that back in.

MR. ROLLINS: Correct.

DR. MAURO: Okay, it wasn't apparent that that was the situation.

MR. ROLLINS: Originally those numbers were developed to add in for those people that were unmonitored, but since everybody's monitored since '57, there's no need to do that.

DR. MAURO: Okay.

DR. MAKHIJANI: Yeah, and before '56 period, would you retain that for the before '56 period for the non-compensable cancers or how would you do that? Oh, no, so we're just talking '63 -- sorry, I don't know what I was --

DR. MAKHIJANI: Sorry, we're talking about the '60s. No, I -- I agree that, you know, if it's only to be assigned for -- I don't know if John agrees so it's sort of real time resolution here and there doesn't seem to be any -- any reason to add in a dose for --

DR. MAURO: No, I --

DR. MAKHIJANI: -- unmonitored people --

DR. MAURO: Right.

DR. MAKHIJANI: -- for uncompensable cases, and then if you have to do it, then you take it away, it just makes -- I think it makes everything much more messy.

MR. PRESLEY: So SC&A agrees with --

DR. MAURO: Yes.

DR. MAKHIJANI: Well, I think -- I think --

MR. HINNEFELD: But this is our -- response hasn't been --

DR. MAKHIJANI: -- this response would have to be changed.

MR. HINNEFELD: We are amending our response here to say that we'll change the instructions to the dose reconstructors just to say that from -- for the universal badging period when people badged and we've gotten information

about what they (inaudible) with control badges, et cetera, so it's -- there is no need to add that environmental at any point from the universal, and just make that the general instruction, regardless of dose reconstruction.

DR. MAURO: When I read the site profile on this during that time period, apparently the mon-- though universal, there was an awful lot of problems with the degradation of the badges from heat, humidity and their being destroyed -- in other words, there wa-- and -- there was a lot of that. So though there was universal badging, there might be an awful lot of workers whose badges were not readable and usable.

MR. HINNEFELD: Well, I think -- another issue -- I mean we're getting in -- we'll get into issues I think in a -- later in your report about the dosimetry record --

DR. MAURO: Yes.

MR. HINNEFELD: -- and the quality of the dosimetry record. And so we can maybe --

DR. MAURO: That's the -- we'll deal with that then?

MR. HINNEFELD: -- capture that at that point.

DR. MAURO: Sure, okay. Okay. But given that

you've got -- other words, what you're saying, given that you've got a sound set of -- of film badge dosimetry for this time period, use it. And there's no need to add in --

MR. HINNEFELD: Right, don't add back in environmental external.

DR. MAURO: -- don't add anything in because it wasn't subtracted.

MR. HINNEFELD: Right.

DR. MAURO: Got it.

MS. MUNN: And how will we know when you've issued those instructions?

MR. HINNEFELD: I'll let you know.

MS. MUNN: Good, thank you. Then we can take that one off.

MR. CLAWSON: But we are going to talk later on about the film badge reliability.

MR. HINNEFELD: Yeah, it's on here. I'm sure it's in here.

MS. MUNN: Oh, yeah.

MR. PRESLEY: Anybody have anything else about comment eight?

(No responses)

EXTERNAL DOSE DATA '68 TO '76

Okay, let's go on to comment nine.

DR. MAKHIJANI: Comment nine is pretty similar. There's no environmental -- (reading) Lack of environmental dose -- external dose data for '68 to '76 is puzzling. TBD has not specified an approach estimating external environmental dose for this period. Venting in the 1968-'70 period likely made external dose in that period, and possibly beyond, higher than 1967. So your response was the same, and I guess the resolution would be the same?

MR. HINNEFELD: That's what I believe would be the resolution is that external environmental doesn't need to be added back anyway.

MS. MUNN: It's captured by the badge.

MR. PRESLEY: All right.

DR. MAURO: You're going to have to help me out a little bit. Now -- okay, we -- what we're saying is there's this time period where you don't have TL-- you don't have film badge readings.

DR. MAKHIJANI: Environmental TLD.

DR. MAURO: Right, these are -- these are environment-- these are workers in -- that --

DR. MAKHIJANI: No, you have the worker data, but there's no environ-- like the envir-- area

-- area monitoring external dose data are missing.

DR. MAURO: Okay.

DR. MAKHIJANI: And -- and we don't know why.

DR. MAURO: Okay. But then when I go to Proc. 60, I see the standard hundred millirem -- I think it was 123 millirem per year. But the issue here is this business of venting, which could be transient situations where exposures could be --

DR. MAKHIJANI: Not --

DR. MAURO: Help me out a little bit, maybe I'm misunderstanding. In other words, I don't see Proc. 60 solving the problem.

MR. HINNEFELD: But I mean if you're -- a venting -- if the person's badged, will be --

DR. MAURO: You've got it.

MR. HINNEFELD: -- you know, will be measured.

DR. MAURO: Right.

MR. HINNEFELD: And the --

MR. PRESLEY: I mean this is in the 1960s.

MR. HINNEFELD: -- the approach is that, you know, we have a badge record for each person.

DR. MAURO: Okay, so lack of environmental but you've got the badge -- okay.

MR. HINNEFELD: Okay?

DR. MAURO: Okay, that's...

DR. MAKHIJANI: So the external -- the internal dose would be an issue, but not -- not the external dose.

MR. HINNEFELD: You mean from the venting? Yes.

DR. MAKHIJANI: Yes.

PRE-1963 EXTERNAL ENVIRONMENTAL DOSE

MR. PRESLEY: Okay, comment ten?

DR. MAKHIJANI: (Reading) TBD does not provide any guidance for pre-1963 external environmental dose. Issues relating to unmonitored workers, as well as time of entry into contaminated areas, could be important. And I think this is sort of captured by the SEC petition, except --

DR. MAURO: This is external --

MR. HINNEFELD: Well, this is external dose.

DR. MAURO: This is external, though.

DR. MAKHIJANI: Yeah, so from '57 on, you're okay.

MR. HINNEFELD: From '57 on we think we're okay with -- with the badge record.

DR. MAKHIJANI: So this is the same as the

prior comment, and then you need a coworker model for '56 --

MR. HINNEFELD: Yes.

DR. MAKHIJANI: -- up to '56.

DR. MAURO: We agree to that.

MR. PRESLEY: Through '56?

DR. MAKHIJANI: It's not -- it's not there in the response --

MR. HINNEFELD: It's not there now, but we agree we need it. Right?

DR. MAKHIJANI: -- but --

MR. HINNEFELD: Isn't that right?

MR. PRESLEY: Need a coworker what now?

DR. MAURO: For the worker model -- well, for pre-'57.

MR. HINNEFELD: Coworker or source term or something like that.

DR. MAURO: Some -- some way to capture --

MR. HINNEFELD: Some method, yeah.

DR. MAURO: -- plausible upper bounds.

MR. HINNEFELD: Coworker -- coworker is preferred, source term might be feasible. Area survey might be -- survey data.

MR. ROLLINS: There was personnel data back then.

MR. PRESLEY: Up to --
MR. HINNEFELD: '57.
DR. MAURO: 1957.
MR. PRESLEY: -- 1957.
DR. MAURO: I guess that's '51 to '57?
MR. HINNEFELD: Yeah.
DR. MAURO: That's important.
MS. MUNN: This is going to require a change to the TBD.
DR. MAURO: So far, of all the issues we've discussed -- I mean just to give a little commentary -- I think that the point being made -- some of these internal issues that we -- you know, some of the other issues we talked about before, but this sounds like a big one. That is, these people -- in theory during those time periods -- could have experienced some substantial exposures. And the co-- how you come at the coworker model --
MR. HINNEFELD: Right.
DR. MAURO: -- is going to be very important. In other words, if you're saying where's the big ticket item here that could really have an effect on dose reconstruction, here it is.
MR. HINNEFELD: And this is -- yeah, this is

pre-'57 external, we really --

DR. MAURO: Pre-'57 external.

MR. HINNEFELD: -- want to try to come up with a way to do that.

DR. MAURO: Yeah, this is a hot one.

MR. PRESLEY: I put down '51 through '57. Is that correct?

MR. HINNEFELD: Yeah -- '56.

DR. MAURO: Yeah --

MR. PRESLEY: All right, it's up to -- should be '51 through '56, right?

MR. HINNEFELD: Correct.

MR. PRESLEY: Through '56.

DR. MAKHIJANI: Mr. Presley, I think it might be somewhere in between -- it might be something like April --

DR. MAURO: Yeah, it says April 1st '57 is the cutoff point. That's what the response says, so -- so some -- so before April 1st, 1957 is when there's a lack of data.

MR. PRESLEY: Okay. Anything else on comment ten then?

(No responses)

Okay, comment 11?

CORRECTION FACTORS

DR. MAKHIJANI: (Reading) Correction factors for external environmental dose due to geometry of organ relative to badge, and angular dependence of the dose conversion factor need to be developed.

NIOSH split this into three -- four parts, I didn't remember there were four parts. The -- on the first part, in relation to geometry, the -- the location of the badge versus the organ for which calculations are done, NIOSH agreed to develop correction factors for lower torso organs, and we agree with that. And also agreed that the geometry -- other geometry factors, angle of incidence and dose conversion factor needs to be fixed. I think there's been an extensive discussion about this before in relation to the procedures, so we also agree with that.

And NIOSH also agreed time -- time of entry into contaminated zone is important. This is partly covered by a prior discussion about the radionuclide list, so this is a repeat of that. I -- I had one question about the NIOSH response to 11c, which was when minimizing or provid-- the last -- second last sentence in

11c, which is (reading) When minimizing or providing a best estimate -- providing a best estimate dose, the photon energy range assumption is 24 percent in the 30 to 250 keV range and 75 percent greater than 250 keV. Now I didn't see where the 25/75 split came from and why it should be regarded as claimant favorable. Is there some sort of fission product analysis basis for that, or...

MR. ROLLINS: Well, four years ago I remember doing a little bit of work using the Harry Hicks* documents that -- time dependence, and that may be where that came from.

DR. MAURO: It's a very tractable issue, but as -- whether or not that's correct or not, I can't speak to it, but the information is out there in the literature to determine if that's correct.

MR. ROLLINS: Now from a IREP point of view, we could go 100 percent greater than 250. That would be absolute minimizing --

DR. MAKHIJANI: Yes.

MR. ROLLINS: -- as far as energy distribution is concerned.

DR. MAKHIJANI: Right.

MR. ROLLINS: Now my opinion is it would make very differen-- it would make very little difference in compensability on a case that's from the actual cases. So rather than doing a huge study of this, I would -- I would just say, for minimizing, go to 100 percent rather than 250, and then there's no issue.

DR. MAKHIJANI: Yeah -- no, for minimizing I think it's all right. I think that's -- 100 percent greater than 250's okay. It's sort of the best estimate -- is your best estimate claimant favorable with a 25 to 75 split, and I think that does need some kind of -- a Hicks table justification would be fine, but -- but I think you do need to show that -- that -- that you're covering all reasonable times of entry with that split, and that you remain claimant favorable in a best estimate dose. I'm not saying it's wrong, I just think -- I just think that it needs some -- some technical basis, which -- which isn't -- that I don't see right now.

MR. HINNEFELD: All right, we'll provide that.

DR. MAURO: Am I correct, the -- the lower the energy distribution, the more important this

issue of angle inci-- angle of incidence and badge location becomes, because the difference -- the effect of angle of incidence is much more profound when -- and the -- and the -- where the badge is, relative to the organ of concern, if you're dealing with lower energy photons, so they -- they --

MR. HINNEFELD: We don't have our external dosimetry expert in the room --

DR. MAURO: I don't -- I seem to recall it came up on another subject.

MR. ROLLINS: Jack was on the phone.

MR. HINNEFELD: Got a bunch of internal dosimetrists -- is Jack on the phone?

MR. ROLLINS: He was.

MR. HINNEFELD: Jack, are you on the line?

(No responses)

Okay. I don't know -- I don't know for sure. Film was kind of a funny thing, and low energy photon over-responds --

DR. MAURO: It over-responds, but then you -- yeah.

MR. HINNEFELD: -- and then when -- and even when you depart from a 90-degree angle on film, since the track -- the photon track through the

emulsion is longer, you actually have a higher, you know, response to the film for a little bit until -- unless you can end at that. So film's a funny thing in terms of how it reacts to the photons -- photon energy. TLD, I don't know if you'd have the same situation.

DR. MAURO: I -- I guess the point that is when -- when we look into this matter of energy distribution and what's claimant favorable and what's not, I think it's confounded by the issues related to angle of incidence and where the fil-- where the organ -- target organ is versus where the film badge is worn. They sort of all play on each other in -- in ways that right now I guess is not self-evident.

MR. HINNEFELD: Right. Right.

MR. FIX: This is Jack Fix --

DR. MAURO: Good.

MR. FIX: -- calling in.

MR. HINNEFELD: Jack, could you hear our discussion about --

MR. FIX: Yeah, I'm sorry, I had trouble with my mute button. I had it on. Yes, I did, and it is -- it is problematic, as this discussion indicated, and that's why laboratory studies

were done in which dosimeters placed on a anthropomorphic phantom were rotated in selected beams. It was done here at Hanford with the different historical dosimeter designs. All of the Hanford designs were placed on phantoms and rotated in selected beams. Those -- unfortunately, those particular beams were a little higher energy than -- so they were 100 keV and higher, and the International Agency for Research on Cancer, when they did their 50-country study in a paper that should be coming out before long, they did a similar study in which they placed dosimeters -- personnel dosimeters, in this particular case, ten widely-used designs used throughout the world, and they did laboratory studies at the Medical Radiation Physics Laboratory for the International Agency for Atomic Energy. And both of these studies had the same results, and that is for the energies that were used and then lowest energy used there by the international study was 80 -- essentially a narrow X-ray beam of around 80 keV effective. And all this showed is that the -- and they used isotropic and rotational as

well as anterior/posterior orientation, and all these showed that the film would significantly over-respond to the delivered personal dose equivalent for that geometry. For example, in a rotational geometry, that the dosi-- the film dosimeter -- interpretation greatly overestimated -- significantly overestimated, say by about a factor of three -- the actual dose.

Now there's still concern at low energies. You know, like say 17 or -- but a-- but again one has to pay a great deal of attention to the actual exposure scenario because as the pho-- as the energy gets lower, non-homo-- non-uniform exposures are significant, but the range is so much lower so usually you're worried about people that are working directly with -- with the material.

So it's complicated and that's why we did the laboratory studies, and we didn't -- it wasn't feasible to cover all energies, but that's what the results showed.

MR. HINNEFELD: So with respect to our response on the apportionment of photon energies, which is where we started, it -- it may be well --

that apportionment may well affect angular adjustment and those type of things, and we will I think go ahead and provide some sort of backup for a best estimate split that's something -- you know, some sort of best estimate --

DR. MAURO: It sounds like you have the wherewithal and ability to --

MR. HINNEFELD: Yeah, I think there's --

DR. MAURO: -- to -- to run this to ground.

MR. HINNEFELD: I think there's data out there probably that will allow us to do it.

MR. PRESLEY: So y'all are going to provide an explanation of the 25/75 split or a best estimate split.

MR. HINNEFELD: Yeah, some sort of best estimate split.

MR. PRESLEY: Okay.

DR. MAKHIJANI: And then the last item in 11 is this data integrity issue, is sometimes workers did not wear their badges when the quarterly dose limit was near three rem. Now that's the same as a full comment, the comment number 20, and we concurred there or here, but the NIOSH response that they can't find a way of

retrieving the missed data, and since -- and you can't do core dosimetry, the -- the basis of the response that NIOSH will investigate this, along with DOE complex sites where similar claims have been made, I -- I disagreed with that approach of investigating this. You know, there -- there are -- there've been of course statements made about Rocky Flats and other sites, and I'm aware of that. But in this particular case, you had very senior health physics officials who personally have testified to what was going on, so -- so I don't think it's sort of like an affidavit or -- I think it's in a completely different class. It's in a class like when you brought -- I forget her name, the -- the paper by the person who was involved in the monitoring at Bethlehem Steel, or you had brought Mr. Breslin to say how they did things when they actually did the monitoring. It's -- it's of that -- so it's truly -- you know, I'd say almost a report prepared by an expert.

MR. HINNEFELD: Right.

DR. MAKHIJANI: And so I actually think that you can't put this particular thing in the same

box and say --

MR. HINNEFELD: As Rocky Flats.

DR. MAKHIJANI: -- we -- as we've been approaching Rocky Flats where you take an affidavit, you go to the worker's record and so on. Here you've got somebody who was there throughout the testing period, and it was corroborated independently by people who are still there who are part of the DOE and -- or DOE contractor system, and so it had two independent corroborations from pretty senior health physics people. So I don't think this is the right way to deal with it.

MR. HINNEFELD: Well, there's another way that we're looking at dealing with this, and it really depends upon can we get the dataset in a good re-- in a good fashion, you know, a good robust dataset, because a distribution of the exposures, if you have all the -- all the readings, exposure shows you some particular distribution. And if there was a practice of shielding your badge so that you wouldn't exceed a limit, then at the top end of your distribution, instead of carrying out, it should roll over because people were not -- you

know, they were not badging themselves and so they wouldn't get six rem, they're going to stay down here at three.

DR. MAKHIJANI: Yeah.

MR. HINNEFELD: Okay. So in that sense, there may be a way to reproduce those. You know, to produce that distribution, that probability -- or that -- yeah, probability distribution, observe that rollover and -- and -- and extrapolate how much of an adjustment is necessary to these people who were in this position. And then that could theoretically be applied to people who have significant dose and therefore were legitimately in those candidates who may be extending -- who may be exceeding. So there'd be some threshold probably you would choose to apply this adjustment to, something -- people above this dose number would do it. So far, this is theoretical. Okay? And do -- is the dataset complete? I don't know.

DR. MAURO: So -- so we have a worker and -- the scenario goes like this. He does not want to exceed three rem recorded.

MR. HINNEFELD: Right.

DR. MAURO: It's not in his interests, let's

say in theory his fin-- economic interests.
MR. HINNEFELD: Right.
DR. MAURO: Now he's badged weekly, monthly or quarterly? If it's quarterly, then it becomes almost like a non-starter. I mean if it's quarterly, it's --
MR. HINNEFELD: Yeah, you --
DR. MAURO: So it would have to be at least monthly, I guess.
MR. HINNEFELD: It'd probably be at least monthly, and I don't know -- do you remember the badging frequencies, Gene, at NTS, how often they exchanged badges?
MR. ROLLINS: Monthly.
MR. HINNEFELD: Monthly.
DR. MAURO: So in other words -- so the idea being all right, the worker's -- sees his exposure month number one and he sees -- uh-oh --
MR. HINNEFELD: Oh, I'm over a rem.
DR. MAURO: -- wait a minute, it's starting to climb month number two -- right? -- so by the time he's -- he's approaching this quarterly, he say I'm running into trouble and you're saying that -- so all of a sudden, the last

reading of his quarterly sequence would all of a sudden drop off the table.
Now, it could drop off the table for two reasons. He did this --
MR. HINNEFELD: Right.
DR. MAURO: -- or he was taken off that job --
MR. HINNEFELD: Right.
DR. MAURO: -- and put someplace else because they didn't want him to exceed his quarterly levels --
MR. HINNEFELD: Right.
DR. MAURO: -- LARA practice. My guess is if the latter were the case, the records should show that. That is that yes, he was reassigned. Someplace there's a --
MR. HINNEFELD: There's some -- be some personnel record or something.
DR. MAURO: -- some documenta-- the personnel documentation that he was taken off, put in -- because of this. If that doesn't exist, then we have a situation where this might be --
MR. HINNEFELD: Right.
DR. MAURO: -- and you're saying that it -- under those circumstances, it's tractable, and then you would just -- if that were the case,

you -- you would -- if you had a real person where you thought this might be the case, you would just extrapolate, assume that he -- whatever dose he got in month one, month two, month three --

MR. HINNEFELD: Well, actually what we probably would expect to do would be --

DR. MAURO: One -- one -- the two months in a row, then the third one.

MR. HINNEFELD: Well, what we would expect to do probably would be have some adjustment factor based on the total distribution -- beta distribution, say -- see, it should go straight, it -- it lays over at the top, that means we're going to conclude that that meant they did this. And -- and rather than seek additional individual records about individual assignments on the hope that we would see somebody was reassigned from a forward area after two months and -- and do that, we'd probably make this a general application to people who fit the category of highly exposed and -- and just make that a general adjustment. That would -- I'm just -- and we're speaking here hypothetically now 'cause like I said, so

far all we've done is thought that this might -- this might be a way to do that.

DR. MAURO: A way to track it down.

MR. HINNEFELD: This might be to do this and that there might -- you know, this -- this may be a solution. And we want to be real -- you know, pretty careful about saying that we're going to make a lot of fine distinctions -- on Joe Smith we're going to treat it this way and Bob Smith we're going to treat this way --

DR. MAURO: You may be universal.

MR. HINNEFELD: -- and Joe Jones we're going to treat --

DR. MAURO: How do you do it annually then? Let's say -- yeah, I guess I didn't quite understand. Say you've got this -- you have this worker --

MR. ROLLINS: Let me -- let me make an observation.

DR. MAURO: Yeah.

MR. ROLLINS: Just in general -- and this is -- this is one thing the workers keep talking about, about how nobody ever got any dose out there. Well, the reason they didn't get any dose, for the most part, is they weren't

exposed to very much. There's -- is an exception to that, and the only cohort group that we see out there that ever got close to limits were those that were involved in the reactor experiments -- and the cleanup of the reactor experiments, because they sent those people out there to pick up the pieces and they -- they ran their doses up pretty high. And so that's a fairly small group of people. It's a handful of people, but they're the only ones that we see that ever had anything approaching any kind of limit.

DR. MAURO: But then we get this '51 to '57 time period where we don't have the badging, so that's --

MR. HINNEFELD: Well, that's problematic in another sense.

DR. MAURO: I know, but you see, that confounded --

NOTE: Multiple speakers commented simultaneously.

DR. MAURO: But I think they're related. I mean it's -- doesn't that confound --

MR. HINNEFELD: Well, this would be a -- well, I don't know if it's a -- I think it's a related -- it's a -- it's a different issue,

but it -- and it would maybe -- if people weren't badged and they weren't hiding the badges. So to me it's kind of a separate issue --

DR. MAURO: Oh, you said you had no badges, of course. What am I talking about?

MR. HINNEFELD: So if you're -- but during the badged period it would seem to me that it may be solvable if the -- if the dataset is complete enough, if we can get that and it lines up okay. You know, we've had occasions when we felt we could line the data up okay and -- and the -- when you start looking at individual reads, it just doesn't -- individual read data just doesn't look that -- you know, that consistent internally, you're not really sure what you're looking at on some of these databases. A lot of annual totals look good -- well, annual totals okay, but trying to put -- you know, build up those annual -- you know, figure out what quarter it was available or what the monthlies were to add that total, you start looking at the database, it's not -- it's kind of hard to figure out which was the monthly result. So there may -- we may run

into a situation like that where we can't get these monthlies in good order and -- and then there's still an open question if there's something you can do or not. But at the moment we're hopeful that we could make some sort of adjustment like that for these people who intentionally took their badges off to avoid exceeding a -- some sort of limit, you know, the three rem or administrative limit or something like that, so we are hopeful of that. But right now, like I said, it's -- it's theoretical right now, so I'd have to get up with Dr. Neton about exactly, you know, are we anywhere on that or anything. I think that may be another subcontractor task order.

DR. ROESSLER: Let me make sure I understand this. It seems different now than when I was reading this. When I was reading this I had the impression that because people hid their badges a lot during a certain period of time that -- that this was probably impossible. But it seems like there were not many people in that category where the doses would reach that limit, and now from what you're saying, theoretically you can -- because they wouldn't

hide their badges until they got to the end of the quarter, that maybe the first two monthly readings would be valid and you can take from that -- is that what you're --

MR. HINNEFELD: It -- it could be, but we wouldn't -- we wouldn't think about using that person's first two monthly readings and then -- and then extrapolate that to the third. I don't know that that's -- 'cause that's a pretty fine structure for dose reconstruction. Probably what we would do is identify the likely candidates who probably fit in this category, and provide an adjustment to their recorded dose --

DR. ROESSLER: For those candidates.

MR. HINNEFELD: -- with the assumption that they participated in this practice. So that's probably an approach that is, you know, implementable if in fact there is -- the data provide a basis for it, which is not -- which I don't know today.

DR. ROESSLER: And I have one more question. Now this time period where Jay Brady talks about -- and the others talk about they're hiding the badges, what -- what is that time

period that -- that this allegedly happened?
MR. HINNEFELD: He said it may have continued into -- what, about 1970 or --
DR. MAKHIJANI: Jay Brady thought it went into the mid-'60s or about the time -- there's some -- there's some doubt about how long this may have continued, mid-'60s to maybe early '70s at the latest.
DR. MAURO: I think it was linked to the conversion of the film badge into part of the security badge.
DR. ROESSLER: Oh, yeah, --
DR. MAKHIJANI: Brady thought it had been --
DR. ROESSLER: -- where their ID was --
DR. MAURO: Where their ID was locked up with their film badge.
DR. ROESSLER: Okay.
DR. MAKHIJANI: Then it became a minimal problem after the --
DR. ROESSLER: So that's the potential period.
DR. MAKHIJANI: Yes, maybe late '60s, some-- it's somewhere in there. We haven't been able to get a good answer.
DR. MAURO: Keeping the thought process going, so -- so let's say you go through this process

with the post-'57 dataset and you come up with these fixes for this subcategory of workers, which will be these high-end class of workers. So now you've built what you would call a fairly robust dataset for workers post-'57, taking into consideration perhaps some strange practices. All right. Now you've got that. Now you want to work your way backward and say okay, we're going to use that information somehow to reconstruct doses to -- external doses to workers from '51 to '57. Now I guess you haven't started -- I'm trying to visualize -- so what you've got now is this very large population of badged workers post-'57, and the vast majority of the -- and this almost brings us back to Y-12 and pre-'61. The vast majority of them are going to be -- have low doses or no doses --

MR. HINNEFELD: Right.

DR. MAURO: -- except for some small subset, perhaps the ones that were involved in the reactor testing program are going to be -- you're going to have almost like a binom-- bimodal distribution -- some -- a group of workers that are up here and then the rest are

going to be down in this low end.
Now, confronted with that set of information, then you ask yourself okay -- but now we have this other group of workers, who knows how many there are, that was from '51 to '57, and somehow we want to build a bridge from that -- between the data, recognizing that the -- the data that was compiled from -- I'm sorry, I'm thinking through the problem -- I thought I was trying to solve it. From '57 to '62 is aboveground testing --
MR. HINNEFELD: Yes.
DR. MAURO: -- so that becomes the data of greatest interest because that's the data that -- 'cause there's a lot of testing went on and that -- so -- and you -- one could argue that the nature of the exposures that took place from '57 to '61, the actual monitored data, probably represents the most representative set of data that might apply to '51 through -- through '57. And now would you work off the full distribution? So now we have a worker that is in the early years. Is it -- would it be your inclination to work off the full distribution of let's say that dataset, the '57

to '61 dataset, or work off the upper 95th percentile as being your surrogate?

MR. HINNEFELD: I haven't even thought about it yet, but certainly we'd have to be concerned about -- you know, use of -- use of full distribution in coworkers is -- we really only use like mid-point for people who we're pretty confident were unexposed, so if we had, you know, job classes that we would consider unexposed or -- or at least only moderately exposed --

DR. MAURO: 'Cause you -- you could see how important that would be --

MR. HINNEFELD: Yeah.

DR. MAURO: -- because if you go with the full distribution, you capture this large number of workers who weren't exposed.

MR. HINNEFELD: Who weren't exposed, right.

DR. MAURO: If you go with the 95th percentile, you're going to be working off this upper --

MR. HINNEFELD: There was -- there was some personnel monitoring data before '57.

DR. MAURO: Oh, okay.

MR. HINNEFELD: Then there's universal monitoring after '57. There is some personnel

monitoring before '57, but you know, we haven't solved the nut -- you know, we haven't solved the issue in here today yet about pre-'57.

DR. MAURO: We're going to have another pre-- we're going to have another Y-12 pre-- 'cause we haven't done that yet, as you all know, but that's going to be another place where this is exactly the same situation, and the -- the stra-- and I guess we're going to be -- quite frankly, I guess we'll be marching forward pretty soon with regard to the Y-12 issue. I think how that resolves -- is resolved and where that ends up is probably going to be a very good precedent for the strategy that ultimately is adopted here 'cause --

MR. HINNEFELD: I suspect --

DR. MAURO: -- it seems to me that they're very similar.

MR. HINNEFELD: I suspect it is, right. I suspect it is.

MR. PRESLEY: So we can say that NIOSH will provide an adjusted dose for or to the workers that supposedly hid their badges? Is that how you'd say that?

MR. HINNEFELD: Yeah.

MR. PRESLEY: I mean that's --
MR. HINNEFELD: Some sort of appro-- we're gong to work on an approach.
MR. PRESLEY: Okay.
MR. HINNEFELD: You know, I can't promise success --
MR. PRESLEY: Yeah.
MR. HINNEFELD: -- but we're -- we intend to work on an approach to do that.
MR. PRESLEY: Okay.
MS. MUNN: Isn't it a shame we can't have a sense of Congress as to how they feel about workers who might have shielded their badges and now issue claims for compensation. I'd -- I'd like to hear the Congressional sense when that --
MR. HINNEFELD: You might -- you might get 535 -- maybe more.
MR. PRESLEY: Okay. Any more comments on 11?
MS. SCHUBERT: Could a person on the phone ask a question?
DR. WADE: Surely.
MS. SCHUBERT: I just was wondering, I just got on -- this is Sandi Schubert from Senator Reid's office -- and I heard a woman mentioning

they'd like a sense of Congr-- a sense from Congress as to what they want in a particular arena. I didn't actually hear what that arena was.

MS. MUNN: This is Wanda Munn, and I was being facetious. I was sim-- I was not expecting Congress to respond at all.

MS. SCHUBERT: Is there any way to find out what the topic was, or if there's notes on this --

MS. MUNN: Oh, yes. We had been discussing the case of workers who may have deliberately shielded their badges in order to circumvent any level of exposure that would require them to change jobs or to not go to work.

MS. SCHUBERT: Thank you very much, I appreciate that.

MS. MUNN: Yes.

RADON DOSES IN G-TUNNEL

MR. PRESLEY: Arjun, you want to talk about comment 12?

DR. MAKHIJANI: Oh, yeah. Comment 12 is (reading) Radon doses in G-tunnel are not claimant favorable. Gravel Gertie radon doses are not discussed, and could be substantial.

Site status of Gravel Gertie workers needs clarification.

NIOSH's response basically was along the lines of the recommendation we gave in the site profile review, so the -- the suggested value is okay with us, the revised upwards 16 working level, so that's -- that -- and NIOSH is going to research the question of Gravel Gerties for relevance to NTS. My -- my question about that is the -- the status of the Gravel Gertie workers is kind of unclear to me. Were they Los Alamos or Livermore or Nevada Test Site or do we know?

MR. HINNEFELD: I don't know today. Gene do you know if -- where the people --

MR. ROLLINS: I'm not sure I understand the question.

DR. MAKHIJANI: Well, the question of which -- where the records of these workers would be located. Are they classified as workers who came from Los Alamos who worked in the Gravel Gerties just before the tests --

MR. ROLLINS: They would -- any --

DR. MAKHIJANI: -- assembling the – the --

MR. ROLLINS: -- any record of exposure in the

Gravel Gerties at NTS would be controlled by the NTS.

DR. MAKHIJANI: So -- so there's not an issue as to the status of the workers then. They would be regarded as NTS workers.

MR. ROLLINS: They would be regarded as NTS workers.

MR. PRESLEY: When you went on site, you swapped your badge for an NTS badge. At least that's what I did. They held my badge out till the day I walked out.

DR. MAKHIJANI: And then -- but that dose would be added to the -- in a multi-site way if there's a claimant you have --

MR. HINNEFELD: Right, there are a lot -- as you said, there are a lot of people from Los Alamos and Lawrence Livermore who spent time at Nevada Test Site. And the records of that are pretty clear. We -- we identify both. We get the records from both -- you know, on -- in the event that their Lawrence Livermore record doesn't include their dose received at NTS, we go to NTS and see what record NTS has, so yeah, we would incorporate those.

DR. MAKHIJANI: So I guess the one outstanding

item from that -- from comment 12 is NIOSH is going to research the Gravel Gertie question. And -- and this came up a little bit in Iowa as regards the radon -- radon dose in Gravel Gerties and that Iowa is a high radon area but Texas was not, and so I guess maybe your -- your comment regarding relevance of other sites to NTS activity, was that -- was that what -- what you were referring to?

MR. HINNEFELD: I believe that'd be correct. I mean there's other state data relevant to NTS and can we make any -- draw any conclusions along those lines, that would be what we would be interested in.

DR. MAKHIJANI: So basic-- basically we're in agreement with NIOSH in response to comment --

MR. ROLLINS: May I ask you a question? These -- these Gravel Gerties -- these were concrete vaults constructed. The air was forced through filters. Is that the situation with Gravel Gerties at -- in use at the other locations?

DR. MAKHIJANI: I believe so --

MR. ROLLINS: These are forced-air filters.

MR. PRESLEY: Yes -- yes, sir. All that I've been in are.

MR. ROLLINS: And they have -- we have radon measurements available at those locations?
MR. PRESLEY: I'd say Pantex has probably --
MR. HINNEFELD: We've got them for Pantex. Okay? We've got them for Pantex.
MR. PRESLEY: -- got all kinds of them.
MR. ROLLINS: Okay.
DR. MAKHIJANI: But this is -- this is an early -- I believe there was one, and only in the early period, at -- at Nevada Test Site, so I think the site-specific conditions would probably be important to know.
MR. PRESLEY: Unless you can go back and look and see what it is at Pantex, and it may be -- I mean the air -- the air circulated through those things just almost instantaneous, but it -- you know, the -- the chances of getting something, I don't know, but they were probably slim and none.
DR. MAKHIJANI: It may be it's not a big dose, but it just -- it just -- whatever it is, it needs to be put -- resolved.
DR. MAURO: You know, that -- the handle on this problem for radon -- if it turns out the air turnover's very high, the radon would come

in through cracks and penetrations in the foundation of the structure -- I assume it's some kind of concrete foundation and -- and perhaps even the materials --

MR. ROLLINS: Walls and ceiling.

DR. MAURO: -- walls, too -- is all --

MR. ROLLINS: It's all concrete.

DR. MAURO: The whole thing is underground. Okay, so the -- so your radon -- now the only reason why you get a buildup of radon is that there's a resonance time of the -- of the air, but if you have an air turnover rate of several times per hours, let's say, you know, what's going to happen is the radon's going to be -- it's going to be brou-- so you get the fresh radon coming in -- okay? -- without the progeny, 'cause progeny you're not going to see then; they're going to sort of be trapped in the soil and the cracks and fissures, so the progeny don't move in. The radon comes in, the radon goes out and -- before it even has a chance to decay. I -- I think if I was trying to track this and try to come up with a handle on whether or not it's possible to have a buildup of progeny -- certainly if you have

measurements, great; I mean if you have working level measurements inside these Gravel Gerties, you know, you've got it covered. But if it turns out you don't and you're trying to get a handle on what kind of working levels might be inside these things, knowing the air turnover rate inside one of these things is going to be the hook to solve this problem. I mean that's -- I -- I just -- I just offer that up as a way to track this if you don't have actual measurements.

MR. ROLLINS: Taking it -- taking the thought to the limit, if you had extremely high turnover rates -- which you indicate air whistling around; I know in the canyons the air's whistling around 200,000 cubic feet per minute -- but you essentially end up with the same radon inside the Gertie that you have outside, and so you -- now you're starting to assign ambient radon.

DR. MAURO: Right, and you -- and you don't have a chance for progeny to grow in because the air is not -- the radon is not indoors long enough to -- to have progeny grow in, so there you go, yeah, I agree.

MR. ROLLINS: But that's something we typically don't do on a project --

DR. MAURO: Yeah.

MR. ROLLINS: -- is -- is assign doses to lung --

DR. MAURO: Yeah.

MR. ROLLINS: -- from ambient radon.

DR. MAURO: Oh, yeah. No, I agree with that. What are you talking about, a fraction of a picocurie per liter.

MR. HINNEFELD: Well, it has to do -- the reason on when we assign radon and when we don't has to do with the nature of the structure.

DR. MAURO: Yeah.

MR. HINNEFELD: And if it is a -- if it's a normal working structure, even the basement of a building -- it's a building, even the basement of a building, we consider that part of the natural background. The natural background is included in the IREP risk models and the background risk and so on and so forth, so it's accounted for in that way.

DR. MAURO: Okay.

MR. HINNEFELD: But if it's a tunnel --

DR. MAURO: Man-made special --
MR. HINNEFELD: -- or a -- or a structure that --
DR. MAURO: -- special --
MR. HINNEFELD: -- sort of assimilates/simulates* underground structure like a Gravel Gertie -- we kind of made that decision, there may be others; Gravel Gertie is the one that comes to mind, or tunneling -- in the tunnels, we consider that sort of a non-standard work location and therefore we put the radon in if it's -- it may not amount to enough.
DR. MAURO: No, no, and I understand it, but -- and this is the first time I was yet -- I was informed that the air turnover rate was extremely high, and that's important, and that might -- that might be the solution to this problem -- Gravel Gertie question and radon.
MS. MUNN: Actually it wouldn't even need to be very high. If you had any forced air at all through it, it seems it would --
MR. PRESLEY: question. The ambient -- in Nevada, the ambient amount of radon at ground level cannot be too high because of the amount

-- the -- the nature of the soil that's on the surface. It's not like east Tennessee where you have the clay that's full of it. I mean if you go down and put a concrete structure 16 or 20 foot in the ground, you're still not into an area that's going to produce a tremendous amount, I would not think, of -- of radon.

MR. ROLLINS: Could be in the aggregate.

MR. PRESLEY: It could be in the aggregate, but I mean how long -- how long is that going to stay in that aggregate?

DR. ROESSLER: Where did they get the aggregate.

MR. PRESLEY: Yeah.

MR. ROLLINS: Don't know what they used for --

MR. HINNEFELD: I don't think we're going to have any of these answers today. I'm certainly not up-to-date.

DR. ROESSLER: It's still not like Tennessee or Pennsylvania or even Iowa, those kind of states, so --

MR. PRESLEY: So what I've got down here is NIOSH will research the Gravel Gertie problem --

MR. HINNEFELD: Yeah.

MR. PRESLEY: -- and get back to us.

DR. ROESSLER: I'd call it a situation. We don't know it's a problem.

MR. PRESLEY: Yeah, situation.

DR. MAURO: Keep in mind -- I mean once the air turnover rate drops down to let's say one per hour, the radon progeny start to grow in, half-- 'cause the -- it's the half-life of the progeny that determines the degree of working level buildup, not three-day half-life of the rad-- I mean -- speaking -- preaching to the Pope here. Okay.

MR. PRESLEY: All right, that's 12a?

DR. MAKHIJANI: Yeah, I think -- I think we've covered a, b and c. In a and b basically NIOSH accepted the recommendation that we made. They changed the working level assumptions for radon in the tunnels, and c they're going to research.

MR. PRESLEY: Okay. Anybody else have any more comments or questions on 12?

(No responses)

I-131 VENTING

Thirteen?

DR. MAKHIJANI: (Reading) Environmental doses

due to I-131 venting need to be taken into account for non-monitored workers.

And NIOSH is going to do that, so we have -- and going to revise the TBD, give new guidance to the dose reconstructors, so we have no issue with that address.

MR. PRESLEY: Will revise TBD? Okay. Anybody else have any comments -- 13?

(No responses)

INTERNAL DOSE FOR PRE-'67

Fourteen?

DR. MAKHIJANI: Fourteen, (reading) There are no internal monitoring data until late 1955 or 1956; some Pu from then on; some tritium from 1958; plutonium, tritium and mixed fission products from 1961; and full radionuclide coverage established about '67. The TBD does not provide significant guidance for estimating internal dose for the pre-'67 periods for many radionuclides.

NIOSH response of course is that for the SEC period this question has been resolved because NIOSH has granted SEC based on inability to reconstruct internal dose for that atmospheric testing period, but I didn't -- I didn't see a

response to the second part of the comment that would cover '63 to '67. I -- in -- in researching the thing, I -- I must admit I didn't do it deeply enough to know exactly how the thing was phased in, you know, from -- from plutonium and tritium and mixed fission products or whether you have an approach to use for mixed fission product data to bound the doses in some way. But I think -- I think there is -- there is a methodological gap in '63 to '67 that seems to be outstanding still.

MR. HINNEFELD: Yeah, I believe that it's a fact that we have to have an approach for '63 to '67, as we stand today, so I don't know if we say that, but certainly something has to be done '63 to '67, or if we can't develop one, presumably we could extend that period of the class or write a new (inaudible) for a new class. So clearly something -- we need to be able to deal with that, internal doses for '63 to '67.

DR. MAKHIJANI: So I guess that's sort of a pretty big item there.

MR. HINNEFELD: Yeah, that is.

DR. MAKHIJANI: I don't believe there's

anything else on 14.

BLAST WAVE

MR. PRESLEY: Fifteen?

DR. MAKHIJANI: Fifteen, (reading) Resuspension of radionuclides by the blast wave, fractionation of relatively non-volatile radionuclides due to the variability of Cs-137 to -- and the variability of Cs-137 to strontium-90 ratios need to be taken into account for internal dose.

This is -- applies only to atmospheric testing and has been taken care of.

MR. HINNEFELD: Good.

MR. PRESLEY: Is it okay, no problem?

DR. MAKHIJANI: No problem.

USE OF PHOTON DOSE

MR. PRESLEY: Sixteen?

DR. MAKHIJANI: (Reading) Use of photon dose, as done by DTRA, as the basis for estimating internal dose during periods when there are no data scattered -- or scattered internal monitoring data has significant uncertainties. These uncertainties are compounded by data integrity issue associated with NTS.

And I think this has the same response as

before, because it applies to the atmospheric testing period, and that has been taken care of since NIOSH basically re...

MR. HINNEFELD: Yeah.

DR. MAKHIJANI: We -- let me just look at my notes just to make sure I'm not forgetting something.

Yeah, so in -- in our view, the issue's resolved.

INGESTION DOSES

MR. PRESLEY: Okay. Seventeen, ingestion?

DR. MAKHIJANI: (Reading) Ingestion doses need to be better evaluated.

John, in my notes this is your baby. This is -- this is in the context of (inaudible) and I was kind of wondering how I had done this.

DR. MAURO: Oh, well, let me -- let me see the response, I --

DR. MAKHIJANI: Basically this -- this relates to resuspension doses from ingestion from resuspension, and I'll go back to our review just to make sure that I didn't miss something.

DR. MAURO: Okay, I'm looking at your response. You're talking about five milligrams per cubic meter dust loading, and that's up there. In

fact, that's the threshold limit value for nuisance dust, five microns. If that's an assumption that you're going to use to bound the doses -- other words, have that kind of dust loading, airborne -- the ingestion -- and then you talk in terms of -- that would be inhalation. And then ingestion, 50 milligrams per day -- again, that would be an upper bound on the -- recommended by the *Exposure Factors Handbook*. I guess I'm saying that you -- that's -- that's certainly a bounding strategy if that's what you're saying here, without a doubt, to accommodate -- and if I remember, you -- you had pointed out perhaps the -- the doses were still extremely small, in spite of that. Well, then this problem goes away. That's --

MR. ROLLINS: relative importance of ingestion versus inhalation.

DR. MAURO: Yeah. Now the only thing I -- I was -- didn't -- didn't understand is the F-1. There were some words here somewhere, and there may be an error on our part, I'm not sure. When you inhale -- when you run IMBA -- okay? -- and you inhale and the -- the stuff that's in the upper -- upper respiratory tract and it's

cleared through the mucociliary ladder, then it's swallowed -- what's swallowed has -- let's say it's plutonium oxide, or uranium -- what's swallowed has a certain F-1 once it hits the gut. Now my -- if that F-1 any different than the F-1 you would as-- the absorption fraction you would assume if the stuff was actually directly ingested, hand to mouth ingestion? 'Cause here -- I see a comment here that we wrote that -- that I'm not -- when I read it again in your quote where in one case you assume ten to the minus three absorption for actinides and in the other case it's .10 to the minus one.

DR. MAKHIJANI: That's inhalation versus ingestion.

DR. MAURO: Well, that -- that's what I was saying. I mean I guess I was surprised to see that, perhap-- I mean I was surprised -- the absor-- the fraction that's -- in both cases we're talking about what's being swallowed?

DR. MAKHIJANI: No, no, no, no, you're --

DR. MAURO: No? Okay, maybe I understood -- yeah.

DR. MAKHIJANI: -- you're -- if I remember

correctly, we were talking about the relative importance of inhalation versus ingestion --

DR. MAURO: Yeah.

DR. MAKHIJANI: -- and -- and the argument was when does ingestion become more important, despite the fact that the F-1 for ingestion is much less than the F-1 for inhalation. So you've got a lot of elbow room before in-- ingestion becomes important because of the lower F-1, but the point we made in the review was that at some point it does become important and you have to assess that.

DR. MAURO: If there's -- okay, but I -- I guess make sure. You don't make a distinction between the F-1 for what's ingested directly as compared to the F-1 which happen-- which is built into IMBA, what -- that's swallowed from the mucociliary ladder. They're both, for ac-- for actinides, extremely -- ten to the minus three, on that order. I mean it -- I -- I just wanted to -- 'cause that's what confu-- that's -- am I correct? That's about where they are. They're both treated the same. There's no reason to treat them separately. Okay.

I guess my response is, these assumptions that

you would make regarding inadvertent ingestion, 50 milligrams per day -- in fact, the only thing I would want to point out is Jim, when we discussed this matter at Bethlehem Steel, was concerned with the 50 or 100 milligram per day -- I think EPA recommends a default value of 50. I think it's NCRP 123 talks in terms of 100 milligrams per day as the amount of inad-- soil now, this is soil -- inad-- inadvertent ingestion. To me, 50, 100. The -- Jim -- Jim did some looking into this as it applied to Bethlehem Steel, 'cause if you remember, that was one of the six issues that we were struggling with. And one of the places that we came out on is that -- Jim had his approach, which was based on knowing the airborne dust loading of five micron AMAD settles and you predict on that basis, a certain amount settles out on the surfaces, and then a certain fraction of what settles out is ingested. So there was a direct relationship between what's in the air and what's ingested. And our concern at the time was well, there -- there may not be a direct relationship because what's on the ground that you inadvertently ingest may

have gotten there because of spills, because large particles could have directly settled, so as a result -- I'm sorry to re-- re-- this -- I -- I -- I mean it's important that we're consistent with the thinking. Jim made a very strong case that the EPA's *Exposure Factors Handbook* didn't have very good numbers, and I'm familiar with the literature behind that and I have to agree, but it's sort of become the precedent. People use that all the time. Jim felt that, after doing some looking at it, that he had a better approach that he described at one of our meetings, which was a whole different strategy whereby the ingestion model would not be 50 milligrams per day, it'd be something else, something less.

MR. HINNEFELD: Something smaller, right.

DR. MAURO: Smaller, but -- but larger than the number you were coming up with from the .00075 --

MR. HINNEFELD: Right.

DR. MAURO: -- deposition velocity -- so all I'm saying is that whatever approach -- I -- I think that the ap-- when Jim described his approach to us at one of the meetings on

Bethlehem Steel, it was very well-founded in science, to the point where I recommended -- it's got to be published 'cause I think EPA's numbers need to be replaced.

MR. HINNEFELD: Right.

DR. MAURO: That same approach should be.

MR. HINNEFELD: Well, it could. I think -- using 50, which we -- is high, higher than Jim's -- this issue kind of went away anyway.

DR. MAURO: And it -- and it went -- it went away anyway.

MR. HINNEFELD: So you know, we can -- if we can keep it away, we might be more efficient.

DR. MAKHIJANI: Also Jim's -- Jim's argumentation on Bethlehem Steel was that it was indoors --

DR. MAURO: That's true.

DR. MAKHIJANI: -- numbers related to the outdoors, so I don't think you could carry that discussion over. I think this is better --

MR. HINNEFELD: Okay.

DR. MAKHIJANI: -- because it relates to an outdoor situation and that applies to Nevada I think.

MR. HINNEFELD: Right.

DR. MAKHIJANI: So instead of carrying over a -- a thing out of context, we might have more arguments rather than less arguments.

MR. PRESLEY: Okay. So you all agree with 17?

DR. MAURO: We're good. Yeah, we just --

MR. PRESLEY: No problems?

DR. MAURO: -- it was a nuance on 17 that -- as far as we're concerned, the problem's solved.

DR. ROESSLER: Can I ask a curiosity question? What are sterile organs?

MS. BRACKETT: I was -- I was going to ask that same question.

MR. ROLLINS: That's a -- that's a -- that's a -- that's a term I picked up from Ken (inaudible).

DR. ROESSLER: Well, then maybe you ought to tell us.

MR. ROLLINS: I didn't make that up. The last time I saw him, probably one of the last meetings he attended, he used it and --

DR. ROESSLER: And what does it mean?

MR. ROLLINS: It's organs that are not -- that are fed by the bloodstream, that are not open to the atmosphere.

MR. HINNEFELD: Or the GI.

MR. ROLLINS: Or the GI. In other words, non-respiratory, non-GI.

DR. ROESSLER: Oh.

NOTE: Multiple speakers commented simultaneously.

DR. MAURO: Systemic.

MS. BRACKETT: Systemic organs.

DR. MAURO: Maybe he meant systemic as opposed to sterile.

DR. MAKHIJANI: Not in contact with bacteria.

DR. ROESSLER: Well, I'm glad it's -- a lot of you didn't know what that meant.

DR. MAURO: I've never heard of it. I never heard of it.

MR. ROLLINS: Maybe he was slurring, I don't know, but I -- I know he said that.

DR. ROESSLER: I -- I kind of pictured something --

MR. ROLLINS: I said well, that's an interesting way to think about it, but if he says it, I can repeat it.

MS. BRACKETT: I don't know, there's a lot of things he says I don't repeat.

MR. PRESLEY: Sterile and non-systemic, I bet that's what it was. Okay.

Anybody have any more questions on 17?

MS. MUNN: No.

POST-1971 TUNNEL RE-ENTRY WORKERS

MR. PRESLEY: Eighteen?

DR. MAKHIJANI: Eighteen, (reading) Recommended use of TIB-2 for post-1971 tunnel re-entry workers is contrary to guidance in that document, and its scientific validity has not been established. Its use may not be satisfactory even with restrictions, for instance for reactor testing early re-entry workers.

And I think that NIOSH agreed and revi-- will issue revised language for dose reconstructors who observe the limitations for TIB-2, so given that NIOSH is going to address the reactor workers in another context, I think that issue goes away. Eighteen is resolved.

MR. PRESLEY: And NIOSH agrees and will advise -- will revise, not advise. Okay.

Anybody have any more -- anything else about 18?

(No responses)

PRE-1966 BETA DOSE

Make it easy. Nineteen?

DR. MAKHIJANI: (Reading) There are no beta

dose data until 1966; the TBD does not specify a procedure for estimating pre-1966 beta dose. When the approach is developed, the large hot-particle issue will need to be taken into account.

And NIOSH says it is developing an approach by re-reading the original -- oh, it has developed an approach --

MR. HINNEFELD: Well, we're developing time-dependent -- what did we say?

MR. ROLLINS: Photon to beta.

MR. HINNEFELD: Yeah, photon to beta -- the re-reading of the films, I guess that was proposed by what, (inaudible)? Did he still --

MR. ROLLINS: No, no, that was Ron Catherine that proposed that.

MR. HINNEFELD: We haven't committed to doing that. We are...

DR. MAKHIJANI: So this is -- this is kind of an open question --

MR. HINNEFELD: It's an open question.

DR. MAKHIJANI: -- as to how you are going to address skin cancers and things like that for -- between --

MR. ROLLINS: Actually I think the method

that's underway right now, if I'm not mistaken, is the -- using the Harry Hicks data to do the beta/gamma ratios.

DR. MAURO: That would be external, not the stuff that deposits on the skin, and that's certainly appropriate. In other words, that's the stuff that's on the ground or on surfaces, and you want to know the ratio of the photon to beta, you can do that. That's very tractable. But the stuff that falls on the skin --

MR. HINNEFELD: Yeah, the hot-particle issue, which --

DR. MAURO: -- hot particles is a --

MR. HINNEFELD: -- which is part of that NRVU* --

DR. MAURO: Yeah, right, that -- which is part of that, so --

MR. HINNEFELD: -- so it has to be -- you know, both --

DR. MAURO: -- it's within that context.

MR. HINNEFELD: -- both those have to be incorporated into the skin dose value.

DR. MAURO: By the way, do you -- in OTIB-17 doesn't really engage that issue.

MR. HINNEFELD: Yeah, OTIB -- that's part of

our earlier discussion on hot particles.

DR. MAURO: Right, right. I just wanted to point that -- 'cause you mentioned OTIB-17 that -- you know, certain --

MR. HINNEFELD: There's a particular approach in there that -- it's the average dose -- the risk is the average dose over the organ --

DR. MAURO: Right.

MR. HINNEFELD: -- is that really the case, that's part of the whole discussion we need to -- hot particle issue we talked about this morning.

DR. MAURO: Yeah.

DR. MAKHIJANI: I mean I -- I -- in looking at the NIOSH response, I couldn't tell whether -- how it's going to come out. I don't have a sense of what's going to come out of this or -- whether this issue is resolvable or -- neither do you? Is that what you said?

MR. HINNEFELD: So it's research under way.

DR. MAKHIJANI: Yeah.

MR. HINNEFELD: It's research under way, like many of the issues you've raised here today. You know, we don't know today how -- how it'll be resolved because the research is under way.

DR. MAKHIJANI: Right. Right, but on some of them it's clear that there's going to be some technical answer to the question, but on this I couldn't -- I couldn't figure out whether there is one or not.

DR. MAURO: we had talked for a minute or two --

MR. HINNEFELD: Yeah.

DR. MAURO: -- before the meeting that might be helpful. Just coincidentally, I spent about five years looking at the fallout -- BRAVO exposure of Rongolapese, and they had some very serious skin beta dose, and there's a lot of literature and data on real people with real exposures from external gamma, external beta and beta deposited directly on the skin from direct fallout, and beta particles deposited on the skin from resuspension and redeposition on clothing and skin. And the -- the hook -- and there's also clinical data on -- on the amount of exposure and the levels of exposure that caused what type of clinical outcomes from skin damage. If the answer doesn't lie in there somewhere, I'm quite -- not quite sure how you're going to get a hook on this one.

MR. HINNEFELD: Right.
DR. ROESSLER: That's deterministic.
DR. MAURO: Well, yeah, but it's dosimetric. That is -- yeah, there are -- the -- certainly they had -- they had a full range, from reddening up through lesions, bleeding --
DR. ROESSLER: (inaudible)
DR. MAURO: -- pustular lesions, but there is actually -- you know, it's almost like a dosimetric, you could actually make a curve, you know, what -- what doses they received and what were the symptoms experienced. And you rela-- and the doses to skin can be linked back to the external doses. So it's almost as if once you know the external dose you could apply a multiplier that gives you --
DR. ROESSLER: (inaudible)
DR. MAURO: -- yeah, like I say, the external of gamma dose -- I'm not saying you can do it, don't get me wrong, I'm saying that if it doesn't -- if you don't -- if the -- the literature that's -- the body of literature that was developed around that doesn't offer a hook in dealing with the hot-particle beta dose issue, I don't know what does.

MR. HINNEFELD: So you were going to talk with your firm -- right? -- about --

DR. MAURO: Yeah, we -- we have --

MR. HINNEFELD: -- providing that data.

DR. MAURO: -- we have -- yeah, in fact the -- one of the important documented reports, and I can certainly provide you with a copy of it, is Sharpe and Chapman* --

MR. HINNEFELD: Okay.

DR. MAURO: -- and I can provide that to you --

MR. HINNEFELD: Yeah, if you wouldn't mind.

DR. MAURO: -- and -- and any other records, so it's nothing that we did. In other words, we just researched the literature the way you folks would. We didn't do any experiments or anything.

MR. HINNEFELD: All right.

MR. PRESLEY: I've got this marked as an open issue, NIOSH will revise beta dose issue and will issue a procedure for estimating beta dose for pre-1966 time frame?

MR. HINNEFELD: Right.

MR. PRESLEY: Is that -- okay. Anybody else have anything on 19?

(No responses)

Item 20?

NON-USE OF BADGES

DR. MAKHIJANI: I think we've covered 20. This is the -- (reading) appears to have been non--intentional non-use of badges in some circumstances to avoid approaching or exceeding dose limits. Practice may have occurred until the mid-1960s or even extended into the 1970s. NIOSH has not investigated this problem, which raises questions on the integrity of the external dose record possibly into the 1970s, which need to be explicitly addressed.

So I think we covered this under 11b.

MR. PRESLEY: NIOSH will investigate. Okay. Any more comments on 20?

(No responses)

EXTREMITY DOSIMETRY

Twenty-one?

DR. MAKHIJANI: (Reading) TBD does not contain information about extremity dosimetry. Site status of bomb assembly workers is unclear. So their -- TBD is being revised to have external dosimetry guidance. NIOSH has developed it. And bomb assembly workers it says were mostly laboratory -- Los Alamos and

Livermore workers, and so I guess the issue has been punted from NTS to Los Alamos and Livermore TBDs, is that how I understand --

MR. HINNEFELD: Well, I think we could -- we could probably --

I guess my thought is that extremity dosimetry, you know, for our program is only going to matter for people who have cancer on their extremity. You know, that's -- you know, that's -- so there -- that's pretty limited, based on the cases I've seen. You know, you see -- even skin cancers you tend to --you don't tend to see on the extremities. There's a lot of facial skin cancer, but not so much on the extremities, so the extremity being the site -- the origin of the cancer is really pretty rare in our claimant population, so -- and that's the only ones you have to worry about the extremity dosimetry.

Now once you get a case like that, the extremity to -- if you have a whole body dose, the extremity to whole body dose is largely a geometric issue, and it's been measured at a number of sites. You know, people who worked close into material at arm's length -- at arm's

length, like glovebox workers, et cetera, and so the geometric issue is -- is measured in many places. And so since it's already a geometric issue anyway, an adjustment to the whole body badge that could be applied to the extremity if we don't have any extremity data is probably a feasible approach for this. And it -- like I said -- will have very limited applicability because we don't see very many cancers that originate on the -- on the extremities.

MR. ROLLINS: Well, there weren't very many opportunities at NTS --

MR. HINNEFELD: Right.

MR. ROLLINS: -- for large radiation gradients.

DR. MAKHIJANI: Yeah, I think the Gravel Gertie -- the bomb assembly was very, very limited, as I understand it.

MR. HINNEFELD: So that's --

MR. ROLLINS: Consequently I haven't seen much -- in fact, I don't think I've seen any extremity monitoring information at NTS. That's not to say there isn't some, but I haven't seen any, going through the records I've gone through, so --

MR. ROLFES: I've seen some. I can identify a couple of claims.
MR. ROLLINS: Give me the numbers, let me take a look at them.
MR. HINNEFELD: Do you remember if they were laboratory workers or were they, or do you remember?
MR. ROLFES: One was a -- a rad monitor, so --
MR. HINNEFELD: Okay. NTS rad monitor?
MR. ROLFES: Yep.
MR. ROLLINS: I'd like to look at that one.
MR. PRESLEY: Did they hang it on the wall or --
MR. ROLFES: It's claim number 3367.
MR. ROLLINS: 3367?
MR. ROLFES: Yeah.
MR. PRESLEY: -- where they would hang the monitors on the wall in the rooms or...
MR. ROLFES: Have I seen any? No, I haven't --
MR. PRESLEY: No --
MR. HINNEFELD: What -- what extremity dosimetry did you see --
MR. PRESLEY: Yeah.
MR. HINNEFELD: -- was it on a wrist or a ring or what?

MR. ROLFES: I believe it was a wrist badge.

MR. HINNEFELD: So extremity would be either a wrist or a ring badge.

MR. ROLLINS: Did you see a remarkable difference between the wrist and the whole body?

MR. ROLFES: Yeah, this -- this individual had about maybe one and a half rem on -- on his wrist badge and maybe 600 millirem on his whole body badge.

MR. PRESLEY: So 21, everybody's in agreement, no problem?

DR. MAURO: This -- this rela-- relationship you just described, but that's gamma.

MR. ROLFES: Yes.

MR. PRESLEY: All right, no problem? Okay. Comment 22?

NEUTRON DOSES

DR. MAKHIJANI: (Reading) There are no neutron dose data until 1966, and partial data until 1979. TBD assertion that neutron doses during atmospheric testing were negligible has not been substantiated and may be in error for some workers.

And here I didn't agree with the NIOSH response

in regard to the distance because Barton Hacker's official history does indicate there was some tension in the AEC, which was worrying about safety, and the DoD, which was wanting to push personnel closer for their own operational sort of readiness reasons, presumably. And I'm not -- I'm not clear there -- there's kind of a procedural answer to this -- to this question in the way that -- that NIOSH has suggested. And the -- the response in the post-1960 -- where am I? Yeah, it's not clear to me that six -- six kilometers was actually the limit in practice. I think in some -- in most -- some or most tests, it might actually have been, but maybe a look at Hacker's archive, or an interview with him, might be useful because he does -- he does mention this -- this problem of the -- the tension between safety and -- and the DoD.

MS. MUNN: There's -- there's a little problem, I think, in relying -- in -- in asking our technical people to go to journalists and historians for advice here, and that's probably a dreadful thing for me to say because I know, being an Oregon State graduate, he's a past

member of our faculty -- but I didn't spend much time in the history department, I was kind of busy over in the rad center. But I guess -- there's -- there's a -- I'm not saying one must ignore that -- that at all, but what I'm saying is, asking our technical people to rely on -- on non-technical reports for their understanding of what transpired on a site may create some dissonance in how we're viewed as asking our -- our technical folks to proceed. Perhaps I'm being overly sensitive to that, I don't know, but you understand what I mean -- mean when I say that.

DR. MAKHIJANI: Oh, I -- absolutely. Yeah, Ms. Munn, I absolutely understand, and the suggestion wasn't that NIOSH should go to Barton Hacker for the answer, and that's partly why I pointed to his archive. I have looked at his book and he -- he was given -- he was sort of given the charge of writing the official history, so he -- he has looked at the documents, including the classified documents, so his archive is very substantial. And in this matter, which is not a dosimetry matter but, you know, where were the troops stationed

and are there documents that would help us resolve this question, and there may be documents that he might be able to point to. Instead of having a month-long research project to arrive at your own conclusion, you may have day-long research project.

MS. MUNN: If there's a bibliography of raw data, that's one thing. But if -- if we're not talking about references to raw data, then there's -- it's -- it's -- if a historian had access to the data, then certainly NIOSH and ORAU have access to the data. I guess that's my point.

DR. MAKHIJANI: Yeah, and that was the suggestion, basically. Anyway -- and so far as I know, Mr. Hacker's history -- Dr. Hacker's history does not contain the numbers and -- it contains a reference to this problem, which is how I interpreted when I read it and referenced it, and so the suggestion is not to accept what's there, 'cause there's no -- no technical information there anyway. But if he has some raw data that might resolve this issue -- otherwise, maybe it cannot be resolved.

MR. HINNEFELD: Well, DTRA might have it. DTRA

might know where those troops were. I think they know. I think.

NOTE: Multiple speakers commented simultaneously.

MR. ROLLINS: Troops are not covered under this program.

MR. HINNEFELD: Troops are not covered, but there's a question of where the radiation monitors, you know, there with the troops, did they look for hot spots as the troops marched in. At least Brady in his interview said --

MR. ROLLINS: Well, looking for hot spots would not be -- they -- they would not necessarily be there when they first --

DR. MAKHIJANI: All the radiation --

MR. HINNEFELD: Well, right --

MR. ROLLINS: This is a neutron issue --

MR. HINNEFELD: -- neutron issue the first --

MR. ROLLINS: -- first only.

MR. HINNEFELD: If -- if the practice was this, if the practice was the troops were hunkered down close to the blast, and then right after the blast they marched them down to ground zero -- just for psychological testing, so to speak -- and if there was a monitor that preceded them to look for particularly hot areas before

they started out, that monitor would have to be in position relatively close to the troops at the blast. It may be one person, maybe one or two people. They may not have been AEC monitors. Maybe DoD took their monitors, but Brady did say that -- Brady's interview said that they did it, as I recall.

NOTE: Multiple speakers commented simultaneously.

DR. MAKHIJANI: He -- he himself was in the -- he himself was in the aircraft that went through the mushroom clouds -- on one occasion, at least -- and so I raise the issue only in that context because -- and I don't have a definitive answer to this. It's a question.

MR. ROLLINS: -- there when the burst occurred, probably throw it away in six months. It does funky things to airplanes when that blast kind of flies back.

MS. MUNN: -- all that electronic stuff.

MR. ROLLINS: It's turbulence.

MS. MUNN: Yeah, I know --

MR. PRESLEY: What are we going to do now for 22?

MR. HINNEFELD: We'll try to -- we'll -- we'll look for some evidence, either with Hacker,

with DTRA, you know, presence close by, try to get some additional information about monitored, I suppose. And again -- I mean we said less than a millirem at six kilometers, right? Isn't that what we said? Of course there's -- at what point does -- you know, so if it's less than a millirem at six kilometers, then at three kilometers it'd be four times as high as that, so how close could they have been and really is there going to be -- it may be -- it may just go away 'cause if they were never closer than three kilometers, and so you're at four --

DR. MAKHIJANI: Maybe a sample calc--

MR. HINNEFELD: -- four millirem .

DR. MAKHIJANI: That might be a good approach if, you know, there's no easily-available information, then the issue can be rendered kind of moot.

MR. PRESLEY: Going to look for new information on neutron dose. Right?

MR. HINNEFELD: Yeah.

DR. MAURO: Then do a -- demonstrate that the issue is moot, based on dose -- dose -- scoping calculations.

MR. PRESLEY: That the info is what did you say?

DR. MAURO: That the issue is moot, based on scoping dose calculations, 'cause one way or the other you could put this to bed.

MR. PRESLEY: Okay. Item -- anybody anything else on 22?

(No responses)

Okay, comment 23?

SOIL DATA

DR. MAKHIJANI: Here we're back at -- on resuspension. (Reading) Adequacy of soil data for estimating resuspension doses needs to be evaluated, for instance in relation to hot spot detection and plutonium soil data.

MR. PRESLEY: We've beat that to death.

DR. MAKHIJANI: I think we've covered -- covered this already.

DR. MAURO: It's subsumed in the previous ones.

MR. PRESLEY: That's the first time I've heard that.

(Pause)

Okay, covered previously. Okay, 23, anybody else got anything on 23?

MS. MUNN: No, it's been subsumed.

MR. PRESLEY: There's two parts, we've got 23a, 23b, which most of the area (inaudible).

MS. MUNN: Uh-huh.

MR. PRESLEY: 23b, same thing?

MS. MUNN: Uh-huh.

MR. PRESLEY: Okay.

MS. MUNN: It's even more likely that they were nowhere near the hot spots.

DR. MAKHIJANI: This is your issue of spatial coverage, John.

DR. MAURO: It's -- yeah, this -- I mean we're getting a little bit more into the granularity of the issue where we're talking about the way in which measurements are made -- it looks like in situ measurements made, and the coverage that you get out of putting in a jelly -- you know, and start to try to characterize and -- and is that level adequate. And so -- it is very much in keeping with everything else we've talked about about the level of resolution really needed in order to do a good job in reconstructing doses to wor-- to workers at the site. So I would say it -- it also is part and parcel to the previous, but it probably worth -- when -- when it's developed and discussed,

within the context of this particular mode of measurement, you know, it's relevant. Namely these -- the reference we made to is about a -- each reading would be about a ten meter by ten meter square. I'm not -- no, no, I'm sorry. Each -- you only pick up 3.5 percent of the area -- I mean that's the issue -- by making these kinds of measurements. Is that good enough for you -- for a person to -- to use as the basis for doing a dose calculation.

MR. HINNEFELD: Well, certainly, you know, with respect to this, I -- I guess I kind of have mixed feelings on this. I mean there are -- there are other data besides these intermittent sampling that would kind of describe the distribution, you know, fly-overs and things like that --

DR. MAURO: And that might be -- and that might be the answer.

MR. HINNEFELD: -- which kind of showed a pattern of, you know, isopleths and -- and so there's sort of other characterization besides these bit by bit samples.

DR. MAURO: Yeah, so collectively all the information may actually create the picture you

need.

MR. HINNEFELD: It -- it may -- and it may work out, and -- and again, resuspension of areas and -- areas that sound pretty big probably don't become very -- you know, probably don't have a lot of really granularity to the outcome when you're talking about resuspension. You think about a six mile per hour wind that's blowing at about nine feet per second, so it'll cross a 500-foot grid in about a minute.

DR. MAURO: So it's an integrator.

MR. HINNEFELD: Yeah. So you're essentially integrating all the -- you know, the contamination as you resuspend and distribute it on the wind --

DR. MAURO: In principle, I think that I would agree.

MR. HINNEFELD: -- you're essentially averaging --

DR. MAURO: You're averaging over a large area, so...

MR. HINNEFELD: -- once it gets airborne, yeah.

DR. MAKHIJANI: Good point.

MR. PRESLEY: 23b then?

DR. MAKHIJANI: I think 23b is covered under

the previous.

DR. MAURO: Yeah.

MR. PRESLEY: So you want to skip 24?

HIGH-FIRED OXIDES

DR. MAKHIJANI: (Reading) Presence of high-fired oxides resulting from atmospheric weapons testing and reactor testing needs to be investigated.

And NIOSH is developing guidance, and we're okay with that.

DR. MAURO: It's a done deal.

UNIDENTIFIED: (inaudible)

DR. MAURO: That's for tomorrow.

MR. PRESLEY: That's exactly -- I'm going to put down here --

DR. MAKHIJANI: This issue has been dealt with in the context of Rocky Flats and NIOSH is going to reflect that in its NTS (inaudible) and we're okay with that.

MS. BRACKETT: Well, I -- is this two separate issues? I mean there's the issue of how to assess an intake of super S or high-fired oxide, but then I believe part of this question is are there high-fired oxides present that need to be addressed, so that --

DR. MAURO: I think -- I think the an-- in dealing with this, the issue might very well be here also, and how it plays out -- in other words, we very much have developed how it plays out at Rocky, and its implications and how to deal with it so they can do dose reconstructions. The degree to which this issue is at play here and how to deal with it in light of the protocols that are laid before us, probably needs to be addressed -- and -- and -- and to the extent to which the precedent established by Rocky is helpful here, great. It may turn out the issue is not very significant here at all.

MS. BRACKETT: Is that -- I just meant that, you know, addressing it tomorrow doesn't cover it here, because --

DR. MAURO: No.

MS. BRACKETT: -- the concern is --

DR. MAURO: No.

MS. BRACKETT: -- was it present and do we actually have to do something --

DR. MAURO: No, the -- yeah, I -- the only point being is that you will stand on the shoulders of the work that has tomorrow --

MS. BRACKETT: Right.
DR. MAURO: to be -- be held to be responsive to this.
MR. HINNEFELD: Yeah.
DR. MAKHIJANI: I -- I agree with Liz that there is a piece that needs to be done regarding reactor testing and atmospheric tests. Atmospheric tests, in a way, only -- the only way that it enters in is in the resuspension because --
MR. HINNEFELD: In later years.
DR. MAKHIJANI: In later years.
MR. HINNEFELD: Yeah, because you want to be doing the internals for the atmospheric testing period anyway, so resuspension of that material and is it high-fired -- yeah, okay.
DR. MAKHIJANI: And then you have the reactor --
MS. MUNN: Do we know that --
MR. HINNEFELD: (inaudible)
MS. MUNN: Do we know that --
MR. HINNEFELD: (inaudible)
MS. MUNN: Do we know that?
MR. HINNEFELD: Well, today I don't know.
DR. MAKHIJANI: (inaudible) reactor.

MR. HINNEFELD: There's been a lot of studying out there and somebody (inaudible) attention to it.

MS. MUNN: Well, yeah, you'd think somebody would know. I would never have thought. I wouldn't have thought --

MR. HINNEFELD: You get it high enough fired, it's glass.

MS. MUNN: So surely somebody's done something that would tell us, but who where.

MR. HINNEFELD: That's the problem, you've got a lot of studies --

MR. PRESLEY: Going to revise the Technical Basis Document down the road sometime to identify this question about high-fired plutonium.

DR. MAKHIJANI: Whether high-fired oxides were generated.

MR. PRESLEY: Okay.

MS. MUNN: Yeah.

MR. PRESLEY: Okay.

DR. MAURO: And -- and it does have a ripple effect. I mean the degree to which it's determined that yes, they were, then it bears on the -- let's say the validation of the

resuspension model, as you had mentioned earlier, regarding the bioassay for plutonium because it does affect how that -- other words, I think that once it's determined that yes, we are dealing with high-fired with the plutonium or uranium or whatever, transuranics, and its implications regarding post-'62 dose reconstruction, including the use of the data as validation for some of the resuspension models -- you know, it needs to be embraced.

MR. HINNEFELD: Okay.

DR. MAURO: But there -- the science upon which these -- the -- these -- the answers lie will emerge -- has emerged from the work that was done on Rocky. In other words, understand the kinetics and what a kin-- what assumptions or adjustment factors need to be applied. And then if you do have that problem here, apply them and see what the implications might be.

MR. HINNEFELD: Right.

MR. PRESLEY: It's going to apply to plutonium oxides. Right? Okay.

Number 25.

SITE EXPERT INTERVIEWS

DR. MAKHIJANI: (Reading) NIOSH documentation

of site expert interviews is inadequate, and crucial site expert interviews have not been performed or performed in an incomplete manner, notably Barton Hacker and William J. Brady. Potentially critical archives and documents have not been reviewed, including the Naval Radiological Defense Laboratory and Barton Hacker primary reference materials.

So there was a little bit of a surprise for me in the response here in that NIOSH says they documented almost five hours of discussion with Mr. Brady in early 2004. We were aware of a contact between NIOSH and Mr. Brady and thought we had the full information about the one question that was put to him, and we published that. But we have seen nothing on this five hours of interview or its documentation, and he certainly didn't remember it when I talked to him -- asked him about it, I believe more than once.

MR. ROLLINS: We have that -- we have that documented.

MR. HINNEFELD: Yeah.

MR. ROLLINS: It wasn't me, it was some of the people on our team.

MR. HINNEFELD: Yeah.
MR. ROLLINS: And they've -- they've documented that.
DR. MAKHIJANI: Could we request --
MR. PRESLEY: Is it --
MR. HINNEFELD: Can you pull it up?
MR. PRESLEY: Has it been redacted or -- or checked for classification where it might be --
MR. ROLLINS: I don't -- I don't -- I'm not -- I'm not certain exactly what records were kept there as far as those conversations are concerned except -- except private communication records were -- were kept that yes, we went and talked to Mr. Brady and we talked about these issues. Probably -- probably did not take as good notes, looking back on it now, as they should have. But I wasn't involved in those discussions, but these -- there were several people on our team that had a personal relationship with him and they -- they asked to speak with him basically not as a -- you know, just as a personal relationship sort of thing and they -- and they talked about these sorts of things while they were there, so -- you know, probably couldn't have gotten to

talk to him under -- under other circumstances. My understanding his health was not very well -- very good and he wasn't going to talk to just anybody, but he knew these people from way back so he agreed to speak with them.

MS. MUNN: They may have a good memory that can provide some additional notes that might -- might be -- might make --

MR. ROLLINS: Well, there's more -- there's more in there as here --

MS. MUNN: Right.

MR. ROLLINS: -- it's just not here. Okay?

DR. MAKHIJANI: Okay.

MR. PRESLEY: Make sure -- can we ask that that be provided to SC&A? Before something like that (inaudible) go out (inaudible) be checked for classification, please?

MR. HINNEFELD: Classified?

DR. MAKHIJANI: Certainly, I --

MR. HINNEFELD: When does the conversation occur.

MR. ROLLINS: If we -- if we -- if we -- if we formalize the notes of the discussion -- if I understand the question correctly, if we formalize the notes of the discussion with the

various principals at the NTS that that -- that piece of information must go through a derivative classifier before it's given to the Board, and I happen to know one at NTS that I'm sure would be more than happy to do it.

MS. MUNN: That's good.

DR. MAKHIJANI: Mr. Brady was certainly -- I don't know him, I've never met him, but he was certainly very gracious with me and -- and spent quite a lot of time with me. I -- you know, he -- he is unwell and has certain restrictions about how much and when he can talk and so on, but he was -- he was really -- he gave a lot of his time to me in reviewing the notes and -- and in spending time with me on the phone. But the broader point that came up in this context was exactly this question of documentation of NIOSH interviews because when we talked to NIOSH during -- during the process of developing this review, one of NIOSH's comments was, you know, that they take down what's relevant. And that didn't seem to strike us -- that is, I guess -- Kathy DeMers and I are the main ones that are doing the review. There are -- or interviews, and there

are others who were involved, but we normally try to write down the highlights of whatever the person is saying and decide on its, you know, relevance in terms of what we think is relevant independently of that and let the interview stand on its own because sometimes you can't tell the relevance of something until you've finished your research. And it doesn't -- it doesn't seem -- somehow -- the larger comment here in regard -- aside from the specific person involved, seemed to be that the interview should be taken for what it is. I mean if you respect the person enough to interview them, then you have to -- you have to represent what they said and not what -- what you want to write down for what they said. And it's a more generic question, but it came up very sharply during -- during this particular review.

MR. PRESLEY: I'm going to mark this as an open issue with a notation on it that NIOSH will provide interview data to SC&A, and then we'll be looking for your comments back.

MS. MUNN: Do you find the other interviews that were done as being applicable or adequate?

DR. MAKHIJANI: We -- we did look -- we did look at some of the other interviews, like the ones that were done with Martha DeMarre, and some of it was very useful --

MS. MUNN: It would appear to be very extensive.

DR. MAKHIJANI: Yes, and some of it was useful. The one -- the one thing that kind of stood out was this -- this problem with the badges that was -- was missing from the NIOSH record, which came up in our interview -- in independent interviews that we did, and it came up despite the fact that we didn't have any particular personal relationships or history with the site or any reason for people to have or not have confidence in us. It was just -- it just came up, and it was documented by us at face value. But it didn't seem to be recorded anywhere in the NI-- although NIOSH did really do an extensive amount of work in relation to drawing out NTS site experts, and I believe the TBD did benefit from that. We did look over it and I think NIOSH did a lot of good work. I just think -- maybe it came up and it wasn't documented, maybe it didn't come up, I don't

know what happened. That was a very big and important gap. It should have come up. But I personally wasn't aware of this issue. It just -- it came up in the course of the interview from Mr. Brady, and similarly I believe it came up when Kathy and Tom Bell were interviewing Martha DeMarre and her colleagues independently. I -- I don't believe they were aware of the issue.

MS. MUNN: Well, I -- I thought everyone was aware that every site that existed had people who maintain that they did that, or were told to do that. That's a -- that's -- I mean that -- it's -- it's no --

DR. MAKHIJANI: I will look over my notes, but I don't believe, for NTS anyway, that I -- it was a surprise to me that the principal health physicist himself said that he did this thing.

MS. MUNN: Yeah, that -- that surprise -- it surprises me, too, because -- but it's indicative of some -- some other experiences that you hear these kinds of reports from almost all sources. So we shouldn't be -- I guess what I'm saying is it shouldn't be surprising that you hear the report. Whether

or not the -- the practice is something that can be confirmed or not is a different thing, but to hear the report is no surprise.

MR. PRESLEY: Well, we're down to -- according to my computer, this thing says 39 of 39. Anybody have any more comments on any of the -- on the comments that we have, concerns or issues that they want to address, any of these -- Mark, do you want to add anything?

MR. ROLFES: No, not at this time. Thanks, Bob.

MR. HINNEFELD: Now Bob, you took a note -- did you take a note with each finding in terms of a resolution pathway, is that what --

MR. PRESLEY: Yeah, what I did is I did comment -- just going by each and then -- and then took a short thing of what we need to do.

MR. HINNEFELD: So you're going to share that with all of us --

MR. PRESLEY: Yeah.

MR. HINNEFELD: -- then so we all work from that same list, or at least have us --

MR. PRESLEY: Now what I --

MR. HINNEFELD: -- take a look at it.

MR. PRESLEY: -- plan on doing is -- is doing

my comments and sending it around and let everybody add theirs to it.

MR. HINNEFELD: Okay.

MR. CLAWSON: I have -- I have one question. We kept talking about the reactors down there. We only dealt with the rocket motor reactors. You know, there were others down there and they -- they blew off --

MR. ROLLINS: The propulsion --

MR. CLAWSON: -- the --

MR. ROLLINS: The propulsion motors were mentioned in here, too.

MR. CLAWSON: Yeah, the propulsion motors. Did -- did they mention the rover reactor that they blew up?

MR. HINNEFELD: Is that in the site profile?

MR. CLAWSON: Did that change anything with the graphite? I know they spent over four to five months cleaning up the desert after that, so everything -- I just --

MR. ROLLINS: That's where -- that's where a lot of people got the doses that were pushing the limits.

MR. CLAWSON: Okay. Well, I just -- 'cause I worked on the other end of that so knowing

what came through with that and I understood there was quite a bit, but I just kind of kept hearing the propulsion and I just wanted to make sure the rover --

MR. PRESLEY: The rover was a propulsion.

MR. CLAWSON: Yeah.

MR. PRESLEY: You -- I mean that's -- I presume that that's what they -- they called propulsion, which would encompass -- to me it would encompass the -- the mishap or whatever you want to call it when -- when we blew rover sky high out there.

MR. HINNEFELD: They might call that a mishap.

MR. PRESLEY: It was.

DR. MAKHIJANI: I think -- I think Gene mentioned cleanup workers in relation to the hot particles when -- when we talked about it, which was a new one for me, and I have it in my notes.

MR. PRESLEY: I'm glad that happened out there and not in Oak Ridge. I don't know whether you all are aware or not, but we did have something similar to that that they ran on Sundays in Oak Ridge for a few years at the tower/tire* shielding reactor. You could hear it. I -- we

lived within about 12 miles so we could hear that thing fire up. They would fire it up on Sundays. Everybody would be away from ORNL X-10 facility. They'd fire that thing up and you could hear it roaring in Oak Ridge. Nobody knew what it was for years.

MS. MUNN: It was an adequate propulsion system was what it was.

MR. PRESLEY: Inadequate propulsion system, is that what you said? That's right -- a huge one, at that.

Lew, have any comments?

DR. WADE: Well, not technically, but procedurally I think we need to look at sort of a path forward. If you look at sort of milestones, there are a number of sort of -- there's lots of small issues and some major issues were collected. I mean I tried to keep a running list of what I thought the major issues were. You had the hot particle issue. We have an issue on oro-nasal breathing. There are many issues surrounding resuspension. You have this issue of the covered badges and a mechanism for dealing with that. You have issues of internal dose from '63 to '67. You

have the need of a coworker model or some mechanism for dealing with external dose prior to '57. You have the post-1966 beta dose that we have to deal with. We have issues about the presence of high-fired oxides.

MR. HINNEFELD: I believe it's pre-'66.

MR. PRESLEY: Pre-'66.

DR. WADE: Pre-'66?

MR. HINNEFELD: Pre-'66 beta dose, as opposed to (inaudible).

DR. WADE: Ah, pre-- I'm sorry, pre-'66 beta dose.

So those are issues. The only reason I run down that litany is as we look at a path forward, the Board will have a call on August the 8th, and certainly the Chair of the working group can report out, you know, status and significant issues. There's a Board meeting in Nevada in the middle of September, so I think the working group needs to get a sense from NIOSH and ORAU and SC&A as to the pace of the work here, and then the working group needs to decide when it wants to engage again. And I think those are issues for you to talk about now as we look at sort of the path forward. I

guess it would start with NIOSH, who I think has the biggest list of, you know, when are you going to be ready to -- to share in a significant -- in a significant enough volume that would warrant the working group coming back together.

MR. HINNEFELD: Well, given the number of issues and if we're -- and the -- well, let me think about this for a minute. We have a number of items where we said we will amend the site profile, we agree we're going to amend --

DR. WADE: Right.

MR. HINNEFELD: -- so those are -- are those ones we're pursuing in general but we're --

DR. WADE: Right.

MR. HINNEFELD: -- you know, some of the ones you've mentioned, we've said that.

DR. WADE: Right. I think really it's where there's intellectual lifting to do. I think that's when the working group needs to engage.

MR. HINNEFELD: Okay, there's the resuspension issue that we talked about that we have some issue to deal with. It's not clear -- it's not clear to me that we will have substantial -- substantial progress toward all the things we

have to be -- have to be done by the September Board meeting. I think that would be too optimistic. In order to make substantial progress, we'd -- on all the things, including the things we -- where there's agreement, you know, the TBD to write. I guess I'd like to get a better sense of outlining and -- with -- with the ORAU team in terms of the task, and maybe provide some feedback and proposed schedule when we think some of these issues where we're still in discussion, we didn't necessarily agree right off, where we think -- you know, when we think we can come back. I hate to predict sitting here and, you know, I don't know how free Gene is to commit his own time. He has a management structure that I'm not a part of that essentially gives him his priorities, so it's a little difficult for us to do that in this meeting, but we should be able to gather relatively quickly and provide information to the working group before -- maybe before the August 8th phone call, but that's pretty close, with some ideas about when -- some issues we might be able to deal with forthwith for a few things, for the -- the ones

where we're still -- where we didn't necessarily line up and agree today. So you know, maybe a time in --

MR. PRESLEY: I can see us having our -- our comments ready possibly by August 8th.

MR. HINNEFELD: Right.

MR. PRESLEY: On the -- you know, or the issue comments. But as far as what you all have to do between August the 8th and September the -- week of September 18th --

MR. HINNEFELD: I don't know that we'll be able to make much progress before the next Board meeting. August --

MR. PRESLEY: I hate to say it, but all I can see maybe is a -- is a report at the --

MR. HINNEFELD: 'Cause August 8th is less than two weeks away.

MR. PRESLEY: Right, and I'm -- I'm busy as I can be, too, and I know you all are, 'cause I -- I'm going to try to sit down tonight and push these things together and maybe if y'all are going to be here tomorrow or something --

MR. HINNEFELD: I'll be here Thursday.

MR. PRESLEY: Okay.

MR. HINNEFELD: Are you going to be here

Thursday?

MR. PRESLEY: Yeah.

MR. HINNEFELD: Okay.

MR. PRESLEY: If nothing breaks I'll give them to you and we --

MR. HINNEFELD: Okay.

MR. PRESLEY: -- cuss them and discuss them.

MR. HINNEFELD: And then probably between the August 8th phone call and the September 21st meeting, we may be able to come out with a schedule for when we can deliver our product that we committed to on some of these issues that are in -- where we're still in discussion, where we haven't converged.

DR. WADE: There I think --

MR. HINNEFELD: Somewhere in that --

DR. WADE: -- I think it's a reasonable path forward.

MR. HINNEFELD: -- time frame we could maybe --

MR. HINNEFELD: So the -- a summary of what happened here will be shared with all. You'll go back and caucus and look at when you will be able to produce intellectual product that will be worthy of bringing the working group back together. Once you share that information,

John will have to look at how long it will take his people to get their mind around that. So all of this should be aiming at setting a time for the working group to come back together with sufficient new information to justify that happening. And while we can't set that date today, I think we need to be reali-- we need to realize that we need to be pushing for that because, again, we all know what happens if we don't keep our focus; then it's easy to -- to get distracted and -- so I -- I would think that would be a reasonable course of action. And then Robert, you can set the time for the next working group meeting when this sort of comes together.

MR. PRESLEY: Yeah, I would -- you know, I'm going to be honest with you. I'd love for us to vote on this thing while we're at the Test Site -- I mean we're -- we're at NTS. But with what we did today, I --

MR. HINNEFELD: We have enough action that we've agreed to do, you know, just not even counting the things where we're still -- we have enough stuff that we've agreed to do that require research that I don't see us having a

resolution --

MR. PRESLEY: Right, this last item --

MR. HINNEFELD: -- in front of the working group at the time --

MR. PRESLEY: -- on here I think is going to be -- that's going to be one of your long-wait items is trying to pull all that stuff together.

DR. WADE: There again, this is a site profile review, so there doesn't have to be a formal vote. I mean I --

MR. HINNEFELD: Right.

DR. WADE: -- but I think we need to continue to make progress to -- to see that these issues are -- are raised, debated, resolved, closed, and then we work our way down to the tail of the curve. We made great progress today. I just think we want to keep some sense of urgency to it.

MS. MUNN: Maybe we could consider at least a working group phone call toward the end of August, try to --

MR. HINNEFELD: Well, we can aim for that. Again, I -- I really -- I need to caucus with management on the ORAU side to make sure that -

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MR. PRESLEY: It doesn't take long to get a working group phone conversation going. We can -- you know, if they get enough done, I don't see a problem with that.

MR. HINNEFELD: And we can share -- I would assume if we have a product we can share with the working group and SC&A at any time --

MS. MUNN: Oh, yeah.

MR. HINNEFELD: -- we'll share it. You know, when we have a product together, we'll share at that time.

MR. PRESLEY: We could always meet in Vegas the Friday before the 18th.

MS. MUNN: Oh, yeah, right.

DR. ROESSLER: Government rate, no less, over the weekend.

MS. MUNN: And we could fix ourselves over the weekend, couldn't we?

DR. WADE: But I think great progress has -- you -- you did extremely well today. I think the discipline of the discussion was fine. I mean I think you've made great progress on a number of issues. We just want to stay with it.

MS. MUNN: Yeah, if we could -- if we could aim for a phone call, say the week of August 21st sometime, then we'd at least have something on our schedule for --

MR. PRESLEY: August what did you say?

MS. MUNN: Oh, I --

MR. HINNEFELD: What do you want to accomplish on the phone call?

MS. MUNN: Well, accomplish on -- hopefully on the phone call, if there are any additional issues that you -- that have been encountered or that -- that still are -- are really thorns in the side for SC&A --

MR. HINNEFELD: Okay.

MS. MUNN: -- that we can at least get a sense of how things are moving along, and if there's any -- any major item that is going to take more than the kind of discussion that's gone on here today, in order for everyone to be aware of where we're going.

MR. PRESLEY: August 21st, is that what you said, that week?

MS. MUNN: That -- sometime that week seems to be --

MR. PRESLEY: Okay, it'll have to be the first

part of the week.

DR. WADE: Well, we have a -- there is another working group meeting on the 22nd -- August -- the week of August 21st. Yeah, the Savannah River Site's meeting on the 22nd. You know, we could try -- would the 23rd work for you, Wednesday?

MR. PRESLEY: Yeah.

DR. WADE: How would the 23rd be?

MS. MUNN: Phone call, tentatively.

DR. WADE: Pick a time that's convenient for westerners as well as easterners.

MS. MUNN: Thank you so much.

MR. PRESLEY: How about 9:00 o'clock?

MS. MUNN: Yeah, right -- again.

DR. WADE: What do we say, 11:00 or 1:00 -- 11:00 a.m. or 1:00 p.m.?

MR. PRESLEY: Why don't we do it at 1:00? That gives everybody time. What do you think about that, 1:00 in the afternoon?

MS. MUNN: Perfect for me.

MR. CLAWSON: 1:00 our time or yours?

MR. PRESLEY: No, 1:00 -- 1:00 eastern standard time, which would be --

MS. MUNN: 10:00 my time --

MR. PRESLEY: -- which would be 10:00 you-all's time.

MS. MUNN: -- 11:00 your time.

MR. PRESLEY: That way we get lunch out of the way. The majority of the people in this part of the -- are in this part of the country and that gets your lunch and stuff like that out of the way.

DR. ROESSLER: August 23rd?

MR. PRESLEY: Yes, August 23rd, 1:00 o'clock p.m. eastern standard time.

DR. WADE: Eastern daylight time.

MR. HINNEFELD: Eastern -- eastern daylight time.

MR. PRESLEY: There you go.

DR. ROESSLER: It's okay, I can eat on -- while I'm on the phone.

MR. PRESLEY: We'll shoot for that.

DR. WADE: With an understanding that call will be a -- sort of an update, and maybe just to get a status as to, you know, whether or not there are significant issues that warrant, you know, the working group getting together to work or whether it appears to be as we imagined it was today.

MS. MUNN: As we hope it will be.

DR. WADE: It's quite reasonable.

MR. PRESLEY: I think I need a new Blackberry.

DR. WADE: Is there anybody on the telephone line who'd like to make a comment, ask a question, an observation?

(No responses)

Okay.

MR. PRESLEY: That you all very much.

DR. WADE: Thank you, sir, for your leadership.

MR. PRESLEY: A great day.

(Whereupon, the meeting was adjourned at 3:25 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 July 25, 2006; 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 13th day of August, 2006.

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STEVEN RAY GREEN, CCR

CERTIFIED MERIT COURT REPORTER

CERTIFICATE NUMBER: A-2102