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CENTERS FOR DISEASE CONTROL
NATIONAL INSTITUTE FOR OCCUPATIONAL
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ADVISORY BOARD ON RADIATION AND
WORKER HEALTH

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WORK GROUP ON NEVADA TEST SITE

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WEDNESDAY,
DECEMBER 3, 2014

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The Work Group meeting convened in the London Room of the Cincinnati Airport Marriott Hotel, 2395 Progress Drive, Hebron, Kentucky at 9:00 a.m., Bradley P. Clawson, Chairman, presiding.

PRESENT:

BRADLEY P. CLAWSON, Chairman
WANDA I. MUNN, Member
GENEVIEVE S. ROESSLER, Member*
PHILLIP SCHOFIELD, Member*

ALSO PRESENT:

TED KATZ, Designated Federal Official
ROBERT BARTON, SC&A*
MARK FISHBURN, ORAU Team*
STU HINNEFELD, DCAS
JENNY LIN, HHS*
ARJUN MAKHIJANI, SC&A
MARK ROLFES, DCAS
GENE ROLLINS, ORAU Team*
MATT SMITH, ORAU Team*

*Present via telephone

T-A-B-L-E O-F C-O-N-T-E-N-T-S

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

(9:20 a.m.)

MR. KATZ: This is the Advisory Board of Radiation Worker Health, the Nevada Test Site Work Group. Welcome, everybody. There are materials for this meeting and those are, including an agenda, they're posted on the NIOSH website under the Board section under meetings, today's date.

So people on the line who want to follow along with documents that are addressed during this meeting should be able to find them there if you want to read along with us. Okay. And then, Phil, you should be, you should have Live Meeting for you and, Gen, for you too.

MEMBER SCHOFIELD: I do.

MR. KATZ: Okay, very good. Okay. Since this is a sites-based meeting, please, everyone, speak to conflict of interest as well when we go through roll call and let's get going, beginning with the Chair.

(Roll Call)

MR. KATZ: Okay then. Brad, it's your meeting. Let me just remind folks on the line to mute your phones when you're not speaking, *6 if you don't have a mute button and then *6 to unmute. Thanks.

CHAIRMAN CLAWSON: I would like to thank everybody --

MEMBER ROESSLER: This is Gen.

MR. KATZ: Yes, Gen.

MEMBER ROESSLER: I couldn't hear Mark Rolfes very well and I think we're going to be hearing a lot from him so I would like to ask him to get a little closer to the mic.

MR. KATZ: Yes, thanks for that, Gen. We'll take of that.

MR. ROLFES: Should be okay. Gen, is that better?

MEMBER ROESSLER: That's much better. Thanks.

MR. KATZ: Okay, super. Brad?

CHAIRMAN CLAWSON: Well, I would like to thank everybody for taking time out of their day today and starting into this. What we're going to start off with is we're going to just start working through the summary of the NTS Site Profile Matrix Update, which Arjun has updated.

And we'll just start with that and it's in NIOSH's court, or what?

DR. MAKHIJANI: Yes, NIOSH has responded to it and we have NIOSH's response.

CHAIRMAN CLAWSON: Okay.

MR. KATZ: Someone should just review what was the finding and then the response.

DR. MAKHIJANI: Right. Do you want me to do that?

MR. KATZ: Sure. Yes, that would be helpful I think for the record, thanks.

DR. MAKHIJANI: Sure. So went through item by item. The first item was about radionuclide lists and we felt that it was resolved except for the resuspension aspect, which is

another matrix item.

On the first item on which there may be discussion is item number two which is the Site Profile does not provide adequate guidance for dose estimation to gonad, skin and gastro-intestinal tract for early reactor test re-entry personnel and especially in regard to large hot particle doses for the skin and GI tract have not been evaluated.

Naval Radiological Defense Laboratory documents and models have not been evaluated though one document is records. And then the status was that NIOSH and SC&A agreed that NRDL model could be used.

NIOSH had been partially but not fully responsive to SC&A comments, which is there had been discussion, I think in 2006, about the use of this model and then it was bumped to the post-SEC discussion that is the Site Profile discussion which is why our, my remark was that some review needs, is warranted at this stage. And then NIOSH responded.

MR. ROLFES: Yes, we have a detailed response here which I'm not directly familiar with on firsthand, but because of the SEC, the hot particle dose from internal exposures, any ingestion or inhalation of hot particles would no longer be reconstructed because internal doses without bioassay, we would not be reconstructing internal doses anymore.

As far as external doses I'm going to see if Gene Rollins might have anything to discuss on this issue and maybe relay our position, Gene.

MR. KATZ: You might be on mute, Gene.

MR. ROLLINS: Yes, I am on mute.

MR. KATZ: Not anymore. Go ahead.

MR. ROLLINS: In the response it says that it would be appropriate possibly to use this for an NDRS area for which the model was developed. But once you get outside of NRDS it would not be appropriate to use that NRDS model to estimate external doses.

And I think in our response here we said

we would use that if we come upon a case where a worker has been identified as being in that area and we have the parameters necessary to be able to populate the model, that we would use that to estimate that individual's external dose. But outside of that it would not be appropriate to use that.

We would use our typical models like VARSKIN to do those types of contamination estimates.

DR. MAKHIJANI: Gene, in 2006 there was discussion that NIOSH thought that the NRDL report method might be applicable for individuals involved in drill back and tunnel re-entry and that NIOSH was going to evaluate whether this model could be used.

Is there an evaluation available? Presumably, you seem to have evaluated and decided it wasn't applicable but we haven't seen that evaluation?

MR. ROLLINS: Okay. Well I'm not sure

we ever really put a White Paper on that. If you go to the comment and response on item three, there it indicates the types of information that we have to have in order to use that model. And it involves the fission density of the use of Phoebus 2A, which assumes a reactor running for 20 minutes at a power level of 5,000 megawatts.

It's also an infinite field of radioactive measurement one hour post shut down three feet above the ground, which would not be appropriate you said in a drill back situation. And there again it's also appropriate to coarse particle greater than 12 micron diameter ground deposition density of one particle per square meter.

This is information that could possibly be available for the NRDS areas that were affected by reactor events. But I do not see how it could be applied to drill back operations.

CHAIRMAN CLAWSON: So, this is Brad. So for the external part of this and especially the

hot particles, what is NIOSH suggesting that we're going to use? How are we going to do this?

MR. ROLLINS: Where the information is available for NRDS re-entries and we have enough information that we can populate the model, then we would employ that model to estimate external dose for the, I guess for gonad, skin and, yes, it's been a while since I've looked over this. I'm having to refresh my memory on this.

MR. HINNEFELD: This is Stu Hinnefeld in response to you. I'm not terribly prepared but I got this far in preparing for the meeting. I'm only here because Jim is on vacation.

In our response to part two we identify an exercise that we had done looking at claim information, sampling of claim information and we looked at dose claims and found that there were evidence, there was re-entry evidence is what it was called. I assume that's some sort of sheet where the person, it's recorded and we get in their exposure record that this person re-entered an area

whether it was a drill back or an NRDS test or maybe it was only an NRDS test.

And in that sampling I think it was over half of the samples, the cases that were sampled had that sort of evidence that these people did in fact re-enter this type of area. And the others were in job categories that it's not surprising that they didn't re-enter. See it's in the response.

You know, someone was like a fry cook or something, but they aren't all that obvious. They were job titles that you would not be surprised. And so what we had proposed to say that if we had this re-entry information where they re-entered into the, you know, the evidence is the person re-entered then they would receive this model dose and otherwise they wouldn't.

Now recall that the NRDS tests were done during the SEC period. And so we're only doing partial dose reconstructions anyway. And we're only going to reconstruct what we can reconstruct.

In this circumstance, with the evidence we can reconstruct it. Without the evidence, they either weren't exposed to it or we can't reconstruct it.

CHAIRMAN CLAWSON: Okay. My main thing was especially like for skin cancers and so forth like that, that's why I wasn't understanding fully in this response what, how we were going to process through that. But with, and we've got good enough data to be able to do this because we're all starting off, again this one has been the back burner for a long time.

And so I just wanted to make sure how significant the data was on this that we'll be able to do this partial, external process and you have a model to be able to do it.

MR. HINNEFELD: Yes, the NRDS model was what Gene looked at and said if we know these things about power level and things like that we can, where this energy is modeled will be applicable.

And the entry information that's in the

individual claim file would tell us whether this person gets that modeled dose or not. So we feel like we have enough information to do this.

CHAIRMAN CLAWSON: Okay, and, but part of what I was not understanding in this is when Gene was talking this NRDL process you have to have so much of this information, 5,000 megawatts, da da da da. If he doesn't have that what are we using for a model for those people that are re-entries?

MR. HINNEFELD: If we can't do it, we can't do it.

MR. KATZ: That's what makes it a partial dose reconstruction for those people.

CHAIRMAN CLAWSON: Well my thing was the reason we were doing a partial was because the SEC was put for an internal and part of my thing that I was questioning is when we originally started to go into this, I was under the impression that, we were kind of told, well, we've got this model and for the external we feel that we were able to do this.

So we kind of bypassed this part of this because we showed that we could do this hot particle external. Internal was questionable. And now it's kind of flopping back to, no, we can't.

And that's what was giving me a little bit of confusion on which way we were going there because looking at this and I'm just trying to understand what he just told me there in reading this response, we're not going to have, out of these people that are re-entry people and everything else like this which the big issue was, was a lot of the hot particles and everything else because of how soon they re-entered back into the process and the drill back teams and everything else like that, we're not going to have any of this 5,000 megawatts and everything else like that.

So that's part of my question is so what good is it to us?

MR. HINNEFELD: It, well it provides us a way to do dose reconstruction for people that we have evidence went there and did that. And if we

can't do, you know, we already know we can't do complete dose reconstructions. That's why there's an SEC here.

And so the rule says we will reconstruct what we can. And so I'm not exactly sure whether, if it's an NRDS re-entry if we can just pick a particular run time and set of parameters and say any time we have an NRDS entry we will use this set of parameters and assign a skin dose or gonad, an external dose based on the NRDS model any time we have NRDS entry, re-entry.

But it won't be applicable for drill back re-entries and so we can't do anything, you know, additionally for those beyond what would be like on, you know, badge readings or whatever we would do.

DR. MAKHIJANI: I think they are two separate issues. The item two is just about the NRDS. So maybe we could address, you know, whether you would use this model generally for workers in that area and then we could address the other one

which is more complicated.

MR. HINNEFELD: I think the expectation is that we will use the NRDS model for people who re-entered the NRDS areas. And apparently the claim file has evidence of re-entry. And so that's what we are proposing to use.

DR. MAKHIJANI: I don't have a good recall of this. But was there an identified set of workers who worked in NRDS or was it generally Nevada Test Site workers who worked in NRDS also worked in other areas during the time of the reactor tests?

MR. ROLFES: I think that would, I don't think there's a master list of NRDS workers. I think it would have been in each individual's claim file you would have to go through to determine whether or not they in fact entered into NRDS.

MEMBER MUNN: I thought it was the latter.

DR. MAKHIJANI: But they have the records of when they entered.

MR. HINNEFELD: So apparently we get into the claim files because that's what this sampling that we've done here illustrates.

DR. MAKHIJANI: The thing I didn't understand in this response is the response is mainly about what's in Hacker's, Barton Hacker's book and the references to that and not directly to the model that we were talking about. So kind of, I was a little confused by that, why the response focused only on Hacker's book and the references to that book.

And honestly I don't remember what was in our Site Profile. I do remember mentioning or discussing Hacker's book in the references but I thought that reference was more general for understanding the Nevada Test Site radiological condition and not just in relation to this particular item.

So I was confused by the focus on Hacker. This is in the response to number two.

MR. ROLFES: I'm reading from the

response on Page 2 and it says SC&A 2005 also stated the following. SC&A suggests that NIOSH make a careful assessment of Barton Hacker's history and the sources that are cited insofar as they concern on-site radiation safety practices, so right.

DR. MAKHIJANI: As I said, I thought that SC&A reference was generally to the Nevada Test Site and not just, so I was confused by why in response to the question about NRDS and hot particles that basically the response didn't say much about hot particles.

But maybe since you say you have the records and you're going to apply the model when you have the records, the actual response on paper is a moot issue and, but, and there could be some clarification of that.

MR. HINNEFELD: What I said there was part of the response on paper. I'm just reading from what we put in the matrix. That's all I know about this.

DR. MAKHIJANI: In response to the next

item though. What I was confused about was the response to two and what you were talking about was the response to the next matrix, which I understand. But I was confused by the response to two and why there was all of the discussion about Hacker and nothing much about hot particles.

MR. SMITH: This is Matt Smith with ORAU Team. I don't have any input on the Hacker write up. But for the group, I'll point out that on Pages 58 through 60 of the current external NTS TBD which is Rev 3, gives the outline of the approach for NRDL and using the NRDL report models.

When we have documented hot particle external exposure we're going to use OTIB-17 along with VARSKIN to assign any skin dose associated with a hot particle incident. So those pages cover approach for photon dose and electron dose. You know, it basically lays out if we have the information, we'll use it.

DR. MAKHIJANI: So in terms of the size of the hot particles and the radiation dose from

those particles you're going to use the data in the NRDL documents?

MR. SMITH: If it's NRDL in terms of work site.

DR. MAKHIJANI: Yes.

MR. SMITH: Or NRDS, however you want to --

DR. MAKHIJANI: Yes, I was referring to the NRDL documents that describe the NRDS work. Yes, okay, so I mean that at least clarifies it for me for item two. I don't know, you know, I don't know what's more, maybe something explicit to that effect regarding re-entry would be helpful, but it's already part of the record.

MR. HINNEFELD: Clipping what's in three and putting in two, you mean?

DR. MAKHIJANI: Yes.

MR. HINNEFELD: The part about the review of the dosimetry records, a recent review reveals that DOE dosimetry records, that?

DR. MAKHIJANI: Yes.

MR. HINNEFELD: I guess we can clip that paragraph and --

MR. ROLFES: Before we agree to do anything I just want to see, you know, Matt, could you tell me the date that the TBD was approved for NTS that you just referenced, please?

MR. SMITH: Certainly. The effective date on this is November 9 of 2012.

MR. ROLFES: Okay. I just wondered if it was done before or after the SC&A review. I wasn't sure if our response, clearly we've documented something in an effort to respond to SC&A's concern about hot particles in the TBD.

So we may have already addressed this issue in more detail and it could satisfy SC&A's concern already. Do we need to do anything else or should we go back to the TBD first and check to see whether the issue has been resolved there?

MR. HINNEFELD: Well, if we have agreement here that we've resolved the issue by checking this, which is I think what we've done,

I'm not sure but it seems to me we've resolved this issue by saying look if we've got re-entry information, that these people re-entered NRDS or L, and we're going to use this NRDS model. If we have agreement on that and we can satisfy the Work Group by clipping this paragraph and copying it into item two, I would say let's do that and call it done.

DR. MAKHIJANI: I agree, sure.

MR. ROLFES: Works for me.

MR. HINNEFELD: You've got to make sure, we've got to keep, somebody has got to keep track of what we're going to do.

MR. ROLFES: All right. So we'll clip the response from comment three.

MR. HINNEFELD: Yes, the part about the, where we look into the record before we, that paragraph.

DR. MAKHIJANI: Our matrix update was done after your external dose.

MR. ROLFES: Right. I see that in

December.

DR. MAKHIJANI: And I do remember looking at that.

MEMBER MUNN: So I want to be very clear before we say we're done with this that the statement under the status section of number two that says NIOSH has been partially but not fully responsive to SC&A comments is now resolved. I wanted to verify this.

DR. MAKHIJANI: Yes, with the agreement that we have I think. I don't know, Brad, you have the final word on this obviously or the committee does, Work Group does. But I agree with Stu that if the records are there, I don't see what more could be done in a partial dose reconstruction.

CHAIRMAN CLAWSON: I agree. I'm just, you know, I guess part of the thing is it's a little bit confusing because two and three are kind of one and the same but not really and then we get into four that we've got ingestion of nonrespirable hot

particles which I think was taking care of the SEC, right, because that's an internal issue.

I'm just trying to draw lines to all these different ones that are tied into this one process there. So, okay, yes, I agree with that. We can, we would be able to close that when we do that and we've got a process through so we would be able to take care of two and three.

(Simultaneous speaking.)

DR. MAKHIJANI: Two is only about the workers in the reactor area.

CHAIRMAN CLAWSON: Okay.

DR. MAKHIJANI: And the suggestion, so the suggestion we had made in our Site Profile Review which we had discussed subsequently was, can you apply that same model if there were hot particles in other areas?

So I think we agreed in the past that there were hot particles in other areas and that NIOSH would investigate whether the NRDL model could apply there. And what I'm, so that's, I

think there's some --

CHAIRMAN CLAWSON: This is where I'm getting confused, so.

MR. KATZ: So before we move on let's just check with Gen and Phil and make sure they're on board too.

MR. HINNEFELD: You're talking about with closing number two?

MR. KATZ: Yes, closing number two. Gen, Phil?

MEMBER SCHOFIELD: I don't have a problem with that.

MR. KATZ: Okay. Gen, are you still there?

MEMBER MUNN: Are you on mute?

MEMBER ROESSLER: I was on mute.

MEMBER MUNN: I hope you didn't say anything really --

MEMBER MUNN: I'm okay with that one.

MR. KATZ: Okay, good. Thank you. Two is closed.

CHAIRMAN CLAWSON: So now we'll go on to the issue of hot particles and issue number three.

DR. MAKHIJANI: So the issue number three was, can we apply that same, are there hot particles in other areas from atmospheric testing and from the venting of the atmospheric tests in the post atmospheric testing period like Baneberry, can you apply that model to those hot particle exposure issues?

So there are two issues here. Were there hot particles and can you apply the model? I think previously in our 2006 discussion I think NIOSH agreed that there were hot particles and that, I'm just reading from this NIOSH response.

NIOSH agrees that live particle ingestion and skin deposition could be important for individuals in underground testing. I'm reading from the NIOSH response of July 2006.

The TBD will be revised to include information assessing any potential for large hot

particles in NTS processes and work areas and external dose reconstruction guidance appropriate to the TBD that will allow the dose reconstructor to adequately account for NTS doses due to large hot particles.

So the internal dose of course has been resolved by the SEC. And so what remains is the question of large hot particles. And as I read your response, well, maybe read your response and then we can discuss it.

MR. ROLFES: If we have data available outside of the NRDS that would indicate a hot particle exposure, we would assign the dose from hot particle exposure to the skin, any external dose that is or any other organ affected.

However, if there is no information available that comes back to the ability to reconstruct and we would only be able to reconstruct an external dose when we have information.

MR. HINNEFELD: The hot particle

external dose.

MR. ROLFES: Correct.

MR. HINNEFELD: Presumably, these people were badged or --

DR. MAKHIJANI: The thing that is giving me a little bit of pause is that the SEC was only about internal doses. So the idea that you can reconstruct external doses is still, people who have skin cancers presumably get an external dose reconstruction.

So this seems very germane. I and maybe, I mean there's a question of whether it should go beyond the people who have records of hot particle deposition outside of the NRDS and whether some kind of model should be created because that's what, that's how I read what NIOSH was saying earlier on.

So the characterization of the hot particle environment outside of NRDS may be important. And for those workers who were involved in the kind of activities where they could

have had potential for exposure could be assigned a coworker exposure or, you know, something like that not strictly if they have a record of hot particles because hot particles as you know goes beyond the badge question. Hot particle exposure is not necessarily recorded by the badge.

MR. HINNEFELD: I guess, our view is that in an SEC Class, an SE period, our obligation is to reconstruct what we can reconstruct. And we're not really in, we don't really, or we're not really in a position to invent, essentially invent doses which is what we would be doing.

I mean a hot particle situation is kind of a tough coworker situation to describe, you know, because, you know, who is the coworker that has the hot particle, it's the other guy with the hot particle and how do you identify those people?

So absent some evidence that, and this would be I guess maybe Matt or Gene can correct me if I'm wrong, but since the claim files have re-entry information and as I understood it, survey

information, that theoretically the hot particles would, you know, an indication of hot particle or survey would be on the survey result from the re-entry information.

And so that would be the evidence that we would require in order to do a hot particle and that's what Matt was saying a while ago. Use VARSKIN and the methods described in order to do those.

And I, you know, despite the fact that the SEC was, says well the conclusion is we can't reconstruct internal dose, I don't think that puts us in the position of essentially inventing hot particle doses for people when there's no evidence of it.

I think we need to be able to, we should reconstruct what we can reconstruct and that's what we'll do. When there's evidence of it, we'll reconstruct it because absent that, you know, you're just making things up. You're just inventing it.

You know, we move away and we get into a SEC partial dose reconstruction, you kind of move away from the bounding dose as being an alternative. You know, that's not really the alternative you have. You reconstruct what you can reconstruct.

So the bounding, a bounding approach is not really the alternative in the SEC partial dose reconstruction.

DR. MAKHIJANI: Let's, sorry --

CHAIRMAN CLAWSON: No, go ahead.

MR. SMITH: The main thing I'll add and this is Matt Smith with ORAU Team is the process that Stu just described is written up, again. It's towards the bottom of Page 58, again, in the current TBD revision addressing, you know, gamma dose from hot particles.

Again, if we have a documented hot particle exposure, we'll use VARSKIN, we'll use OTIB-17 methods which have been discussed in other work groups. And then it's discussed again in

terms of electron exposure at the very top of Page 60.

And the subtopic is underlined as Hot Particles. It's meant to address situations outside of the NRDS.

DR. MAKHIJANI: Well, you know, I have this page in front of me. And so there's a problem in concluding that NTS sampling data does not indicate hot particles outside of NRDS but then in the next sentence saying that measurement of hot particles was not conducted at NTS.

So if it was not conducted the answer has to be we really don't know, not that the available information indicates that wasn't a problem. So that's kind of a starting point, I think.

And my second observation from what Stu said is I don't think, you know, we're, I'm suggesting that doses be invented, you know; that would be wrong. We don't want to be inventing numbers. However, many of the numbers that are

used in dose reconstruction are a construct that's not directly related to the worker.

We use environmental information for example and apply it generally to workers. We use for coworker models. We even use source term data which is, you know, a fair remove from the individual worker.

And so what I think maybe should be considered, if the Work Group is so inclined, is I think previously we agreed that this could be an issue. And some evaluation of whether hot particles were an issue other than in NRDS and I think previously we thought that could be an issue.

And I don't see an evaluation that somehow you can say, I can't, these two sentences in the Site Profile don't, one doesn't follow from the other. You say there are no measurements then perhaps you can go into the individual records, some of which may indicate hot particle exposure and then construct from there others who did the same work.

It's not applying an invented number to everybody. It's applying others who did, applying it to others who did the same work and the same tests perhaps. But I don't, in my opinion at least there's not a detailed enough discussion to support the conclusion that it can't be done or shouldn't be done or it would be inventing a number.

I don't know that's inventing more of a number than we do in other areas of dose reconstruction.

MR. ROLLINS: This is Gene Rollins over at ORAU Team. I would like to make a comment here. I want to make sure everybody understands this.

The NRDL model was developed to control exposures upon re-entry. And these hot particles that they were talking about were basically on the ground. What Matt is talking about with VARSKIN, et cetera is when we had hot particle on the skin. Two separate and distinct exposure scenarios.

I'm not sure everybody understands that. But I wanted to make it clear that's what

the NRDL model was, is hot particles on the ground in an infinite plane.

DR. MAKHIJANI: My memory of that and may be wrong, is that's not all it was. I thought the NRDL documents also discussed direct deposition on the skin and the doses that were a result from it. But my memory may be --

MR. ROLLINS: That's not my recollection. We were concerned about doses to the gonad and they wanted to have a model so they could predict what it could be upon re-entry.

DR. MAKHIJANI: Obviously, you know, I have to go and verify this. But my memory is there was certainly an issue of dose from hot particle deposition on the ground. But to my memory there was also an issue of direct hot particle deposition on the skin of the workers in NRDS, but obviously subject to verification.

MEMBER MUNN: Yes, that clearly needs to be checked. Those of us who have no access or no background at all in that particular document,

in that particular study have no way of knowing.

MEMBER ROESSLER: If Wanda is talking would you get closer to the mic?

MEMBER MUNN: I'm sorry. I wasn't really saying anything of any great consequence. I was just saying that those of who don't have any personal experience with the study that we're talking about, with the database, can't possibly make any judgment about whether or not it's a plane or whether or not it's skin deposition.

And clearly, as Arjun has already said, that needs to be verified before we could make any judgment one way or the other.

MEMBER ROESSLER: I agree with that. That was, I think, important to say.

CHAIRMAN CLAWSON: Well I'm going to mention something here that the part to me, because I want us to all take a step back in time before the SEC. And the picture that was painted to us of what could be and could not be done and one of our big issues was hot particles, re-entry,

reactors that were out there, the blasts and everything that could be done. And we had a picture that was painted for us of everything that we could do because we had no SEC at that time. Now all of a sudden we have an SEC and kind of what I'm hearing if I'm hearing correctly is now we can't do any of this stuff.

And that's a little bit frustrating to me because we spent all this time before this and my biggest issue is because one of the biggest ones at Nevada Test Site was a lot of hot particles, not just from the reactors but especially the re-entry teams going back into blast areas, a lot of the stuff that they were bringing out, a lot of the people going into it and so forth like that.

And if I remember right we had a lot of data of them going back into it but not -- some of the dosimetry was there. It was a little bit vague. And my bottom line is, with this is if I'm looking at the people that are not going to be taken care of by the SEC, I need to make sure this Site

Profile gives them the best that we can.

And I understand that NIOSH has told us, you know, the SEC has taken out the internal part of it. You know, we're going to be doing partials anyway. But I want to be able to, because at Nevada Test Site, hot particles was a fairly big one if I am correct.

And I'm looking at this NRDL and then the VARSKIN and I'm going to be right honest, I don't understand where we're going from on this. And the NRDL is for only hot particles on the ground. The VARSKIN is for skin.

And I guess, Arjun, you being our contractor, I guess my question to you is, is this right? Is this, because to me it looks like to me we're lacking an awful lot here.

MR. HINNEFELD: I'd like to make a comment first before we go on with this, okay. I think it's unfair to compare our propositions today to our propositions eight years ago.

First of all we have eight years of

advice from the Advisory Board and their contractor about what's acceptable and what's not. And based on that advice, we now look at things differently than we did eight years ago.

And so based on that advice, we made different recommendations. And I thought that was really unfair to kind of sort of say well we've changed our minds since 2006 and say that somehow that makes this not a good proposal. I think that was unfair.

CHAIRMAN CLAWSON: Okay. Well, no, wait a minute. That's very true. So now you know how I feel an awful lot of the time because I get this continuously. So my whole thing that I want to make sure is that okay, then we can't do this.

Then we have a problem here we're going to have to work out. I need to be able to know how they're going to be able to do this, how this is going to be taken care of so we've got an issue here that isn't going to be resolved on this, I guess.

We can continue on. I want to make sure

that the work force gets what they can to it and by no means was I trying to jab you or anything else. It's just, okay, so we forget everything from eight years ago and start on to a new process here.

I, going into this and after an SEC is issued it is a totally, everything flip flops in every one of these sites because at the beginning of this we're looking at what we can't do. Now after the SEC we're looking at what can we do. And that's what I'm trying to get to at this point.

MR. HINNEFELD: And I apologize if --

CHAIRMAN CLAWSON: No, no, Stu. It's frustrating on both sides and I don't take it personally. And I did not mean it personally.

MR. HINNEFELD: And this is a frustrating program. And I want to make sure that people who get partial dose reconstructions get the best deal we can get. I understand, you know, we all agree on that.

CHAIRMAN CLAWSON: I've never questioned that.

MR. HINNEFELD: The thing that flips, you know, and partly, you're right, once there's an SEC the logic reverses because until there's an SEC a bounding approach is under feasible conditions is a sufficiently accurate dose reconstruction. That's what the regulation says.

Now once you have an SEC I really question whether a bounding dose for these partials is really what is expected of the regulation. The regulation says we'll reconstruct what we can. And to Arjun's point, there might be something we can do to say that well you don't actually need the hard survey data.

There might be something you can do. I don't know. To be honest, I'm not very familiar with what really information is available to us about surveys and were there any hot particle identifications and things like that.

So I think that it does get, the logic does get changed a little bit at least in my mind when you have an SEC Class.

MEMBER SCHOFIELD: I've got one question for clarification here. Looking at the two studies there, I'm kind of concerned how you would readdress the resuspension of some of these large particles given the dusty environment and everything they have.

Now you have the potential of what was on the ground being airborne again landing on skin or somebody, maybe his mask isn't on properly, they're breathing this in. Is that much of a factor or not? I'm asking, this is a question.

MR. HINNEFELD: Well, Phil, certainly for the internal and for the breathing in that would be an internal exposure which is SEC and we can't reconstruct it. So that clearly is off the table from the SEC.

With respect to your other question if this dust can be resuspended and placed on, you know, become a skin contamination issue, I guess that's part of the broader question. I had really hoped that we could kind of resolve some things

today.

But let's kind of be clear when we leave this what it is we need to resolve because it's not, you know, what are the things that have to be taken? Because we can go write something and then you can look at it and say, we can keep arguing back and forth which we've done, you know, we've done as a, kind of been our careers really.

But we could, let's try to figure out what it would take to answer the question and what are the questions and what will it take to answer the questions. So now we have, on the hot particle issue not NRDL, we say okay, there were atmospheric tests. There were underground tests, re-entries, there were accidental releases from the underground tests.

In all these situations theoretically you have a potential to have an external contamination with, for lack of a better term, you have a skin contamination hot particle or whatever, a skin contamination. And is there some evidence

that is available that would make us believe that they seem to find those when they happened.

I mean were there surveys when people did these re-entries, were they personally surveyed? Is there a way to identify when they happened, is a job title good enough? What job title had a skin contamination during such and such a test?

I mean are we going to go to that level. I mean we also have to make sure that whatever we decide is a feasible approach is actually feasible given the information we have in claims. And so I'd like to maybe before we go on, and I'm not sure I'm the one to really appraise this, but what is it that we should answer?

What are the questions we should answer about skin, I'm just going to call it skin contaminations and what can we do for skin contaminations? What are the questions that we need to, that need to be answered? I don't know.

MEMBER MUNN: It appears to me that the

question that keeps coming up over and over again is the question of hot particles as though the hot particles were some deep mystery and we were a part of a script writing group here who was going to try to identify what the most horrifying thing is that could possibly happen.

Hot particles are not that much of a mystery. They've certainly been known for a long, long time and they have been the focus of an enormous amount of interest not just here but in the profession as a whole.

The assumption that something other than skin cancers might be a result of something like hot particles is something that probably needs to be clarified in this venue because the question continues to arise with respect to what the overall external exposure is, not just what the hot particle exposure might have been.

So it seems to me, Stu, in answer to your question and I certainly agree with it, I would like for us to go away with a very clear understanding

about what it is that we are going to try to answer. And I guess I would pose this question to Arjun.

Are we looking for the best effort that can be made with respect to total external exposure or are we really focused now on the hot particle issue because they really are different things?

DR. MAKHIJANI: Well, Wanda, the hot particle skin exposure obviously is a subset of the whole --

MEMBER MUNN: Yes.

DR. MAKHIJANI: -- external exposure question. The reason it becomes important is when you have hot particle deposition on the skin that particular area gets a dose that could be very high that would not be reflected in the badge.

So normally with external exposure you have good badge records and you go the badge records and that suffices to tell you what the cumulative external dose was and to feed it into, you know, I mean the, that's my best understanding. So the interest in hot particles is not because it's some

mysterious issue.

In this particular context where skin cancer is one of the common cancers but not in the SEC cancer list, so how you resolve that could become important for many people. And that's the reason to think about it more carefully.

CHAIRMAN CLAWSON: And I want us to think about when we got into this issue because going back to the Nevada Test Site, Nevada Test Site was an interesting one from the aspect of not just the reactors that were there because, you know, we've seen the deposition of people washing off the trailers after a reactor test of all the hot particles and this is where it gets onto the ground.

But also two of them off of their skin and so forth like that, which was a common practice back there. And the re-entry teams that went into it come to find out that, you know, they had, a lot of them had protective clothing and so forth like that.

But the hot particle was kind of an

issue from their standpoint. And this is like all of these sites, each one of them has their own little nuance that is there. And part of the issue with this hot particle was the ingestion part is out of the picture, but the TLD that they were wearing wouldn't be capturing this.

And I just, this has been one of the things that's been kind of an interesting one to be able to look at. And the drill back people and when we're talking about that we're not just talking the drill back into the shot. We're talking about in the caves and so forth coming back into these.

And as they would come out a lot of those were deconned down but they had hot particles that had been on them. And this is just how, you know, how can we even address this? This is --

MEMBER MUNN: Well my question here still we go back to my original question. What are we trying to determine here? I mean there are a couple of things I want to clarify.

First of all, are we trying to identify whether hot particles may be of interest to other external exposure other than skin? Is that an issue here or are we focusing on skin exposure as a result of hot particles?

This to me is really and truly salient because if the claims that we have are not skin cancers then the hot particle issue, in my mind, becomes moot. Now I'm not a health physicist. I could be incorrect about that.

But that's to me is one of the things that need to be defined here. Are we specifically looking for the result of hot particles being anything other than skin doses? If it is than we have something else to look at.

If not then to me it reduces the number of cases. It reduces the issue to cases that are involved with skin cancer only.

DR. MAKHIJANI: Well I think we're dealing with the effect of hot particles on external doses because the internal dose issue has

been resolved.

MEMBER MUNN: Exactly.

DR. MAKHIJANI: Originally when it was raised there was, in my mind, a pretty big issue of what hot particles do when they're ingested in the GI tract. You normally don't breathe in large particles, they get stuck somewhere before they reach your lung.

But now that issue has gone away because there's an SEC. And I think the cancers that would be covered by that are mostly in the SEC. So the focus is basically on skin doses.

So I might kind of make an attempt to move the issue along for your consideration, that I think the first thing is to characterize whether there was a hot particle issue outside NRDS more carefully and where. So Brad just brought up, you know, this decontamination question.

There were cloud sampling aircraft. They were decontaminated. I mean I've seen pictures of decontamination procedures where

personnel were just hosing down these planes without any protective --

MEMBER MUNN: Yes, that's common.

DR. MAKHIJANI: Yes. So in those situations you may well have had deposition of hot particles. So I would suggest that to move the issue along it may be useful to look at some generic activities where there was this potential and whether there's any documentation of that potential.

And if you don't have documentation of that potential then I think we would be stuck and possibly say that we can't do this. But if there is documentation then possibly we could think of applying the NRDL model and as I look at our Site Profile Review that we did back in 2005, the NRDL model used the available data to calculate the probability that a hot particle would actually be deposited on the skin.

It was a pretty sophisticated affair. We didn't look at their statistical model but we

did note that they calculated the probability of finding a particle in the GI tract or on the skin. GI tract is moot, but on the skin is not moot.

That probability was small, but not zero. So they, while they were not talking about directly surveying people's skin they were talking about skin doses from direct deposition of hot particles in the NRDL model. So my memory wasn't as faulty as I thought it might be.

MEMBER MUNN: That's always reassuring.

DR. MAKHIJANI: It is very reassuring.

MR. ROLLINS: This is Gene Rollins, ORAU Team. While you've been talking I just went and reviewed that model, the 1968 report. And I just sent the abstract of that to Mark for his review.

I wanted to say that resuspension, i.e. deposition on the skin and deposition to the GI tract were considered to be virtually small effects. And all of the doses were calculated

based on vertical density, size of the particle for particles and infinite plane.

MEMBER MUNN: Thank you, Gene.

DR. MAKHIJANI: I have to review the document. But that's not what our review said. They actually calculated, doses are estimated using a statistical approach by calculating, combining the probability of finding a particle on the GI tract or on the skin (small) and dose for particle (large).

So I think we would need to read the full document or amend, if this is wrong then we would have to go back and fix our old Site Profile Review, which is possible. It's possible there's an error there.

But the main point I think for this discussion is I think the starting point would be to characterize the possibility that there are hot particles and certain groups of workers that were not in NRDS and then the next step from that would be could you use this particular model which was

actually talking about probabilities of skin deposition and apply it to certain groups of workers.

That, I think, that could be a way to move forward and address this issue, at least a starting point for discussion you may find it useful.

MR. ROLFES: This is Mark. I just wanted to point out that I think it was 99 percent of the recorded external doses from the dosimetry program at the Nevada Test Site showed that individuals received no dose above the minimum detectable amount on their badges over the entire operational history.

People that would have potentially been exposed to hot particles were ones that weren't going to have zero dose on their badge. They would have had significant doses likely because the chance of them encountering a single hot particle and never receiving any kind of measurable external dose is just essentially nil.

So there are instances back in the 1950s where individuals that were removing cascade impactor filters from aircraft received some significant extremity doses on the order of, you know, maybe 30 rem from beta dose. Those individuals, yes, they could potentially have had a hot particle on their hand or something.

But to, I just wanted to make sure that we're pointing out that, you know, with an individual that has no recorded external dose the likelihood of them being exposed to a hot particle is very, very low. And to apply a model to everyone who has, you know, essentially a zero recorded dose from a hot particle is not an accurate approach in a dose reconstruction.

MR. HINNEFELD: I think where we would go probably is if there is evidence of, you know, can we find some evidence that would allow us to make a model, just model a hot particle for a selected piece of the population. You know, for the appropriate piece of the population. I think

that's kind of where the task is.

DR. MAKHIJANI: I would think so. I mean that's what I was suggesting.

MR. HINNEFELD: I want to try and resolve this and so I want to try to go off and do the tasks we need to resolve this. And I am absolutely sensitive of the fact that I don't want to cheat anybody out of anything because a non-SEC cancer case is difficult.

You can only do a partial and so I understand that. So I think it's all going to come down to what kind of information we can find.

DR. MAKHIJANI: Yes, and, Stu, just for the record my allusion to the earlier discussions wasn't about, you know, God knows I've changed my mind about things. So if you don't change your mind it means you're not learning anything.

MEMBER MUNN: There's some famous adage about that I believe.

DR. MAKHIJANI: It doesn't mean you change your mind about everything if you've learned

enough in some areas. But, you know, so I was bringing it up simply because I thought that the responses in the matrix did not correspond to what I thought NIOSH was going to do which is to look into a certain issue, not that NIOSH had a different position now than before.

MR. HINNEFELD: Which is fine.

MEMBER MUNN: So we're clear on where we're going to go here?

MR. HINNEFELD: Well we know what we're going to start out. We're going to try and find information about, you know, is there information about skin contamination surveys, you know, things like that in populations where the skin contamination is likely.

You know, likely re-entry into NRDL, drill back into underground tests, you know, populations that were, you know, re-entries or mostly re-entries in I think above ground tests a lot of those people were military. That's who is usually marching into the above ground tests.

DR. MAKHIJANI: Other than the health --

MR. HINNEFELD: There were maybe some health physics monitors.

CHAIRMAN CLAWSON: This is where some of this came up from because we had some of the Nevada Test Site people that were with that, that had certain tests that they were retrieving and so forth. And this is partially where part of the hot particle stuff came up because of what was on those that they cleaned up.

And, Mark, you're absolutely right that this isn't, this is not and I want to make this, this isn't for the whole site. This is kind of the select group of people that are going into these situations.

And that's what we were looking at on this. So --

MEMBER MUNN: So we know where we're going for next time on this issue.

MR. KATZ: Can I just ask for

clarification? Is it a two part question? One, whether they had exposure potential, but two whether even if they did does the model, can the model be applied to them?

MR. HINNEFELD: Yes. It is essentially a two part question. I mean theoretically this is going to be a relatively small proportion. I mean because at some point everybody who went past Mercury got a badge, right?

And so there are a lot of people who really you wouldn't expect to have any exposure. So you've got a lot of essentially non detectable badge readings.

But there would be a cadre of people who participated in events like a drill back or something that you would expect them to have some exposure and their badge should show some exposure.

And then we'll have to decide how much, you know, we'll have to conclude based on the information we have in the claim files which I'm really not very familiar with, what could we, you

know, what kind of judgments can we make?

You know, what population can we identify that may fit into this and then what information is available about contamination surveys and skin contamination that would allow us to do some sort of probability assessment.

And part of this might be a careful look at the NRDL entire paper to see what it, if in fact it does say there's a certain probability that this material that was on the ground can be resuspended and placing onto people's clothing or what in some of these decontamination activities is there monitoring data or some things like that.

And then once you can, if you can get enough data to decide that you can, there's an estimate here and even though Joe Smith doesn't have a documented skin contamination we have evidence that he did something, he was in one of these situations we can say based on being in that situation and the information we have from other people or other sources in that situation we will

do something.

And it might be a probability. It might be kind of probabilistic. I mean it might have a distribution about it that, you know, that is strictly probabilistic. I mean we could think about something like that.

But it will, but remember we're going to reconstruct what we can reconstruct. And there's got to be some reason to reconstruct this for this population.

MR. KATZ: And the other thing is it has to pass muster by the same metrics that the Board and NIOSH decides that doses are feasible to reconstruct. We can't all of a sudden go by a different metric to whether this is feasible.

MR. HINNEFELD: We can't come in here with a technique that was not, you know, that wouldn't present an SEC for instance.

MR. KATZ: Right.

MR. HINNEFELD: You know, they would say that's not a suitable technique.

DR. MAKHIJANI: I agree with the construct that you have made.

MR. HINNEFELD: So I don't know what we, how much information we have. I don't know what we're going to find. And to be honest I don't know what kind of a schedule I can put on this because, you know, there is a lot stuff in the project that we're working on. I have no idea.

MEMBER MUNN: We deal with the reality we have.

DR. MAKHIJANI: Do you know how many skin cancer cases we have?

MR. HINNEFELD: Well I don't know specifically, but skin cancer is a common cancer. Now there are three actual skin cancer models. And realistically it only basal cell carcinoma has a risk factor that is particularly beneficial to the claimant.

Melanoma is kind of in the middle. But squamous cell has almost no risk factor.

MEMBER MUNN: It's common. Everybody

has it anyway.

MR. HINNEFELD: Yes, well basal cell is really normal.

MEMBER MUNN: Exactly.

MR. HINNEFELD: You know, a lot of people get it. And I mean --

MEMBER MUNN: It's a question of whether there are excess cancers more than anything else that really is of interest.

MR. HINNEFELD: For whatever reason, you know, the causal, you know, the causal factor for basal cell is relatively high.

MEMBER MUNN: Yes, it is.

MR. HINNEFELD: And so again, you're more likely to be compensated with a basal cell in our program for basal cell than for the other two types.

MEMBER MUNN: But it's almost universal. Actually there are very few people over the age of 65 that don't have one or more things, either basal cell or otherwise.

MR. HINNEFELD: I think I'm aging badly. Could we take a break?

MR. KATZ: Okay. So let's take a ten minute break.

MR. HINNEFELD: Ten would be plenty.

MR. KATZ: Okay. So, we'll restart.

(Whereupon, the above-entitled matter went off the record at 10:27 a.m. and resumed at 10:40 a.m.)

MR. KATZ: We can get started again, Brad, if you want.

CHAIRMAN CLAWSON: Okay. Well let's recap on this because I just want to make sure kind of where we're at with this. For item two and item three, Stu is going to look into, well it's kind of a three part.

DR. MAKHIJANI: Two was resolved.

MR. KATZ: Two is resolved.

CHAIRMAN CLAWSON: Two is resolved. Okay. It's just for three. Okay, that's going to

help us here and it's kind of a two part. We're going to see what we can do and kind of a little bit of, you know, whether it's feasible to be able to do.

And one thing I wanted to make sure of too, Stu, on this. This is, I'm not looking at this as over the entire site. This is just a select people really.

MR. HINNEFELD: Right.

CHAIRMAN CLAWSON: And I just want to make sure of that. So as we go into this we'll just, this will be NIOSH's. NIOSH will see what they can do and go forward from there. With that we'll --

DR. MAKHIJANI: Number four.

CHAIRMAN CLAWSON: Number four. And, Arjun, this one to me is really not, it refers back to two and three but because of the SEC this --

DR. MAKHIJANI: I agree. It really should have said resolved because of the SEC. And I think in the next revision it should say that.

CHAIRMAN CLAWSON: So with everybody's concurrence could I say that number four is closed?

MEMBER MUNN: Yes. For the reason it's covered by the SEC.

DR. MAKHIJANI: I think so.

CHAIRMAN CLAWSON: So for issue five, Arjun, I'll --

DR. MAKHIJANI: Issue five is so tangled and has such long, long history. But my best summary of this whole thing is because we went through many iterations and many White Papers, and my best summary and my best memory, correct me if I'm wrong and others remember differently, is that where SC&A had left it is that a mass loading approach would be claimant-favorable and would be adopted.

And we went back and forth I think between NIOSH and SC&A about what model should be adopted. But I think that issue was not finally fully resolved as to what approach NIOSH was going to take and whether SC&A was agreed with it.

I think where we left it was that SC&A thought a mass loading approach should be adopted and NIOSH said, no, maybe some other method. But I don't recall all the back and forth I must say. I'm sorry about that.

MR. ROLFES: Well I guess it comes back to, you know, defining an environmental exposure versus an operational internal exposure. And we've developed a mass loading model that I believe results in five micrograms of soil per cubic meter from an environmental aspect.

With a radionuclide inventory that was based upon, I believe it was the Hicks data if that's, if I recall correctly, Gene.

MR. ROLLINS: Mark, this is Gene Rollins, ORAU Team.

MR. ROLFES: Yes.

MR. ROLLINS: Let me refresh everybody's memory on this. I had to go back and do this all over again myself because it's just been so long. We did try a mass loading model using some

suggested mass loading values and the doses came out to be extremely high and not reasonable.

So we went back and the model that's currently in the environmental TBD is really not based on resuspension at all. It's based on the highest plutonium air samples taken over the 20 years or so that we have data. And that happened to come from Area 7 in 1972.

So it's not really a resuspension model at all now. To get potentially higher atmospheric or to look into what potentially higher loading could have been we used Anspaugh's model to get the early resuspension. And that is discussed in the TBD and it does make a small difference for some organs. And that's been tabulated and that's now in the TBD.

But these are typically organs that are covered under the SEC so we don't typically have to calculate these doses because they're already being compensated. But and I don't want anybody to think that the model that we're currently using

is based on resuspension or mass loading because neither of those ideas are true.

They are actually based on actual atmospheric measurements.

DR. MAKHIJANI: Of plutonium?

MR. ROLLINS: Right.

MEMBER MUNN: Of plutonium from 1972.

DR. MAKHIJANI: And how do you, do you use the Hicks Table to relate the plutonium to everything else or Hicks Table to fix the problem?

MR. ROLLINS: No, we used the McArthur data, the soil data.

DR. MAKHIJANI: Okay, right.

MR. ROLLINS: Averaged over the entire site to get the other radionuclides. Now we did use the Hicks data to estimate increased doses due to early resuspension which occurred after atmospheric testing had stopped. And that's explained in the, we looked at 173 short-lived radionuclides, short and long-lived radionuclides over a period of ten years.

And I developed modification factors. And that's discussed in detail in the appendix now to the environmental TBD.

DR. MAKHIJANI: Were the mass loading doses so high that we would think they were implausible or mainly a judgment that --

MR. ROLLINS: That was, I discussed this with my counterparts at NIOSH. And we all came to the conclusion that the doses were just not reasonable.

We would have seen, in the bioassays that were taken and there were quite a few bioassays taken out there, this type of loading would have shown up.

DR. MAKHIJANI: Right. Okay. So I must say that, you know, my memory that John Mauro and Lynn Anspaugh and you were in the middle of all those White Papers and discussions. May I request that we bump this a little bit after so I can call John Mauro and see if he can be on the call?

I should have done that earlier. I

apologize. But I don't feel that my memory is adequate enough to represent everyone.

MR. ROLLINS: Well I had to go back and actually read the transcripts. And the last discussion that we had was between John Mauro and myself.

And I had explained the model that we were using and how we had used the highest concentration ever measured in an atmosphere out there and how we had, when we did the other radionuclides we used the highest ratio of concentration anywhere on the site.

And we were, as I was going through all of these limiting, bounding conditions that I had put into these calculations, John suggested that I may be overly conservative.

DR. MAKHIJANI: Is that on the record, Gene, somewhere?

MR. ROLLINS: It's on, in the transcript.

DR. MAKHIJANI: It's in the

transcript? Okay.

MR. ROLLINS: Yes. In fact I had to go back and dig all this out. But he said we should get together and you and I should discuss where we could remove some of this conservatism and get a more reasonable estimate of what the resuspension might have been.

And that was the last we ever did with it because the SEC came out and we ceased discussing it.

DR. MAKHIJANI: And are there, the non-SEC cancers for which this would be relevant would be throat and I don't have that list in my head.

MR. ROLLINS: Larynx.

DR. MAKHIJANI: Larynx.

MR. ROLLINS: Yes. In fact I was --

MR. HINNEFELD: It would be, well the, there are some ET1 organs, tongue, mouth theoretically. I mean there would be some things like that.

MEMBER MUNN: Like what?

MR. HINNEFELD: Tongue, mouth, you know. ET1 is a very --

MEMBER MUNN: Yes, everything above the shoulders.

MR. HINNEFELD: Yes, everything is essentially before the larynx.

MR. ROLLINS: I actually calculated potential doses to those organs so that you could get an idea of the magnitude of the doses. And that shows up as Table A-10 and Attachment A to the environmental TBD. And this basically assumes 30 years of exposure.

DR. MAKHIJANI: A-10, environmental TBD. I have the wrong one open.

MR. ROLLINS: And I also did the same thing for the ingestion pathways.

MEMBER MUNN: Arjun made what seemed to me to be a reasonable request when he asked if we could postpone this a little bit so that he and John Mauro could have an opportunity to take a look at

it for just a few more minutes.

DR. MAKHIJANI: Table A what, Gene?

MR. ROLLINS: A-10.

DR. MAKHIJANI: A-10. This table is so long I can't find the beginning of it.

MR. ROLLINS: It originally was a stand-alone report and they asked me to incorporate it as an appendix.

MEMBER MUNN: Oh my.

MR. KATZ: We're getting there.

DR. MAKHIJANI: We're getting there. One more. Yes, here we go. Did you compare, so there's a short list of cancers did you compare the effect of using a mass loading model for those, like the above shoulder organs that are part of the non-SEC list compared to the model that you are using?

MR. ROLLINS: I did that comparison but I did not document it.

DR. MAKHIJANI: Yes.

MR. ROLLINS: Because the doses were

just extraordinary.

DR. MAKHIJANI: Extraordinarily high?

MR. ROLLINS: Correct.

DR. MAKHIJANI: Okay. So it does make a difference?

MR. ROLLINS: Yes, it does. And if we really had that kind of mass loading and those kind of concentrations then we would have seen it in the bioassay because the people would have been showing up positive.

DR. MAKHIJANI: Let me call John Mauro at lunch time and confer with him. And, Gene, could you tell me which transcript that you looked at just so I could --

MR. ROLLINS: I tell you what over lunch I'll go back and try to find it again.

DR. MAKHIJANI: Yes, okay. Thank you very much.

MR. ROLLINS: I've got it all on my computer. So I think I can locate it.

DR. MAKHIJANI: Yes, this while I was

the task manager this was one discussion that I had left to John Mauro and you and Lynn so it's not in my brain, not enough memory to draw from.

MR. ROLLINS: It's been a long time.

DR. MAKHIJANI: It was the longest, it was the thing on which we had the most discussion I think.

MR. KATZ: So we could, if you can forward to me the transcript reference if you find it at lunch I'll forward it on to Arjun.

MR. ROLLINS: And who is speaking please?

MR. KATZ: I'm sorry. This is Ted Katz.

MR. HINNEFELD: Or you could send it to Mark also.

MR. ROLLINS: I tell you what I can do. I can send it to Mark --

MR. KATZ: Yes, that's fine.

MR. ROLLINS: -- and let him distribute it.

MR. KATZ: Okay.

MR. ROLLINS: Is that okay?

MR. KATZ: Yes, that will work, thanks.

MR. ROLLINS: I've just confirmed that I've got his e-mail and it's correct.

MEMBER MUNN: Good.

MR. KATZ: Thank you, Gene.

MR. ROLLINS: All right.

MEMBER MUNN: So we'll go back to number five after lunch.

CHAIRMAN CLAWSON: Actually, five is tied to an awful lot of other ones.

DR. MAKHIJANI: It is tied to an awful lot of other ones.

MEMBER MUNN: Yes, it is. But there are others --

DR. MAKHIJANI: That's why I wanted to be cautious here because I know it's tied to other ones. And I don't want to --

CHAIRMAN CLAWSON: Before we continue I want to just make sure that I understand the, this

part of it. This is a mass loading. This is an environmental dose?

DR. MAKHIJANI: Right.

CHAIRMAN CLAWSON: That we would use for the site, not just for everybody.

DR. MAKHIJANI: As I understand it. Environmental dose is applied to everybody, right?

MR. ROLFES: That would be correct, yes.

MR. ROLLINS: That's correct. That's what we're currently doing. And also I need to make the distinction once again that these are not doses that would be expected from operations. These are doses that would be expected from ambient conditions.

CHAIRMAN CLAWSON: This would be just for the normal person out there out on the site?

MR. ROLLINS: Correct. Maybe different from one area to the next, but not performing work.

CHAIRMAN CLAWSON: Okay, that's what I

was wanting to make sure because in reading this I was kind of getting the impression that it was going to go to everybody. But, you know, then we started talking about after the atmospheric testing and there wasn't anything in '67.

And I'm sitting there going, I didn't understand fully what this was. But for my clarification this would be given to everybody that's driving across the site as ambient dose?

MR. ROLLINS: Yes, in our current dose reconstruction guidelines we give this dose to everybody.

CHAIRMAN CLAWSON: Okay. That's all I was just wanting to clarify for myself because reading through a lot of these responses it kind of went every different direction on there. So, okay, well we'll table this one or however we want to put this until a little bit later.

And when we go into the next issue the, is number six which is tied to that.

MR. ROLFES: Brad, sorry to interrupt

you but I think I found a location, Gene, where we discussed this issue in the transcripts. It was back in 2009. There is some discussion, let's see I've got the Working Group transcripts from April 23, 2009.

MR. ROLLINS: Okay. I'm pulling that up right now.

MR. ROLFES: And I believe Dr. Mauro had begun speaking about the environmental exposure approach on Page 17.

MR. ROLLINS: Okay.

DR. MAKHIJANI: Are past meetings under announcements?

MR. KATZ: Past, just go to the meeting date and it should be an attachment to that page, the transcript under schedule of meetings 2009.

MR. ROLFES: Which e-mail, I can e-mail you a link, Arjun, if you like.

DR. MAKHIJANI: April what?

MR. KATZ: 23rd.

MR. ROLFES: And then we can come back

to it I guess after you talk to John Mauro.

MR. KATZ: Thank you, Mark.

MR. ROLFES: No problem.

CHAIRMAN CLAWSON: Okay.

DR. MAKHIJANI: So I think six is related to five.

CHAIRMAN CLAWSON: It is.

MR. KATZ: So is there anything outside of the issues of five covered in six?

DR. MAKHIJANI: No, because it's related to how NIOSH is approaching five.

CHAIRMAN CLAWSON: Yes, because this comes down to the different people and so forth.

MR. KATZ: So that's after lunch too?

CHAIRMAN CLAWSON: Yes. And also issue seven.

DR. MAKHIJANI: Seven also NIOSH not using resuspension models so we can't do seven.

CHAIRMAN CLAWSON: Right. So that's there. So we're up to eight. I'll let you handle this, Arjun.

DR. MAKHIJANI: Okay. Issue eight is use of 1967 external dose data for '63 to '66 is not claimant-favorable. NIOSH pointed out that badging was required for all workers after 1957.

And while we didn't sign off definitively my comment was that no further review appears to be needed and of course that's pending the Work Group's agreement with that. But I didn't think that we, there was more review needed since people were being badged and we didn't have to back extrapolate from '67.

CHAIRMAN CLAWSON: So number eight is --

DR. MAKHIJANI: I think number eight should be marked as resolved.

CHAIRMAN CLAWSON: Okay. Wanda, any --

MEMBER MUNN: No, I think we're good.

CHAIRMAN CLAWSON: Phil and Gen, do you have any problems with closing number eight.

MEMBER ROESSLER: I'm off mute now.

No, I'm fine on that one.

MEMBER MUNN: Good.

MEMBER SCHOFIELD: Same here.

CHAIRMAN CLAWSON: Okay. Sounds good.

DR. MAKHIJANI: And I think the same applies to nine which was external environmental dose so which would be captured by the universal badging.

MEMBER MUNN: Close.

CHAIRMAN CLAWSON: Okay. So we'll close nine.

DR. MAKHIJANI: Right.

CHAIRMAN CLAWSON: Okay, brings us to ten.

DR. MAKHIJANI: Okay. So this issue was how NIOSH was handling the badge doses that were recorded and whether background doses were being subtracted. Is that it? No, excuse me, sorry.

SC&A's preliminary conclusion that NIOSH values may reflect subtraction of badge MDL.

NIOSH clarification on how values were derived as needed. So NIOSH response maybe.

MR. ROLFES: Yes, I think this might have been when we had our original coworker table which essentially had, based upon the recorded values for NTS workers they were by and large zero. That was our initial approach to assign a coworker external dose.

And that has since been revised using the missed dose approach, the number of badge exchanges times the limit of detection divided by two to calculate a missed dose which would be assigned as a coworker dose instead.

DR. MAKHIJANI: Yes, so that's the general approach that you're taking now?

MR. ROLFES: Correct.

DR. MAKHIJANI: Which I think is the normal way you proceed at other sites?

MR. ROLFES: Correct.

MEMBER MUNN: That's been generally accepted.

DR. MAKHIJANI: I think so.

MEMBER MUNN: I think so too.

CHAIRMAN CLAWSON: Okay. So number ten can be --

DR. MAKHIJANI: With that clarification I think, with the NIOSH statement that's there I think my suggestion would be that we're good with it.

MR. KATZ: Gen and Phil?

MEMBER ROESSLER: If Arjun is happy, I'm happy.

MR. KATZ: That's beautiful.

CHAIRMAN CLAWSON: What about me, Gen?

MEMBER ROESSLER: Well I know you are happy.

MR. HINNEFELD: You heard her.

CHAIRMAN CLAWSON: I know who matters here. Okay. So issue ten is closed with a caveat of NIOSH's response in Table 4-11.

DR. MAKHIJANI: Yes, that's the thing that clarifies what happened and I find acceptable.

CHAIRMAN CLAWSON: Right. And I just wanted to make sure of that. Okay. And we're on to 11.

DR. MAKHIJANI: Is that reflected in the TBD in that way?

MR. ROLFES: I'm going to ask Matt Smith if he's available on the phone. Matt, is the current TBD, the external TBD does that already incorporate the 50th and 95th percentile missed dose values?

MR. SMITH: I'm trying to catch up with you on that one. Let me, I'll weigh in as soon as I get it in front of me here. Go ahead and continue. I'll interject later.

MR. KATZ: That's fine. Thanks.

DR. MAKHIJANI: Eleven, correction factors for external environmental dose due to geometry of organ relative to badge need to be developed. NIOSH has provided a table of photon energy spectra to be used.

NIOSH concluded that external dose

conversion factors would not make a material difference. Then our, my comment in the update was NIOSH's photon energy grouping appeared to need review. Correction factors for skin dose may be much greater than one.

SC&A's preliminary view is that some aspects of NIOSH's conclusions of external environmental dose correction factors need review to assure they are claimant-favorable.

MR. ROLFES: All right. Gene, are you familiar with this issue?

MR. ROLLINS: Could you say again, Mark, please?

MR. ROLFES: Gene, I just wondered if you were familiar with this issue? Arjun has said that he believes that skin dose correction factors could be much greater than one. And I'm not sure, Arjun, if maybe you could explain that.

DR. MAKHIJANI: I looked at 6.4.2.1 in the most recent TBD. I have it open in front of me. And the beta to gamma ratios appear to me to

be low. One I think is your median value.

MR. ROLLINS: Okay. Yes, I am familiar with this issue. We're using a value of 1.04.

DR. MAKHIJANI: Right.

MR. ROLLINS: And that is based on measurements that were taken by dosimetry. We had like 100 data sets where we had actual shallow dose and deep dose recorded.

So it's not theoretical, it's actually empirical.

DR. MAKHIJANI: The, now where is the decay corrections, and how do you account for the short-lived beta exposure? So because again we're focused here on the skin question. And my --

MR. ROLLINS: Excuse me, go ahead.

DR. MAKHIJANI: My recollection of beta to gamma dose ratios I reviewed the operation process documents a long time ago not as part of this job, is that the short-term beta to gamma ratios that were found in the field after the tests

were quite high, much higher than one.

And so I'm wondering, you know, when skin dose is involved again we're sort of related to the earlier issue, is it appropriate to use these average values in the badges for beta to gamma ratios for skin doses?

MR. ROLLINS: The TBD gives the dose reconstructors the latitude to use higher beta to gamma ratios. And those ratios are delineated in the appendix.

If they feel like they understand the exposure scenario well enough they are able to use higher beta to gamma ratios.

MEMBER MUNN: Would that vary by test?

MR. ROLLINS: Pardon me.

MEMBER MUNN: Would that be varying by test or by time after test?

DR. MAKHIJANI: I think it would vary by time --

MR. ROLLINS: Time after test.

MEMBER MUNN: Time after test, okay.

DR. MAKHIJANI: I think that, I'm not a true expert in this. But in my opinion the time after test would be the more important variable compared to the test. It would vary by test too because there are different devices.

MEMBER MUNN: Yes, I couldn't remember that much variation in the ratios. It didn't list the data that deeply either.

DR. MAKHIJANI: Where is the table in the appendix, Gene?

MR. ROLLINS: Hang on just a minute and I'll get it for you.

MR. ROLFES: It's been a number of years since we've discussed these values.

DR. MAKHIJANI: This is a major factor in our discussions today.

CHAIRMAN CLAWSON: All of a sudden these memories, these flashbacks are coming into your head.

MR. HINNEFELD: No more pleasant than it was then.

DR. MAKHIJANI: I'm not too unhappy with my memory.

MR. HINNEFELD: Mine's shot.

MR. ROLLINS: It's in Appendix C, Table C-1. We have beta to gamma ratios by a test and by hours and days and years after the detonation.

DR. MAKHIJANI: All right. Okay, that's good. Table C-1. Okay. I'm there. I have it. Right. So these ratios are much higher in the shorter time periods because you've got ratios of ten and 15 and 18 and seven and so how do we, in regard to skin dose I would have thought that these would be more germane than your average calculated from the badge reading.

MR. ROLLINS: These might be associated with one particular test re-entry for example and wouldn't necessarily be reflective of individuals, you know, entire occupational, you know --

DR. MAKHIJANI: Right. I agree with that. So I think some way needs to be found to

account for maybe by looking in the records of, you know, these are like the re-entry workers, the people who went to collect the instruments.

Those kinds of workers I think maybe the guidance ought to be more explicit as to when this table should be used. I mean you've got the data here.

MR. ROLLINS: The problem we're running into is we really made no attempt to measure shallow dose I think prior to 1966.

DR. MAKHIJANI: Correct. There are no measurements as I recall prior to '66.

MR. ROLLINS: What you're seeing back here in this appendix is purely theoretical based on Hicks= study.

DR. MAKHIJANI: Right. But it does reflect field measurements that have been made during the test. Hicks data didn't come out of a void.

MR. ROLLINS: I don't think this is empirical at all.

MR. HINNEFELD: You think he generated it based on inventories, radionuclide inventories.

MR. ROLLINS: Yes, based on inventories given by Hicks.

MR. HINNEFELD: Okay. So I wonder if Matt has anything to offer on the kind of instruction that is given to dose reconstructors in doing this because, you know, a dose reconstructor doesn't normally do a dose reconstruction with a Site Profile open in front of him.

They have some other set of guidance whether it be a procedure or a tool or something like that. And I don't know if, Matt, do you have anything to offer on that on how is this alternative weighed by a dose reconstructor?

MR. SMITH: Sure. First let me jump back to the previous item. Just real quick on item ten on Table 6-11, the update described in the response still needs to be done in the TBD. And certainly it makes sense looking at it and the date

on this matrix response is just after the revision was put out.

DR. MAKHIJANI: Okay. So thank you.

MR. SMITH: That's a clarification on that. With respect to this next item, some of the direction is actually given in Table 6-17 of Rev 3 of the TBD.

DR. MAKHIJANI: What page is it on?

MR. SMITH: I'm sorry. It's on Page 59 of 135.

DR. MAKHIJANI: Fifty-nine. Okay. I'm on Page 59. Yes.

MR. SMITH: Here's where we're saying if there's evidence of exposure during a drill back or tunnel re-entry values appropriate to the period after the event in Attachment C, would be the technique to use. These values are to be applied to the dosimeter exchange for the drill back or tunnel re-entry.

DR. MAKHIJANI: In Appendix C, go back to that Table C-1 you have an annual average value

that's pretty high. I'm trying to retrieve the table. On site during the year and the footnote says average values can be used if a reasonable approach is required or if the employee is not directly identified with an event.

So these beta-gamma values are quite high. And so which ones of these values would the dose reconstructor be using? I mean they are all over the map. Would they use the one in the last column, on site during the year or --

MR. SMITH: Well you've got the event.

DR. MAKHIJANI: Right.

MR. SMITH: So the DR would have to be looking at the, you know, claimant's file to see which of them would be the appropriate one to use. I mean we, this is where they're going to have to use some judgment and then capture all of their assumptions in the DR write-up.

DR. MAKHIJANI: I also note that the beta/photon ratios in days and even years after are all much greater than one. So I'm wondering how

your distribution came up with a value of 1.04 for the measured values because these are completely at variance with what you described in the body of the TBD in that 6.4.2.1.

MR. SMITH: The 1.04 was based on actual badging information where we had shallow and deep dose information. That's actually measured.

MEMBER MUNN: That's the empirical.

DR. MAKHIJANI: Where did Hicks get his numbers?

MR. ROLLINS: That was all theoretical.

DR. MAKHIJANI: Yes, it couldn't have been theoretical in a void. I mean, Hicks tables are very well recognized and used.

MR. ROLLINS: I take that back.

DR. MAKHIJANI: I'm of the impression that Hicks tables were a theoretical elaboration of measurements that were made and models that were constructed of what happens during nuclear explosion in terms of fission product generation

and the spectrum of fission products that are generated.

So that's where I think this comes from. I'm puzzled by the, because it's always been my impression that beta/gamma ratios in nuclear testing are much greater than one and maybe this is where I get my impression.

MR. HINNEFELD: Well this is Stu. If I could ask Gene a question. The 1.04 ratio which comes from measured values, do we have what measured values? Do we know what we're talking about in terms of which group of dosimeter readings did we look at to arrive at that ratio?

MR. ROLLINS: Was that a question to me? I'm sorry.

MR. HINNEFELD: Yes, I'm sorry. Yes, Gene, it was to you.

MR. ROLLINS: Could you restate that please?

MR. HINNEFELD: Well you say the 1.04 ratio is based on measured dosimetry values. And

so which dosimeters were those? I mean which, what years, what people or do we have a description of what that is? Was it an entire years or several entire years?

MEMBER MUNN: Entire site?

MR. HINNEFELD: Do you know?

MR. ROLLINS: I'm trying to read right now. They had some of that information in the TBD.

MR. HINNEFELD: I'm just trying to square that, you know, reconcile that 1.04 with this Hicks data from the Hicks table. That's all I'm trying to do. If the Hicks says the ratios are this why are the measured values 1.04?

MEMBER MUNN: Of course the Hicks values would be very brief in time.

DR. MAKHIJANI: Also he has values for days and years. And they are all much more than one.

MEMBER MUNN: Big numbers.

MR. ROLLINS: I've got to go back to the main part of the TBD. It might take me a minute

or so to find this. The reason the measured ratios are so low is due to weathering and self-shielding that's happening in the environment over time.

Especially the positive material will probably have a much higher measured beta to gamma ratio than what we actually measured.

DR. MAKHIJANI: What actually surprised me and I didn't remember this when I was first, when we first started talking about this is the Hicks ratios are large even for times long after the test.

MR. ROLLINS: Right.

DR. MAKHIJANI: Years.

MR. ROLLINS: That's taking into account weathering and self-shielding, over burdens that sort of thing.

MEMBER MUNN: It sounds as though we may still have an unresolved issue in that regard.

MR. HINNEFELD: Well I think the, it was just a matter of curiosity why the badges read 1.04 versus these ratios. That's just kind of a

matter of curiosity.

I think the essential ingredient that we need to be firm on is and it could be that since we're still resolving the Site Profile issues that the final guidance to the dose reconstructor hasn't yet been written, you know, in terms of telling the dose reconstructor this is what you should do to do these dose reconstructions.

So it could be that it hasn't been written yet. But that to me is the key question is that we have the Hicks ratios. We have these badge measured ratios. And it would be nice if we had a fairly descriptive set of decisions to make for a dose reconstructor so that under these situations they make the same choices.

Dose reconstructors for the same case would make the same decisions. That's ideally what you would want.

CHAIRMAN CLAWSON: Well and that's what me and Wanda were just talking about a minute ago. I'm looking at this from the dose

reconstruction of okay, are we going to end up with the same thing because all of a sudden getting the dose reconstruction this one used this table when they should have used this.

It's the same thing we get into a lot. So it's just clear guidance of what the dose reconstructor would be using.

MR. HINNEFELD: I think, well no matter what we find out today I think that's kind of the question that we're going to have to come back with. I mean what, you know, we've got all this information, you know, all these available ratios out there.

How are we going to write instructions for the dose reconstructor so that we have a consistent application of a set of rules so that it's essentially not the luck of the draw?

DR. MAKHIJANI: And this particular issue is very important for skin dose questions.

MR. HINNEFELD: Skin dose issue and skin and eyes.

DR. MAKHIJANI: It's really the one thing where it would make potentially a pretty big difference.

MR. HINNEFELD: Okay.

MEMBER MUNN: But it's also fairly obvious just not even knowing the details just looking at the issue that we had before us. It's fairly obvious that there is some kind of an artifact, some kind of a process between the raw data that the Hicks tables show and the information that's obtainable from the badges.

Clearly they're not, one has a bearing on the other but it's not a direct inference. It's something that certainly I would like to see a little more information about than what we have.

MR. HINNEFELD: Yes, I think the key element here is, you know, what are the decision rules for a dose reconstructor given this wide range of potential ratios.

DR. MAKHIJANI: Well, Stu, I think it would be useful also to look at the measurements.

Earlier on you raised that question which badges.

And so it might be useful for us to look at, I mean if the Work Group wants to go there. That's how I understand Wanda's comment.

MEMBER MUNN: Yes, it's very interesting to me how you could have a group of badges from the same essential time period that are supposedly covered by the Hicks data and have such a discontinuity between. It would be interesting to know why or at least to have some logical, rational basis for saying why.

DR. MAKHIJANI: So it would be useful to see the construction or derivation of that, the numbers that are in the TBD in that section.

MEMBER MUNN: A better understanding, from my point of view I'm not even crystal clear on how the Hicks data was developed, exactly how he made those measurements. I haven't delved into his report myself. So it would be helpful to have some idea.

DR. MAKHIJANI: It's been awhile. So

I'm not going to hazard an answer now. But maybe Mark might know.

MR. ROLFES: I don't recall which dosimeters were evaluated. Presumably you would want ones that actually had recorded dose on them. And I don't know how he categorized them. I'd have to take a look back. It's been many years.

MR. ROLLINS: The derivation of the 1.04 of ratio is discussed on Page 52, about the middle of the page. And it talks about they looked at results of 84 claim files with positive beta and gamma results between 1966 and 1987. Three hundred sixty-eight data pairs were identified from 84 claims.

Based on these data a log-normal distribution was calculated in the 50th percentile at 1.04 and 95 percentile at 4.59. It gives a GSE of 2.41.

DR. MAKHIJANI: Okay. So this might have something to do with, you know, the atmospheric tests ratio and exposures may have been

quite different than in the period we're talking about. Anyway, I think this is an issue that we need to, I would recommend needs some further work.

CHAIRMAN CLAWSON: Right. But you guys can't re-review anything until NIOSH --

DR. MAKHIJANI: Well we haven't seen this data and I guess we would have to go, I don't know whose court the ball is going to be in. I think probably NIOSH's court until we see something from them.

CHAIRMAN CLAWSON: Okay.

MR. HINNEFELD: The, I've lost track of which comment, which finding number.

MR. KATZ: Eleven.

MR. ROLFES: And see if we can find a file of the data that we've analyzed to come up with the numbers that were presented in the TBD.

MR. KATZ: Yes, and then Wanda just wants it, if we can do that some sort of explanation of the relationship between Hicks and what we've done, what we've looked at comparatively.

MEMBER MUNN: Yes.

MR. KATZ: As to what might explain it. So some explanation for that would be good and then Stu mentioned also which would, actually it seems like it would come afterwards once you understand all this protocol, how to apply whichever data.

CHAIRMAN CLAWSON: And then --

MR. KATZ: Yes, and then you can look at that.

DR. MAKHIJANI: Yes. There is another part to 11 that we haven't talked about yet.

MR. KATZ: Okay. Part A.

DR. MAKHIJANI: I think we talked about Part B first.

MR. KATZ: Okay. Part B first.

DR. MAKHIJANI: But if we're done with the beta/gamma the photon spectrum issue I think was not actually addressed in NIOSH's response. NIOSH addressed just the beta/gamma part of the issue.

MR. SMITH: There is language

addressing energy ranges, you know, no one is constrained by IREP. It's the language at the end of the response.

DR. MAKHIJANI: Let me see here. You are right. Okay.

MEMBER MUNN: Is that adequate?

DR. MAKHIJANI: I'm not sure. I have to go back and see where, these photon energy groupings that we talked about were not related to the IREP groupings because IREP groupings are fairly crude. We were talking about photon energy groupings in relation to correction factors for skin dose.

Now, you know, I have to go back to our TBD to see where this came, unfortunately there's no page number reference to our TBD and the comment. But I will try to bring it up. If you would bear with me for a minute.

MR. KATZ: Sure.

DR. MAKHIJANI: I'm looking in the wrong place. Excuse me.

MR. ROLFES: Earlier on in the meeting I had pointed Arjun to the April 23rd transcripts discussing our original approach, which was the mass loading approach. There is additional discussion in the 12/15/2009 transcripts regarding the revised approach.

DR. MAKHIJANI: Sorry.

MR. ROLFES: There's additional information discussing the revised internal environmental approach after we changed from the mass loading approach.

DR. MAKHIJANI: Are we going back?

MR. ROLFES: Yes.

DR. MAKHIJANI: Can we come back to that after lunch?

MR. ROLFES: We sure can. I just wanted to point it out.

MR. HINNEFELD: There are additional transcripts.

MR. ROLFES: There may be additional transcripts discussing the issue as well.

MEMBER MUNN: Which other one did you just say?

DR. MAKHIJANI: Well we have lots of transcripts. That issue went on for a long time. I think I have found the place.

MR. ROLFES: That was 12/15/2009 for that.

MEMBER MUNN: Yes.

MR. ROLFES: Beginning around Page 32.

DR. MAKHIJANI: Okay. So this is maybe a better explanation for that matrix entry. I should have just copied this in the matrix. But let me just read from the Site Profile Review and I think it might clarify what we're talking about.

Due to the special and highly varied nature of activities at NTS there was potential for exposure to an exceptionally large array of radionuclides from various irradiation geometries. Since these radionuclides have photon energy spectra that cover all three ranges of the inputs required for IREP, which is used to

calculate Probability of Causation it appears crucial for the dose reconstructor that the TBD should define the photon energy spectrum and irradiation geometry for each type of worker or installation.

So that's where the relation of this photon spectrum and the IREP came from. That's where that matrix item comes from. So I think just going back to saying the IREP categories, we use the IREP categories kind side stepping the issue because the issue was the IREP categories for the specific situation of the NTS might need some more clarification for the dose reconstructor to know how much of the badge reading to put in which block.

MR. SMITH: Okay. This is Matt Smith with the ORAU Team. The response directs us to Attachment B, of the Site Profile. And you can see where the author is, he used the radionuclide inventory from Table 2-2. And again, I'm refreshing as I go on this as well.

CHAIRMAN CLAWSON: We're all doing

that.

MR. SMITH: But you can see where an analysis was done, I'm going to guess by, you know, some of the original authors of the TBD where they took a look at the radionuclide inventory and then in Table B-1 provided an approach to getting the spectra for these various operations into the proper IREP.

DR. MAKHIJANI: Yes, I see that.

MR. SMITH: You can see how he's footnoted it and also in the text of Attachment B he has described or I should be fair and say he and/or she has described how that approach was taken.

DR. MAKHIJANI: Right, so do the dose reconstructions actually use this table?

MR. SMITH: I'm going to have to take another jump and, Gene, maybe you might be already ahead of me in my --

DR. MAKHIJANI: Because that might resolve the issue if they are consistently using

this table and to figure out what to put into IREP then that would resolve the issue.

MR. SMITH: My guess is, yes. I would have to jump back up into the body of the TBD to see how it's in turn referring back to Table B-1.

DR. MAKHIJANI: That may not be so hard. Let's try.

MEMBER MUNN: Take a look and see.

DR. MAKHIJANI: Yes, let's just try to find the reference of Table B-1. Okay. So there's no reference to Table B-1 in the body of the TBD, at least I don't find it.

MR. SMITH: While the group continues I'll, either Gene or I will take a look and see if there's a link back.

DR. MAKHIJANI: Yes, I mean I just did a word search.

MEMBER MUNN: Yes, right. Thanks, Matt.

DR. MAKHIJANI: Yes, so I think --

MR. ROLLINS: We do mention in the body

that additional information for ratios are given in Appendix C. So we redirect that the dose reconstructor to Appendix C.

DR. MAKHIJANI: And that's a different, that's the beta/gamma ratios. That's not this problem. This problem is what about the photon spectrum guidance that you're going to give for the specific problems.

You know, you've got all these work categories and Table B-1 is actually pretty good. And also it seemed to me I haven't reviewed all the numbers but I think it's what you were looking for. And so I think there should be something specific for dose reconstructors to use that table.

MEMBER MUNN: The question is, is the direction to it where it needs to be.

DR. MAKHIJANI: And whether it was noted earlier that, you know, dose reconstructors don't always have the TBD in front of them when they are doing this job. But this table would seem to be particularly important.

MR. ROLLINS: I can tell you in practice what we do is typically assume 30 to 250 keV and if we get close to a decision level then we might dissect that a little further. But typically we'll just use the claimant-favorable 30 to 250.

MR. FISHBURN: Gene, this is Mark Fishburn. Also the workbook has all of these available to the dose reconstructor if they want to choose from these.

MR. ROLLINS: That's true, yes.

MR. FISHBURN: That's always available.

DR. MAKHIJANI: I would think that this, I mean is their job specific information in the workbook because this is a table that gives you these photon spectra by job, which is important and interesting?

MR. FISHBURN: Yes, the workbook has it by drill back operations, re-entry, routine tunnel operations, the same that are listed in Table B-1.

DR. MAKHIJANI: Are in the workbook?

MR. FISHBURN: Yes.

DR. MAKHIJANI: So then, so it's there and so they presumably are using this when they do the dose reconstructions?

MEMBER MUNN: Yes, although generally it's 30 to 250.

DR. MAKHIJANI: Yes.

MR. ROLLINS: If we need a best estimate we'll go into that much, we'll go down to that detail.

DR. MAKHIJANI: Okay.

MR. KATZ: Okay, good.

MR. SMITH: I'll jump in as well and point people towards Table 6-13. I don't have Table B-1 open at the same time. But for drill back we're at .03, for less than 30 keV .5 for 30 to 250 and .47 for greater than 250. Real quick, does that match up with Table B-1?

It should because the footnote says see Attachment B for derivation of partition of fractions.

DR. MAKHIJANI: Yes, I would have to open two windows here.

MR. SMITH: Yes, I'm in the same boat. My quick take on it is that Table 6-13 is echoing Table B-1. In the body of the TBD it is giving the DR this information and direction. And it also discusses the default value of 100 percent, 30 to 250 as Gene brought up.

DR. MAKHIJANI: I'm going to do a random check. Employer explosive devices, it's not the same numbers. No, adjusted photon, no, it is the same numbers. You're using the adjusted photon, what is the adjusted photon fraction?

Attenuation of low energy photons. Attenuation by what? So the note A says this, so you know, my head is focused on skin doses, right. So for instance that nuclear explosive device assembly, less than 30 keV is .73 but once adjusted is .57. So it's being attenuated by something.

MEMBER MUNN: Air, dirt, clothing, what?

DR. MAKHIJANI: So the skin dose would probably be an unattenuated dose, right, maybe? I'm not sure.

MR. SMITH: Many times when we work up a skin dose we are looking at factors that could have attenuated.

DR. MAKHIJANI: Like clothing?

MR. SMITH: Clothing, shielding.

DR. MAKHIJANI: So what attenuation does this reflect, this Table B-1?

MEMBER MUNN: I've seen that discussion about clothing. But I don't remember whether it was in the NTS context or not.

DR. MAKHIJANI: Wouldn't less than 30 keV produce a higher Probability of Causation?

MR. ROLFES: Yes, it typically would but that's not usually what the nuclear test would produce.

DR. MAKHIJANI: Right. But in this particular case I'm just looking at there are some, because the default is 30 to 250 there are some

jobs, quite a few jobs, low level waste site, radiation instrument calibration and this explosive assembly that have the larger fraction being in the less than 30 keV.

So I think some clarification in regard to how this table is being used. But I would say generally the use of this table would resolve the issue that we raised with this one caveat.

MR. SMITH: The discussion is again that the bottom of Page 111.

DR. MAKHIJANI: Page 111. So it's attenuation in the environment.

MR. SMITH: Right.

DR. MAKHIJANI: Yeah, I mean, is there something we can see in regard to that attenuation factor? Because it might make a difference to some people.

MR. SMITH: Off the top of my head, and Gene can fill in the blanks, my guess is one of the original authors wrote this section. I don't have instant access to their knowledge.

DR. MAKHIJANI: Yeah, it was just a question. I think we're not far from resolving this issue if we could see some information on the attenuation and how it's being applied. I mean, the fact that it's in the workbook that dose reconstructors use at least would put me at ease.

MEMBER MUNN: So perhaps we can have that next time?

MR. HINNEFELD: Who's doing something here?

MR. SMITH: I'll certainly look into it.

MR. HINNEFELD: We're going to see if we can find the information that led to that attenuation?

MEMBER MUNN: Thanks, both of you.

DR. MAKHIJANI: Is there like a paper on the derivation of that table where all the numbers came from that NIOSH might share with us?

MR. HINNEFELD: If we have it, we'll share. I don't know.

MEMBER MUNN: That's what we're, one of the things we'll look to see, how NIOSH --

MR. HINNEFELD: That was apparent in a table you were looking at, was it the B-1 Table?

DR. MAKHIJANI: Yeah, Table B-1.

MR. HINNEFELD: I hope Jim is really enjoying his vacation.

(Laughter.)

DR. MAKHIJANI: Brad, I have no more on 11.

MEMBER MUNN: We have our expectation for 11 for next time.

MR. KATZ: So, NIOSH is going to provide whatever information on the derivation of Table B-1. But otherwise the issue can be closed because everything else is sorted out.

CHAIRMAN CLAWSON: Okay. So we've got that one.

MEMBER MUNN: This is talking about photon energy.

CHAIRMAN CLAWSON: Yeah, well, the

photon on that part of it, and I was hearing that we've got it in there. But how do we get it? I just want to make sure that we've answered what your question is.

DR. MAKHIJANI: Yeah, I went back to our original Site Profile Review, Brad, to refresh my own mind as to where all this stuff came from. And I think Table B-1 is pretty responsive to the issue that we raised back then.

And the only question now is, you know, how is this attenuation factor derived? Because it might be important for some people.

CHAIRMAN CLAWSON: Okay. So as soon as we get that we can close that one. So we'll continue on to 12. And this is the famous Gravel Gerties.

DR. MAKHIJANI: I think I would recommend acceptance of NIOSH's response because it indicates to me, at least confirms --

MR. KATZ: Can you just summarize it?

DR. MAKHIJANI: Oh, I'm sorry. The

issue is, the item is that there might have been radon doses in G-Tunnel. The doses were not claimant-favorable. NIOSH had addressed that issue.

The one point that was outstanding as to whether anyone entered the Gravel Gerties after 1992 and if so are the radon doses being incorporated? Important for some, potentially important for some non-presumptive cancers.

MEMBER ROESSLER: Is anybody on the line?

MEMBER MUNN: Yes.

MS. LIN: Yes, Dr. Roessler, this is Jenny, I'm still here.

MR. KATZ: Oh, I'm sorry. Something happened and the phone just muted itself.

MEMBER ROESSLER: Okay. I'm glad that it wasn't my fault.

MR. KATZ: No, thanks for speaking up because I don't know when that happened. But I just noticed it when you said that.

MEMBER ROESSLER: Okay, thanks.

MR. KATZ: Thanks.

DR. MAKHIJANI: So the main question was did anybody go into the Gravel Gerties after 1992 and what is being done about those doses? And I infer from what NIOSH has said -- so maybe NIOSH can provide --

MR. ROLFES: Yes, this is Mark. Places such as the device assembly facility were still entered after 1992. So we agreed that we would in fact calculate radon exposures for workers that were entering into a Gravel Gerties-type facility.

DR. MAKHIJANI: Okay. So that issue would then be resolved. Presumably you would put this in the revision of the TBD? Because I don't think it's there.

MR. ROLFES: Yes, I will have to check and make sure that there's a statement in the TBD. And if it's not then we will incorporate it.

DR. MAKHIJANI: Yes, just alert that

after 1992.

MR. KATZ: Can we close this, Work Group?

MR. SMITH: This is Matt Smith of ORAU Team. Sorry, the line dropped and I had to dial back in. And I'm sorry to go out of sequence again. But jumping back to number 11, I haven't opened up the document yet. But the reference cited in that Attachment B is by Griffith in 2008 and the SRDB number is 41175.

MR. ROLFES: Okay. Then we'll just take it off NIOSH's table for now and we'll let SC&A review that.

DR. MAKHIJANI: SRDB 41175?

MR. SMITH: Correct. It's estimation of fractional photon contribution by NTS work area and operation.

DR. MAKHIJANI: I don't know whether the Work Group wants us to look at it. But we could if you wanted it.

MR. KATZ: Why don't you see whether

that's answering what you were going to follow up on.

CHAIRMAN CLAWSON: Actually, after NIOSH agrees that's what we want to do then we'll -- then you guys can review that from there.

MR. KATZ: All right, Mark. If you just take a look at that. See if that does answer the issues.

MR. ROLFES: Okay.

DR. MAKHIJANI: So then you would communicate with us and then we would automatically go ahead and review that or --

MR. KATZ: Yeah, there's no point in you --

(Simultaneous speaking.)

DR. MAKHIJANI: And I want to be clear that once we hear from you that we don't need another --

MR. KATZ: Yeah, no, we don't need a meeting for this. We would just have an e-mail.

MR. SMITH: And I'll try to take a look

during your lunch hour and report back after your lunch.

MEMBER MUNN: Good.

MR. KATZ: Thanks, Matt.

MEMBER MUNN: Yeah, thanks.

DR. MAKHIJANI: So item 12, I think, should be considered resolved with the appropriate entry into the TBD about Gravel Gerties and radon doses.

CHAIRMAN CLAWSON: Okay. Gen and Phil, any issues with closing number 12?

MEMBER ROESSLER: Well, what do you think, Brad?

CHAIRMAN CLAWSON: I think that it is great.

MEMBER ROESSLER: Okay. I agree with you.

CHAIRMAN CLAWSON: Okay.

MEMBER SCHOFIELD: Yeah, I agree.

CHAIRMAN CLAWSON: Thank you. And Wanda, you're good too?

MEMBER MUNN: Yes.

CHAIRMAN CLAWSON: Okay. On to Comment 13.

DR. MAKHIJANI: So, environmental doses to I-131 venting need to be taken into account for non-monitored workers. NIOSH's method for estimating I-131 exposure due to Baneberry venting does not appear to be claimant-favorable.

And the most recent comment from SC&A was that development of a method for assigning more claimant-favorable partial doses for I-131 appears to be warranted. So then there's a long response, which Mark can explain.

MR. ROLFES: Yes, and, Gene, are you able to go through our response? I know we had reevaluated the internal doses from iodine following Baneberry and wondered if you might be able to walk us through what we've done.

MR. ROLLINS: Well, I don't know what I have over and above what's written here.

DR. MAKHIJANI: Maybe you could

describe what's written there for the record.

MR. KATZ: Yeah, exactly.

MR. ROLLINS: We looked at the cohort group that was identified as being expose to iodine from the Baneberry event. And the minimum detectable dose at that time was 1 millirem.

MR. ROLFES: Just to add something also. I mean, this is one of those fine lines between an operational internal exposure and an environmental exposure. The people that would have been directly involved, I would say, would be an operational exposure and not some, you know, downwind, you know, exposure scenario.

So if we have an individual that was directly involved and does not have bioassay data or thyroid counts, we would say that internal doses for that individual could not be reconstructed without bioassay data due to the SEC Class that has been added. So what we're trying to estimate here is an environmental exposure for individuals that were not directly involved.

And I believe we had changed our approach since our last meeting. I think we had gone back and looked at some air sampling data. But that is what I was not quite sure about, Gene.

MR. ROLLINS: We did go back and look at some air sampling data. But where we did get positive indications of airborne iodine, it was in this group of individuals that we identified as being contaminated and potentially had intakes.

We took all those individuals, and if they were contaminated, then we put them onto a bioassay program and actually had thyroid counts and urine samples from these individuals. And those individuals that showed up positive on the bioassay were assigned doses based on those bioassay results.

But I don't know how we could postulate somebody could have been out there that got exposed and we didn't know about it. I mean, again, we might be making stuff up if we try to do that. I don't know how we could do that.

DR. MAKHIJANI: I think, first of all, a lot of what this refers to is not the occupational dose. It is the people who were accidentally exposed in the aftermath of Baneberry.

So they weren't necessarily -- some of them may have been operational workers. But I think most of them were probably not.

MR. ROLLINS: Well, that's this cohort of 900 individuals.

DR. MAKHIJANI: So that's what I'm clarifying, is that these 900 individuals, Mark was mentioning that, you know, there's a line between environmental and occupational dose here.

I'm just clarifying that really we're talking about environmental dose here because this was not in the context of work that these people were doing. It was in the context of an accidental exposure because the fallout --

MR. ROLLINS: And they attempted to characterize what their potential exposure could have been.

DR. MAKHIJANI: Right.

MR. ROLLINS: And they had a pretty good cohort group of 900 individuals.

DR. MAKHIJANI: Right.

MR. ROLLINS: There were only about 17 that had measurable dose.

MEMBER MUNN: Which is good.

MR. ROLLINS: Yeah, that's good. But other than that, I don't know how I could extrapolate that to a dose that we would want to apply to everyone who happened to be on site during that time period.

DR. MAKHIJANI: How many people actually had bioassay from these 900 individuals?

MR. ROLLINS: Sixty-nine had thyroid counts. If they came up positive on the thyroid count, then they went and they had a whole body count and they underwent urine analysis. And it appears, based on this, that only about 17 of those had significant dose or anything above what they could measure on the bioassay program.

MEMBER MUNN: Anything measurable, yeah.

MR. HINNEFELD: Our response says all but 17 were assigned doses to their thyroids from that cohort.

MR. ROLLINS: Oh, I'm sorry. Sixty-nine of the 900.

MR. HINNEFELD: Our response also says there were 145 that underwent decontamination and submitted bioassay samples. So according to the response, if this is written correctly, 214 of the 900 were bioassayed in some fashion, right? If the response means what it says.

MR. ROLLINS: Yeah, and that's correct. I'm just trying to refresh my memory.

MR. HINNEFELD: Two hundred fourteen of them had bioassay in some fashion. And so we'll have either a dose calculated from the bioassay or a missed dose from the bioassay or whether it was in a thyroid count or a urine sample.

So in terms of working with the 900, and

so, Arjun, your question is the other 900 who were just out there, you know, maybe -- I think they were like under construction groups and stuff out there during Baneberry that had to be evacuated. Your question is, what about those guys and what do we know about potential exposures there?

That's your question. And my question is, do we know who they are? So if we could figure out what the dose would be to somebody who is not in the monitored part, who are part of the 900 but not monitored, do we know who those 655 people are?

MEMBER MUNN: Well, and --

MR. ROLLINS: I think that information is available.

MR. HINNEFELD: Okay.

MEMBER MUNN: And is it even feasible to assume that it would be an internal exposure problem if you have no badge reading that's discernible? It would seem you would have some kind of a discernible reading.

DR. MAKHIJANI: Most of the internal

exposure is dealt with by the SEC. There's these few cancers and, again, skin dose. And in Baneberry I think you have that sort of skin particle deposition issue that we have discussed in the past that I think maybe ought to be reviewed.

MR. ROLFES: I would sort of disagree with that, because you're going to have a gas or a vapor, really, for iodine rather than a particle. I wouldn't expect there to be really, you know, hot particles essentially settling on someone's skin.

DR. MAKHIJANI: No condensation?

MR. ROLFES: Condensation?

MR. HINNEFELD: That the iodine might condense a little.

MR. ROLFES: I guess it's possible. But it's a pretty low moisture environment that's --

MEMBER MUNN: Yeah, it's not likely to condense in Nevada.

MR. HINNEFELD: So, I mean, it's also feasible that the evacuation was successful and

people were evacuated without being exposed. That's also possible.

DR. MAKHIJANI: Yeah, my memory of what happened in that incident is -- I'll bring this up with John Mauro again, this Baneberry thing on our side was handled by John and Lynn and not by me. So let me bring it up with him at lunch. And if we could kind of pick this up after lunch, I would appreciate it.

CHAIRMAN CLAWSON: Well, you know, speaking of that, we're pretty close to it.

MEMBER MUNN: We are, like five minutes of.

CHAIRMAN CLAWSON: So why don't we do that then and we'll pick up after lunch.

MR. KATZ: Then this is probably a good time to break. Is this a good time to break for folks on the phone too? And we'll pick up --

MEMBER SCHOFIELD: Sure.

MR. KATZ: Okay. We'll pick up at one our time. Is that good for everybody, an hour?

Okay. Thanks everyone and speak to you after lunch.

(Whereupon, the above-entitled matter went off the record at 11:55 a.m. and resumed at 1:07 p.m.)

MR. KATZ: So, Brad, do you want to resume?

CHAIRMAN CLAWSON: Yeah, I guess we'll pick up where we left off on this. And I believe it was Comment 13, which was I-131. And I think at the end of that we had concluded that we needed to reevaluate or --

DR. MAKHIJANI: Yeah, can we go back to Item 5 and just kind of settle that? Because there are a lot of items related to Item 5.

CHAIRMAN CLAWSON: Sure.

DR. MAKHIJANI: So I talked to John Mauro during the lunch break. Brad was also there in part of the conversation. Wanda and Ted were also there.

John basically said that it went

through a lot of iterations and SC&A went back and forth, NIOSH went back and forth, and eventually we had suggested this mass-loading model. As was discussed earlier, NIOSH found the doses were coming unreasonably high.

I don't remember the exact words that were used. But they came up with this other method. John said that he -- so unfortunately he's not available right now. He's preparing for a big 2 o'clock meeting. But he conveyed the message to me, and also Brad, that basically he may have agreed with a piece of it or all of it and he’s not sure.

He thinks that he wants the chance to review the issues before we sign off it and consult with Lynn Anspaugh. Because as you all recall, a lot of it went back and forth between Lynn Anspaugh and Gene Rollins. And we would like a chance to look at it and maybe send you a memorandum on the question as to whether we agree that it should be closed or what's outstanding exactly.

It was my impression when I updated the

matrix that there were outstanding issues on this mass-loading question. And I must say I didn't review all the transcripts when updating the matrix. So I may have missed something.

So I think I would rather leave it to John and Lynn to get back to you. John said that it would require only modest effort to get this done but he wanted to revisit it, if the Work Group approves.

CHAIRMAN CLAWSON: Okay.

MR. KATZ: That's fine. Just make sure that John looks at the transcript so he knows what he's said before.

DR. MAKHIJANI: Yes, I told him that. I told him, I gave him the date. I have the date, you know, I have the transcript.

MR. KATZ: There are two days, or at least two days.

DR. MAKHIJANI: April 23rd.

MR. KATZ: No, not just that. There was also -- Mark referenced the December one.

MEMBER MUNN: December of '09.

MR. KATZ: 12/15/2009.

MR. ROLFES: Starting around Page 30.

DR. MAKHIJANI: 12/15/2009. Okay. I'll bookmark that.

MR. KATZ: Just so we don't re-track.

DR. MAKHIJANI: Yeah, yeah, I'll bookmark both of those. Okay. So those are the last two meetings where it would be.

MR. ROLLINS: You might also want to go back and look at the June 23, 2008, meeting. There was some discussion of mass-loading, Page 39. And Page 75 is where John, you know, agreed to help us out to find a solution.

MR. KATZ: Thanks, thanks.

DR. MAKHIJANI: I don't even recall being present in those meetings, but I may have been.

MEMBER MUNN: How soon we forget.

DR. MAKHIJANI: Okay. So thank you for that, for giving us the elbow room.

On Baneberry, I guess there was this question of what happened to the -- what we're doing about the individuals who were not monitored. Is there a NIOSH proposal for that?

MR. ROLFES: In the TBD -- this is Mark Rolfes -- we did put in a short description of the air sampling data available to us. I think it was at Area 12 Camp. And had estimated the thyroid doses from those air concentrations and two hours of exposure. And the resulting doses were less than a millirem.

DR. MAKHIJANI: Okay. That's what you say here. Okay.

MR. ROLFES: And I can point the page out, if you like. I think I still have that up. That's Page 38 of 116 in Nevada Test Site Internal TBD.

CHAIRMAN CLAWSON: But Baneberry was just one of them that breached like that. That was just the most famous one. This is Brad.

DR. MAKHIJANI: Well, that's where the

environmental dose would have been most in question because there were a large number of workers who were involved in that incident that were not occupational doses. For occupational doses, you don't have the -- occupational doses are not on the table for internal calculation.

So, I'm not 100 percent sure about all of the ventings and environmental doses related to the venting as we sit here. Can we make this -- I don't -- it's my impression as we sit here that there's not an issue. But can we put that in the memorandum that we're going to send you?

MR. ROLFES: That's fine with me. Sure.

MEMBER MUNN: I think we've done that.

MR. HINNEFELD: So SC&A is going to send you an evaluation and let us know if there's still an issue there. Is that where we're at?

MEMBER MUNN: That's what I thought, yeah. Did we get that correct, Arjun?

DR. MAKHIJANI: Yes.

CHAIRMAN CLAWSON: Okay.

DR. MAKHIJANI: Fifteen is related to --

CHAIRMAN CLAWSON: Fourteen is on the previous page.

DR. MAKHIJANI: Fourteen is closed. There are no internal monitoring data until late '55 or 1956. But this issue relates to the SEC and can be closed.

Fifteen is related to resuspension and what we were just talking about.

CHAIRMAN CLAWSON: That goes back to the Issue 3, I believe.

DR. MAKHIJANI: Yeah, 16 was calculating internal doses from external doses using the Defense Threat Reduction Agency methods. And that's internal dose, so I believe it's closed. At least that's what -- right?

MEMBER MUNN: Yeah. Correct.

DR. MAKHIJANI: Ingestion doses need to be better evaluated. The only part of this, I

think, that openly relates to the resuspension models, or whatever approach we're going to use for that piece of environmental dose. The rest, the occupational part of this would be covered by the SEC.

But there's a piece of it that relates to the environmental dose that would belong and what we would do about Item 5. Item 18 recommended use of TIB-2 for post-1971 tunnel re-entry workers.

MEMBER MUNN: That's already closed.

DR. MAKHIJANI: That's resolved by the SEC. So, closed.

Nineteen, I think we covered under 11. It relates to beta dose data and the beta-gamma ratios for the period for which there are no beta dose data.

And we agreed in principle on the use of beta-gamma ratios. And the specifics of that guidance that would go into the TBD we discussed earlier. And I think it's still an outstanding issue.

MEMBER MUNN: Yes.

DR. MAKHIJANI: Item 20, intentional non-use of badges. We talked and investigated this extensively. I believe it can be closed. But, you know, obviously this is a judgment call for the Work Group to make.

MEMBER MUNN: But we had debated that and agreed to it in the past.

DR. MAKHIJANI: We debated this a lot. And fairly --

CHAIRMAN CLAWSON: This one, the Nevada Test Site was a very in-depth research.

DR. MAKHIJANI: It was an in-depth review. We didn't find anything big. You know, obviously there are different memories and different perceptions and different, you know, statements. And I think it was difficult to carry it farther from where we left it.

CHAIRMAN CLAWSON: Well, if I remember right, we had even done a random search through the whole process and everything else like that. My

personal opinion is that this one can be closed. Any other Board Members?

MEMBER MUNN: Agreed.

CHAIRMAN CLAWSON: Okay.

MR. KATZ: I think you may have closed it previously.

MEMBER MUNN: I believe we did.

CHAIRMAN CLAWSON: I thought we had.

MEMBER MUNN: And with SC&A's concurrence, that ought to do it.

DR. MAKHIJANI: Yeah, when I looked at it when I updated the matrix I thought it was very difficult to take it farther and we should close it.

Twenty-one, TBD does not contain information about external dosimetry.

MEMBER MUNN: Extremity.

DR. MAKHIJANI: Extremity dosimetry. And in specific reference to bomb assembly workers and NIOSH has a response for that.

MR. ROLFES: When we have extremity

dosimetry available we can use that to ratio doses to the extremities. If there's a skin cancer on the hands, for example, or if we need to make geometrical correction factors or if it's in the lower torso, for example. We also have technical guidance documents for correction factors, the organs of the lower torso, as well.

So on a case-by-case basis we could evaluate the differences in dose to the organs of the lower torso or to the extremities using guidance documents, or individual dosimetry data for individuals who were doing hands-on weapons assembly work.

DR. MAKHIJANI: Mark, I don't think this guidance is in the Nevada Test Site TBD.

MR. ROLFES: These are general guidance documents, like the TBD or -- excuse me, the Technical Bulletin for Geometrical Correction Factors Associated with Glove Box Workers. I think it's TIB-10, Technical Information Bulletin-10. That might be correct. But it's a

generic document for geometry primarily.

DR. MAKHIJANI: Well, that's where, you know, in relation to this bomb assembly, you make reference to other bomb assembly sites and not to a more generic approach. Wouldn't it be worthwhile to have a more specific approach given that the work was so different than normal glove box work?

MR. ROLFES: Well, such work was typically done by employees from Pantex or the National Laboratories, and they were typically monitored by those facilities or by those laboratories at NTS, in addition to being monitored by NTS.

I could see where an individual would have had extremity dose monitoring routinely for doing assembly work. But we would know based upon an individual's job title that they were, in fact, you know, an assembly -- person involved in the assembly of a device for testing based upon information from the telephone interview and in the

claim file.

DR. MAKHIJANI: Yeah, that wasn't -- my question was, shouldn't there be guidance that's specific to assembly work in the Nevada Test Site Site Profile rather than guidance that is general in regard to extremity doses?

MR. ROLFES: Well, there's not a lot of individuals that were directly involved in assembly work, and especially not Nevada Test Site employees. So it's more of an individual from a place like Sandia National Laboratories, Lawrence Livermore National Laboratories, Los Alamos National Laboratories or Pantex.

DR. MAKHIJANI: But it's always been very difficult for us to say there's not a lot of workers, and that's kind of been a vague area. We have specific information and why not put that specific information in the TBD?

MR. ROLFES: What specific information would you like to see?

DR. MAKHIJANI: The specific

information from assembly workers' extremity doses rather than more generic guidance about extremity doses. At least it's a question in my mind. It's for the Work Group.

MEMBER MUNN: Well, and I have a question about your question. What do you perceive as being the major difference between assembly at NTS and assembly anywhere else?

The devices were varying types, but nevertheless they were assembled in a fairly precise sequence and a precise manner. What would make NTS different than other assembly sites?

DR. MAKHIJANI: No, I wasn't saying that. In fact, I was saying that instead of having a more generic guidance about extremity doses from assembly sites, non-assembly sites, glove box work, why not make the guidance specific to assembly work? Not just NTS assembly work but, perhaps, Pantex, Iowa, whatever information is available about assembly work, should be provided in this guidance?

At least that's what it seems to me. That's up to the Work Group.

MEMBER MUNN: Well, perhaps it would be instructive for us to have a better feel for what's in the OTIB. You know, it seems to be a question as to whether or not the defining document is instructive enough.

MR. HINNEFELD: The OTIB we're talking about here is the glove box. I mean there's a glove box OTIB which is a geometry correction. And that's really for organs of the lower torso. I mean, that's really what it describes. And that's what we say here.

And then there's a geometry -- it started out as like a Mallinckrodt and it ended up a general geometry adjustment for certain geometries that you would encounter in a uranium processing facility.

But, again, that's like lower torso organs compared to a badge. I'm not exactly sure what we have on extremities. The question here is

extremities.

DR. MAKHIJANI: Yes, it is.

MR. HINNEFELD: And so, Arjun, you said we have data about assemblers.

DR. MAKHIJANI: You have data from -- I presume you have data from Pantex about assemblers.

MR. ROLFES: Sure, but --

DR. MAKHIJANI: I haven't been involved in Pantex, so I don't know.

MR. ROLFES: What a deployable nuclear weapon looks like versus how a test device might look is completely different. So there's going to be a lot more intricate work at a place like Pantex involving, you know, a lot more hands-on work with weapon components versus at a site like NTS where, you know, they're going to have parts sent and you know it's going to be a last minute, onsite assembly of one test device, for example, versus, you know, hundreds or thousands day-in and day-out at Pantex.

So it's a little bit different

situation. We're going to have a limited exposure potential during this final assembly phase right prior to a test.

MR. HINNEFELD: Okay. So your point is at Pantex an assembler spends his entire year in this environment, in this geometry.

MEMBER MUNN: Yeah, complex devices.

MR. HINNEFELD: And anybody particularly involved in assembling at NTS would assemble at most a few devices per year, and most of his annual exposure would not be in that geometry, correct?

So the issue, then, if we had an assembler's geometry adjustment, if we can develop that from Pantex, then you have the following question of what fraction of an assembler's external dose in a year did he receive during the assembly process? Because that would be the part where you would want to make the adjustment.

So essentially it's a two part question. If we had -- okay, I hate to give

ourselves a big assignment here. Because all this assembly would have occurred during the SEC period. I don't want to cheat anybody. And cancers on the hands are actually fairly rare.

CHAIRMAN CLAWSON: There's actually a third part. And as Mark has already said, and correct me if I'm wrong, Arjun, but most of these people that assembled these were either from Pantex, Livermore or whatever and they were being badged by both sides, weren't they?

MR. ROLFES: Yes.

CHAIRMAN CLAWSON: My question to this is, because where we get a hand-off at two different sites, how would the dose reconstructor be able to utilize this information? What would guide him to be able to do this to -- because you're right that most of the weapons were assembled by the Pantex people. They weren't the NTS people. They were the lab people that were doing this.

But you're getting into this one now where what site is really responsible for it,

aren't you? But you're going to be double-badged from the Nevada Test Site and also from, say, Lawrence Livermore.

I'm trying to figure out what we're trying to gain from this, Arjun, as far as --

MEMBER MUNN: The claimant would certainly have a badge reading that would be extensive from whatever their normal routine employment was. And their claim would probably not be an NTS claim. It would more than likely be one from their basic coverage.

But it would certainly cover any exposure that they would have had, and certainly any assay would catch any exposure that they had.

DR. MAKHIJANI: I'm not saying that what you're doing is unacceptable. And it says here I guess a check would be useful whether there are still no extremity cancer claims, because last time we looked there were none. And so it's kind of -- sort of a moot question. But if the records of the assembly workers are mainly in Livermore and

Los Alamos, Pantex, you know, I guess --

MEMBER MUNN: Well, can we put it to bed? What could we do to put it to bed? Would a simple one more check to make sure that, as Stu pointed out, they're extremely rare, you know, hand, extremity.

DR. MAKHIJANI: Perhaps we could do that, if there are no --

MR. HINNEFELD: We can certainly query the database, yeah. We can certainly query the database.

MEMBER MUNN: If there are no claims then it is a moot question.

MR. HINNEFELD: There's probably an ICD-9 code for the skin cancers. Usually a location on the body is one of the sub-numbers for ICD-9 codes, usually. So we should be able to query the claim database.

MEMBER MUNN: From my perspective, that would be helpful for our information for next time.

MR. HINNEFELD: It is relatively -- I mean, skin cancer is common. But skin cancer on the extremities, in our experience, is pretty uncommon.

MEMBER MUNN: Not likely.

DR. MAKHIJANI: As of 2007, there were no such claims. Just would be good to update it.

MR. HINNEFELD: I mean, we can check. And then beyond that we still have the question of that geometry for an assembler at the Nevada Test Site is a relatively unusual geometry for their work. And it's just -- well, I don't want to cheat anybody, like I said.

Depending upon what their other duties are, if they got exposure during the entire year and then only had geometry -- of course, on the other hand, if they were there the whole year and that really the only exposure was when assembling the weapon, then all of their angles should get it.

It's a complicated thing to sort out. And having enough information about a claim to sort

it out might be problematic too.

CHAIRMAN CLAWSON: This is -- if all of us remember going back --

MR. HINNEFELD: I don't remember.

CHAIRMAN CLAWSON: That's true because Jim's been in here a lot of that. Part of the process that came into this was these were people that came from the labs, who came to Nevada Test Site, so this dose was at Nevada Test Site. This was part of their assembly. This is the process that they went into this. So this is why it -- you know, because my question, I remember a while back is, well, why wouldn't that just be a part of Lawrence Livermore or Pantex or whoever we're going to put into. And it was because it was at Nevada Test Site. This is where it was at. So this is where it is at. And one of the questions was cross-references to make sure that information got back to their site, which we did quite an in-depth check on, and their data from Pantex was sent back to Livermore. But it still stayed separate. It

was, you know, two different areas.

But on their personal dose, it was there. So I think to be able -- you know, if we were to take and look at this extremity dose, the skin cancer part of that, I think basically we would just bring this to bed and be able to get rid of it because it was -- it's kind of convoluted problem. And then you throw in coming from a different site and so forth.

Do you agree with that or would this satisfy it, if we were to check the skin cancer part of this for the extremities?

DR. MAKHIJANI: I think so.

CHAIRMAN CLAWSON: Wanda, does that --

MEMBER MUNN: Yes.

CHAIRMAN CLAWSON: Okay. So that's what we'll do to put that one to bed.

DR. MAKHIJANI: Okay. So that was 21. No neutron dose data until 1966, partial data until '79. TBD asserted that atmospheric neutron doses were -- neutron doses during the atmospheric

testing period were negligible. We thought that should be checked as to whether it was right.

So the remaining outstanding item regarding the neutron doses was what specific neutron/photon ratio to use. And NIOSH has proposed something.

MR. ROLFES: Yeah. The issue that was still outstanding was the neutron dose reconstruction method for people involved in device assembly, once again, at the Nevada Test Site. And we had proposed to use the n/p ratios for device assembly workers from Pantex, apply those to people that were doing device assembly at the Nevada Test Site.

And the current status of the neutron dose reconstruction approach for Pantex is in the final phases of being completed now. So we will update the TBD to incorporate, you know, any information from the Pantex coworker neutron approach into the NTS TBD as soon as it's finalized.

CHAIRMAN CLAWSON: Isn't this kind of

an overarching issue, one of them that we've got because of this neutron/photon?

MR. HINNEFELD: Well, it occurs a number of places. It does occur in a lot of sites. But we don't really consider it overarching because the solution tends to be site-specific.

MEMBER MUNN: It's different in each site.

MR. HINNEFELD: Yeah, because you have to resolve it individually in each site, except in an instance where the weapons at Pantex were theoretically the same weapons at Nevada Test Site, and so theoretically the ratio is to be the same. And so as Mark said, the Pantex Work Group has been struggling, you know, we're trying to finish this issue.

And in both cases, in Pantex and at Nevada Test Site, we're talking about external doses in the SEC period, during the SEC for internal. And so we're trying to get a method for doing the neutron doses in that fashion, in those

years.

So, to me, there's a lot of merit to saying, look, the devices likely were the same as at Pantex. We're going to use the same ratio, assuming we can come up -- you know, I think we'll come up with an acceptable ratio for the Pantex workers.

DR. MAKHIJANI: Yeah, I agree with his response. My only question was, what you've been addressing, I haven't been involved in our Pantex work, so I don't know what the status of that is.

MR. HINNEFELD: We're finalizing.

DR. MAKHIJANI: So once that is signed off, I would be comfortable, if the Pantex Work Group signs off on it. You're involved in that right, Brad?

CHAIRMAN CLAWSON: Yeah, I am. That's why I was trying to remember. I knew that we had issues with it and we were still coming to closure with it. And when you called that out that's why I was questioning if it was kind of overarching.

MR. HINNEFELD: Brad, you're in too many work groups. How can you have not have all these things run together?

CHAIRMAN CLAWSON: Yeah, I'm sitting here --

MR. HINNEFELD: I can't keep them straight. That's for sure.

CHAIRMAN CLAWSON: It's there. But that's why I was wondering if it was an overarching issue. But you're correct. We are, because I've got the Pantex matrix sitting right there. So for this one we'll just -- it could be contingent on what we come up with for Pantex.

DR. MAKHIJANI: Right. I'm comfortable, once the Pantex issue is resolved, with using the same approach here. I mean I don't see why -- I don't see a problem with that.

CHAIRMAN CLAWSON: Okay. I just wanted to make sure, because when it called out that I knew that we were still working on that with Pantex. So --

MR. KATZ: So when it's closed at Pantex, effectively it will be closed here?

CHAIRMAN CLAWSON: Right.

MEMBER MUNN: That's great. Can we have a note in the matrix to that effect?

MR. KATZ: Of course.

CHAIRMAN CLAWSON: Pending the evaluation of Pantex, okay.

DR. MAKHIJANI: Okay. Nearing the end here.

CHAIRMAN CLAWSON: Twenty-three goes back --

DR. MAKHIJANI: Twenty-three goes back to 5 involving resuspension. Twenty-four is about high-fired oxides and internal doses. That is closed because of the SEC.

Twenty-five is NIOSH documentation of expert interviews is inadequate. That is now part of the Worker Outreach Review so is no longer being reviewed by this Work Group. And the landscape has radically changed in that regard, you know, there's

been a lot of review of worker expert interview documentation. I'm just saying that for the record so there's no misunderstanding.

And 26, a number of issues relating to the waste handling, decommissioning. This is a new matrix issue as a placeholder for Work Group discussion. It's post-1992 site activities. And we did not discuss these, you know, while we were doing the SEC work. We kind of punted on that. And we need some guidance as to where to go from here. That's the last item.

MEMBER MUNN: But we don't have any indication about what those issues are?

DR. MAKHIJANI: Well, I should have -- I'm sorry, I should have been more alert about that last issue and given you a short list. Can we recess for five minutes and I'll get a short list?

MEMBER MUNN: I just wanted to comment about 25 before we went away there. It's true that things have changed radically. I'm not aware that Worker Outreach is actively reviewing this any

further. We spent quite a bit of time with it in years past.

But I think recommendations have been made and NIOSH has made a number of changes. I haven't checked my own notes, but so far as I know, this is not outstanding in Worker Outreach.

So my question is, I guess I need to check with the Chair to make sure that's the case. But can this be resolved completely then and closed by having a statement concerning with respect to some of the interview documentation approaches that are now being used, if that's acceptable?

MR. KATZ: I thought that Arjun was saying that it was closed anyway because it was transferred to Worker Outreach.

MEMBER MUNN: Well, it would be much more comfortable for some of us if it said it's closed.

MR. KATZ: I thought 25, weren't you saying 25 is closed here?

DR. MAKHIJANI: Twenty-five is closed

for this Work Group.

MR. KATZ: Yeah, yeah.

DR. MAKHIJANI: And whatever is going to be addressed will be in Worker Outreach.

MEMBER MUNN: Okay, yeah. I thought that we were done because I thought the recommended changes had already occurred. But --

MR. KATZ: Yeah, so it is closed.

MEMBER MUNN: Okay. Well, then, are we taking a few minutes while Arjun does his homework?

DR. MAKHIJANI: I'm sorry.

MEMBER MUNN: Does his office work.

(Coughing.)

MR. KATZ: Phil, I'm going to have to reach through the phone and pat you on the back.

MEMBER SCHOFIELD: Sorry, I thought I had it on mute.

MR. KATZ: No, it's okay.

MEMBER SCHOFIELD: At least I came by my coughs cheap, no cigarettes.

MR. KATZ: I don't know about cheap. No cigarettes, but I don't know about cheap.

DR. MAKHIJANI: So we had several issues that I think we punted from our original Site Profile issue in relation to waste handling. One related to extremity doses which we have just covered only in relation to bomb assembly.

That is sort of a different issue for extremity doses for waste handling or at least we had raised it. There was a question as to whether waste handling had been adequately covered in the TBD in terms of the types of work and the periods in the areas, whether there was adequate guidance for all the types of waste handling that were done.

There was a question of neutron doses when waste handlers were dealing with orphan sources. That was the list that I could come up with in my brief review. And I think, to my memory, we did not cover these issues earlier during SEC period.

MR. ROLFES: That's correct. We'll

take a look into that. I don't know if you have anything written other than what you just relayed.

DR. MAKHIJANI: No, this is, I was just relaying from our original Site Profile Review of 2005. I, that's why I kind of just entered this as a placeholder. I did not see that the most recent versions had addressed the issues that we had raised in regard to waste handling.

Now again, this is from my review of a little over two years ago so there may be a little gap in the memory there. But that's the best that I can come up with.

MR. ROLFES: Yes, we haven't really discussed the more recent era of waste handling activities. But, you know, most of what I'm aware of being sent to NTS were rather large containers, barrels that wouldn't really directly be handled by individuals, but might have been handled by forklifts and cranes and such.

DR. MAKHIJANI: It also, there would be a, some of these questions would relate to the SEC

period also in terms of the, like the neutron. The neutron/photon doses from Pantex. I have a note in here about orphan doses, orphan sources.

Mission at NTS with respect to orphan sources concentrates on neutron-emitting sources. So LANL, this is post '92. LANL is collecting sources as part of their orphan source recovery program.

I think all of that was post-Cold War to my memory. But anyway there are a number of places where waste handling comes up. Some of it is pre '92 and some of it is post '92.

MR. ROLFES: Okay. So it's mostly the waste handling activities and more from an external dose issue?

DR. MAKHIJANI: Yes.

CHAIRMAN CLAWSON: Because Nevada Test Site became one of the depositories basically I know that we shipped a lot of fuel down to them, actual fuel cases.

MEMBER MUNN: So this is another one of

those cases where we need to be sure we know what we're asking. You have listed in your original document all of the issues that you would like to see addressed.

DR. MAKHIJANI: Well we haven't reviewed it recently, yes. But we listed a number of issues and --

MEMBER MUNN: And we don't have a response yet essentially?

DR. MAKHIJANI: I believe so. That is correct.

MEMBER MUNN: So we'll, so I guess we need to ask for a response.

MR. HINNEFELD: Which document has a list of these issues?

MR. KATZ: 2005.

DR. MAKHIJANI: I don't know that they are all listed in one place. What I just did was I did a search for the term waste handling. But if you go through it we did review the waste handling question to some extent and raise some

questions about dose reconstruction for those workers.

MEMBER MUNN: Okay.

DR. MAKHIJANI: And it may be, you know, that the responses may be straightforward.

MEMBER MUNN: But you also say, or during the SEC review.

DR. MAKHIJANI: Yes, well the external doses are relevant throughout the period post and pre SEC.

MEMBER MUNN: Is that going to be obvious to NIOSH when they start looking at this? I'm trying to define it to make sure we know and NIOSH knows exactly what they're expected to respond to.

DR. MAKHIJANI: Well the matrix item that I put as a placeholder said activities post 1992, site activities.

MEMBER MUNN: In your 2005 and SEC review. And that's why I'm asking the question where to go and get this.

DR. MAKHIJANI: I think in relation to the discussion we've been having today some of the items originally raised in our Site Profile Review might be relevant to external doses for waste handling workers in the SEC period as well. So it would be good to cover them, if not covered already. That's the end of the list.

MR. HINNEFELD: Okay. So we have things to look for in 2005 would be waste handling sources like the source program, was that mentioned in there?

DR. MAKHIJANI: Yes.

MR. HINNEFELD: Okay. And so we can word search the document for things like waste handling, sources and by those we should be able to find the various places where this is --

DR. MAKHIJANI: The 2005 review.

MR. HINNEFELD: That's where I'm looking. Okay.

CHAIRMAN CLAWSON: What year was it that they stopped the aboveground or the, all the

testing at Nevada Test Site, their detonations, their nuclear testing?

MR. ROLFES: 1992.

CHAIRMAN CLAWSON: 1992, that's why we're using that as --

MR. HINNEFELD: That was the ending point for the SEC was the end of the testing.

CHAIRMAN CLAWSON: Okay. And that's when they kind of took on a new mission of a --

MR. HINNEFELD: Yes, they did eventually. When they stopped they were thinking they were going to restart, I think originally, I think some people thought they would be testing again.

CHAIRMAN CLAWSON: We've sure shipped a lot of stuff to them for burial down there. They've become a large burial ground.

MR. ROLFES: Little bit of thorium.

CHAIRMAN CLAWSON: What was that?

MR. ROLFES: A little bit of thorium from Fernald.

CHAIRMAN CLAWSON: A few train cars, I believe.

MR. ROLFES: Send them anyplace we can get it.

MEMBER MUNN: Well that's not much actually when you get right down to it. That's not much in terms of waste products that's not much.

MR. KATZ: So are we finished?

CHAIRMAN CLAWSON: Okay.

MR. KATZ: Thank you, everyone. Good work. I don't think we're ready to figure out when we're going to meet again, right, because I think --

MR. HINNEFELD: It's again --

MR. KATZ: Look at the homework schedule and all that.

MR. HINNEFELD: Lots of sites and a finite number of people.

MR. KATZ: So thank you, everyone on the line, much thanks. I think this was very productive today and have a good rest of the day.

(Whereupon, the above-entitled matter went off the record at 1:49 p.m.)