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

convenes the

WORKING GROUP MEETING

**ADVISORY BOARD ON**

**RADIATION AND WORKER HEALTH**

**NEVADA TEST SITE**

The verbatim transcript of the Working Group Meeting of the Advisory Board on Radiation and Worker Health held in Cincinnati, Ohio on March 27, 2007.

**C O N T E N T S**
March 27, 2007


| | |
|---|---|
| WELCOME AND OPENING COMMENTS<br>DR. LEWIS WADE, DFO | 6 |
| INTRODUCTION BY CHAIR | 10 |
| ENVIRONMENTAL INTAKES AT NTS | 12 |
| COMMENTS 6 AND 7 | 57 |
| COMMENT 23 | 59 |
| TBD DISCUSSION | 71 |
| COMMENT 1: RADIONUCLIDE LISTS | 72 |
| COMMENT 2: REACTOR TEST RE-ENTRY | 84 |
| COMMENT 3: DOSES FROM LARGE PARTICLES TO GI TRACT | 94 |
| COMMENT 4: ORO-NASAL BREATHING | 98 |
| COMMENT 8: EXTERNAL DOSE DATA FOR 1963-1966 | 99 |
| COMMENT 9: ENVIRONMENTAL EXTERNAL DOSE DATA FOR 1968-1976 | 103 |
| COMMENT 10: PRE-1963 EXTERNAL ENVIRONMENTAL DOSE | 105 |
| COMMENT 11: CORRECTION FACTORS | 105 |
| COMMENT 12: RADON DOSES IN G-TUNNEL | 110 |
| COMMENT 13: ENVIRONMENTAL DOSES DUE TO I-131 VENTING | 114 |
| COMMENT 14: INTERNAL DOSE FOR PRE-1967 | 121 |
| COMMENT 15: BLAST WAVE | 128 |
| COMMENT 17: INGESTION DOSES | 130 |
| COMMENT 18: ORAUT-OTIB-0002 | 145 |
| COMMENT 19: PRE-1966 BETA DOSE | 148 |
| COMMENT 20: INTENTIONAL NON-USE OF BADGES | 150 |
| COURT REPORTER'S CERTIFICATE | 186 |

**TRANSCRIPT LEGEND**

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

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

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

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

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HOWELL, EMILY, HHS
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MAKHIJANI, ARJUN, SC&A
MAURO, JOHN, SC&A
MCDONOUGH, ALEX, SEN. HARRY REID
NETON, JIM, NIOSH
ROLFES, MARK, NIOSH
ROLLINS, GENE, ORAU
SMITH, CHERYL, DADE MOELLER AND ASSCS.

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

(9:30 a.m.)

**WELCOME AND OPENING COMMENTS**

**DR. LEWIS WADE, DFO**

**DR. WADE:** This is the work group. We're about to begin. This is Lew Wade and as always I have the privilege of serving as the Designated Federal Official for the Advisory Board. And this is a meeting of a work group of the Advisory Board. This work group is focused on the Nevada Test Site site profile. It's ably chaired by Robert Presley. Members are Munn, Clawson and Roessler. They are all here with us in the room.

First, I'll ask if there are any other Board members on the call by telephone. Any other Board members?

(no response)

**DR. WADE:** Clearly, we don't have a quorum of the Board, and that's a good thing. So we can do our business.

What I'd like to do is our usual sort of marathon introductions. We'll start by

going around the table here, and then I'll ask for on the phone other members of the NIOSH/ORAU team, other members of the SC&A team, other federal employees who are on the call by virtue of their employment, members of Congress, their staff, workers, worker reps, and then anyone who would like to be identified.

When we do our introductions, particularly for Board members, for NIOSH/ORAU and for SC&A, please identify if you have any conflicts relative to the topic today, and that's the Nevada Test Site. Then we'll conclude the introductory comments with some discussion of phone etiquette although we're getting better. We had two meetings yesterday, and they were relatively background noise free.

So this is Lew Wade. Again, I work for NIOSH and serve the Advisory Board.

**MR. ELLIOTT:** Larry Elliott, I work for NIOSH, and I have no conflicts.

**DR. ROESSLER:** Gen Roessler, Board member, no conflicts.

**DR. MAURO:** John Mauro, SC&A, no conflicts.

**MR. ROLFES:** Mark Rolfes, NIOSH health physicist, no conflicts.

**MS. MUNN:** Wanda Munn, Board member, no conflict.

**DR. BEHLING:** Hans Behling, SC&A, no conflicts.

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

**MS. HOWELL:** Emily Howell, HHS, no conflict.

**DR. NETON:** Jim Neton, NIOSH, no conflicts.

**MR. PRESLEY:** Robert Presley, Board member, no conflicts.

**MR. CLAWSON:** Brad Clawson, Board member, no conflicts.

**DR. WADE:** Okay, let’s go out to telephone land and look for other members of the NIOSH/ORAU team.

**MR. ROLLINS (by Telephone):** This is Gene Rollins, O-R-A-U team, no conflict.

**MS. SMITH (by Telephone):** Cheryl Smith, O-R-A-U team, no conflicts.

**DR. WADE:** Other members of the NIOSH/ORAU team?

(no response)

**DR. WADE:** Other members of the SC&A team?

(no response)

**DR. WADE:** Other members of the SC&A team?

(no response)

**DR. WADE:** Other federal employees who are on the line by virtue of their employment?

**MR. KOTSCH (by Telephone):** Jeff Kotsch, Department of Labor.

**DR. WADE:** Welcome, Jeff.

**MS. CHANG (by Telephone):** Chia-Chia Chang, NIOSH.

**DR. WADE:** Okay, Chia-Chia, we spoke to you earlier.

Any other federal employees?

(no response)

**DR. WADE:** Members of Congress, their staff, workers, worker reps?

**MR. McDONOUGH (by Telephone):** Alex McDonough, office of Senator Harry Reid.

**DR. WADE:** Welcome, sir.

Members of Congress, staff, worker, worker reps?

(no response)

**DR. WADE:** Anyone else who would like to be identified for the record?

(no response)

**MR. PRESLEY:** Could we go back and get the person for Congressman Reid's office to identify, please?

**DR. WADE:** Our court reporter had trouble picking up your name, sir.

**MR. McDONOUGH (by Telephone):** Alex McDonough, office of Senator Harry Reid.

**DR. WADE:** Thank you for joining us. We appreciate your time.

Okay, again, relative to phone etiquette, please, if you're not speaking, put the phone on mute, put your equipment on mute. If you are speaking, speak into a handset as opposed to using a speaker phone. Be mindful of background noises. And sometimes if you put people on hold, there's elevator music that plays, and sometimes we get to hear that. Just again, a bit of thought about it and this will be a productive vehicle for the work group to be able to use.

With that, Robert, it's up to you.

**INTRODUCTION BY CHAIR**

**MR. PRESLEY:** If it's all right with everybody, what I would like to do is have a copy, and everybody should have it on their

computer, of the NIOSH's response to SC&A's issues for five, six, seven and 23. What I would like to do is for us to spend the majority of our time going through this and saying yea or nay on what we approve or disapprove. And then after we get this done, go back and start with issue one in the comments and go back through the matrix and try to iron out any problems that we have with any ongoing problems. Is that all right?

**DR. MAKHIJANI:** Just a clarification, we're not starting with the matrix?

**MR. PRESLEY:** If y'all want to start with the matrix we can.

**DR. MAKHIJANI:** No, no, no, I just wanted to know what we're starting with.

**MR. PRESLEY:** I just wonder about going ahead and spending, if you want to start with one, I have no problem with that.

**DR. MAKHIJANI:** Oh, you're starting with certain matrix numbers.

**MR. PRESLEY:** Yeah, what I would like to do is start with five, six, seven and 23, and let's go through this first and take care of it.

**MR. ROLFES:** Just for clarification I just wanted to make sure that everyone had received those two separate e-mails that I sent out. One contained the matrix, and the second contained a white paper discussing comments --

**DR. NETON:** It's the one that came out over the weekend, right, Mark?

**MR. ROLFES:** Yeah.

**DR. WADE:** Does anybody need a hard copy?

**MR. PRESLEY:** The matrix we want to use is the one that's got a note at the top that says Notes from 3-21-07. Is that correct?

**MR. ROLFES:** Yes, I believe so.

**MR. PRESLEY:** Mark, do you want to kick us off and have a, since it's you all's comments.

**ENVIRONMENTAL INTAKES AT NTS**

**MR. ROLFES:** Well, a lot of the issues that we're trying to address are the issues of environmental intakes at Nevada Test Site. And we've gone back and forth. We realized our initial model had some gaps in it and some shortcomings. And so we were in the process of updating our Technical Basis Document to address those gaps. And also at the same time we were receiving comments from SC&A and the

Advisory Board members.

So in order to address those gaps we began with a new model, a mass-loading model. And also concurrently we had received some comments from Dr. Lynn Anspaugh, pointing out additional shortcomings. So I believe Gene Rollins is on the telephone.

**MR. ROLLINS (by Telephone):** Yes, I'm here, Mark.

**MR. ROLFES:** Okay Gene, would you like to go through what you have done to address some of the issues with the environmental intakes at Nevada Test Site?

**MR. ROLLINS (by Telephone):** At SC&A's request we went back and evaluated using a mass-loading model, using actual dust-loading factors experienced in the Yucca Mountain NTS environment. And when those factors were applied, the maximum intakes increased significantly not unexpectedly. And we went back and I have adjusted the numbers for maximum intakes in the TBD.

And in addition, I have revised the TBD to provide instructions to dose reconstructors about how these maximum intakes

should be applied. I hope everybody has had an opportunity to read the attachment because there's some very important words towards the end about how these intakes should be applied.

Simply put these intakes are really only going to be important in terms of probability of causation for a small number of organs. And that would be mostly respiratory, liver and bone surfaces. So what I have proposed to do, even though these numbers can get, these intakes can get fairly high doses to these particular organs, what I propose to do is we will apply the maximum intakes to all cancers across the board, and then we will determine whether or not those intakes are affecting compensability.

And if those intakes are affecting compensability, then the dose reconstructor will have to, as you will, sharpen his pencil and to try to figure out whether they are reasonable or not. And there are a number of circumstances that are outlined in the verbiage that I've added to the TBD that will allow the dose reconstructor some discretion as to how these intakes are applied.

But I guess what we need to decide among us today is whether or not these maximum intakes as calculated by the mass-loading model are indeed bounding and whether additional adjustments need to be made. And so I guess I would like to open up what I've done to discussion to see what type, what your feelings are about how we're applying them now.

I have provided some tables in the back, about page six that give you an idea of the magnitude of the doses. These numbers -- you've seen these before by the way. They've been adjusted slightly. But these are 30-year organ doses resulting from ten years of intake at the maximum intakes that have now been adjusted as shown in Table 1 which is on page five of the white paper.

And you can see, the first column there on Table 1, those were the maximum intakes that were in the original Rev. 0 of the TBD. And then the next column over is the maximum using the mass-loading model including Area 30 which I have given several reasons in this paper as to why we don't think it's

appropriate to use Area 30. So the third column there are the annual maximum annual intakes without Area 30 included in the weighting.

Now, I'd like to point out that there's some text in this white paper, I didn't have a chance to go through it real thoroughly, but on the second page under Response 5, the first paragraph, there's some discussion there about the use of average intakes. And that will have to be removed. That should not have been in this white paper. I thought I'd gotten it out, but it somehow crept back into this paper.

**DR. MAKHIJANI:** How does the paragraph start?

**MR. ROLLINS (by Telephone):** The paragraph starts Response 5 in bold on page two, and you can just, if you would, please, --

**DR. ROESSLER:** Gene, you're going awfully fast. Are we on the just one document now?

**MR. ROLLINS (by Telephone):** Correct.

**DR. ROESSLER:** Okay, and I found Table 1, and I found Table 2. Now where are you?

**MS. MUNN:** Now he's gone back to page two.

**DR. ROESSLER:** Page two.

**MS. MUNN:** Response 5.

**MR. ROLLINS (by Telephone):** Okay, I'm sorry.

**DR. ROESSLER:** Response 5, is that correct?

**MR. ROLLINS (by Telephone):** Yes, the last two sentences of that first paragraph should be deleted. We're not going to be dealing with average intakes anymore.

**DR. MAKHIJANI:** So from, "It should be noted that average values ..."

**MR. ROLLINS (by Telephone):** Correct, just delete that to the end of the paragraph. Although what I've said here is really still true because the average intakes because they're much smaller, they really don't impact compensability at all and so we don't have to consider them. That's why I'm going to simplify the TBD, and we're not going to be discussing the application of average intakes.

**MR. PRESLEY:** Gene, Bob Presley, you're taking out the last three sentences in that first paragraph. Is that correct? Where it says, "However, average intakes..."?

**MR. ROLLINS (by Telephone):** That's correct.

**DR. ROESSLER:** That's three sentences or lines?

**MR. PRESLEY:** That's three lines. I'm sorry.

**DR. ROESSLER:** I think it's actually, and get the sentence before that, too, Bob, where it starts, "It should be noted..."

**MR. PRESLEY:** Oh, okay, I'm sorry. I got it.

**MR. ROLLINS (by Telephone):** Just get all of that out of there because that's really not important to the discussion anymore.

**MR. PRESLEY:** Thank you.

**DR. ROESSLER:** Gene, this is Gen Roessler. I'm getting up to speed here. You mentioned Area 30, and I lost, I didn't catch why Area 30 is not included.

**MR. ROLLINS (by Telephone):** Area 30 is a very remote area of the site where they did the PLOWSHARE, some of the PLOWSHARE projects like basically digging trenches. It's a relatively small area, inaccessible and typically not inhabited by anybody. It's where a lot of the soil contamination still resides because of the nature of the tests

that were done there.

**DR. MAKHIJANI:** I had a question about that, Gene. Are there job cards similar to Rocky Flats at NTS that would allow you to determine like who went out there to do the digging and so on as opposed to who did not? I haven't noticed such job cards, but then I haven't gone through every DOE file in the claimant files so I don't know.

**MR. ROLLINS (by Telephone):** My understanding is, and my experience in looking over some of the records and doing the actual dose reconstructions, people that were allowed or approved to go into these areas of high contamination, they would have gone in on a radiation work permit, and they would have entry cards issued by Nevada Operations.

**DR. MAKHIJANI:** And that would be in their DOE record that you would get when NIOSH requested the DOE record, that entry permit?

**MR. ROLLINS (by Telephone):** Yes.

**MR. PRESLEY:** Gene, this is Bob Presley again. Plus there ought to be dates where they kept that area closed down. You know, that was one of the areas where you just did

not go in unless you had a valid reason to. Do you agree?

**MR. ROLLINS (by Telephone):** Yes, I do agree.

**DR. MAKHIJANI:** And was there typically like bioassay done after people went there or that's the thing, I mean --

**MR. ROLLINS (by Telephone):** I can't respond what their, I don't know exactly what their criteria was for bioassaying the people coming in and out of areas of known contamination. I can research that and get back to you, but I don't know exactly what that criteria would be.

**DR. MAKHIJANI:** Because, I mean, if we're excluding Area 30, the implicit assumption is that whoever went in there was appropriately monitored so it'd be in the record. So you don't need to pay special attention to that area in terms of the (unintelligible) dose. So it would be good to see, I think it would be good to just verify in a couple of examples that that's actually the case unless there's documentation otherwise or some procedure or something like that.

**MR. PRESLEY:** Gene, this is Bob Presley. Have you run up on any documentation on that that shows when that area might have been opened for entry and when it may have been closed for entry?

**MR. ROLLINS (by Telephone):** No, not personally, but I'm sure it exists.

**MR. PRESLEY:** Yeah, because I have never been up there, but if my memory serves me correctly, you had to come up with all kinds of special permission and a real need to even begin to get close to that place.

**MR. ROLLINS (by Telephone):** That's my understanding, also, Bob.

**DR. MAURO:** Gene, this is John Mauro. I've got a couple of questions that go into the actual resuspension model and the assumptions. And I do have a document in front of me called Attachment B, Mass-Loading Model. I assume that's the correct document to be working from.

**MR. ROLLINS (by Telephone):** Right.

**DR. MAURO:** And first of all I think that this is the strategy in my opinion that is the most relevant, that is, a dust loading as

opposed to a resuspension model for the older radionuclides. Then in going into the key parameters I sort of circled three. And the first one is I see you've adopted -- and correct me if I'm wrong -- a default value of a dust-loading five milligrams per cubic meter as being, that's the assumed dust concentration.

**MR. ROLLINS (by Telephone):** Where are you, John?

**DR. MAURO:** I'm on the first -- see, I may not have -- I'm on a document called Appendix B, by Rollins, and the very first page has the equation in the middle of the page and then the definition of each of the terms.

**MR. ROLLINS (by Telephone):** You can also find this in Attachment 1 to the white paper. It's on page 12.

**DR. MAKHIJANI:** Oh, so that's the same as Attachment B that --

**MR. ROLLINS (by Telephone):** Same as Attachment B, correct.

**DR. MAURO:** Now, I just want to confirm, so your dust loading is five milligrams per cubic meter. For anyone where you applied this

model, I understand that there were only certain circumstances and people under which you would apply the model, but when it is being applied, it's assumed that for whatever time period the person's out there in the field doing his job, you're going to assume that during that time period he's chronically exposed to five milligrams per cubic meter of dust loading?

**MR. ROLLINS (by Telephone):** That's the starting point. It's been pointed out to me that that might be a little on the high side, but I --

**DR. MAURO:** I agree.

**MR. ROLLINS (by Telephone):** -- that was for what was termed an active environment.

**DR. MAURO:** Yes, and I would agree certainly there will be time periods when it could go higher, but not for a protracted time period. So I mean, my first reaction just for the benefit is -- And in reading this over the weekend getting ready for the meeting, my first reaction was that's a good number.

**MR. PRESLEY:** Claimant favorable.

**DR. MAURO:** Yeah, a claimant favorable

number. Here I'm showing some of my ignorance. A relaxation length, one relaxation length is E to the minus 1? Right? And that number is what, 2.7? In other words I'm trying to get to the depth of -- So in other words --

**DR. MAKHIJANI:** One over two lengths.

**DR. MAURO:** One over two, so therefore, you're saying -- let me see -- the average activity, in other words, you're starting with Becquerels per meter squared from an aerial survey or some other data, and you're now going to convert that to Becquerels per gram. You have to get that conversion.

So what you're saying is all those, there is actually an exponentially declining concentration vertically in the soil with a relaxation length of 2.3 centimeters. Just to help me out a little, that puts what percentage of that total activity, that Becquerels per meter squared, in what depth? Could you help me out with that? I just want a feeling whether or not you're putting the activity --

**MR. ROLLINS (by Telephone):** I believe,

John, it puts most of it in the first three centimeters.

**DR. MAURO:** Good, that's what I thought. I just wanted to, by the way, when I say good, I'm giving you my own reaction. And certainly other folks may not necessarily agree.

**DR. MAKHIJANI:** Yeah, it'd be about 70 percent, I think the first three things, maybe 75.

**DR. MAURO:** Especially if it's aged, somewhat aged. In my opinion, my familiarity with the subject, that's a good conservative assumption.

Now, the only place -- and then I'll step back after this -- in looking at the models I noticed that you have all these different areas. You have sort of broken up the whole site into 30 areas, each having its own radionuclide concentration distribution. But later on you had mentioned that you're assuming that you're going to actually apply this resuspension model to the activity averaged over a 500 square mile area. Is that correct?

In other words the area, in other

words the person that's being exposed, that is out there, you're not going to say, well, he was in Area number, you know, number eight, for so many hours. You're basically saying that, no, we're going to assume that whatever he experiences is averaged over a 500 square mile area. I'm getting that out of page five of the Appendix B that the heading of the paragraph is Spatial Variations in Radionuclide Soil Concentrations. And I have to say that 500 square miles, as I understand the write up, is quite a large area to average over, and it may not --

**MR. ROLLINS (by Telephone):** Actually, John, these maximum intakes that are provided in Table -- what is it? Table 1 there or Table 4.2.2-3 of the Rev. 1 TBD, those are actually maximum for any area.

**DR. MAURO:** Okay.

**MR. ROLLINS (by Telephone):** So it's not really even averaged.

**DR. MAURO:** Okay, so what is this 500 square mile? I'll read the sentence. "Currently, the area used in developing the concentrations represent approximately one-third of the site

or 500 square miles." I guess I misread that.

**MR. ROLLINS (by Telephone):** Well, I probably wrote it poorly which is why you were confused.

**DR. MAURO:** So you actually did work with the smaller areas?

**MR. ROLLINS (by Telephone):** That's correct.

**DR. MAURO:** Excellent. Okay, I have no more comments.

**MS. MUNN:** I understood, the way that the table was laid out, I understood we were having an opportunity to look at those dispersions including Area 30 which is highly improbable. I doubt that there's more than a dozen people that would be involved in that, and without Area 30 which is the more logical one. I had interpreted that as being the reason we were making that, unless you can identify that the individual was, in fact, in Area 30, then Area 30 really should not apply. Am I reading that correct, Mark?

**MR. ROLFES:** Correct, yes.

**MR. ROLLINS (by Telephone):** Maybe it will help you a little bit if you start reading the reasons that I have provided for why we

believe it's claimant favorable. And number one basically says the 39.3 Becquerels per year, which is the maximum intake that we will be applying, was calculated using the mass-loading model only for Area 8 which happens to be the area of highest soil contamination. So when we give that individual 39.3 Becquerels in a year what we're basically assuming is that he was out there in Area 8 2,600 hours for the year.

**DR. MAKHIJANI:** Highest for what radionuclide, Gene?

**MR. ROLLINS (by Telephone):** Well, in this particular case it was Plutonium-239.

**DR. MAKHIJANI:** Now what, is there a time cutoff closer than what you don't apply this? That is, you're applying the mass-loading long after deposition is there. I forgot whether you defined that long or is this the model to be applied whenever people go in?

**MR. ROLLINS (by Telephone):** This is, we're basically going to apply this. And you remember the original resuspension basically leveled out after about two years.

**DR. MAKHIJANI:** Right.

**MR. ROLLINS (by Telephone):** And that's when it was pointed out to me that it would be appropriate to move to a mass-loading model. As it turns out, the way that I have applied this mass-loading model, it will, in my opinion, you could look at it or we could talk about it, but my mass-loading model the way it's designed right now will continue to overestimate potential intakes even for periods less than two years.

Is that what you're asking?

**DR. MAKHIJANI:** Yeah, that is what I'm asking, and the reason I'm asking that is not because of the mass-loading factor there in your equation, but because of the radionuclide list. I think Dr. Anspaugh pointed out when you get close to the time of the tests, you have to worry about the short-lived radionuclide.

**MR. ROLLINS (by Telephone):** I would like to make an observation on that. As you can imagine, those calculations can become quite complex when you get into short times after time zero. Even Dr. Anspaugh and others have agreed that dose from fission and activation

products is bounded by external exposure. And so it's my belief that anybody that was near these areas, especially after 1957, would have had external dosimetry; and therefore, they would have measured this exposure to the fission and activation products.

**DR. MAKHIJANI:** I don't know that I agree that, I mean, the whole problem in that initial period as I read it is that that was the assumption then. That is, the external exposure's the main thing. And then when we went back to try to look at that assumption, it turned out that in many cases it wasn't right, but internal exposure potential was important which is why we have to go through all this stuff. And so that's the question that I'm raising.

**DR. ROESSLER:** From the very short-lived things? Isn't that what you're talking about now?

**DR. MAKHIJANI:** Maybe not, maybe not from the short-lived.

**DR. ROESSLER:** Yeah, I think that was the point here.

**MR. PRESLEY:** I don't know how you're going

to get an ingestion on those short-lived things because, I mean, there was very few people around the thing, and there was, at that time there was nothing in the air or ingestion or anything like that to get. It would have to be an external exposure.

**DR. MAURO:** By way of orientation for me now, my understanding was this model is being, was developed and is going to be used, for post-'62 time period.

**MR. ROLLINS (by Telephone):** That's correct. That's correct.

**DR. MAKHIJANI:** So actually this is --

**DR. MAURO:** So in other words, what we're saying is all the tests have been completed so therefore, what we really have here is residual radioactivity on the ground from previous tests. And we're making an assumption that by and large it's aged to the degree that it has commingled to some degree with the soil. As a result, a dust-loading model makes sense. Certainly, if it was during the test period where you have fresh fallout then one could question whether you would use dust-loading.

**DR. MAKHIJANI:** No, I agree. It's the post-atmosphere.

**DR. MAURO:** For pre that's a different problem.

**DR. MAKHIJANI:** And I think that caveat just has to be up front or I woke up too early or something.

**MR. CLAWSON:** This is Brad Clawson. I have a question here. It says, "therefore this intake does not apply to miners or tunnel workers". I guess my question is when we were in Nevada, we heard many people discuss their question of their classification because they were actually a mechanic out of the central facility out there that if they needed a mechanic or whatever, he would go up to the tunnels, work on that, but he worked throughout the whole test site.

And is there a very distinguishing between the miners and the tunnel workers as far as this overall workforce that they had. I understand why you feel the miners and the tunnel workers wouldn't be there, but I think they kind of had a commingling of people that went in and out of there.

**MR. ROLLINS (by Telephone):** My experience in looking over the records with the entry logs it's fairly easy to tell those that were working underground and those that were not.

**MR. CLAWSON:** Okay.

**DR. MAKHIJANI:** John, has Lynn looked at this, Lynn Anspaugh?

**DR. MAURO:** No, I don't recall him specifically.

**DR. MAKHIJANI:** I don't think he's had a chance to come. Have you all sent it to Dr. Anspaugh?

**MR. ROLFES:** We've sent it out probably about four times and didn't get any comments on it.

**DR. MAKHIJANI:** I guess we have to call him.

**DR. MAURO:** Well, I'll give him a call. I'd like to hear what he has to say, but as I said, my reaction was just fundamentally exactly what I sort of had in mind when I made the comment originally.

**DR. MAKHIJANI:** Right, because basically, this is your comment that --

**DR. MAURO:** That was my comment from the beginning.

**DR. MAKHIJANI:** It would be good to have, since a lot of this started, since a lot of this started with Dr. Anspaugh's paper, and the interpretation of the paper I think would kind of close that circle. It would be good to have his comments so maybe I can --

**DR. MAURO:** I'll take care of it.

**MS. MUNN:** You've seen it. Please say something.

**MR. PRESLEY:** Go ahead. I'm sorry.

**DR. MAKHIJANI:** No, Mr. Presley, I was just telling John that since a lot of the, this questioning of the resuspension model started with the interpretation of Dr. Anspaugh's paper, that it would be good to close the loop on this to get a response from him about this. Because if you'll remember, in our review of the site profile we had a different interpretation of Dr. Anspaugh's paper than what NIOSH had. And so we asked Dr. Anspaugh to comment on it, and he had some criticisms. And so this came out of that. So I thought it would be good if we got some kind of answer from him, if you agree.

**MS. MUNN:** So whose action is that?

**DR. MAURO:** Mine, point of clarification though, originally the model was a resuspension-factor model where resuspension factor as low as ten to the minus nine per meter was one of the parameters. And so our reaction was that's awful low, and perhaps, especially if we're talking about age, this sort of sets the perspective for age fallout. You wouldn't use a resus -- So but at that point we said let's talk to Lynn and see what he thinks, and that's when we brought him in.

So what really started out was how do you best use his resuspension-factor model for this kind of situation. And the answer was, well, you really don't use it. You use the dust-loading model. So I think that, I mean, I won't speak for him, of course, but I think that the very fact that that we converted to a dust-loading model is going to be a very favorable.

Now, of course, he may have some commentary on the five milligrams. He may have some commentary on the vertical profile depth. I don't know. I gave you my response. I suspect that he'll have an opinion on that

and also interesting because he knows the site so well, his perspective on the data that was used to characterize different contamination areas, the different Areas 1 through 30, and whether or not, yeah, that's probably good numbers.

And so, yeah, it'd be great to have him. I will take it as an action item to forward this on to him and just ask him if he had, because I don't think it'd take very much time for him to read it and give us his impressions if that's okay.

**DR. ROESSLER:** It looks to me like the numbers you're looking at in that model were taken from his paper.

**DR. MAURO:** Oh, is that right?

**DR. ROESSLER:** The reference is right above there, and I'm assuming those were Lynn's numbers.

**MR. ROLFES:** Yeah, we referenced quite a few of his documents.

**MR. PRESLEY:** I won't speak for the whole working board. I have no problem with this, but I would like to have his comments back ASAP to the Board and to Mark. So if there's

anything that we need to work with and change and we can do this. What say you, Board?

**MS. MUNN:** If we need to talk about this particular point again, I'd like for us to be able to do it at least on a conference call before our next meeting.

**MR. PRESLEY:** Right, because I mean, this is something right here that's about as claimant favorable as you can possibly get.

**MS. MUNN:** Yeah, that's as far over backward as you can go without turning back flips.

**MR. ROLLINS (by Telephone):** This is Gene Rollins. I would encourage everyone to read the reasons provided for why we believe the model to be claimant favorable. I think I've numbered them there, one, two, three, four, five.

**DR. MAKHIJANI:** What page are you on?

**MR. ROLLINS (by Telephone):** Any part of those discussions that you don't understand or I haven't explained adequately, please get back with us and give us a chance to explain it better.

**DR. ROESSLER:** This is page two of the mass-loading --

**MR. PRESLEY:** Yeah, about halfway down where it starts.

**DR. ROESSLER:** "NIOSH believes this guidance to be claimant favorable for several reasons:"

**DR. NETON:** Gene, this is Jim Neton. Now, you did say earlier though that this would be applied as a worst case analysis for a claimant unless he's gotten in the position where there was, there needed to be a better estimate, right?

**MR. ROLLINS (by Telephone):** That's correct.

**DR. NETON:** And is that guidance in here somewhere?

**MR. ROLLINS (by Telephone):** If you go back to the attachments where I've actually inserted, the attachment is actually the proposed revision to Section 4.2.2 of the Technical Basis Document.

**DR. NETON:** That's Attachment 1 to this white paper that came out over the weekend, correct?

**MR. ROLLINS (by Telephone):** Correct. And if you go back, the discussions and the advice and the directions to the dose reconstructors starts on about 14 and gets into the meat of

the situation about page 15.

**DR. NETON:** I think that's important for people to look at because, again, this model is very claimant favorable and is not necessarily going to be applied to all claimants. So I think a good look at the rationale in Attachment 1 would be appropriate as well.

**DR. MAKHIJANI:** Would you clarify that, Jim, that this would be applied only in the so-called worst case denial or also for compensability?

**DR. NETON:** No, I believe what Gene said was this would be a worst case analysis for denials.

**MR. ROLLINS (by Telephone):** And in cases where it affects compensability which will be for the organs of the respiratory tract and possibly liver and possibly bone surfaces, the instructions allow dose reconstructors discretion as to how these intakes are to be applied.

**DR. NETON:** Could be applied, but there's some discretion there.

**DR. BEHLING:** Could I ask a quick question

regarding Table 2, the particular tissues? What is LN? Is that lymph node?

**MR. ROLFES:** Yes.

**DR. MAKHIJANI:** So in principle a dose reconstructor could look at a claim and apply this 39 Becquerel intake, and if you get over 50 percent, the person could be compensated?

**DR. NETON:** In principle they could, but I guess, I haven't read through this attachment yet, but I'm assuming that there are factors that come into play like 2,600 work hours and the area and that sort of thing.

**DR. MAURO:** Yeah, Gene, this is John Mauro again. It sounds to me that when you use the worst-case assumptions, for example, regarding where he was located, duration of exposure, the five milligrams per cubic meter, you're placing what I would call a plausible upper bound. I wasn't quite sure whether you're going to be using this exclusively for denials or possibly use it for a compensation also. And that's what you mean by leaving it up to the discretion of the dose reconstructor?

I see there was some language in here whereby there was judgment by the dose

reconstructor on how he will apply this. It will be up to him. And I guess at that point it's really on a case-by-case basis then. And I wasn't quite sure of how much leeway, you know, how that would be done if, in fact, he decides to do something different than what's in Appendix B.

**MR. ROLLINS (by Telephone):** John, the only situation that I could envision where these intakes would be applied in a compensable case would be one that the job description would indicate that the individual spent a majority of the time outdoors and either he was in Area 8 the entire time or we don't know where he was. I don't think those situations are going to present themselves very often, but they could.

**DR. MAKHIJANI:** At least that clarifies it.

**MS. MUNN:** And thank you for that language on page 14. Until I got to that part I was particularly concerned about how these extraordinarily over-favorable numbers were going to be applied. So thank you for that.

**MR. ROLLINS (by Telephone):** What this will allow us to do is to efficiently process a

large number of claims as far as these environmental intakes are concerned.

**MS. MUNN:** That's good.

**DR. MAKHIJANI:** I had one other question. You have under Table 1, I guess that's 4-point -- I've got two different documents open, and you see under the assumption that 50th percentile expected intakes are those in Tables 2 and 3, the 95$^{th}$ percentile value would be (unintelligible) by a factor of plus or minus ten. And I just wondered where that plus or minus ten came from.

**MR. ROLLINS (by Telephone):** There really is not much technical basis in that. It was just professional judgment, but in fact, the way these intakes are currently being applied since they are bounding --

**DR. MAKHIJANI:** It's on page 12.

**MR. ROLLINS (by Telephone):** I understand what you're asking, but the way these intakes are typically being applied now is because they are bounding upper, they are upper bounds. They are being applied as constants. So the geometric standard deviation doesn't come into play.

**DR. MAKHIJANI:** So which is the upper bound? Is it the 95th percentile and you already multiplied by ten or is it the 50th percentile that's the upper bound? I'm a little confused here.

**MR. ROLLINS (by Telephone):** There has not been a statistical evaluation performed on this data. If you're looking for the variability in the data, that has not been done.

**DR. MAKHIJANI:** Yeah, I kind of gathered that, you know, from reading this that there wasn't, that this was a kind of a judgment number.

**MR. ROLLINS (by Telephone):** It is.

**DR. MAKHIJANI:** But we've got to have something that underpins the judgment, and now I don't know whether the numbers that we're talking about in intakes are your 50th percentiles, which are those in Tables 4.2.2-2 and dash-3, and the 95th percentile values so upper 95th percentile would be ten times that. So you're not proposing to use that 95th percentile --

**MR. ROLLINS (by Telephone):** I would not

characterize those intakes the way you're trying to characterize them.

**DR. MAKHIJANI:** I'm just reading from here so I'm just, I guess, not understanding that sentence.

**DR. ROESSLER:** But you're jumping from a table in Appendix B back to a table in, of the document I think.

**DR. MAKHIJANI:** No, I am in that document on page 12.

**MR. ROLLINS (by Telephone):** I am probably going to have to rework that sentence because I don't think that's appropriate to have that, the way that I have presented this data, it's not an average. It's not a mean. It's not 50 percentile. It's actually, what I'm presenting here are maximums. And average, those really aren't true averages because they aren't even weighted averages. So I need to go back and look over that language again because I don't think it's correct, and I'm glad you pointed that out to me.

**DR. MAKHIJANI:** Where is equation 4-1? Because you say you're going to calculate your GSD from that so I'm just trying to find it

here.

**MR. ROLLINS (by Telephone):** That's in the early part. That's a pretty standard equation. That's in the early part of the TBD.

**DR. MAKHIJANI:** Oh, 4-1 in the TBD.

**MR. ROLLINS (by Telephone):** Right. See, what you're reading is actually an insert that's going into the TBD.

**DR. MAURO:** Gene, this is John Mauro again. I have a quick observation. I'm just looking at the combination of assumptions. The way I look at it is you pick the dust loading, which right off the bat, which is a chronic five milligrams per cubic meter, you've already capped it off. From then on all the other parameters that you might want to use, such as Becquerels per square meter, probably should be your best estimates because you don't want to have an upper bound, you don't want to use an upper -- in other words, a five milli -- basically, I'm backing off in terms of the degree of conservatism. I'm saying that if I understand the model correctly, you have come up with a deterministic model which places a

plausible upper bound for screening purposes. Because by adopting five milligrams, you've capped it. Then after that if you're going to say, well, what do I use for my Becquerels per meter squared, it seems to me in keeping with the philosophy that has been embraced by NIOSH and we've agreed with, is you don't pick, if you have four or five parameters that go into your equation, you don't pick the upper 95$^{th}$ percentile for each one of those. You may pick one and say we're going to go with a bounding one such as the five milligram, and then the others we're going to try to be realistic. And that brings you to a place where you want to be. You want to be at the upper end of the distribution and use that as a constant. So I guess I'm not quite sure where the uncertainty comes in in this analysis. What I'm hearing is that you will be applying some kind of distributions when you use your input to do these dose calculations, and I guess, I don't see where it would be. You know, where would the uncertainty be?

**DR. MAKHIJANI:** This whole thing confuses me

because I looked at the site profile and equation 4-1 is just the ratio of the 95th percentile and 50th percentile which are going to have those numbers to use the equation. It's just a standard statistical equation for lognormal distribution and --

**DR. MAURO:** Am I correct that --

**DR. MAKHIJANI:** -- and we don't have the numbers to put into it.

**MR. ROLLINS (by Telephone):** That's correct, and I'm going to go back and revisit that language because it's probably not appropriate. It's an artifact from the other TB –- from the web zeros. I just need to update that language.

**MR. ELLIOTT:** What you're seeing here is Gene's proposed draft of a revision to the Technical Basis Document that hasn't even gone through NIOSH comment resolution yet. So --

**DR. MAKHIJANI:** I mean, it's just --

**MR. ELLIOTT:** -- these are good things to talk through --

**DR. MAKHIJANI:** -- just going through it the question came up, and I didn't see, so I presume it's fair.

**MR. ELLIOTT:** Yes.

**MR. ROLLINS (by Telephone):** John, I appreciate your input on conservatism in the deterministic model. And there are a number of areas that I'd identified, reasons one through five, and methods that we could use to reasonably reduce these intakes. I might be interested in having your input of those five identified, claimant favorable assumptions.

And don't answer me now. Maybe you can get back to us a little bit later about which of those do you think would be areas that we should consider providing additional guidance or additional information to the dose reconstructors for potentially coming up with a best estimate. I'd like for you to look through those five items that we've identified as conservatisms, and I'd like your input, your thoughts on where we might be able to use some of those to provide a best estimate.

**DR. MAURO:** I appreciate that, and I will take up that offer. I look forward to doing it, working with you on that.

**DR. MAKHIJANI:** My only other comment, Gene, is going back to the Area 30 thing. It would

be good to, I mean, I trust these things will be in the records of the workers because otherwise it becomes almost impossible, especially for places like the Test Site, for a survivor claimant because they have no idea what their family member did. And they could never specify what happened if their family member obeyed the law.

So I think it would be good to go, I don't know if there are claimants whose records we could look at. But if you know of a couple, it would be nice to see the work permits and the monitoring following the outside work. And that's my only other comment.

**DR. MAURO:** In a way -- this is John Mauro. What I'm seeing here is that you've built a method to place a plausible upper bound for that first cut, and in my mind it certainly is an upper bound. But then I also noticed that you are going to leave quite a bit of discretion to the dose reconstructor on when to back off from that and what data.

So I guess the only place where, there are certain judgments that are going to be

made based on a case-by-case basis whereby that dose reconstructor is going to say, well, based on the information I have it appears that he was really never in Area 8. Or it appears that he only was out there for a certain amount of time. I suspect that certainly if you have a high level of confidence in those records, you could use those assumptions.

But my guess is that sometimes these records are, you can't have that much confidence, in fact, we had this conversation during breakfast this morning with Brad. That is, all I would offer is when you're doing a case, and you're really not quite sure, you may find yourself always regressing to the more conservative assumption, as simple as that.

**DR. NETON:** Even under these very conservative assumptions, I'm looking at Table 2, there are about four or five organs, as Gene pointed out, that are fairly high. But a 30-year dose to the lung is only one rem. I mean, so even under those conditions unless there's some other extraneous exposure, that's

not even going to be close to 50 percent. Those would be down in the --

**MR. ROLLINS (by Telephone):** For example, in the case of the lung, just for your information, most of the workers that we've evaluated have a smoking history, and we typically are seeing lung doses in the range of 45-to-70 rem before we have a compensable situation. So, and that's a good point that you've made. One rem to the lung usually is not going to be important.

**DR. NETON:** Right, so I think that the idea here is, as John pointed out, is almost like a screening value that would be applied. And even under these conditions you're not going to bother to look at the areas that the worker was in. You're going to assume he was in Area 8 the whole time. And almost in all of these situations, with the possible exception of some of the lymph nodes and maybe, I can't see too many of these going over 50 percent even under these extreme conditions.

**MR. CLAWSON:** This is Brad Clawson again. But still we come back to one underlying factor and that is data reliability. And so

many times in a lot of the interviews and the people have made the comments in there that if you go back to their work area they say they only worked in this one area, where they worked throughout the whole site. That was where they were based out of.

They've got a central facility there at NTS, and they went out throughout all of the site and were working all this. But when you look in their records, it said that was their normal place. I take myself, for example. If you were to look at my records, it would say C-P-P-6-6-6, but it doesn't take in P-B-F-10, M-T-R-749, Three Mile Island. It doesn't take into account any of those. So we need to be very careful when we classify this person, well, he couldn't have been in this area because a lot of times they could have been.

**DR. NETON:** Yeah, I agree.

**MS. MUNN:** But, Brad, I think the argument that's being made is those people were badged. It isn't that they weren't badged. So I think what's being said here is their badge would have indicated any unusual exposure from

having been above ground more than their job description indicated.

**MR. CLAWSON:** Well, we're looking at a mass-loading out here. Let's take a mechanic or whatever like that. There's a lot of times they may be out there, right, well, we need you to go out to this place in the area and take and stuff. We're looking at mass-loadings of dust and everything else. I know the wind never blows in Nevada, but guess what, it, this is the point --

**MS. MUNN:** Which means none of this would ever have been covered up. It would all have been laying on top.

**MR. CLAWSON:** Or dug up and blown everywhere, too. So this is the point that I'm trying to get to because so many times we use a worker's, well, he was only in this area and this is only going to affect, and I think that's an assumption that we use. And I don't really feel that comfortable with it because I know from experience of where we get around to.

**MS. MUNN:** Well, and even I with my magnificent memory, could not tell you where I

was 50 years ago.

**DR. NETON:** Right, but I think the approach to be taken here is these Area 8 values, 2,600 hours, five milligrams per cubic meter, would be used if, almost as a default. If you didn't use these values, then it has to be fairly well documented in the dose reconstruction why that was not used. And then presumably we'd have some pretty good evidence to put in there that would make that fact. And, of course, the claimants have the right to look at that and --

**MR. ROLFES:** In the absence of information for a specific claim, we would default to maximum intakes for that person.

**DR. BEHLING:** Will this be converted into a workbook if it's adopted?

**DR. NETON:** I don't know what ORAU's plans are, but I would assume it might be, yes. Actually, it wouldn't be that, it'd almost have to be at some point because these 30-year doses wouldn't be applicable. We'd have to go back and do the annual dose by year. So there'd be some sort of a spreadsheet workbook.

**DR. BEHLING:** Yeah, that's quite complex if you try to do this manually, by hand.

**DR. NETON:** Oh, yeah, I don't think the dose reconstructors would be doing this by hand. There would be a spreadsheet of some type adopted.

**MR. PRESLEY:** I guess the only action item we have on this is that Gene Rollins is going to re-do the resuspension model write up. And then John's going to have -- I'm having a senior moment -- Lynn Anspaugh give us his comments.

**DR. MAURO:** Yeah, I have two action items. Let me make sure I've got it right. One is to check in with Lynn, and the other is to work with Gene on the five reasons for why this is conservative and deterministic business.

**MR. CLAWSON:** Wasn't NIOSH going to look at this? You guys have -- have you been able to look at this?

**MR. ELLIOTT:** Well, what will happen, I think, here in this particular instance, the Board's working group thoughts on this particular draft are going to be addressed by Gene, and then they'll be put into our review

process. So it's kind of an interesting anomaly we see here. Typically, we produce something and put it on the table and you react to it as a final. Here we have a closed approach in draft form. So that's interesting. We'll see how this goes.

**MR. PRESLEY:** Hopefully, we don't muddy the water up.

**DR. WADE:** Yes, Brad, NIOSH is going to take this discussion and modify their document based upon what was said here. We can't forget Brad's point that, make sure if we don't know where a worker was or if there's some question, then we need to default to the maximum.

**MR. ELLIOTT:** The benefit of this as I see it will knock out an issue here on environmental dose from resuspension. So if that gets us to the end game faster in producing something in final form for you to react to that's all well and good.

**DR. NETON:** Well, a lot of working groups have gone this way. I mean, Bethlehem Steel went on for a year where we negotiated, maybe that's not the right word, but we discussed

internally quite a number of options, and until we got to the point where we were all comfortable with the approach, then we adopted it. So we kind of --

**MR. ELLIOTT:** I don't think we produced draft section language for TBDs though.

**DR. NETON:** No, this has gone a little bit further what is a draft. The concepts were there. I mean, we --

**MR. ELLIOTT:** We discussed the concepts, didn't discuss the language.

**DR. NETON:** The language was not nailed down. You're right.

**DR. WADE:** Language in this case was just used as a mechanism to convey the thought.

**DR. MAKHIJANI:** And that's the spirit in which I took it anyway. We're not nitpicking the grammar, word-smithing for you.

**COMMENTS 6 AND 7**

**MR. PRESLEY:** Mark, do you want to talk about Comment 6, 7?

**MR. ROLFES:** Did we cover a little bit of those?

**MR. PRESLEY:** I think we did.

**MR. ROLFES:** Our response to Comment 6 was

see Response 5.

**MS. MUNN:** That's good.

**MR. PRESLEY:** Did you have the same thing on seven?

**MR. ROLFES:** Seven was referring to the short-lived radionuclides which would be primarily during the atmospheric weapons testing, and that has been designated as an SEC for the prior to 1963 time period. So we don't feel that a resuspension model needs to account for the short-lived radionuclides associated with the atmospheric weapons testing time period.

**DR. MAKHIJANI:** The comment, Mark, is about the early re-entry tunnel.

**MS. MUNN:** Early re-entry work.

**DR. MAKHIJANI:** Oh, okay, so this, this, I have to go to the original review.

**DR. MAURO:** My understanding of -- we're on seven now -- is that this deals with a time period prior to 1963.

**DR. MAKHIJANI:** I'm just checking what our finding was. Sometimes from the very short comment there in the matrix, it's very hard to figure out what all is said in the findings.

**MS. MUNN:** It's expanded a little underneath that, the original comments are there.

**DR. MAKHIJANI:** I'm just trying to find 22.6. Oh, here it is. Yes, I believe Finding 6 is about that in the review. That's right. It's the same as Finding 5.

**COMMENT 23**

**MR. ROLFES:** That will take us on to 23. SC&A's comment was the adequacy of soil data for estimating resuspension doses needs to be evaluated, for instance, in relation to hot spot detection and plutonium soil data. And I believe we've alluded to this as well in Response 5 with our discussion of the mass-loading model. So using the maximum intakes from Nevada Test Site and excluding Area 30, unless that person worked specifically in Area 30.

**DR. MAKHIJANI:** Now, as I recall Lynn had made some comments in the site profile. We also made some comments about the crudeness of the grid for sampling. And also in the, the areas that were designated as not hot areas, but I guess you've taken care of that by focusing on Area 8. So I guess the remaining

comment from that in terms of 23 would be the variance within Area 8 and how the average relates to that.

Gene, was your plus or minus ten related to that by any chance?

**MR. ROLLINS (by Telephone):** No.

**DR. MAKHIJANI:** Then how do we deal with a sort of inside area variability?

**MR. ROLLINS (by Telephone):** I touch on that in those responses one through five. There's going to be a certain amount of dispersion and averaging going on just through natural processes. I just don't think it likely that someone would have extended exposure to hot spots.

**DR. MAKHIJANI:** But these areas are pretty big. I don't know how big Area 8 is. I don't remember. Mr. Presley might remember.

**MR. ROLLINS (by Telephone):** The procedures at the site require that areas of known high contamination are barricaded and usually fenced. And entry into those areas requires permits from Nevada Operations Office. And they know where those areas are. And so I just believe that we should be taking some

credit for dispersion and environmental attenuation.

**DR. MAKHIJANI:** Area 6 is 36 million square meters.

**MR. ROLLINS (by Telephone):** It's pretty big.

**DR. MAURO:** This is John Mauro.

**DR. MAKHIJANI:** I mean Area 8, sorry.

**DR. MAURO:** I can help out a little bit here. I remember originally the reason for this comment was I believe you were averaging over the whole site. In other words, there was very little texture to the, how you were breaking the site up. No, is that --

**DR. MAKHIJANI:** No, no, I think in the original also it was broken down by area.

**DR. MAURO:** I can help out in terms of I ran into this problem, I did some work with EPA when they were concerned with the clean up of sites and where there was soil contamination. And they would have adjustment factors. And said, okay, well, listen, if a person is standing on contaminated soil, and he's breathing, he's inhaling airborne radioactivity, the air that he's breathing

reflects the average activity over some area. Certainly, it does not reflect the activity under his feet.

So it's some area where it's realistic to say, okay, what is the integrated, what's the area of what you really want to average. And there's literature on that. Now I guess, you folks may have already looked into this, but it may not be a bad idea to take a look at this Area 8 and its size. And then there is this literature on what the averaging area should be when you're dealing with this kind of problem because it's been looked at a lot.

And it may turn out that maybe Area 8 is very large, and you may have enough, I guess I don't know if you have enough information to break it up into sub-areas or whether you need to do that or not. But I think Arjun's right, and if it's that large, it's probably something that needs to be at least explored a little bit, whether or not we're averaging over too large an area.

**MR. ROLFES:** I don't find it credible to find a person standing in the hottest spot within that area --

**DR. MAURO:** I agree.

**MR. ROLFES:** -- for 2,600 hours per year.

**DR. MAKHIJANI:** No, no, I'm not saying that. That's not the construct. In a very large area when you've done a survey with a crude grid, then you have some variability. And the question is, is the number that you're using for site contamination, what is the variability in that, and how well is that represented in the intake. So the question is not are we putting a person at the hottest spot within a factor of a hundred more than the average, is not that for 2,600 hours. That's not the comment that I'm making. It's just for clarity. The idea was related to how the survey was originally done and what that implies for how comfortable we are with the number that we're using and what the variability of that is.

**MS. MUNN:** (Unintelligible) compared to the other areas?

**DR. MAKHIJANI:** No, but all these, I mean, the Test Site is huge so (unintelligible) huge areas.

**MS. MUNN:** I know the Test Site itself is

huge, but Area 8 isn't really.

**DR. MAKHIJANI:** No, Area 8 is not one of the larger areas.

**MR. ROLLINS (by Telephone):** No, Area 8 -- this is Gene Rollins -- Area 8, the contaminated area that was identified by McArthur is 13.3 square miles, and that's out of a total contaminated area of 510 square miles. And the total NTS area is like 1,350 square miles.

**DR. MAURO:** So how many miles? I think in terms of three-by-three. What is it, four-by-four?

**DR. MAKHIJANI:** Yeah, well, three-and-a-half by three-and-a-half. Yeah, that's 36 million square meters.

**DR. MAURO:** In the level of information that you have in terms of -- I'm just thinking through the problem. If I were asked to look at this problem, I would say, okay, I've got this area that's three miles by three miles, and I know that a person spent some of his time there. Now certainly, there's reason to believe that he spent a few hours here, a few hours there, all over the site, yeah, then you

would work with the, you'd do it exactly the way you did it.

If there's reason to believe that no, there's reason to believe that, no, that there is quite a bit of variability within that three-by-three, let's say it would be a tenfold difference, and there's a couple of square miles over here that are ten times higher than over here. I feel as if I owe it to myself to say, okay, is it reasonable to say that, well, maybe a person could have spent quite a bit of time in that section.

But at the same time you've got to ask yourself when the wind is blowing and re-suspending it is an integrating factor. What is really in operation here? Does the wind pick up and you inhale dust that may be blown from two, three miles away? I seem to believe that's the case by the way.

I seem to recall that we're talking about when you're working in an area, and you're inhaling dust, the dust you're inhaling is not only the dust that's being re-suspended from your immediate vicinity, it's also the stuff that's being blown from a mile or so

away. So it may turn out that everything is just where it should be, but all I'm saying is I would sort of explore it a bit and air it out.

**DR. NETON:** I'm sorry. I stepped out for a second. It seems you're now questioning or discussing the appropriate value to use for the Area 8 dust-loading model.

**DR. MAURO:** Yes.

**DR. NETON:** How does that bounce against your previous comment though that we've already taken five milligrams per cubic meter as a very large number, and you just said five minutes ago we need to go back and look at the extra conservatism we built into these things.

**DR. MAURO:** I'm not saying --

**DR. MAKHIJANI:** That has not to do with the dust loading. For the five milligrams okay, but the radionuclide content per milligram of that is what we're talking about.

**DR. NETON:** No, but what John was saying though is if you already start at five milligrams, and you've made a very conservative assumption at that point then, I heard John, I think, say then you might want

to consider what you pick for your representative values for these other factors because you're already at the high end with the dust loading. And so if you pick the high end dust loading and then maybe the high end of the concentration is maybe a little bit of overkill.

**DR. MAKHIJANI:** No, Jim, that wasn't the spirit of the comment.

**DR. NETON:** Okay, I stepped out --

**DR. MAKHIJANI:** -- a couple of times. So the idea wasn't that you place somebody in a hot spot for 2,600 hours. That wasn't the comment that was made. The comment, I think the matrix item is essentially what was the nature of the grid that was used in the sampling. It wasn't (unintelligible). What is the variability in this number that we're looking at and what do we know about it?

So it's not that we should use a higher number or place somebody there for 2,600 hours. If we're going to use this, especially in denial cases and worst cases, that we should have some idea of the relationship of these numbers since it's a 36

million square meter area.

**DR. NETON:** I think that's fair, and that sort of falls into that category where John agrees to work with Gene on these other factors is what's appropriate.

**DR. MAURO:** I'm just thinking it through; in fact, while I was talking it out I tried to visualize. The impact is within miles. So I think maybe it's right where it should be. In other words, I wasn't saying you should use a conservative assumption. I just want to demonstrate that, yeah, the assumption we're using by averaging over the entire Area 30 area is certainly a reasonable, appropriate, realistic assumption. And I would want to convince myself that that's the case.

**DR. NETON:** Sure.

**DR. MAKHIJANI:** Okay, so is this going to be thrown into that pot where you --

**DR. MAURO:** Yes.

**DR. MAKHIJANI:** -- where you kind of look at the degrees of conservatism?

**DR. MAURO:** Yes, yes. That's what I suggest.

**DR. NETON:** It seems appropriate.

**MR. PRESLEY:** How about a seven-and-a-half or ten-minute break here?

**DR. NETON:** Start your stopwatches.

**DR. WADE:** Is there another document that's going to come out that's going to be discussed there are any copies of?

**MR. ROLFES:** No, there's not. I apologize for the confusion.

**DR. WADE:** But you're saying the matrix? You said after we do these items --

**MR. PRESLEY:** What we're going to use is the matrix that Mark put out.

**DR. WADE:** Does anybody need a copy of that?

**MR. PRESLEY:** Ray does, he says.

**DR. WADE:** Ray does. So I need a copy to copy. We're going to take a break for ten minutes, however long ten minutes is in this time zone. We'll find out, but we'll be back to you.

(Whereupon a break was taken from 10:47 a.m. until 11:02 a.m.)

**DR. WADE:** Okay, we're getting ready to begin again. Might I ask who's on the line?

**MR. ROLLINS (by Telephone):** Gene Rollins is here.

**DR. WADE:** Hello, Gene.

**UNIDENTIFIED (by Telephone):** Kathleen from Senator Reid's office.

**DR. WADE:** Thank you.

**MS. SMITH (by Telephone):** Cheryl Smith.

**DR. WADE:** Welcome.

Okay, that just gave me a sense of who's out there. We are ready to begin.

Mr. Presley?

**MR. PRESLEY:** What I would like to do, we've gone through items five, six, seven and 23. Are there any more questions about item 23, Comment 23?

(no response)

**MR. PRESLEY:** I guess what I'd like to do now is start with item one, and let's go back through the matrix. I think Lew was printing everybody a copy. And we'll just start going through each comment, and what I would like to do is where we are working on the TBD for completeness, Mark is prepared to give us an update on where we stand on that.

And unfortunately or fortunately, we have added to their problems by putting a couple more things in there that they have to

look at before this TBD can come to us. So, Mark, do you want to talk about the TBD first since it pertains to probably 60 or 70 percent of these comments?

**TBD DISCUSSION**

**MR. ROLFES:** A lot of the issues that we discussed today were at the heart of the issues being discussed. The mass-loading model took up quite a bit of the, many of the comments were addressed or related to the mass-loading model and the environmental intakes at Nevada Test Site.

We had attempted to provide that to the Advisory Board for discussion prior to it being an official approved document. This was just done to try to expedite things rather than present our research and findings and then receive comments after we had approved the document. This is just to try to simplify things and try to get everything, try to expedite things and get comments addressed before we have an official document that we're using for dose reconstructions.

A lot of the comments we have resolved with draft methodologies that have not been

approved in a TBD yet. We are trying to address as many of these issues as we can before we put that TBD out and use it for dose reconstructions. So we can provide some updates to you on where we stand with these various issues and indicate whether we have the work completed and whether it's ready to use.

**MR. PRESLEY:** Okay, thank you.

**COMMENT 1: RADIONUCLIDE LISTS**

Why don't we start with Comment 1. It had to do with the list of radionuclides and looking back at that the documents were changed. I believe everything is complete on that, and the working group is waiting on the TBD to go through. Is that correct? Anybody have any more comments on that?

**DR. MAKHIJANI:** I wondered why Sodium-24 and Neptunium-239 were not added for tunnel re-entry workers, and why that addition was restricted to those three.

**MR. ROLFES:** Well, for the short-lived radionuclides, because we have a special exposure cohort from the time period covering 1951 through the end of 1962, we will not be

reconstructing internal doses from the short-lived radionuclides.

**DR. MAKHIJANI:** Yeah, I know. I was talking about the tunnel re-entry workers.

**MR. ROLFES:** Okay, Gene? Gene?

**DR. MAKHIJANI:** Or maybe the -- was the review comment only for atmospheric testing? I don’t remember.

**DR. WADE:** Gene, are you with us?

**MR. ROLLINS (by Telephone):** Yes, I’m here.

**DR. WADE:** Okay, Mark would like to prime you.

**MR. ROLFES:** Gene, could you tell me whether we have incorporated any internal dose approach or description for tunnel re-entry workers post-1963 into our TBD?

**MR. ROLLINS (by Telephone):** We have provided some instruction.

**DR. MAKHIJANI:** Our finding did relate to both atmospheric and (unintelligible).

**DR. WADE:** Arjun had a question about two radionuclides. What were they again, Arjun?

**DR. MAKHIJANI:** Sodium-24 and Neptunium-239. We had an original list in Table 1 of our site profile review on page 26, and of those, I

thought the three that you added -- let me just cross-check here.

**MR. ROLLINS (by Telephone):** This is Gene Rollins. We have, or are in the process of developing, tables based on Hick's data that show the relative abundance of various radionuclides time after detonation. And we will be evaluating whether Sodium-24 or some of the other short-lived radionuclides represent radionuclides that would be important to dose.

**DR. MAKHIJANI:** Yeah, but you included Aluminum-2 at 28 which has a half life of only 2.24 minutes. And you didn't include Sodium-24 which has a half life of 15 hours. So that kind of raised the question in my mind as to why you picked these three out of the list in Table 1, and left out the Sodium-24 15 hours, and 279-Neptunium 2.36 days. So it seemed a little backward, but 2.2 minutes would seem not so relevant for tunnel re-entry workers.

**MR. ROLLINS (by Telephone):** We will go back and look at these lists once again in terms of the Hick's data. And we will decide which ones need to be considered.

**DR. MAURO:** Gene, regarding the Hick's Tables, I recall using them in the past, and sometimes in some tests they included activation products. And sometimes they were limited to just the fission products. And I know Hans is pretty familiar also with the Hick's Tables. I guess the only thing is it sounds like your set of Hick's Tables include activation products, and that's good.

**DR. BEHLING:** Well, they will include things like cobalt and iron and others, but the key element here I believe is Neptunium-239 because it's produced in large quantities at least for some of the detonations that I've looked at. It's one of the most prominent radionuclides in the immediate aftermath of a detonation.

**DR. MAKHIJANI:** And it could also affect quite a number of workers because it has a half life of --

**DR. BEHLING:** It's 2.6 days.

**DR. MAKHIJANI:** You go out a week or two with this.

**DR. BEHLING:** And I don't believe Sodium-24 is included in the Hick's Table.

**MS. MUNN:** That's the issue. How significant is --

**DR. MAKHIJANI:** I don't know, Wanda.

**MS. MUNN:** My memory which could be flawed.

**MR. PRESLEY:** Gene? Gene, this is Bob Presley. Are you there?

**MR. ROLLINS (by Telephone):** Yes.

**MR. PRESLEY:** How significant is the sodium? I don't recall using that much of it or seeing that much of it used.

**MR. ROLLINS (by Telephone):** I really can't respond quantitatively to that question, but qualitatively I would be surprised if it was very important.

**DR. MAKHIJANI:** This is just a raised here as an activation product from natural sodium which you would expect to be present in the geologic environment.

**MR. PRESLEY:** Yeah, a geological environment.

**DR. MAKHIJANI:** So that's why it was raised in the context of the tunnel re-entry workers. Because you would expect an activation just like you do with sea water.

**MS. MUNN:** Yeah, but it's such a small

fraction, well, it's worth looking at to see if it's --

**DR. MAKHIJANI:** I think this list that was in our review was from the National Academy report in '89, but that one was in the context of atmospheric testing. So, yeah, it may be that neptunium is important and sodium is not, but it's worth checking.

**MS. MUNN:** Are there any other radionuclides you're concerned with, Arjun, that haven't been covered by these tables?

**DR. MAKHIJANI:** I don't remember what's in the TBD, but I have in front of me what we had in our review which was Neptunium-239, Sodium-24, Manganese-56. We picked up Chlorine-38, Aluminum-28. They're very short-lived, and Scandium-46?

**MS. MUNN:** Scandium-46, those three --

**DR. MAKHIJANI:** And 134-Cesium and Cobalt-60.

**MS. MUNN:** Cesium and Cobalt-60 are surely in there, aren't they? I'm trying to think --

**DR. MAKHIJANI:** Now, I don't know why I included them in this table if they were not, they must have not been in the TBD. I'd have

to go back and check if they were, but I presume that they were not in the TBD; that's why they were in this table.

**MS. MUNN:** So Cobalt-60 and --

**DR. MAKHIJANI:** Cesium-134.

**DR. BEHLING:** Are they short-lived?

**DR. MAKHIJANI:** This is on page --

No, no. Cesium-134 is two years and --

**DR. BEHLING:** No, no, I was going to ask about the short-lived radio-iodides included in the TBD, 132, three, four and five.

**DR. MAKHIJANI:** No, this is activation, the title of the table is "Activation Products Important for (unintelligible)". We raised the iodine issue separately.

**MS. MUNN:** And the real question then becomes how significant are they, and do they need to be included, correct?

**DR. MAKHIJANI:** Yes. I think this was raised at the time before the SEC petition as a combination that would apply to all workers potentially, but some of them may be only relevant for atmospheric testing workers. And we haven't gone back after the SEC petition

and actually checked which one would be relevant. But I presume that NIOSH would be checking that.

**MS. MUNN:** Yeah, I would think so. Well, my question is because if there are issues with respect to the table, it would be beneficial for all of us to cover any issues that exist without bringing more up later.

**DR. MAKHIJANI:** Well, my memory's a little bit dim from having researched this a year and a half ago, but I can remember we raised all the activation products that we had concerns about in this table.

**MR. PRESLEY:** That's why I bother about bringing this up because a year ago we said that that list of nuclides that was put out there was fine, no problems. Everybody was agreed that we would go with what we did about a year ago. So if we've got new things that we need to put up here, we need to make sure --

**DR. WADE:** These were not raised in the original SC&A review. Now the question is --

**DR. MAKHIJANI:** These are not new, Mr. Presley. These were raised as omissions from

the site profile in the original review that we filed. That's what Comment 1 is. Exactly from the table that I'm reading, Comment 1 is about the table that I'm reading which was from August, from December 2005.

**MR. PRESLEY:** Okay, I thought we were --

**MS. MUNN:** And if they're insignificant, we should say so.

**DR. MAKHIJANI:** No, we're not adding anything, but we just don't, we did not parse at the time what was important for atmospheric or underground. And that's the thing that we did not do. It's all mooshed in there in one set.

**MS. MUNN:** We wanted to make sure we were covering them all.

**MR. ELLIOTT:** As we revise the Technical Basis Documents to address, not in presumptive cancers for the class, we'll have to factor this into that figure as well as the post-class periods.

**MS. MUNN:** If it's insignificant, it's easy to say so.

**DR. MAKHIJANI:** Yeah, actually I have some explanation here that the TBD actually has a

matrix, if I remember, of which radionuclides are relevant and which circumstances, and Cobalt-60 is listed as being relevant for tunnel re-entry and mine back operations. So I think Cobalt-60 is not an issue because it's already covered in the TBD.

**MS. MUNN:** It's already covered.

**DR. MAKHIJANI:** So the others --

**MS. MUNN:** At least manganese and cesium, neptunium and sodium.

**MR. PRESLEY:** What I've got here is that NIOSH will go back and look at sodium and neptunium and see if they need to be added to the list.

**DR. MAKHIJANI:** And there are a couple of others perhaps.

**DR. BEHLING:** Is (unintelligible)-67 included?

**DR. MAKHIJANI:** I didn't have that originally, no.

**DR. BEHLING:** I don't know if that's an important in an aqueous environment only or it was a very important radionuclide in the Pacific.

**MR. PRESLEY:** If we need to be adding it,

let's add it now instead of waiting for the next time we have a meeting.

**DR. MAURO:** This is John Mauro. I guess I see this as an area of vulnerability. I'll explain what I mean by that. The list of radionuclides that are associated with these things are very, very long. And the activation product list is often incomplete. And I guess I just caution that, you know, there's always going to be, I can see it down the road. There's always going to be something that's going to pop up that we didn't look at. All I'm just saying is that we are dealing with something that, a complete list to make sure we captured all --

**DR. MAKHIJANI:** Zig*-67 is stable.

**DR. MAURO:** Pardon me?

**DR. MAKHIJANI:** Zig*-67 is stable.

**DR. BEHLING:** Only has a couple year half life.

**DR. MAURO:** We ran into it as a big deal at the Marshall Islands.

**DR. BEHLING:** Or 65, maybe it's 65. I don't remember which number. It's relatively long-lived. It does concentrate at least in the

marine environment.

**DR. ROESSLER:** Two hundred and forty-three day half life. It has 67 stable.

**DR. BEHLING:** Okay, stable.

**DR. MAURO:** You may want to look into some of the research and work done in the DTRA world, the Defense Threat Reduction Agency world. They have an incredible amount of information on this subject. That is, the radionuclide inventory. You probably have already done that. But that is a resource that will -- see, they've been struggling with this problem of veterans of activation products, making sure they had a complete list. And it may be helpful just to look under that rock.

**DR. MAKHIJANI:** Yeah, at this stage, I think you know, maybe geological data on the Nevada Test Site and which activation products may be important might be the best way to narrow this down quickly and things that are very short half life can be omitted and screened out. I think 67 clearly has a long half life.

**DR. BEHLING:** No, it's 65.

**DR. ROESSLER:** At least it's stable. That's

very long.

**DR. MAKHIJANI:** Now you've got like a proton, right?

**MR. PRESLEY:** Okay, Mark, you going to take that as an action item, please?

**MR. ROLFES:** Okay, we'll look into the radionuclide and verify that it is complete.

**MR. PRESLEY:** Okay, the list.

**COMMENT 2: REACTOR TEST RE-ENTRY**

Comment 2 has to do with the guidance for dose estimation for gonads, skin, gastrointestinal tracts of the early reactor test site personnel for large hot particles.

**MR. ROLFES:** All right, Gene. Gene?

**MR. ROLLINS (by Telephone):** Yes.

**MR. ROLFES:** Could I have you speak about hot particles, ingestion of hot particles and skin deposition of hot particles, please.

**MR. ROLLINS (by Telephone):** We have provided a response to the concerns to the issue of using NRDL techniques, and our conclusion has been, as we have stated in this matrix that we sent to you, is that the factual information necessary to employ the NRDL methodology is limited to a very small

dataset.

And to try to extrapolate that to other situations is intractable. And I believe we said here that in those cases where we do have the data available, we will employ them as appropriate, but we don't know how to move that methodology to other environments.

**DR. MAKHIJANI:** I actually, you know, the question had arisen for skin deposition in the context of how you average from a very small hot particle to a larger area how you actually calculate a probability of causation from a very high but very local dose. And that was the question about the VARSKIN model as related to what the NRDL said.

And then so a more complex version of that would be for the GI tract and how you, how do you, what kind of guidance do you give as to when this model is to be used? Because you suggest that the NRDL model might be used sometimes, but I didn't see anything specific as to how the dose reconstructor would decide how that would be translated --

**DR. NETON:** That issue has been put onto the overarching issues list. That's one of the

ones that we're working on and specifically the skin and the GI tract model. I presented a brief on that somewhere. I forgot where I discussed that, but --

**DR. MAKHIJANI:** I think you did.

**DR. NETON:** So our recollection there is no special requirement, no special dosimetry required for transport of hot particles through the GI tract. And I pulled out some relevant literature to discuss that. And the hot particle model for deposition on the skin, VARSKIN, of course, would model anything you give it, and I think we had some default language we were working on to put in there would only go down to average over no less than one square centimeter.

**DR. MAKHIJANI:** I remember there was some question of averaging, and I could not remember what it is, and where we are about that.

**DR. NETON:** That's wrapped up in this overarching issues list. It's not done yet. We're working on that. Maybe this would be noted in here as an issue that NIOSH is addressing. Don't lose it from the context of

this review, but possibly table that to our addressing this on a complex-wide basis, just a suggestion.

**DR. MAKHIJANI:** The reason I guess I got confused and I forgot that it was in a different list is because here it says TBD will add guidance to Chapter 5, but doesn't mention that other paper.

**DR. NETON:** Yeah, we need to make sure that's --

**DR. MAKHIJANI:** And so I kind of did not know what was happening there. And I did forget that you had added that.

**MR. PRESLEY:** So what you're saying this is going to be complex wide?

**DR. NETON:** There will be complex-wide guidance on how to deal with hot particles from skin contamination and ingestion prepared by NIOSH outside of this TBD. But we'll need to, I guess, make sure that that issue doesn't get lost from this matrix so when we close out this complex-wide issue, it will be back through here.

**DR. MAURO:** Given that the technical issues certainly are tractable, that is, VARSKIN, we

can come up with something, I guess I view the tougher question is okay, now that we have tools, how do you apply it them to, let's say, a particular claimant that may have been exposed to hot particles. How do you, you know, that's --

**DR. NETON:** That's a different subject. That's the implementation of it, and I'm not sure where we go with that.

**MR. PRESLEY:** Okay.

**MS. MUNN:** This brings up another issue with respect to timing, Jim. How are we going to deal with the overarching issues issue? Is the timing, are we going to be able to address those one at a time? We had, what, six or eight of them as I recall.

**DR. NETON:** Eight now, eight to nine.

**MS. MUNN:** And are we going to be able, what's the plan --

**MR. ELLIOTT:** They're going to come forward as we see the complete development of the position that we're going to take. And so it may be that, I think Jim's probably close in May, at the May meeting, to present two or three.

**DR. NETON:** Two or three are going to --

**MR. ELLIOTT:** And then once we get your input in those, we'll finalize those and the site profile that is affected here will be so referenced and others as well.

**DR. NETON:** But the answer is we're working on these in parallel, not serially. It's just as we can.

**DR. WADE:** And I think the tracking mechanism is that Larry in his report at each face-to-face Board meeting will give an update of status on these. Hopefully, that update of status will trigger Jim presenting a product, but you'll see the full list at every Board meeting.

**MS. MUNN:** Yeah, my concern was the timing concern with respect to whether or not the hot particle issue is going to be fully addressed in time for us to incorporate it into what we're doing at NTS or since we clearly have an issue --

**DR. WADE:** I don't think there's any guarantee of that.

**MR. ELLIOTT:** They'll come forward as they're developed. Some may be sooner than

others.

**DR. NETON:** We'd love to put together a list that says here's the delivery date on all of these, but the nature of our business these days --

**MS. MUNN:** I know that's impossible --

**DR. NETON:** -- is difficult.

**MS. MUNN:** -- I was grasping for whether or not hot particle was close enough for us to be thinking --

**DR. NETON:** I think the guidance that we could put out there is not that difficult. John alluded to that. I mean, we can reference what we're going to do and how we're going to do it technically. The difficult part comes into how we implement it and how do you know when a person's been exposed to a hot particle. I think I see some verbiage in here that says, well, when we do know it, we'll use it.

**MS. MUNN:** Yes.

**DR. NETON:** But it gets to that situation of how you deal with a negative. How do you that people weren't exposed to hot particles? Are you going to default and give everyone a hot

particle dose? These are the kind of issues that --

**MR. ELLIOTT:** Or do we have an indication that certain activities or jobs were more likely to have --

**DR. NETON:** Yeah, it looks like --

**MR. ELLIOTT:** -- found themselves in those circumstances.

**DR. NETON:** -- like the rocket experiment here seems to be a prime candidate for hot particles.

**MR. ELLIOTT:** Yes, we're not necessarily able to capture this level of detail in our CATI interview, especially with survivors. So then do we go forward and ask for medical reports? In many cases you're not going to find those.

**DR. NETON:** You might not have even known you had a hot particle.

**MS. MUNN:** Yeah, it still may not be helpful even if you have the medical report.

**DR. NETON:** I'm pretty sure the GI tract issue will go away from a technical standpoint. I've looked at this and the dosimetry is not that different. The skin

dose, of course, the smaller you make the surface area or activity per unit surface area, the larger the dose. I don't know where we can end up defaulting on that.

**MR. ELLIOTT:** Now in a worker outreach we can ask these kinds of questions, you know, are there activities where splinters were found all the time and people got sent to Medical to get the splinters taken out. We can assist ourselves that way, but it's still not going to be straightforward. We're still going to have to apply it, I think, in a general context rather than in an individual context.

**DR. WADE:** But the tracking issue, Wanda, is an interesting one. I mean, it's possible that this work group could close its work but with the caveat that that is contingent upon how the particle issue is being resolved. I mean, there has to be a way that we keep this alive until it's actually done.

**MS. MUNN:** And that's really my concern is when we can say we're good to go with NTS.

**DR. WADE:** And I would think closing it, if it's on the complex-wide list, I think closing

the review with the caveat that it's contingent upon that issue being resolved, I think is not an unreasonable way for the Board to conduct its business.

**DR. NETON:** That's the approach we took at Bethlehem Steel. It was closed given that NIOSH was going to develop an overarching approach for oro-nasal breathing. But we determined that that was an issue larger than just that one site profile. And this, in fact, is one I hope to be able to present in May at the Board meeting in Denver.

**MS. MUNN:** That would be great.

**DR. MAKHIJANI:** Actually, Jim, for Bethlehem Steel we agreed that oro-nasal breathing wasn't very important to the dose, and so we closed it --

**DR. NETON:** Closed it --

**DR. MAKHIJANI:** -- for that site.

**DR. NETON:** --- for that site, right.

**DR. MAKHIJANI:** But that's not the case here.

**DR. WADE:** On the fifth call I have a sort of a curious agenda item that goes to the completeness of the Board reviews, and that's

part of it where we have to be careful that we don't put something to bed here with the understanding it's going to be dealt with somewhere else and do the same thing there and then wind up without closing the review. So I think we need to talk a little bit about that methodology.

**COMMENT 3: DOSES FROM LARGE PARTICLES TO GI TRACT**

**MR. PRESLEY:** Comment 3 is essentially the same thing, dose from large particles of the GI tract and skin of the workers in early atmospheric testing period. Would this comment not fall under the two?

**MR. ROLFES:** Correct.

**DR. MAKHIJANI:** The only new thing in the response here, Mr. Presley, is in the second sentence in the second paragraph which is historically measurement of hot particles was not conducted at NTS. So that kind of raises this issue we were just talking about. And it says that although insufficient or non-existent hot-particle data from NTS makes dose calculations intractable, any documented hot-particle external exposures can be addressed.

So I think what NIOSH has said here is

kind of making the identification problem very acute. So if there is some, I've heard informally that in the testing program at NTS in contrast to, say, Pacific Proving Grounds, it was not a hot-particle issue, but that's being an informal kind of observation that people say these things. I haven't seen any documentation or measurements or some radiological evaluation. Have you all come across anything like that?

**MR. ROLFES:** Gene, have you seen anything to answer Arjun's inquiry?

**MR. ROLLINS (by Telephone):** As to whether there were surveys for hot particles?

**DR. MAKHIJANI:** Yeah, or any comment that it was in an official or health physics or radiological survey document that, you know, this had happened at PPG, but it's not a problem at NTS. An informal opinion is sometimes offered about that, but I've never seen any documentation to that effect.

**MR. ROLLINS (by Telephone):** I have not either.

**DR. MAKHIJANI:** So I guess this kind of goes back to the earlier problem of how you

identify the workers. So it is in that respect the same as item two.

**MR. ROLLINS (by Telephone):** But kind of on the other hand, we don't have documentation, or I haven't seen documentation that suspects hot particles might be a problem at NTS.

**DR. MAKHIJANI:** Yeah, this is what Jim was saying.

**DR. WADE**: It's a conundrum.

**MR. CLAWSON:** Well, I thought odd in talking about it. You know, they talked earlier about the early propulsion systems and if that was a hot particle problem there because some of the surrounding areas would be closed down during those processes until the buildings could be washed down and so forth like that because of the hot particles.

**DR. MAKHIJANI:** Now that was a documented hot-particle problem. There were measurements made post-reactor tests, and they did quite a lot of studies about that. So I guess you could say the absence of studies in the testing might say something. I don't know how you would argue that, but it's an issue.

**DR. NETON:** Yeah, it's something we're going

to have to deal with. It's almost more of a policy issue than a science issue.

**DR. MAKHIJANI:** Yeah, maybe a policy issue. I agree. If you don't find any documentation, and you had it at Pacific Proving Grounds, then, which is, you know, not exactly the same type of test site obviously, it raises a question for NTS, and then I guess it becomes a policy issue which takes out, maybe, out of our, SC&A's realm.

**DR. WADE:** I think the Board would care about how it was addressed.

**DR. NETON:** I mean, this is post-atmospheric testing we're talking about now, so we're not talking about raining down of the immediate shot. So then one wonders how much, how far you'll be exposed to from the resuspension pathway and possibly in the tunneling and drill backs.

**DR. MAKHIJANI:** In the drill backs is where I'm thinking because that's when you're resuspending significant sized particles, not in the resuspension as in relation to breathing fine particles in the suspension of large particles.

**DR. NETON:** Right, we have to look at that and see. I don't have a feel for that at all right now.

**MS. MUNN:** You must be talking about a very small number of workers.

**MR. PRESLEY:** Yes, yes, very small.

Okay, what I've got on this is it will be addressed in the site-wide report the same as Comment number 2. Is that correct?

(no response)

**COMMENT 4: ORO-NASAL BREATHING**

**MR. PRESLEY:** Go to Comment 4, ingestion. It has to do with reactor testing and the nuclear weapons testing workers for oro-nasal breathing. It says it needs to be evaluated.

**MS. MUNN:** It's one of the overarching issues.

**MR. PRESLEY:** That's what I remember. I've got a note here that says included in the Board's meeting schedule.

**DR. NETON:** It's similar to the ingestion issue where hot particle oro-nasal breathing is being addressed, and that's hopefully the one that's going to come up in May, I hope. We never promise any more but --

**MR. PRESLEY:** We can say that this will be coming up --

**DR. WADE:** Say Jim Neton promised it'd be.

**DR. NETON:** Checks will be in the mail by Christmas, I remember being quoted as saying.

**COMMENT 8: EXTERNAL DOSE DATA FOR 1963-1966**

**MR. PRESLEY:** We've done five, six, seven, eight. There's the external dose data from '63 to '66 not claimant favorable. I've got a notation on this that the TBD will address some guidance to the Chapter Six revision.

**DR. MAKHIJANI:** You've published a revised TBD, right?

**MR. ROLFES:** That's correct. We did update the TBD with a page change revision so that has been addressed and an approved document that's available for dose reconstruction at this time.

**MR. PRESLEY:** Can we say that Response 8 then is complete and off of our table?

**DR. MAKHIJANI:** Mr. Presley, I don't know what the procedure is if NIOSH has completed and the revision of the review are we review that and make sure that the comment was addressed or if the TBD has been published

then a separate action reviewing that is required by the Board. Or I'm not clear what happens in a circumstance like that.

**MR. PRESLEY:** Lew, you got any?

**DR. WADE:** Yeah, I think it's up to the discretion of this work group. I mean, NIOSH was instructed to do something. NIOSH reports it's done that. The work group can (a) take it on faith, (b) review it itself or (c) ask its contractor to review it.

**DR. MAKHIJANI:** Because we, pending instruction from you, we haven't done, and I sent you an e-mail about that I think. We have not done any reviews of changes that have been published pending instruction from the working group.

**MR. ROLFES:** It'd be a simple one to review. It's really just one or two pages.

**DR. MAKHIJANI:** Yeah, I mean, to be formal about what we do I wanted to be --

**DR. WADE:** It's up to the work group.

**MR. PRESLEY:** Do I have a consensus that we need to let SC&A review this and get back with us with their comments?

**MS. MUNN:** Actually, as Mark points out,

it's not that big a thing, but I had expected personally to have time to review both Section Five and Section Six, which have been re-done, and shamefully, have done neither. And so my personal preference would be to have an opportunity to go over those two chapters myself. My feeling is that probably if the issues have been addressed appropriately, then it's difficult for me to evaluate whether they have or have not since I have not read those two chapters which are now available for everybody. They're up on the web, and I just have not read them. Have all the other Board members reviewed them?

**MR. PRESLEY:** No.

**DR. ROESSLER:** You're putting us in a corner.

**DR. WADE:** Don't ask me to join her in the corner.

**MS. MUNN:** Welcome to my corner.

**MR. PRESLEY:** I'm with you in the corner, too. At this point I would suggest that we let SC&A review this, get back to us with their comments.

**DR. MAURO:** It sounds like the issue was

that external doses from ’63 to ’66 were not, basically, are being reconstructed using 1967 data. And our concern was can they do that. I guess you folks have answered that, yes, you can. Can you just give us a quick, 30-second sound bite on the strategy?

**MR. ROLFES:** Sure. Yes, I will refer to the change that we made in the Technical Basis Document. We received a master dosimetry gamma dose sheet for individuals monitored from 1945 so there were some individuals that were at the Trinity site, but beginning in 1951, these would have included the people at Nevada Test Site all the way up, I believe we have, this sheet just has through ’83, but I believe we do have more recent dose information.

What we did, we were able to get information on the number of people that were monitored at Nevada Test Site, and the number of people that fell into various dose categories and had doses between one and 50 millirem, 50 to 100 millirem, 100 to 150 millirem and on up all the way from 7,500 millirem up to 10,000 millirem. So we have

incorporated this into the Technical Basis Document I believe.

Is that correct, Gene? I want to make sure that I'm referring to the correct thing that we incorporated this master dosimetry table that we received for assigning unmonitored doses for 1963 through 1966.

**MR. ROLLINS (by Telephone):** Yes, that has been incorporated.

**MR. ROLFES:** Okay.

**DR. MAURO:** So let me see if I understand. You do have dosimetry data from '63 to '66 upon which to do dose reconstructions or at least build a coworker model --

**MR. ROLFES:** Correct.

**DR. MAURO:** -- for those who weren't monitored from '63 to '66.

**MR. ROLFES:** Correct.

**DR. MAURO:** And the data is in your amendment.

**MR. ROLFES:** Yes, that's correct.

**DR. MAURO:** So I can look at that. It's easy.

**COMMENT 9: ENVIRONMENTAL EXTERNAL DOSE DATA FOR 1968-1976**

**MR. PRESLEY:** Comment 9, and it's the same response as Comment 8. It has to do with the environmental external dose '68 to '76. Anybody have any problems with what we have there to be taken care of in Response 8?

**MR. ROLFES:** Same issue, same response.

**MR. CLAWSON:** Let me ask one question. When you do a change to the TBD like that, you change the one on the web, right?

**MR. ROLFES:** Yes, that's correct. The one on the web will have an indication that there's a page change revision, and it'll have the date that the revision was made.

**MR. CLAWSON:** Okay, so I need to keep updating my TBDs because I'm just looking at mine, and it's a year or so old there. That's what I need --

**MS. MUNN:** You also have to look under NTS.

**MR. ROLFES:** There's a lot of information out there. It's overwhelming.

**DR. MAKHIJANI:** As a reviewer let me say that it's very helpful when you revise something that in the beginning of the revised document you have a notation of the changes that have been made, the sections and if there

are specific changes. That's very helpful. Or if the whole document has been changed, then you need, then you know you've got to go through the whole thing again. But otherwise it really is very efficient to know what to review the second time around. Thank you.

**MS. MUNN:** Mark in the margins.

**COMMENT 10: PRE-1963 EXTERNAL ENVIRONMENTAL DOSE**

**MR. PRESLEY:** Comment 10. It has to do with pre-'63 external environmental dose relating to unmonitored workers. And again, that has been addressed or will be addressed in the TBD.

**MR. ROLFES:** Correct. And this will be addressed by the Comments 8 and 9. Our response is the same information will be used, the master dosimetry gamma dose table that we've incorporated into the Technical Basis Document.

**MR. PRESLEY:** Pardon me. I want to make sure I get the right response on here.

**COMMENT 11: CORRECTION FACTORS**

Comment 11, correction factor for the external environmental dose, and that also has to do with the TBD review.

**MR. ROLFES:** Yes, that's correct. I'll give a brief description and then let Gene make comments if necessary.

We did evaluate, this was an issue about correction factors for external dose from environmental contamination. There was a concern that correction factors needed to be developed specific to these unique geometries associated with contamination disbursed in the soils. It was more of a geometrical correction I believe.

But what we did, we did go through and evaluate various correction factors and found that these were typically less than what we are currently using in our Technical Basis Document. So we didn't feel that it would be appropriate to reduce the dose that we're assigning based on these new numbers that we had developed. Everything was pretty much close to unit, roughly one, a dose conversion factor of one.

Is that a correct description of what we did, Gene?

**MR. ROLLINS (by Telephone):** I think you captured it, Mark.

**MR. ROLFES:** Okay. So we did evaluate these numbers and come up with new dose conversion factors that could be used. However, many of them were less than one so we didn't think it was appropriate to use a lower number than what we already had.

**DR. MAKHIJANI:** I had two questions about this response, one of which was -- what, are you done with the whole thing or just the first part of that?

**MR. ROLFES:** No, I'm finished. Go ahead.

**DR. MAKHIJANI:** Referring to the second paragraph, the energy ranges, I understand the minimum and maximum assumptions, but you don't, say, give any guidance for best case estimates there.

**MR. ROLFES:** Gene, for, well, I take that back, when minimizing or providing a best estimate --

**DR. MAKHIJANI:** Oh, or providing, sorry.

**MR. ROLFES:** -- the photon energy range assumption is 25 percent, 30 to 250 and 75 percent greater than 250 keV. And this was already added into the TBD.

**DR. MAKHIJANI:** And there is a technical

basis for that in the TBD?

**MR. ROLFES:** Gene, do we have measured data for the 25/75 split?

**MR. ROLLINS (by Telephone):** Yes, if you go to Attachment B. We did an evaluation of Table B-1 in the revision.

**DR. MAKHIJANI:** Oh, B as in boy?

**MR. ROLLINS (by Telephone):** B as in bravo.

**DR. MAKHIJANI:** Okay. Is this in the same set of revisions as Comment 8, 9, 10 or in a different set of revisions?

**MR. ROLFES:** Let me refer back to this.

Gene, was this incorporated into the approved Technical Basis Document with the dose table with the recorded gamma dose table? I'm not certain. I don't --

**MR. ROLLINS (by Telephone):** I'm not sure what you're asking, but I'm sitting here looking at the approved revision. Are we still talking about energy ranges?

**MR. ROLFES:** Yes, that's correct.

**MR. ROLLINS (by Telephone):** That's in the revision.

**MR. ROLFES:** Okay, great. So SC&A can verify that it's in there.

**DR. MAKHIJANI:** We can just look at it.

**MS. MUNN:** I must be looking at the wrong thing.

**MR. ROLLINS (by Telephone):** Actually, it occurs on page 94 of 113.

**MR. ROLFES:** Okay, so we have addressed that as well. That's in the approved Technical Basis Document that was recently put out with the page change.

**DR. MAKHIJANI:** All right. And then the last question is I guess it says TBD work completed, but I guess this still remains to be done? Oh, workers job category job matrices added, but the correction factors haven't been developed. Is that right?

**MR. ROLFES:** We did evaluate the correction factors, and we determined that they were roughly unity or less than unity.

**DR. MAKHIJANI:** Including for the geometry of exposure from --

**MR. ROLFES:** That's correct, for environmental contamination, that's correct. We didn't want to lower the dose estimates any more than necessary. It didn't add much to the Technical Basis Document. There was a lot

of volume and there wasn't really any significant change.

**DR. MAURO:** Does SC&A have an action item on this in terms of checking --

**DR. MAKHIJANI:** It's all the same I think. All in the same revisions.

**COMMENT 12: RADON DOSES IN G-TUNNEL**

**MR. PRESLEY:** Comment 12, radon dose in G-tunnel. It also has to do with the Gravel Gertie radon dose. They are not discussed, could be substantial. That is also to be reviewed in Chapter Four of the TBD.

**MR. ROLFES:** And we did speak with some people from Nevada Test Site, and we did determine that they did not routinely use the Gravel Gerties at Nevada Test Site. They were limited to the tests for the design of the Gravel Gertie back in 1957.

And they basically had put some high explosives into it, into the Gravel Gerties to determine whether they would be able to contain any radioactivity with an explosion or detonation of high explosives. We haven't found any indications that there was continual occupants of the Gravel Gerties. But if we do

in the future find someone that did routinely work in Gravel Gerties, then at the time we could assign the radon intakes.

**MR. CLAWSON:** What about G-tunnel?

**MR. ROLFES:** The G-tunnel? Radon intakes, I do believe we have updated the information.

Gene, could you --

**MR. ROLLINS (by Telephone):** Yes, yes, yes, there was a -- I went back and you were correct. It wasn't claimant favorable the way it had originally been constructed. So I had gone back and revised the wording so that we'll be using the G-tunnel concentrations, the higher concentrations.

**MR. CLAWSON:** Okay, so that's going to be a part of the review that SC&A, it's the same chapter --

**DR. MAKHIJANI:** Isn't this, Brad, I don't think this would need any review because there's already a specific recommendation on our part as to what they should do. So I think it has been done. I mean, we could go back and read the page, but I don't think there's any new technical review to be done because what's done is part of the review

already.

**MS. MUNN:** I believe that one's complete.

**MR. ROLFES:** Okay, great.

**MR. CLAWSON:** So number twelve would be complete? I'm filling in for Bob for a second here by the way.

**DR. ROESSLER:** Why don't you call for a lunch break, Brad?

**MR. CLAWSON:** I don't think it's lunchtime right yet.

**DR. WADE:** It's five of 12:00.

**MR. CLAWSON:** Oh, is it?

**DR. WADE:** You can do that. You've got the authority.

**MR. CLAWSON:** Why don't we break for lunch then. Let's go to a lunch break here then and Bob can pick up --

**DR. WADE:** Back at 1:00?

**MR. CLAWSON:** Back at 1:00.

**DR. WADE:** Okay, we're going to go to lunch. We're going to be back at 1:00. We're going to break the contact with the line and then call back in when we get back here. Okay, enjoy your lunch.

(Whereupon a lunch break was taken from

11:55 a.m. until 1:10 p.m.)

**DR. WADE:** Okay, we're going to go back to our deliberations. I guess I would only ask if there are any members of the Board joining us by telephone, I'd like them to identify themselves. Any members of the Board?

Okay, someone's speaking. We can hear you. I don't think you realize we can hear you. Someone is speaking about contract value, and we can hear you. There's somebody out there who's having a discussion about contract value and billing, and we can hear you. Hello?

(no response)

**MS. MUNN:** They must not care.

**DR. WADE:** Well, we can't hear it. Let's begin.

**MR. PRESLEY:** We stopped at 12; we finished with 12. Let's start with Comment 13.

**DR. WADE:** Just a brief report on Brad's leadership. He completed an item, and he called for lunch. Very well done.

**MR. PRESLEY:** He did a good job. Number 12 is completed.

**DR. WADE:** Let the record show.

**COMMENT 13: ENVIRONMENTAL DOSES DUE TO I-131 VENTING**

**MR. PRESLEY:** Number 13, Comment 13 has to do with the environmental dose due to venting, needs to be taken into account non-monitored workers. Again, this is an item which the TBD has addressed in Chapter Five revision. Does anybody have any comments one way or the other on this?

**DR. MAKHIJANI:** I guess as I read it, it hasn't been done yet?

**MR. ROLFES:** Well, Cheryl, are you on the line?

(no response)

**MR. ROLFES:** Gene or Cheryl?

**MR. ROLLINS (by Telephone):** Yes, I'm on the line, Mark.

**MR. ROLFES:** I'm going to see if we can, I believe Cheryl had gone through some calculations for our bounding environmental intake scenario, and that bounding scenario was the Baneberry venting. And I believe she was putting together some calculations in a white paper or in some spreadsheets.

**MR. ROLLINS (by Telephone):** I have those. I can speak to those.

**MR. ROLFES:** Okay, great.

**MR. ROLLINS (by Telephone):** Let me get my papers straightened out here. What we did was to go back and look at the actual measured concentrations of iodine that occurred after several of the ventings. And the highest one that was measured was from the Baneberry event, and it was measured on the plume center line a few hours after the event. But we corrected, actually, a few days after the event, but we corrected -- no, no, no.

We did decay corrections, but the highest concentration that was measured that someone theoretically could have been exposed to was 1.85 ten to the minus 12 microcuries per cc at Camp 12. And what we did was postulate a two-hour exposure to that concentration. And the doses are very small to the thyroid, actually less than a millirem. So we don't deem that to be important to dose reconstruction, the worst case scenario.

**DR. MAKHIJANI:** Are these calculations incorporated or, I guess they're not incorporated in the TBD.

**MR. ROLFES:** They haven't been incorporated

into an approved version of the TBD, but the draft calculations have been completed. I don't believe they've been provided to anyone other than internally within ORAU and NIOSH right now. This is one of those things that we will be incorporating into the approved document when it's --

**DR. MAKHIJANI:** Did you look at the other iodine, short-lived --

**MR. ROLLINS (by Telephone):** Yes.

**MS. MUNN:** He looked at 131, 32 and 33 and 35.

**MR. ROLLINS (by Telephone):** Yes, we have methods to handle those, and they have been included in the calculations. All of them added together I should say resulted in less than a millirem of a dose to the thyroid for a two-hour exposure to the maximum concentration.

**MS. MUNN:** I read some of that in the Chapter Five revision that's already out.

**DR. MAURO:** Excuse me, where is Area 12 in relative to where the release occurred?

**MR. ROLLINS (by Telephone):** It's Camp 12.

**DR. MAURO:** Area 12, Camp -- okay.

**MR. PRESLEY:** It's up on the mesa.

**DR. MAKHIJANI:** Is that where the people were caught in the plume? There were a bunch of workers at Baneberry who were caught in the plume.

**MR. ROLLINS (by Telephone):** I can't speak to that.

**MR. PRESLEY:** I can't either.

**DR. MAURO:** The question becomes is that where the people are? If that's not the case, that's the case.

**DR. MAKHIJANI:** I thought that must be where the --

**MR. ROLLINS (by Telephone):** Let me make this comment. Let me make this comment. As we all know, atmospheric conditions were closely monitored. Of course, they didn't expect a loss of containment at Baneberry, but they typically waited until atmospheric conditions were favorable so that anything that might be released would not be blowing towards populated areas. So although I don't know this to be a fact, it seems to me that what they tried to do here was measure center line concentrations which may or may not have

been where people were expected to be.

**DR. MAKHIJANI:** Yeah, I mean, Baneberry was obviously an unplanned venting, and as I understand it there was a group of several dozen workers who were caught in the plume inadvertently, of course. And so that's why the question is were the doses evaluated for them. Obviously, that was shortly after the venting. I don't remember the time.

**MR. ROLLINS (by Telephone):** I'm speaking from memory now, but it seems to me that I have seen one or two of those cases -- well, I better not say, but it seems to me I remember seeing bioassay results on those individuals. But I can't say for certain.

**MS. MUNN:** That was going to be my next question. Wouldn't that have been known?

**MR. ROLLINS (by Telephone):** Typically, those people that were involved in that type of incident would have been --

**MS. MUNN:** I would think that --

**DR. MAKHIJANI:** It's quite possible. I don't remember actually. We raised that as a question in the review, and I can tell you what we said. Baneberry test in December 1970

was the last unplanned venting. TBD has not specified any approach to estimating external environmental dose during those years.

**MR. ROLFES:** Okay, external?

**DR. MAKHIJANI:** That's this particular finding. I mean, we have a number of places where we mention Baneberry.

**MR. ROLFES:** The external doses would obviously be recorded by a person's film badge. And if a person were hypothetically unmonitored in that area, we have coworker information now. We have the gamma dose table that we referred to earlier that we could also use as well.

**MR. ROLLINS (by Telephone):** There should be no one unmonitored externally.

**DR. MAKHIJANI:** I guess we also had raised an internal question. Oh, yes, here it is. Area 12 Camp personnel who were decontamination -- they had decontamination showers -- personnel were instructed to provide urine samples. So okay, they did have urine samples.

**MS. MUNN:** And then they recorded what the limits of detection for both urine and fecal

analysis were.

**DR. MAKHIJANI:** So I guess that's why we raised that external dose.

**MR. ROLFES:** Okay, so I think the bottom line is that we need to incorporate just some of our bounding calculation or a description of the bounding scenario for exposures to radio-iodines associated with venting from Baneberry, and that will result. Does that sound correct?

**MR. PRESLEY:** Yes.

**DR. WADE:** You'll do that and then the work group can decide if they want SC&A to --

**MR. PRESLEY:** Fourteen.

**MR. ROLLINS (by Telephone):** And is that the decision that we'll include a summary of this discussion in the TBD?

**DR. MAKHIJANI:** No, I was understanding you'll include your calculation, not this discussion.

**MR. ROLFES:** Okay, would the Advisory Board like for us to show a sample calculation --

**MR. PRESLEY:** Yes, I think so.

**MR. ROLFES:** -- in the TBD? Okay.

**MR. ROLLINS (by Telephone):** This is Gene

Rollins again. I'm trying to understand if the Board is asking that sample calculations be put into the Technical Basis Document.

**MR. PRESLEY:** One, Gene.

**MS. MUNN:** A single example, Gene.

**MR. PRESLEY:** Did you get that?

**MR. ROLLINS (by Telephone):** Okay.

**COMMENT 14: INTERNAL DOSE FOR PRE-1967**

**MR. PRESLEY:** We'll move on to 14. There are no internal monitoring data available until 1955 or '56, some plutonium from then, some tritium from '58, plutonium, tritium, mixed fission products from '61, and full radionuclide coverage established in 1967. It says that the TBD does not provide sufficient evidence for estimating internal dose for the pre-'67 period for many radionuclides. And SC&A has said that once the mass-loading model is approved that we as a working group would get this back for comment.

Is that correct, Mark?

**MR. ROLFES:** Yeah, this issue can be resolved by the mass-loading model as well. So when we get that reviewed by the Advisory Board and SC&A, we'll incorporate that into

the Technical Basis Document. We feel that will address this issue.

**DR. MAKHIJANI:** Well, I didn't understand that actually because the internal doses for the tunnel workers -- so the atmospheric testing thing is resolved by the SEC.

**MR. ROLFES:** Yes, correct.

**DR. MAKHIJANI:** The internal doses for the tunnel workers are more than resuspension doses, correct?

**MR. ROLFES:** Uh-huh, uh-huh.

**DR. MAKHIJANI:** Because you would be going in and working in a contaminated environment and exposed to tritium, for example, or a number of other radionuclides. And I don't see how resolution of Comment 5 covers the internal exposure, which is an environmental dose, it covers the internal exposures for the workers in tunnels.

**MR. ROLFES:** All right. We typically see for people that are entering -- I'm sorry, entering tunnels, we do typically see those are the people that are typically bioassayed. Those were obviously the people that were in higher exposure categories, both from external

dose as well as internal dose. And we typically see higher recorded results or more frequent positive doses for bioassay sampling with those people.

Gene, do you have anything to add about the tunnel re-entry workers during this time period? Is my explanation an accurate one?

**MR. ROLLINS (by Telephone):** The individual that was talking was breaking up a little bit, and we have several issues related to tunnel re-entry, but could you please restate what the concern is?

**MR. ROLFES:** There's a concern about unmonitored intakes, I guess, with the tunnel re-entry workers, and my explanation was that we typically see a larger portion of these employees participating in a bioassay program.

**MR. ROLLINS (by Telephone):** That's correct.

**MR. ROLFES:** So these are the people that were in radiation zones that were, that had the potential for higher internal exposures, and hence, they were the ones that were monitored.

**MR. ROLLINS (by Telephone):** That's correct.

The security officers and the radiation workers.

**DR. MAKHIJANI:** Well, the specific content, you know, as you look at the periods into which the comment is divided, it was that there wasn't a full radionuclide coverage for the monitored people. So this comment was directed only partly at the non-monitoring which has been resolved by the atmospheric testing SEC.

But for the underground testing it was directed not at non-monitoring but partial monitoring because there wasn't full radionuclide coverage until 1967. So the thing, I guess, that I was looking for was what's the guidance for converting, say, mixed fission product results which might be available to, into a dose.

**MR. ROLFES:** Gene, correct me if I'm wrong, but in those cases where we have a person that was, say, bioassayed for gross fission products, I believe it's our policy to use one of the most claimant favorable or the radionuclide that results in the highest dose --

**MR. ROLLINS (by Telephone):** That's correct.

**MR. ROLFES:** -- of the potential radionuclides that might be encountered.

**MR. ROLLINS (by Telephone):** That's correct, and the same is for gross alpha.

**DR. MAKHIJANI:** So I guess that's guidance that, I guess that's the thing that, that was the reason for the comment.

**MR. ROLFES:** Okay, great.

**DR. MAKHIJANI:** Is there some rule for what you do?

**MR. ROLFES:** Yes, I do believe we have a description of that in the TBD.

Gene, do we have directions to the dose reconstructor for --

**MR. ROLLINS (by Telephone):** We have those written in a document called "Approach to NTS Dose Reconstruction". It's my understanding that that text was going to be included in the next revision of the TBD.

**MR. ROLFES:** Okay, great.

**MR. ROLLINS (by Telephone):** And it basically provides instructions as to what the dose reconstructor should do when they come upon gross beta, gross gamma, gross alpha.

And we see that quite frequently at NTS, but we do have instructions, claimant favorable instructions as to how to handle those types of analyses.

**DR. MAKHIJANI:** Okay, and we haven't reviewed this, this is a separate document that we haven't reviewed.

**MS. MUNN:** I think that's correct. But also much of this information is contained in Section Five of this new revision to the TBD that we discussed earlier that I haven't had an opportunity to review myself.

**DR. MAKHIJANI:** I think Gene said that it's not in Section Five as yet. Did I understand that?

**MR. ROLFES:** Correct. He said it's --

**MS. MUNN:** It's not.

**MR. ROLFES:** -- like a dose reconstructors' guidance document.

**MS. MUNN:** That's a different document.

**MR. PRESLEY:** Yeah, it's a totally different document.

**DR. WADE:** Will that be included in the --

**MR. ROLFES:** Yes, it will be included in the revised Technical Basis Document.

Correct, Gene?

**MR. ROLLINS (by Telephone):** Yes, that's correct.

**DR. WADE:** So the Technical Basis Document will be revised to include these instructions.

**MR. ROLFES:** Yes.

**DR. WADE:** At which case the Board can review and ask SC&A if it wishes to --

**MR. PRESLEY:** Okay.

**MS. MUNN:** Do you have any idea of when? Are we almost down to that?

**MR. ROLFES:** Gene, how do we stand as far as the timing --

**MR. ROLLINS (by Telephone):** I think we were looking, the revision to Chapter Five is imminent. We have it mostly ready to go. It should not be very much delay from here.

**MS. MUNN:** So that will include the workbook instructions?

**MR. ROLLINS (by Telephone):** That's correct.

**MS. MUNN:** Thank you.

**MR. ROLFES:** As we've been discussing already, I know that we do want to wait until we get a couple of comments from SC&A before we do approve the Technical Basis Document so

that we don't have to go back and change an approved document once again. So we'd like to get as much done as possible before we approve a new document rather than going back and having to re-review it, update it and approve it again.

**MS. MUNN:** Good.

**COMMENT 15: BLAST WAVE**

**MR. PRESLEY:** Comment 15 has to do with resuspension of radionuclides by the blast wave. Again, our response has to do with Comment 14, and I presume this is going to be, fit into the work going into Chapter Five of the TBD on this.

**MR. ROLFES:** Yes, and we've indicated that the work is completed, and I think it's --

Gene, I can't recall. Has this been, is this in an approved Technical Basis Document, our response to the resuspension of radionuclides by the blast wave?

**MR. ROLLINS (by Telephone):** The resuspension by blast wave we're back into the atmospheric time period.

**DR. MAKHIJANI:** This is no more an issue.

**DR. MAURO:** I do have a question. We're at

an interesting confluence of the 250 workday issue and the site profile. I know that as part of the 250 workday issue where this is an issue. And one of the things that's happening is I believe NIOSH is looking into the new DTRA methodologies for estimating intakes. And that's part of the process that's going on right now with regard to the 250 workday issue. Now does that have any, I mean, is there a place where these two come together now all of a sudden? No. So the answer is no. So for the purpose of the site profile what I'm hearing is the issues related to exposures during above ground testing are just, even though their --

**DR. MAKHIJANI:** Internal, internal dose.

**DR. MAURO:** Just internal dose, right, are completely off the table. I just want to make sure I understand that.

**DR. MAKHIJANI:** Well, Mr. Presley, that would be my understanding that if there's anything we covered in the 250 day, and we copy everything we do in regard to the Nevada Test Site to this working group. I mean, those, as I understand it, are our

instructions.

**MS. MUNN:** That's what I thought they were going to do.

**MR. PRESLEY:** So we can mark this complete, not an issue.

**DR. MAKHIJANI:** Yeah, I think that's right.

**MR. PRESLEY:** Okay, now, what about 16 then?

**DR. MAKHIJANI:** It's the same thing.

**MR. PRESLEY:** And it's the same thing on that one. So we can mark this?

Eighteen.

**DR. MAKHIJANI:** Seventeen.

**MR. PRESLEY:** I'm sorry.

**MS. MUNN:** That was, the TIB's 18.

**COMMENT 17: INGESTION DOSES**

**MR. PRESLEY:** I'm sorry, missed a header. Investigate doses needed to better evaluate findings 11, 12, issues 5.5.6 and 5.6.5. And again, we go back to the mass-loading model.

**MS. MUNN:** We have or have not revised OTIB-18?

**MR. ROLFES:** We have a --

**MR. ROLLINS (by Telephone):** OTIB-18 did not need a revision. OTIB-18 contains a 20 percent addition for ingestion pathways.

**DR. MAURO:** John, maybe I can help out a little bit. OTIB-18 is a default method to reconstruct inhalation doses based on the maximum permissible concentrations that were in effect at the time, and the expectation that there was a health physics program in place. So basically it's a default way to come up with a what we consider to be a realistic upper bound on the inhalation exposures.

Now it was also included doses, okay, once you have an idea of what the inhalation exposures might have been, you could estimate what the ingestion dose is by a rule of thumb whereby if the rule of thumb is saying that the ingestion doses are 20 percent of the inhalation doses.

And that's based on certain assumptions that I believe are being revisited, mainly, inherent in that relationship is assumptions regarding the deposition velocity of airborne particulates from the air onto surfaces and the fraction of the material that might be on surfaces that's inadvertently ingested. I believe that that

approach, we'll call the 20 percent rule, that has been widely used and is continuing to be used is being revisited.

Jim is here. He can probably help us out a bit. I don't know if anyone else is familiar. I know it was revisited on behalf of Bethlehem Steel. Whether or not it's being revisited on a more broad basis and a different strategy being applied for deriving ingestion doses, I guess that's the question.

The response here I believe is that you are adopting what I call the 20 percent rule, and that's what you can plan to use. And that's fine, but our understanding is that approach is being revisited, and whether or not you're going to revise it for this application also is the question. It was revised at Bethlehem Steel, but maybe you feel that it doesn't need to be revised here because it's a different setting. I guess we'd like to hear a little bit more about that.

**MR. PRESLEY:** Well, we've got a note in here that says that this activity is contingent on the resolution of Comment 5.

**DR. MAURO:** Oh, I didn't see that.

**MR. PRESLEY:** And I'm just wondering if that's not one of --

**MS. MUNN:** Well, my understanding from the Bethlehem Steel discussion was that this OTIB, this particular issue, was one of the overarching issues. And because Bethlehem Steel certainly is not the only place where deposition is an issue.

**DR. MAURO:** And they came up with a fix. Okay, so then what I'm hearing is that this aspect of the -- is filled, that aspect, the ingestion portion, really is going to wait until there is a facility-wide approach for dealing with ingestion?

**DR. MAKHIJANI:** At this time I don't think so.

**DR. MAURO:** I'm not sure.

**DR. MAKHIJANI:** As I remember -- this is also from long-time memory, but there was, because Bethlehem Steel had rolling only, part of the time there was an ad hoc model developed for that that accounted for mixtures of non-radioactive, increasing mixtures of non-radioactive and radioactive dust.

**MS. MUNN:** Very short periods of time.

**DR. MAKHIJANI:** Yes, so the pure uranium was only once a month or twice a month, whatever the rolling was.

**DR. MAURO:** That was part of it, but there was a more fundamental part which established an empirical relationship between what's on the surface and what's ingested. And it's an empirical relationship which basically replaced the other method which started from, what's in the air, the original, if you know what the dust loading in the air is, we'll assume it's five micron AMAB and will fall at a rate of .000. I remember the number, 7 5 meters per second, and you somehow could get to what's on the surface.

**MS. MUNN:** That was to come from this.

**DR. MAURO:** Yeah, so what I'm getting at is there is a, in my opinion, you've come up with a very sound approach. NIOSH has come up with a very sound approach based on empirical information. If you know what's on the surface, you could predict what might be ingested which divorces itself from what's in the air which is good.

Now my question is, is that, right now OTIB-18 doesn't do that. In other words OTIB-18 still has the old method imbedded.

**DR. MAKHIJANI:** I think so.

**DR. MAURO:** Yeah, so I guess that's my question to NIOSH whether or not there's any consideration to revisit that aspect of OTIB-18 as it pertains to ingestion.

**MR. ROLFES:** At this time I don't think there is. If we have indication that ingestion was a larger player in internal doses, then I think it would be appropriate at that time to consider higher ingestion doses or higher ingestion intakes. I haven't seen any indication of ingestion being a great concern. Typically, for internal dose reconstructions inhalation is the most important pathway and ingestion is a fraction of the internal dose concern in comparison to inhalation.

**MR. ROLLINS (by Telephone):** This is Gene Rollins. A question for John.

John, were you involved, we had these similar discussions for SRS.

**DR. MAURO:** I'm not sure. We have had this

discussion before on other sites. I'm not sure whether it was SRS.

**DR. MAKHIJANI:** Nevada Test Site is a little bit particular because of ingestion dose would be highly time dependent.

**MR. ROLLINS (by Telephone):** I'm sorry, I didn't --

**DR. MAKHIJANI:** Because ingestion doses would be highly time dependent, and you could have other than hot-particle doses, you could still have GI tract doses and so on that are very different than what you would, say, get in a place like Rocky Flats or Fernald or Y-12.

**MR. ROLFES:** I would agree that the ingestion doses might be important during like an atmospheric weapons test period when a person would be exposed to some of the short-lived fission products.

**DR. MAKHIJANI:** How about re-entry?

**MR. ROLFES:** Okay, that could be an issue, but for the majority of the claims that we're seeing I don't believe that the ingestion pathway is that significant. I really don't see that many people being exposed to fresh

fission products where it would be an over, there's not very many scenarios that I've seen that ingestion intakes and the internal doses resulting from those ingestion intakes would exceed that which we're assigning from inhalation pathways.

**MR. ROLLINS (by Telephone):** This is Gene Rollins again. I think the example that we did for Savannah River if I can remember it was we basically had someone standing on contaminated soil. We used the EPA typical ingestion, soil ingestion, and with the dose conversion factors, the calculation that we ran out showed that ingestion would typically be only one percent of the dose that you would expect from inhalation.

**DR. MAURO:** I'm not disagreeing with you at all that ingestion is going to be a small contributor compared to inhalation. All I'm saying is the fundamental model that is currently in the OTIBs and many of the site profiles uses the .2 rule of thumb, not the approach that you just described, for example. But I think that in other words you'd basically be adopting something like 50 to 100

milligrams per day as a default ingestion rate which is an EPA number. But even that, as Jim has pointed out, has some deficiencies. All I'm saying is that I think that the -- it's really a question -- I believe that the ingestion point portion of OTIB-18 that's referred to here in your response, I believe that approach is no longer being used, or the intention is to no longer use that. It may still be being used in carryover because it has a certain amount of inertia, but I believe that NIOSH -- and this is really a question for NIOSH -- is there going to be a general change in approach for ingestion?

**MS. MUNN:** That gets back to my original question. Have we made any revision to OTIB-18? Because there's been discussion about incorporating an entirely different approach. If we have not, then it seems to me this work group has to decide whether or not we would recommend that revision or whether we would recommend that NIOSH incorporate words in the TBD that Mark just gave us that justifies the utilization of the current process.

**MR. ROLFES:** It sounds to me like it's more

of a TIB-18 issue than a Nevada Test Site issue, and that's, if the Advisory Board thinks it's appropriate to review TIB-18 and the methodology used to assign ingestion intakes in TIB-18 that can be reviewed. But and then at that time we can apply it to intakes for Nevada Test Site, but I don't see that that being a site-specific or a site profile issue right now.

**MR. PRESLEY:** Well, that's more of a general issue.

**DR. MAURO:** OTIB-18 is on the agenda for as one of the procedures that will be, we didn't review it as part of our last round of, in our procedure reviews. So it's sitting on the shelf, on your shelf, but we have not yet had an opportunity to have a working group work that particular set of procedures. And I'd like to add that OTIB-18 is going to be a very interesting one where there's going to be a lot to talk about because it's come up time and again.

**MR. CLAWSON:** I thought this was kind of part of the overarching issue.

**DR. MAURO:** It is an overarching issue.

**MS. MUNN:** That puts us back in the same area we brought up this morning.

**MR. CLAWSON:** That's why we brought up OTIB-18 to be reviewed by SC&A after it being completed.

**DR. MAKHIJANI:** In the review -- I'm just going back to see where these matrix entries came from in our review. And on page 47 there's finding 11 on soil ingestion pathways in which we affirm for the most part what Mark and Gene have been saying is right, but for the higher actinide plutonium and so on, your uptake from the gut is so small that inhalation will dominate the dose.

But because you have a mix of radionuclides not confined to higher actinide, some radionuclides could have greater bio-availability from the gut. And in those cases it's a competition whether inhalation would dominate or ingestion would dominate.

And I think, I mean, the comment is in the context that there may be a crossover for some radionuclides, not higher actinides, that needs to be evaluated. And so as I said there is a site-specific aspect to the Test Site for

the ingestion comment because of that problem.

Because normally you wouldn't see ingestion dominating, but we raised the question that in the case of some radionuclides, it may dominate. We didn't do the calculations.

**MR. ROLFES:** I'm trying to picture a scenario when ingestion might be a larger contributor, and I can't think of anything other than during like an atmospheric testing time period.

**DR. MAKHIJANI:** Cesium.

**MR. ROLFES:** Cesium, okay.

**DR. BEHLING:** The only thing it doesn't have to be metabolically significant. For instance, in the case, and I did a lot of dose reconstructions in the Marshall Islands. The bulk of the GI tract dose was due to the simple passage of the bolus as opposed to the metabolic uptake. So you have to be careful. It doesn't have to be soluble as long as it's there and doing, and usually it's the colon or rectum that is the limiting tissue, the epithelial tissue. So it doesn't have to be metabolically taken up to deliver a GI tract

dose.

**DR. MAURO:** For a GI tract cancer, this might be a limiting pathway.

**DR. BEHLING:** And also we would raise the question about the relationship between inhalation dose because if the pathway is one of simple transfer, you can have radioactivity on the table here, and without resuspension or dust loading, the intake from transfer from surfaces to your mouth has nothing to do with the air. And so the blanket assumption of the 20 percent value has no relationship to transfer from surface contamination to airborne inhalation. There's no connection really.

**DR. MAURO:** I think that's what we're saying is that I think it's been accepted that there are circumstances under which the 20 percent rule doesn't work. And when that happens --

**DR. MAKHIJANI:** We did that for Bethlehem Steel.

**DR. MAURO:** And we did that there, and there are other places. This might be one of them. In my opinion I think we would be best served to deal with this when we get to OTIB-18.

This is going to apply across the board to everything.

**DR. MAKHIJANI:** Including GI tract for these specific --

**DR. BEHLING:** Especially if you talk about neptunium which has a 2.6 day half-life. It'll have no metabolic value because it's too short-lived. Usually the bolus will have a transit time to the GI tract of about 48 hours which is already approaching the half-life of neptunium. So you have to be careful in not excluding non-metabolic active nuclides.

**MS. MUNN:** Hans, do I hear you saying that the in vitro information data that we have then is --

**DR. BEHLING:** Yeah, you won't measure, for instance, if the material isn't taken up, a subsequent whole body count days later will not reveal anything that's already been excreted. And so --

**MS. MUNN:** I'm thinking about fecal samples and urine samples. But even though you passed the half-life, you still have detectable quantities there. So it seems to me that perhaps what we're discussing may be a little

bit academic if you have in vitro analyses.

**DR. MAURO:** There's empirical data that establishes the robust relationship between what's on surfaces and what's ingested. And that's been documented. Jim's documented it. And I think it probably applies here.

**DR. BEHLING:** In vitro if you incorporate urinalysis, you will not see. So for urinalysis to be indicative of an uptake, you have to decide what has to be metabolized. In fecal samples the only other option for in vivo analysis that would reveal a transitory exposure that is not metabolically involved.

**MR. ROLFES:** When you're referring to cesium, you had mentioned cesium would be one of those contributors for ingestion of --

**DR. MAKHIJANI:** Cesium would be taken up.

**MR. ROLFES:** That's exactly the point --

**DR. MAKHIJANI:** You're talking about things that pass through.

**DR. BEHLING:** Yeah.

**DR. MAKHIJANI:** This may be more important.

**DR. BEHLING:** Especially when you're talking about oxides of, high temperature oxides that are inside of a definition, the transuranics,

and so forth, but cesium would be a marginal one anyway.

**MR. PRESLEY:** Can we go ahead and say then that we're going to wait on OTIB-18 review to discuss this? Because right now I don't see us going anywhere.

**DR. MAKHIJANI:** Well, OTIB-18 has to be revised before it can be reviewed. I think.

**MR. PRESLEY:** John's going to have a -- OTIB-18.

**DR. MAURO:** And this is part of the concern. So eventually we're going to get there. But maybe that's the best place to do it.

**DR. WADE:** There is a work group that, well, Wanda's the Chair on Procedures Review, so that --

**DR. MAURO:** We're going to get there.

**DR. WADE:** -- your review of OTIB-18 should come before that work group.

**MR. PRESLEY:** What I've got here is awaiting OTIB-18 review on this subject.

**COMMENT 18: ORAUT-OTIB-0002**

Recommended use of OTIB triple O two for post-1971 tunnel re-entry workers, and I have this marked as complete. When we get the

Technical Basis Document, we are to review it for completeness. Is that -- Anybody have any comment on this?

**MR. ROLFES:** I think the issue that we had just been speaking about, number 17, can be addressed by the application of OTIB-0002 intakes. I think this --

**DR. MAKHIJANI:** Inhalation intakes.

**MR. ROLFES:** Well, inhalation as well as, well, this is inhalation intakes but you're referring to ingestion. I apologize, so thank you.

**MS. MUNN:** And I have a question about the wording of that comment. When I read that second sentence, I wasn't sure what I was reading. It's use may not be satisfactory even with restrictions. For instance, for reactor testing and? or? early re-entry workers? I wasn't really --

**DR. MAKHIJANI:** No, this, the early re-entry workers involved in reactor testing, not and.

**MS. MUNN:** Okay. So for early re-entry workers involved in reactor testing.

**DR. MAKHIJANI:** Right, this was, that comment was too compressed from the finding.

**MS. MUNN:** I looked at that and couldn't make sense of it.

**DR. MAKHIJANI:** I guess basically NIOSH agrees with the comment, right?

**MR. ROLFES:** We feel that the intakes that we're assigning are bounding intakes. However, I think it was a concern about the discussion of dates associated with TIB-0002. Now, TIB-0002 had some information in it precluding its use prior to 1970, I believe, unless there's specific justification within a dose reconstruction. And I think that the issue was more along those lines, but wasn't necessarily a technical issue. It was more of an issue with what had been documented in TIB-0002. But I believe --

Gene, could you comment on that, Gene? How did we resolve that --

**MR. ROLLINS (by Telephone):** I believe the original concern was that OTIB-0002 was being used prior to 1971 where there was specific instructions within OTIB-0002 that said not to do that. So what we have done is added information into the Technical Basis Document that says basically you must follow all

restrictions of all TIBs, OTIBs, and that includes OTIB-0002. And so what we're doing more of now is applying OTIB-18 to those situations as opposed to OTIB-0002. But we have added those cautions to the TBD.

**MS. MUNN:** So are we okay, Arjun?

**DR. MAKHIJANI:** Yeah, I think that's fine.

**MS. MUNN:** We're done.

**DR. MAKHIJANI:** If this was just a procedural comment that restrictions are not being followed so if there's guidance that it should be followed, then it's resolved.

**MR. PRESLEY:** What I had marked on this then, this item is complete, and we should see OTIB-18. Is that correct? That should take care of that.

**COMMENT 19: PRE-1966 BETA DOSE**

Nineteen, there are no beta dose data until 1966. The Technical Basis Document does not specify procedures for estimating pre-'66 beta dose. And again, we have marked that work complete, and the working group will review for completeness.

Mark, do you have anything?

**MR. ROLFES:** I believe this is in our

approved Technical Basis Document now. We have some, I think, SC&A had recommended some specific -- I'm trying to recall the gentleman's name, the author of the document. Was it -- it started with a B. There was a document that you had referred us to, and I believe we --

**DR. BEHLING:** And I think that the person involved was the person who was doing dose reconstruction for DTRA?

**MR. ROLFES:** Yes, that's correct. I can't think of the gentleman's name. It starts with a B.

**DR. ROESSLER:** John (unintelligible)?

**DR. BEHLING:** No, he recently published an article in Health Physics Journal that talks about the relationship between beta dose and gamma dose various distances above the contaminated surface. And much of that work involves the Pacific Proving Ground dose reconstruction for beta. Neal Barrs (ph).

**DR. ROESSLER:** Barrs, yes. Yes.

**MR. ROLFES:** But anyway I do believe we have incorporated some methodology based on the Barrs' reference into the approved Technical

Basis Document which is now available on the website, too.

**MR. ROLLINS (by Telephone):** That's correct. That went into Attachment C.

**MR. PRESLEY:** This item should be complete. Is that correct?

**MR. ROLFES:** That's correct.

**MR. CLAWSON:** That's still got the hot particle issue, but we're taking care of that and OTIB's taking care of, it's --

**DR. MAKHIJANI:** This is in volume six.

**MR. ROLFES:** Gene that's -- yes, correct, volume six. And that was added as part of the page change I believe with the dose table that we inserted as well.

**DR. MAKHIJANI:** Is this covered by the earlier kind of that we take care of, review the page change or not, review the page change or --

**MR. ROLFES:** You'll be reviewing the page changes I believe. So this is part of the page change that was made to the Chapter Six of the Nevada Test Site TDB.

**COMMENT 20: INTENTIONAL NON-USE OF BADGES**

**MR. PRESLEY:** Item 20, one of their more

popular items.

**MR. ROLLINS (by Telephone):** Actually, Mark, let me qualify that. Actually, the Attachments A, alpha through delta, they went in as Revision 1-A.

**MR. ROLFES:** Okay, so it was prior to the page change.

**MR. ROLLINS (by Telephone):** Well, it's dated September 8th, 2006.

**MR. ROLFES:** Okay, so it's been out there awhile then.

**MR. ROLLINS (by Telephone):** Correct.

**DR. MAKHIJANI:** So I guess, Mr. Presley, I guess we need a specific direction from you whether to leave it because this is different than the page change. Direction from you as to whether to leave it alone or review it.

**MS. MUNN:** Well, I guess it would be a good idea for you to agree if this has not been resolved adequately to your --

**DR. MAKHIJANI:** Yeah, one of the, the original comment was that there were no beta monitoring data at all until '66. So I think it's a pretty big issue in terms of gaps in monitoring specially for skin cancer. And so

I think in my just, from a technical point of view -- and the working group may want to review it by themselves. But I think someone should look at what NIOSH has done in regard to addressing the skin dose.

**MS. MUNN:** I agree, yeah, and in my view SC&A ought to review that. Is there any reason why not?

**MR. PRESLEY:** I have no problem with that. When can we expect a review on this back to the working group?

**DR. MAKHIJANI:** Mr. Presley, can I consult with John on that tomorrow and get back to you? It should not be long because I think we have people who can review external dose fairly straightforward.

**MR. PRESLEY:** Lew, is this within the guidelines?

**DR. WADE:** Yes.

**MR. PRESLEY:** Okay. I'm going to put on here that SC&A will review.

**DR. MAKHIJANI:** Yes, and I'll get back to you with a suggested deadline to see if it's acceptable to you.

**MR. PRESLEY:** Okay.

**MR. CLAWSON:** I guess I'm a little confused here. When SC&A has brought up this issue and NIOSH has changed it, I thought in the process that we would automatically review the comments that came back on that to agree or disagree. I guess I'm wondering how it got changed to that document. We haven't reviewed it.

**DR. MAKHIJANI:** Well, I wasn't, you know, each working group has adopted a, you know --

**MS. MUNN:** Slightly different --

**DR. MAKHIJANI:** -- different, and so I, and this discussion has come up before as to whether we're doing things that have been explicitly authorized by the working group. So I just wanted to be sure that if NIOSH has made changes corresponding to our comments, that if the working group wants to review those changes themselves, I mean, that's clearly your prerogative and then we wouldn't be involved. But if, since the issue has come up, in the beginning we just automatically reviewed everything and resolved comments. Like at Bethlehem Steel I think we did that. But in Rocky Flats there were some issues that

came up as to whether we'd been explicitly authorized by the working group to do some things. And so I thought it better not to proceed until we received authorization from the working group.

**DR. WADE:** There are two issues. Brad, I think, may be even raising a slightly different issue. If, in the course of the work group process, NIOSH hears that there needs to be a change to a site profile, NIOSH can go ahead and make that change, and then the Board review the change.

It's also possible in some cases we had this morning, that the work group might be reviewing drafts that NIOSH is proposing before they've actually made the change. And it happens both ways. I think NIOSH does what it thinks it needs to do expeditiously so that the dose reconstruction can proceed as appropriate.

In some cases that might mean there's a TBD change that the Board has to review after the fact. And the Board can do that and then comment and NIOSH might have to modify it again. In some cases they're reviewing it as

a draft. We haven't decided that one methodology is preferable to the other. It really just depends upon the timing.

**MR. CLAWSON:** And I know that each one of these sites has their own little special twist to it, and I know how difficult it is. But it seems like to me that when SC&A makes a comment, and there's an issue and NIOSH addresses this issue, that there ought to be something, they ought to be able to review before it gets put into the TBD.

**DR. WADE:** That has not always been the way. And again, it's a matter of --

**MR. CLAWSON:** How we're doing.

**MS. MUNN:** How straightforward is it?

**DR. WADE:** How straightforward, and again, we want to move forward and see the dose reconstructions are done correctly and now hold that process up while we go through this process. So in some cases the cart is before the horse. In some cases it's the other way around. In any case if the work group decides that NIOSH's modification isn't sufficient, then NIOSH will have to modify it again.

**MR. CLAWSON:** Okay.

**MR. PRESLEY:** Twenty, like I said, is our non-use of badges. NIOSH had a response that says coworker -- sorry about that.

Mark, have you got the one's that got the, y'alls --

**MR. ROLFES:** Yes, yes, I do.

**MR. PRESLEY:** Go ahead. Let me get my computer back up.

**MR. ROLFES:** I can discuss this a little bit. If we encounter, we really didn't have an approach to assign any kind of dose to a person that could have been unmonitored or intentionally took off their badge because they were asked to do so. Now in our review you would have had to have had someone that was approaching an administrative dose limit or a regulatory dose limit and that would really be the only reason for someone to have to work in an area.

I'm sorry, yes, if you have a person that's approaching the administrative dose limit, that would really be the only time that I could imagine a person would be asked to take off their badge.

**MS. MUNN:** What if they would opt to take

off their badge?

**MR. ROLFES:** Right, but these are a case-by-case type of situation that we would have to look at the work that was being done, the amount of dose that the person was routinely receiving in this job category. And we'd have to go into the records, look through that case specifically in order to make a determination whether someone could have been in such a situation where they were approaching regulatory dose limit or would have been in a situation where they were asked to remove their badge.

Then in that case we have an approach to address any unmonitored dose that they could have received. And we can add the coworker dose tables that we received in, I believe the current page change only accounts for the time period prior to universal badging which was in April of 1957. So we can extend those dose tables from 1957 forward if necessary.

**MR. PRESLEY:** I think that that would be necessary.

**MR. ROLFES:** Okay.

**DR. MAKHIJANI:** There were, I don't know whether NIOSH checked the couple of people who spoke before the Board on specific instances, publicly, about their own pains, and whether their cases were checked for problems.

**MR. ROLFES:** I don't know what I can say as far as Privacy Act concerns are, but I have looked into some cases. And from an external dose standpoint I haven't seen this issue. I'd be happy to discuss a specific claimant's scenario outside of this conference call if necessary. I'm not sure exactly what precautions I need to protect. I don't want to discuss someone's specific case right now.

**DR. WADE:** If you're talking in generalities as you are, that's fine.

**MR. ROLFES:** Okay, all right. I don't know if I get into speaking about the types of dose and the job categories and such without mentioning a person's name. I'm not sure if I would be --

**DR. WADE:** Well, you've looked at individual claims that have been raised that this practice took place, and you've seen no evidence in the data to support that?

**MR. ROLFES:** As far as the, I've seen certain workers exceed dose limits, but they were not external dose limits. It was a combination of both external as well as internal dose. And that's a different scenario than what we are discussing here. This is related, this Comment and our response is related only to the external dose that a person would have received. I can answer this offline if we'd like to go into a discussion of a specific claim.

**DR. MAKHIJANI:** But actually, you don't expect, it's the opposite of what you said, you don't expect to see external dose exceeded because the claim is that people took off their badges when they were approaching the limit. They were told to, or decided themselves, that they wanted to do that. And I thought that NIOSH was going to develop some, look into the data to see if there were cases where people that, where there were many people, say, in certain situations like tunnel work or ground zero entry work or certain kinds of work, were approaching dose limits and then did not overstep those dose limits.

I thought that that was --

**DR. WADE:** Is that what you remember?

**DR. MAKHIJANI:** -- if I remember correctly, that was the action item that was to be done. And apparently, that was not deemed feasible. I don't know how to read this.

**MR. PRESLEY:** I've got TBD work completed on this thing.

**MS. MUNN:** It was my understanding that these specific cases were going to be looked at individually to see whether it was feasible to assume that any claim of removed badge looked realistic. I don't know how else you can approach it. When the claim is before you, then that's one of the items that must be addressed.

**MR. PRESLEY:** I don't think that you can go out here and paint a big old picture with a paintbrush and say we're going to do the whole group this way at all. It has to be individually taken into consideration.

**MR. ROLFES:** It depends on the specific case, the scenario, the job category of the worker, the job being done, the time period. There's many factors that would be very

difficult to encapsulate, I guess, every unique scenario within a broad guidance document that we're using. These issues are related to specific claims that need to be evaluated carefully on a case-by-case basis rather than as a large guidance document that's attempting to cover thousands of people.

**DR. WADE:** And so one logical approach would be to identify the pattern that you would expect to see if this practice was to take place. If that pattern is identified, then there are methodologies used to assign this dose.

**MR. ROLFES:** Sure.

**DR. WADE:** So that's what you're doing?

**MR. ROLFES:** One might expect that if a person were to take off their badge, they obviously wouldn't do it if they only had, say, 50 millirem recorded for that -- we would expect to see this if it occurred at a person that, say, had 4,900 millirem and was trying to stay below five rem per year. If we have indication that a person was approaching a regulatory dose limit, then at that time if we

have indications that the person was not wearing their badge into a radiation zone, and they were doing the same job that they had previously been doing when they received that large amount of dose, then we would need to address that in some manner.

**DR. BEHLING:** I think you can really only approach that with a CATI report statement that says I was asked to do this or even I may have voluntarily done this. Because in the absence of such a statement you don't know if the person was perhaps reassigned anywhere to avoid this overexposure in which case there was a legitimate reason for him to approach the dose limit or admin limit and not exceed it. And for all the right reasons he didn't receive it because a supervisor said you're off the job for the duration.

**MR. ROLFES:** And even for a person that's monitored, a person, an individual, is not going to know when they are approaching the administrative limits. They're not going to be able to --

**DR. BEHLING:** Well, they could know if they used concurrent air ionization chambers that

they carried with them, and in those days they used to track it that way so as to monitor throughout the wear period where they are in order to, if there was a quarterly, there was a time when there was three rem per quarter, they might have been only assigned a quarterly badge.

But they were tracking it by way of a pocket air ionization chamber and thereby realizing that as they're approaching the limit, you may have to take this person off this particular job and reassign them. Or as some of the claimants, might be right. They might have simply said take off your badge. But it would have to be indicative of comments made in the CATI report that would legitimize that particular issue.

**DR. MAKHIJANI:** The difficulty I've always had with this at the Nevada Test Site issue compared to, say, a general statement is the following. So there's been this kind of allegation at many sites, and this has been brought up, but I think there's some particularities at the Nevada Test Site that are very special that I don't feel are being

captured by this discussion. And that particularity is that the senior health physics staff have independently said that this happened.

So in both sets of interviews which were done, that we did, it came up independently. So the interviews that Kathy and Tom Bell did, apart from what I did, it came up. And then in the interview that I did it came up independently. The documentation about employment practices with references to the documentation at the time shows that there was economic incentive.

And then the usual, what we normally call allegations or assertions in a CATI or by claimants that this was happening which may require more proof actually supplemental to that. So they're happening in a different context than, say, somebody giving an affidavit saying my supervisor asked me to do this. And then you wonder whether you can accept that. So here you're starting from documentation about employment practices and interviews from senior health physics personnel.

So I think if interview data from health physics personnel such as at Rocky Flats is to be accepted when there is no documentation, for instance, we know that large quantities of magnesium-thorium alloy did not arrive at --

**MS. MUNN:** Were not there.

**DR. MAKHIJANI:** -- okay, there's no documentation. So we have contrary information actually, but it's senior management, and we're leaving it there.

**MR. ROLFES:** Uh-huh.

**DR. MAKHIJANI:** Okay. So that's a problem that I'm having with this is if this is not to be accepted as having occurred in a fairly pervasive manner, at least for certain groups of workers that were at high risk, not for everyone --

**MR. ROLFES:** We're not saying that it didn't occur, but it would be very limited.

**DR. MAKHIJANI:** That's the thing I'm questioning. These certain groups of workers were represented by claimants were in situations that can verify were at risk of high exposure like to the workers at ground

zero. And these are the same workers that we're considering in the less than 250-day question for atmospheric testing that also applies.

For this group of workers I think it's very hard for me to think of rejecting, or not accepting this as a base hypothesis without some justification that somehow the senior health physics personnel here are different than the senior personnel elsewhere whose sort of verbal memories and expert testimony we accept generally when there's no contrary evidence. So I think it's going to raise an issue of consistency that's pretty serious.

**MS. MUNN:** But it seems to me that there's no rejection of the senior health physicists' comments. Item 2 here in the response under Response 20 is key. That cohort dosimetry is probably not available because the entire cohort is likely to have adopted the same practice at the same time.

That's essentially the type of thing that the senior health physics staff was relating. That being the case what this response says, I believe, is that in those

cases where this is a possibility, you have to be particularly careful because you don't have cohort information that you can rely on. It's doubly important that you look at the individual case and the circumstances surrounding it.

Am I misinterpreting what I think I'm reading?

**MR. ROLFES:** We're not saying that this practice didn't occur, and I don't want to imply that in any manner. It very well could have occurred. And if we have health physicists saying that it occurred, people that were in a position to know that this occurred, then we accept that.

However, we need to look at on a case-by-case basis, there would be no reason for a person to remove their badge if they weren't approaching some sort of regulatory dose limit. There simply wouldn't be any reason to remove their badge if they're not going to exceed dose limits. I could understand if the badge was going to get damaged, they might have a replacement badge or a temporary badge to use.

But what we would need to do is to look to see, on a case-by-case basis, if a claimant had dosimetry that was approaching regulatory limits. And in that case if a person said that they removed their badge to do the work because they were approaching dose limits, then we would need to address that for that case.

**DR. MAKHIJANI:** Well, I think -- there are a number of issues there. (A), you don't always know when you're very close, and so you're going to have a problem of what's close. Is it 4.9 or in the case of three rem per quarter is it 2.8 or is it 1.9 or what it is.

Secondly, most of the claimants are survivors. You cannot discover this information in a CATI. There are rare cases where a claimant -- and there are cases where a survivor claimant is thoroughly well informed, and they have presented to the Board in public meetings. But for the most part and from what I understood from interviewing, talking to lots of claimants and survivors is that they have no clue what went on in the job generally, much less into the details of the

practices.

So I think if you accept that this practice happened, then the guidance doesn't correspond to, and, you know, to some extent this is a generic issue because the question of survivors from our procedure review has never really been addressed because NIOSH has said we can't do anything about this inequity.

And now we're confronting it in a very specific situation where that item which was resolved supposedly by NIOSH by saying we can't do anything about this inequity, you know, that life is not fair. And now we have a situation where you're saying that, you're relying on the CATI for dose reconstruction when in most cases you can't discover the information in a CATI.

**MR. ROLFES:** That's not necessarily true because if we see someone, if their dose of record is routinely approaching the administrative limits or the regulatory limits, that would be something that would be a flag to us to say, well, this is one of the individuals that might have been affected, might have been asked to remain in the

radiation area and continue work on the job to get the job done. And I understand. I have heard accounts during the time period right before the, excuse me, in the late ‘50s right before the test ban -- I’m trying to think --

**DR. MAKHIJANI:** The moratorium.

**MR. ROLFES:** Yeah, the moratorium, thank you.

Right before the moratorium we were rushing to get in as many tests as we could. And so there was a limited number of staff that were able to complete the job. And so we did have some staff at Nevada Test Site or some of the employees go in, and there were some people that exceeded the regulatory dose limits, combined regulatory dose limits.

And that is very well documented within those people’s files. So I haven’t seen any cases where a person has routinely been approaching those regulatory limits and has no documentation. Like I said, it’s a case-by-case basis that we would have to look at.

Gene, are you on the line there? Do you have anything to add to this discussion?

(no response)

**MR. ROLFES:** No?

**DR. WADE:** So if you were to see a worker's file that had a worker approaching a regulatory limit, and then there is no data, then that's a pattern that should, in our mind, signal the fact that this could be a case where someone was told to or volunteered to remove their badge. And then you would have to generate dose for them using some methodology.

**MR. ROLFES:** Yes.

**MS. MUNN:** Especially if this individual were a worker who received consistently high --

**MR. ROLFES:** Exactly.

**MS. MUNN:** -- near limit doses and previous or following --

**MR. ROLFES:** That would be something that would trigger us.

**MS. MUNN:** -- periods.

**MR. ROLFES:** Exactly, that's a very good point because that would be what we would look for in a dose reconstruction or in someone's DOE dosimetry. We would have to look for

someone that was routinely receiving five rem per year or whatever the administrative control was at the time. That would be the indicator. If we routinely saw someone that was receiving 4.9 rem each year, and they indicated that they had been asked to remove their badge in order to continue working or get the job done, that would set up a flag to us when we do a dose reconstruction.

**DR. WADE:** Mark, just let me stop you there.

Even if they didn't say they removed their badge, if you see this pattern develop, and it's a survivor, then you have reason to say this could have happened. And then you need to take appropriate steps to assign dose.

**MR. ROLFES:** Yes, uh-huh.

**MS. MUNN:** The individuals who would be most likely to fall in that category would be the well-trained individuals who were trained for those specific jobs and who would be anticipated as the leaders in that activity. You would not send an untrained worker who had no idea what was going on in to do one of those setup jobs or for that matter follow-up jobs.

**DR. MAKHIJANI:** So then what do you do? You don't have coworker data, and you don't have the worker's data.

**MR. ROLFES:** Well, we do have coworker data, this datasheet. And that's what we've proposed is to add this table. Right now our page change revision to Chapter Six only incorporates the years from 1951 through April of 1957 because that was the time period that universal badging was not in place at the time. Now, we have data from '45 all the way up through '83 on this sheet, but I do believe '83 forward is available to us as well. And there are indications of individuals, let's see, in 1962 there's individuals, there were 15 individuals that received in between five rem and 7,500 millirem during 19 --

**DR. BEHLING:** Would you conclude that some of those people may have been guilty of this issue? And my experience has been the people who are most prone to do this are contract workers who are being potentially washed out from overtime. That used to be the biggest incentive. They wanted work to come to an outage. They wanted to work as many hours,

60, 70 hours a week, and in order to avoid being washed out they'll take off their badge or do something. And unfortunately, those cases you don't have any documentation because it was a voluntary decision on their part as opposed to a supervisor. In other cases there may be a supervisor who encourages.

**MR. CLAWSON:** And that's true, Hans, because we've got to look at this, and we've got to look at the mindset of the people. You talk to any of the survivors or whatever like that, and they feel that they were as much at war as anybody. And for them to be able to complete this, as the gentleman that gave us the tour, I'm not going to let my badge get in the way of me completing.

**MS. MUNN:** Yeah, this is the job I had to do.

**DR. WADE:** So there are two parts to it. One is you have to identify where this might have happened, and then Arjun's question, what do you do about it.

**DR. BEHLING:** Yeah, what do you do about it.

**DR. WADE:** And those are your questions that have to be answered.

**DR. MAKHIJANI:** The problem you have, you know, even accepting your first part of your diagnosis which I really have some problems. But accepting that for the moment, the problem you have when you have a set of data where your highly exposed workers tail off, and there's a piece of the exposure that you don't know for the whole cohort, you have no idea what the upper limit is, because you can't fill that. By definition you look at your Item 2 in their own statement, or dosimetry probably not available. That means whatever coworker data you have, the high doses among that will share this limitation so you can't fill the gap. So this --

**MR. ROLFES:** That's very possible. We don't know that for a fact though.

**DR. MAKHIJANI:** No, we do know that for a fact because it arises from the nature of the problem. We can define the problem. Maybe we cannot define the solution, but I think we can define the problem. If this was a pervasive practice, then, as you say, you're not going to have cohort dosimetry for the very workers who are approaching their dose limits.

Whether, how you define approaching is a different matter and solvable. But by the very nature you don't have a coworker database to fill that gap because it's a systemic problem. It's not an individual problem.

**MR. PRESLEY:** Can I say something. I've got to go. I'm sorry. I apologize. We scheduled this meeting for two o'clock. The only flight that I can get back is the one after four. I've got to get to the airport. We've beat this -- I hate to say it -- to death, and we can continue to beat it death for the next five or six years.

What I would like to do is to ask Mark to come up with a solution to this from NIOSH, and let's go back to SC&A with the solution. And we've done this half a dozen times, but there's got to be a simple solution to this.

The other thing is when you get all of the paperwork done to the OTIBs and to Chapter Five, I believe, could you make sure that the people on the working group all get a copy of that and the pertinent data that goes with it. And also send Arjun a copy?

**MR. ROLFES:** Sure.

**MR. PRESLEY:** And I would like to have that hard copied because there's going to be a tremendous amount of it.

**MR. ROLFES:** All right.

**MR. PRESLEY:** And that way we will have a copy. Everybody's got the same thing, and then we will sit down and talk about a phone call maybe before our May meeting.

Is that all right, Lew?

**DR. WADE:** Yes.

**MR. PRESLEY:** Try to come back with these issues, and I'm going to ask Brad to continue. I cannot miss this plane. I've got some stuff at home that I've got to do.

**DR. BEHLING:** Can I make a recommendation of how you might want to look at the data?

**MR. ROLFES:** Sure.

**DR. BEHLING:** Obviously, the dose limits are usually defined by yearly limits, either five to the minus 17 for those that can go more than the five rem per year. And what you want to do is look at first quarter, second quarter, third quarter. If you see first quarter one rem or one and a half rem, and second quarter, and then as you approach the

regulatory limit, the questionable problem comes into play in the third and fourth quarter.

And they realize they're now approaching the (unintelligible). And so what I would do is look at high dose workers and compare first quarter. They're doing the same job, hopefully. First quarter, second quarter, third quarter, and if you see something trailing off on the fourth quarter, all of a sudden there's nothing and the guy is still on the job, then you have to be suspicious.

**MR. ROLFES:** Sure, exactly, I agree.

**DR. BEHLING:** Because it's usually a yearly limit that dictates whether or not you get kicked off your job in the third or fourth quarter. And this would be a trigger for you to say I think there's reason to be suspicious here.

**DR. WADE:** For many triggers.

**MR. CLAWSON:** Actually, all I was going to say, Hans, is it would be more of a quarterly limit because I know I monitor --

**DR. BEHLING:** Yeah, a quarterly limit would

be then obviously also a trigger to --

**MR. CLAWSON:** Now, if you come up and hit a plateau every quarter, it's something to be able to throw up there.

**MR. ROLFES:** Maybe that would be the best resolution to this, this is something that has to be done on a case-by-case basis. It's not something that you can --

**MR. CLAWSON:** Do for everybody.

**MR. ROLFES:** Exactly. And so maybe what we should do is put a little bit of discussion referring to what you're discussing -- I'm sorry, a little bit of description if a person does routinely receive say one or two rem on his badge each quarter, and then all of a sudden has zero dose, and he does indicate that he was removing his badge, then at that time then I think we should put some discussion in the Technical Basis Document that we're aware of this practice that potentially occurred, and we will come up with some, an approach to address this.

**DR. BEHLING:** The approach could be then to say, well, if he's getting one rem every quarter and the fourth quarter is nothing,

say, well, you're on the same job, the average of your previous quarters were --

**DR. WADE:** The highest of the previous quarters.

**DR. BEHLING:** The highest, it is a reasonable approach to filling in those gaps.

**MR. ROLFES:** Yes, exactly.

**DR. ROESSLER:** It would be interesting to note, too, how many people this might apply to. Is this a very pervasive situation or is it just two individuals? I mean, you can look at the records and look at some of the numbers and --

**DR. BEHLING:** It would only be the high dose workers.

**DR. ROESSLER:** And I mean from my point of view, I'd be interested in knowing just what is the population that we're talking about.

**DR. BEHLING:** And it's small. It's small.

**DR. MAKHIJANI:** It's a minority.

**DR. BEHLING:** As Arjun pointed out clearly the coworker data is exactly missing those people, and so you can't rely on this.

**DR. MAKHIJANI:** It's clearly a minority of workers.

**DR. WADE:** But there are three, so there are three things I think you need to do. One is you develop sort of a litmus test to say that this is a problem. And you know, Hans has talked about it. There are many logical models you could develop to say I think there's something wrong here. So what are those? You can explain that to the working group and SC&A.

Then the next question is what do you do about it. You don't have coworker data. You give them high dose. How do you determine what high dose is to give them. And then Gen's question could you also then in that document share, from a statistical point of view, evidence you have as to how prevalent this might be based upon what you've looked at to this point. And I think then you may have a starting point to move on.

**MR. CLAWSON:** Okay, since Mr. Presley put me in charge, how about a break?

**MS. MUNN:** I think that's --

**DR. MAKHIJANI:** We have actually scheduled a meeting with a petitioner at three anticipating the meeting. Now we can call

them, but I think it's going to be all very crazy.

**DR. BEHLING:** And they may have already left, and you don't want to disappoint them.

**DR. MAKHIJANI:** Yeah, we meet them at three. So this is a --

**DR. WADE:** How far do you have to go to get there?

**DR. MAKHIJANI:** I think it's about half an hour, 40 minutes.

**MR. CLAWSON:** Okay, can we conclude by adjourning this?

**DR. WADE:** We could adjourn. I think we put that action item on, and then I think you'd need to look at following up possibly with a phone call in the near future to finish this list.

**MR. CLAWSON:** So we'd need to finish Comments 21 through 24.

**DR. ROESSLER:** Except for 23.

**MS. MUNN:** We have five comments.

**DR. ROESSLER:** Twenty-three we finished.

**DR. WADE:** And I think the work on 20 is important work, and then SC&A also has its task to begin to look at the page change and

the other work that's been done. I think we can adjourn.

**MR. CLAWSON:** We can adjourn.

**MS. MUNN:** Have we established a time for a phone call?

**DR. WADE:** Well, we better check with Robert. I'll try and do that this week. We could do it, so the rest of you if you want to pick a time you'll have to notify Robert.

**MS. MUNN:** Why don't we do that?

**DR. WADE:** Okay, let's pick a time for a phone call.

**DR. MAKHIJANI:** Sorry for the multi-tasking schedule.

**DR. WADE:** Okay, let's look at an opportunity. Robert said before the May meeting. So let's start with that as a solution space.

**MS. MUNN:** What if we do, how about giving ourselves a couple of weeks and say the Monday after Easter, the 9th of April?

**DR. WADE:** Would that give you enough time, Mark, or do you want --

**MR. ROLFES:** I'm sorry, what was the -- I didn't hear what you said.

**MS. MUNN:** The 9th of April?

**MR. ROLFES:** Ninth of April.

**DR. WADE:** This would be a call to complete the matrix, so you really wouldn't have to have anything done.

**MR. ROLFES:** Yeah, I think that's fine. I'm just trying to think. I do have some travel coming up in the next week or two and that's what I was trying to think about.

**DR. ROESSLER:** I have another conference call at noon.

**MS. HOWELL:** The only thing about the 9th is that you have meetings here scheduled the 10th and 11th. If any of the Board members or Ray are traveling then on the 9th we could get into a problem.

**MR. ROLFES:** Yeah, I do have a meeting on the 10th here. The Chapman Valve Working Group is meeting on the 10th.

**MS. HOWELL:** And the subcommittee on the 11th.

**MS. MUNN:** I'm traveling on the 10th.

**DR. WADE:** What about the 18th?

**MS. MUNN:** What about the 18th? The 18th would be fine with me. That's the day before

then.

**DR. WADE:** Right, there's a Rocky Flats call on the 19th.

**MS. MUNN:** Yeah, uh-huh, the 18th would be okay for me.

**DR. WADE:** Okay, 18th okay for you?

**MR. CLAWSON:** I will make it where it'll work.

**DR. WADE:** So I'll check with Robert as soon as I can, and we'll say 11:00?

**DR. ROESSLER:** So this is April 18th.

**MS. MUNN:** April 18th.

**DR. WADE:** Eleven a.m., probably two, three hours to finish the matrix.

**MS. MUNN:** Eleven eastern time?

**MR. ROLFES:** We may not even need that much time, maybe only an hour.

**DR. WADE:** Tentatively, I'll get an e-mail out, check with Robert and get an e-mail out before the end of this week.

And now I think we're adjourned. Thank you on the phone. We're adjourned.

(Whereupon, the working group meeting concluded at 2:38 p.m.)

**CERTIFICATE OF COURT REPORTER**

**STATE OF GEORGIA**

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I, Steven Ray Green, Certified Merit Court Reporter, do hereby certify that I reported the above and foregoing on the day of March 27, 2007; and it is a true and accurate transcript of the testimony captioned herein.

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

WITNESS my hand and official seal this the 19th day of June, 2007.

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**STEVEN RAY GREEN, CCR**

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