

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

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ADVISORY BOARD ON RADIATION AND  
WORKER HEALTH

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PACIFIC PROVING GROUNDS WORK GROUP

+ + + + +

FRIDAY  
JANUARY 16, 2015

+ + + + +

The Work Group convened via teleconference at 1:30 p.m., Eastern Standard Time, James E. Lockey, Chairman, presiding.

PRESENT:

JAMES E. LOCKEY, Chairman  
HENRY A. ANDERSON, Member  
LORETTA R. VALERIO, Member

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## ALSO PRESENT:

TED KATZ, Designated Federal Official  
BOB BARTON, SC&A  
HANS BEHLING, SC&A  
JOYCE FRANCIS, DCAS  
DeKEELY HARTSFIELD, HHS  
JOHN MAURO, SC&A  
JIM NETON, DCAS  
MARK ROLFES, DCAS  
GENE ROLLINS, ORAU Team  
MATTHEW SMITH, ORAU Team  
JOHN STIVER, SC&A

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

1:34 p.m.

MR. KATZ: This is the Advisory Board on Radiation Worker Health, the Pacific Proving Ground Work Group.

We are meeting over a Site Profile Review that's been done by SC&A and the Work Group's taking that up.

The materials that we're discussing today are on the NIOSH website. If you go to the NIOSH website and you go to the Board section for meetings, today's date, you'll see all the papers that will be discussed here.

There's a matrix, there's the actual review from SC&A and both of those are useful to follow along with the discussion as well as the Agenda which is very simple.

MEMBER ANDERSON: Hi, it's Andy. I'm on now.

MR. KATZ: Oh, great. And so now I've heard from all my Board Members, they're all on but we need to speak to conflict of interest, so let's

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1 just go down the roster with the Board and address  
2 whether you have a conflict with site.

3 (Roll call.)

4

5 Okay then, that takes care of matters.  
6 Everybody, while you're listening, please keep  
7 your phones on mute just to help the audio quality  
8 and, Jim, it's your meeting.

9 CHAIRMAN LOCKEY: Why don't we get  
10 started then?

11 Hans, are you going to present the SC&A  
12 overview?

13 DR. BEHLING: Yes, I am.

14 CHAIRMAN LOCKEY: Are we ready to get  
15 started on that?

16 DR. BEHLING: Yes, unless there's any  
17 other issue that needs to be resolved before we  
18 start.

19 I can only say that we do have a total  
20 of hours for completing this conference call and  
21 are there any scheduled breaks that we're looking  
22 to introduce somewhere in between the four hours?

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1                   MR. KATZ: Well, Hans, I think we're  
2 hoping not to go for four hours, but I mean we'll  
3 take breaks as people need comfort breaks.

4                   DR. BEHLING: Okay.

5                   MR. KATZ: Yes.

6                   DR. BEHLING: Okay, let me start out by  
7 saying that this is -- since this is the first  
8 meeting over teleconference for the PPG Work Group,  
9 I want to take a few minutes to discuss a few  
10 historical pieces of information.

11                   And first of all, NIOSH issued the  
12 Summary Site Profile for the Pacific Proving  
13 Grounds back in August of 2006. So, that's a  
14 number of years ago.

15                   SC&A was asked to review this document  
16 in 2013 and issued its draft report in November  
17 2013. Our review of the Site Profile identified  
18 a total of nine findings and one observation which  
19 is, at this point, the focus of my presentation here  
20 that's coming.

21                   And in order to really fully understand  
22 the findings that we're about to discuss, it's

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1 important to address some of the conditions under  
2 which personnel at the PPG were exposed to  
3 radiation and that not only is different but very  
4 unique from all the other DOE and AWE facilities  
5 that are part of the Energy Employee Compensation  
6 program.

7 And in Section 3 of the SC&A report  
8 which is on page 14, and I'm going to ask John Stiver  
9 to perhaps then go to the page that I identify so  
10 that we can all look at some of the information that  
11 I'm about to present.

12 And so, page 12 is the beginning of  
13 Section 3.

14 DR. MAURO: Ted, I assume that we're  
15 not on Live Meeting, so we just should do this  
16 independently on our own.

17 MR. KATZ: We have Live Meeting, but  
18 you're welcome to do this. I mean you have the  
19 documents.

20 DR. MAURO: I do.

21 MR. KATZ: So, you can do it either way.

22 DR. MAURO: Okay.

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1                   MR. KATZ: I'll forward you, if you  
2 don't have that, I'll forward you the address for  
3 the Live Meeting.

4                   DR. MAURO: Oh, I have --

5                   MR. STIVER: John, I did send you the  
6 link earlier today, so it should be on both your  
7 SC&A and NIOSH email accounts.

8                   DR. MAURO: Yes, the only problem I ran  
9 into, it requires some kind of Java update which  
10 I don't have. But I'm fine, I'm following it on  
11 the --

12                   MR. KATZ: Okay.

13                   DR. MAURO: Yes, I'm fine.

14                   MR. KATZ: Thanks, John. Go ahead,  
15 Hans.

16                   DR. BEHLING: Okay. John, can you  
17 scroll -- I'm on page 12, but you're at the bottom  
18 of page 12. Okay?

19                   MR. STIVER: Okay, hang on just a  
20 second. You want page 13 or --

21                   DR. BEHLING: No, no, you're on page 12  
22 and on the upper right hand side, you'll see the

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1 page 12, the individual --

2 MR. STIVER: All right.

3 DR. BEHLING: Anyway, I want to briefly  
4 discuss some of the comparisons because there's  
5 really -- there's only one comparison to any of the  
6 other facilities that we have been dealing with in  
7 the past and that's the Nevada Test Site which also  
8 tested nuclear weapons.

9 But, there are some great differences  
10 between those two sites and then I'm about to show  
11 you just what some of those differences are that  
12 I've identified.

13 Between 1946 and 1962, the US AEC  
14 conducted a total of 105 atmospheric and underwater  
15 nuclear weapons tests at several locations which  
16 I identified in the top of Table 3-1. They involve  
17 Bikini Atoll and Enewetak Atoll, both of those  
18 Atolls are part of the Marshall Islands.

19 Also, the third area was Christmas  
20 Island and Johnson Atoll and there's a couple of  
21 other tests that were done in the middle of the  
22 ocean.

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1           And important to note when you look at  
2 those numbers that follow, not only just the number  
3 of tests at each of those sites, but the explosive  
4 yield. And below that, you have minimum, maximum,  
5 mean and median and total.

6           And then a point to note is that the  
7 total yields for, for instance, at Bikini Atoll,  
8 the total yield of nuclear weapons that were tested  
9 there. There were 24 tests with 763,838 kilotons  
10 of explosive yield

11           And you can look down the bottom of the  
12 other ones and Enewetak, that was the second most,  
13 31,653 and so forth.

14           And what it really -- if you look at them  
15 in Table 3, you see that for the 105 nuclear tests  
16 in the PPG, they had the equivalent of 151.5  
17 megatons of TNT. And again, if you segregate them  
18 out between Bikini Atoll and Enewetak Atoll and the  
19 Marshall Islands, there were 108.5 megatons of  
20 explosive yield tested there.

21           And when you then compare that to what  
22 was done at the Nevada Test Site which is defined

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1 in Table 3-2 below, you will see obviously that even  
2 though the U.S. tested quite a number of weapons,  
3 107 at the test site, their combined explosive  
4 yield only represented 1.3 megatons. And compare  
5 that to the 155.6 megatons yield, understand why  
6 these tests were done not in the continental United  
7 States, but somewhere where it was safe to do so  
8 and that turned out to be the Pacific Proving  
9 Grounds.

10 When you go back up to Table 3-1 above,  
11 you'll see that the maximum weapons that were  
12 tested, the yields were two nuclear devices that  
13 had the yield of 15 megatons and that was the Bravo  
14 test that was done in March of 1954 and the Mike  
15 test that was done earlier in '52.

16 Those two tests, like I said, when you  
17 look at the yields of those tests for the Bravo  
18 test, it's 15 megatons. That's a thousand times  
19 greater than the explosive yield of the two bombs  
20 that were dropped and devastated Hiroshima and  
21 Nagasaki at 15 kilotons.

22 So, it gives you an understanding of

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1 just how much of the differences exist between the  
2 nuclear tests that were conducted at the Nevada  
3 Test Site versus those that were conducted at the  
4 Pacific Proving Grounds.

5 One of the other things that I wanted  
6 to point out is the fact that when you look at the  
7 nuclear tests that were done, they were not equally  
8 spaced. Early on with the very first few tests,  
9 they were done at significant intervals.

10 And also, in addition to that, they were  
11 -- explosive yields were very, very low compared  
12 to the what was to come, especially with the  
13 beginning of the Castle series where we had thermal  
14 nuclear devices in the megaton range.

15 John, can you go to the next page? Page  
16 14 -- 13 I mean, 13.

17 And there, I'll just briefly make  
18 mention of some of the things that happened and why  
19 some of these things became a very significant  
20 problem for the rad-safe personnel that were  
21 expected to protect the workers and safeguard them  
22 from radiation exposures.

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1           And one of the things you realize is  
2           that the first series of tests, there was enough  
3           spacing in between to provide at least some  
4           adequacy in presenting some kind of program for  
5           safeguarding personnel and monitoring them.

6           And that became increasingly more  
7           difficult and so, when you go into the next few  
8           years, we had instances where there were two  
9           nuclear tests done on the same day. There were six  
10          days where two tests were done simultaneously.

11          And what it really comes down to is that  
12          both the frequency and the severity of the nuclear  
13          tests posed serious constraints on the rad-safe  
14          personnel who were there to protect the workers  
15          from radiation exposure.

16          And when you look at their program, they  
17          worked under the worst of conditions that one can  
18          imagine for a number of reasons, whether it was the  
19          remote facilities that they were working at out in  
20          the middle of the Pacific Ocean -- when we're  
21          talking about the Marshall Islands, they are 2,300  
22          miles southeast of Honolulu and 1,600 miles removed

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1 from Guam.

2 And this was, I would say, a very  
3 difficult thing to get personnel in there and for  
4 many of these tests, for instance, in the case of  
5 Operation Crossroads which was the first series  
6 that involved Able and Baker, there were a total  
7 of 42,000 people that had to be obviously guarded  
8 against exposures.

9 And, therefore, you had large numbers  
10 of people, you had a remote location for this to  
11 take place, you had no infrastructure within the  
12 Marshall Islands or the other areas where they were  
13 tested.

14 And so, one has to really appreciate  
15 what the difficulties that existed for rad-safe to  
16 protect people.

17 So, in the last statement when I -- and  
18 on the page where I said undoubtedly impact by  
19 unexpected events, limited resources and adverse  
20 operating conditions for rad-safe personnel who  
21 were obviously in charge of protecting the workers  
22 that included obviously private citizens as well

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1 as military personnel.

2 So, with regard to that last statement,  
3 I just want to say that our findings that we are  
4 identifying today should by no means be viewed as  
5 a criticism of the effort by the rad-safe to protect  
6 personnel in the PPG but simply I want everyone to  
7 realize -- I want to acknowledge the difficulties  
8 that NIOSH faces in the reconstruction of credible  
9 doses on behalf of claimants.

10 So, this is really -- the objective here  
11 is to identify some of the difficulties that are  
12 being looked at in our findings that we want to  
13 discuss today.

14 Among the limitations that prevent us  
15 from a complete dose reconstruction at the PPG for  
16 workers was the issue that we do not have any kind  
17 of internal monitoring at the time of the PPG. And  
18 therefore, this inability to assign internal dose  
19 from inhalation, ingestion of fallout that  
20 personnel were exposed to, and that includes  
21 obviously, fission products as well as unfission  
22 weapon-grade fuel, uranium, plutonium.

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1           And as a result of that inability to  
2 assess or by any means any potential internal  
3 exposure, it was acknowledged early on that the  
4 people at -- the workers exposed to it could not  
5 be adjusted for internal exposure and, therefore,  
6 an SEC was declared.

7           And that brings me up to Finding Number  
8 1. So, John, if you want to go to page 14, this  
9 is the Review of the Introduction PPG Site Profile  
10 and it shows that in Section 1 of the ORAU Site  
11 Profile for PPG, it describes that there was an SEC  
12 petition and that SEC petition obviously pertains  
13 to the fact that internal exposures could not be  
14 reconstructed.

15           And it identifies in the first  
16 paragraph that these inclusion of non-SEC cancers  
17 were based on 250 days of employment and that turned  
18 out to be an issue that was the source of our first  
19 finding.

20           And it's important to note, as I said,  
21 that the PPG Site Profile that NIOSH developed in  
22 2006 pre-dates any discussions that we had about

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1 the issue of 250 workdays.

2 And as a result of that, we identified  
3 in the finding, even though we knew that there had  
4 already been an adjustment made in the 250 day  
5 criteria on behalf of the NTS. And that was  
6 clarified when we looked at our Bulletin No. 06-15  
7 that's summarized on the next page, 15.

8 What that bulletin by and large then  
9 allowed us to do is to say, okay, we don't need to  
10 have 250 days for non-presumptive cancers to be  
11 included if we can at least demonstrate that they  
12 were at least 83 days given the fact that when  
13 you're on site for 24 hours that really represents  
14 three 8-hour workdays so the 250 day criteria was  
15 in fact reduced down to 83 days.

16 But, the other thing that the Bulletin  
17 No. 06-15 states, and that's in the second -- the  
18 last paragraph on page 15, that by and large says  
19 that in determining the actual employment period,  
20 the CE must have clear and convincing evidence of  
21 a beginning date (hire) and end date (termination)  
22 of employment at the PPG.

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1           And it goes on further, where the  
2 evidence is not clear and convincing or consists  
3 only of film badge data, without the beginning date  
4 or the end date he must wait for the policy guidance  
5 before proceeding with the verification of covered  
6 SEC employment at the site.

7           Now, that poses obviously a problem for  
8 most of the people who were obviously at the PPG  
9 and who were military, that posed not a major  
10 problem. But it does pose problems for people who  
11 were non-military, who were civilians and who  
12 oftentimes worked for a private company and there,  
13 the employment dates are not necessarily  
14 available.

15           And so, it goes on in this particular  
16 bulletin, it says the National Office of DEEOIC  
17 continues to explore methods by which confirmation  
18 of employment can occur for workers alleging  
19 employment at the PPG.

20           And that gave rise to the next bulletin  
21 which is on -- cited on a summary of status site  
22 on page 16. And that's Bulletin No. 07-05.

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1           And it once again talks about what this  
2 problem concerns and then offers a solution and  
3 that solution was considered to be one that was  
4 viable for establishing employment dates in the  
5 sense that this involves dosimetry assignment.

6           And the bulletin states that the  
7 individual film badges were generally issued on one  
8 day, one week or one month, depending on potential  
9 exposure to the individual. And it goes on  
10 typically film badges records would include the  
11 issue date and the end date which can be used to  
12 account employment periods at the PPG.

13           Now, we will talk about later on what  
14 that really infers.

15           MR. KATZ: Excuse me, Hans, this is  
16 Ted.

17           I mean, I'm sorry to interrupt on this,  
18 but I had a lot of exchanges with SC&A about this  
19 topic. This is really a DOL issue. We've already  
20 agreed we're going to send a memo to DOL about  
21 issues related to how they administer this matter  
22 and our information related to that.

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1                   But, it really is not a good use of the  
2 Work Group's time to be spending a lot of discussion  
3 about this matter. It's not related really to the  
4 Site Profile Review.

5                   DR. BEHLING: Well, I realize that,  
6 Ted. I'm sorry. I wasn't going to spend any time.  
7 I just wanted to make mention of the fact that this  
8 issue that will be resolved separately involves  
9 mission badges and that's all I wanted to say.

10                  MR. KATZ: Right.

11                  DR. BEHLING: And the only thing I want  
12 to say is that mission badges do not represent the  
13 conventional form of dosimeters which are usually  
14 assigned to a person either on a monthly basis or  
15 quarterly basis or any other time.

16                  And whenever a person is in an area  
17 where there's the potential for exposures, that  
18 badge as we know it today will in fact fully under  
19 -- provide a measure of not only the employment  
20 period but also the full duration of exposure.

21                  And that's all I wanted to do here.

22                  MR. KATZ: Okay. Thanks.

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1 DR. BEHLING: And in contrast with that,  
2 I'll just add one more statement. This issue that  
3 where we just now addressed with the badges that  
4 are oftentimes referred to as mission badges, cease  
5 to be used in, let's say, this was May 25, 1956 that  
6 we introduced a new badging system which involved  
7 assigning any person who came on to the PPG site  
8 a dosimeter and that was continued to either be  
9 replaced or maintained by that person 24 hours a  
10 day and until he left.

11 So, starting with the Operation Redwing  
12 that commenced in 1956, that issue goes by the way.  
13 And I just wanted to bring that to everyone's  
14 attention.

15 So, Finding Number 1 is, again,  
16 restricted to the issue of changing the Site  
17 Profile for the PPG to address the revised time of  
18 83 days for inclusion in the SEC, as I mentioned,  
19 and the other issue, hopefully, will be addressed  
20 by the DOL at some later date.

21 MR. ROLFES: This is Mark Rolfes, from  
22 NIOSH. We agree that an update is needed to

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1 reflect the 83, you know, days where an individual  
2 was on site for 24 hours a day.

3 CHAIRMAN LOCKEY: You're breaking up.  
4 I'm having a hard time hearing you.

5 MR. ROLFES: Okay. Is that any  
6 better?

7 CHAIRMAN LOCKEY: That's much better.

8 MR. ROLFES: Okay. We agree that the  
9 83 days needs to be incorporated into the Technical  
10 Basis Document for PPG and so if an individual  
11 worked for the day then spent the rest of his time  
12 on site for 24 hours a day, if he accumulated 83  
13 total days, that would count as 250 workdays and  
14 would meet the 250 workday requirement.

15 And we will update the TBD with that  
16 information.

17 DR. NETON: Yes, this is Jim. I agree  
18 we're going to do that but it really is just for  
19 background information only.

20 I mean as Ted suggested, we don't  
21 qualify workers for the SEC. We receive cases for  
22 dose reconstruction that are qualified already by

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1 DOL. So, it really would just be for background  
2 clarification more than anything. I mean we would  
3 never use that number ourselves to qualify someone.

4 CHAIRMAN LOCKEY: And Ted, do we know  
5 when the DOL is going to respond to us?

6 MR. KATZ: Well, I have -- SC&A is going  
7 to send me a memo with just sort of full-fledged  
8 information and then I will copy the Work Group,  
9 send that memo to DOL and in recent experience,  
10 they've been pretty quick to address issues coming  
11 from us. So, I expect they'll respond pretty  
12 quickly.

13 CHAIRMAN LOCKEY: Okay. For issue  
14 number four then, we're going to wait -- it's  
15 resolved in a separate area from DOL, is that  
16 correct?

17 MR. KATZ: I'm sorry, I'm not sure --  
18 we're talking about issue one I thought just now.

19 CHAIRMAN LOCKEY: The Finding Number  
20 1, Section Number 4, Finding Number 1.

21 DR. KATZ: Right. So, the DOL issue  
22 anyway is not really the Work Group's issue. But

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1 that I'll take care of independently and keep the  
2 Work Group in the loop as to how DOL responds.

3 DR. NETON: Well, Number 1 has been  
4 resolved.

5 CHAIRMAN LOCKEY: Well, Number 1's  
6 been resolved then.

7 DR. NETON: Right.

8 CHAIRMAN LOCKEY: Okay, thank you.

9 DR. BEHLING: Okay, next we have a  
10 single Observation Number 1 and that's very easily  
11 resolved.

12 The observation really addresses the  
13 people that were hired on location and whether or  
14 not that they would be qualified for a potential  
15 exposure associated with medical x-rays.

16 And my comments were that there was a  
17 need for more definitive guidance based on the  
18 interim since 2006 when the Site Profile was  
19 written.

20 There have been changes to the issue of  
21 assigning x-ray doses to personnel where even if  
22 the x-ray existed but it wasn't done at an EEOICPA

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1 facility that it was not granted.

2 So I raised that as an issue and I think  
3 NIOSH responded that they would cancel the  
4 ORAU-PROC-0061 criteria and introduce the  
5 OTIB-0079 which I believe is going to satisfy that  
6 particular observation.

7 MR. SMITH: That's correct.

8 CHAIRMAN LOCKEY: Any questions about  
9 Observation 1?

10 DR. NETON: This is Jim. In general,  
11 I guess are we going to follow the protocol that's  
12 been followed by like say the Subcommittee on  
13 Procedures where we would just put these in  
14 abeyance? Is that what we're saying now or?

15 MR. KATZ: Yes, I think so, Jim. I  
16 think in these cases where we don't have it spelled  
17 out yet in a new document, that's what we would do.

18 DR. NETON: Right.

19 MR. KATZ: Yes.

20 DR. NETON: So, Finding 1 and Finding  
21 2 then I have listed as in abeyance meaning we'll  
22 revise the Site Profile and I mean some point the

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1 --

2 MR. KATZ: The finding -- just to  
3 clarify, Jim, Finding 1 is simple enough that you  
4 can close it because there's no question as to how  
5 that gets spelled out.

6 But when you have a finding where you  
7 need to see the new text, that's when you put it  
8 in abeyance.

9 DR. NETON: Okay, that's good enough.

10 CHAIRMAN LOCKEY: So, Observation 1 is  
11 in abeyance then, right?

12 MR. KATZ: Yes, I think so, Andy -- I  
13 mean Jim.

14 MEMBER ANDERSON: Moving right along.

15 DR. BEHLING: Okay, the next issue  
16 addresses Finding Number 2 and that involves the  
17 issue of environmental dose.

18 And the term environmental dose may not  
19 even be applicable but we'll address it as  
20 environmental dose here. It is more likely to be  
21 regarded as an occupational external dose, but  
22 let's discuss it anyway under Finding 2 what is

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1 really meant here and what's involved here when we  
2 talk about environmental dose at the PPG.

3 In the original PPG Site Profile, there  
4 was reference to environmental dose but it applied  
5 to other DOE facilities. And the reason being is  
6 that many of the people or personnel, civilian  
7 personnel, who were part of the PPG workers that  
8 we're now concerned with also had affiliations with  
9 other DOE facilities at which point they were  
10 always also granted exposures that were  
11 potentially obtained during that time period when  
12 they were at their particular DOE facility.

13 And that included among other things  
14 the occupational medical dose as well as ambient  
15 environmental dose. But when it comes to the  
16 actual environmental dose at the PPG, the Site  
17 Profile had very little to say.

18 And that's really the very important  
19 one and I think I'm going to spend just a few minutes  
20 here discussing why it's very important with regard  
21 to keeping that also as part of the occupational  
22 dose for people who were exposed at the PPG but who

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1 may not have been monitored.

2 And so, from that point of view, I want  
3 to go to page 22 if we can.

4 And let's see here, on page 22 -- are  
5 we on 22 here? Yes.

6 We have by and large the approach that's  
7 taken by the Site Profile for estimating exposures  
8 to people who were at the PPG. And in essence, we  
9 had, as you see down on the bottom, we had an  
10 assessment here for people who were non-DOE  
11 participants and I have as an example Operation  
12 Greenhouse.

13 And these are taken from Appendix A of  
14 the PPG Site Profile and they offer you a  
15 distribution of radiation exposures on behalf of  
16 non-DoD participants.

17 As you see in the bottom there, there  
18 are a total of, let me see, I don't have -- of 551  
19 participants, 110 were exposed to zero dose  
20 according to the Site Profile and you see the other  
21 distributions, 325 were exposed to doses between  
22 1 millirem and range of 1 milliroentgen to one

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1 roentgen and so on and so on.

2 And I just wanted to make that as a  
3 reference point with regard to what is the  
4 calculated dose at the 50th percentile which is at  
5 the very base, 0.95 rem.

6 Are we on that screen? Let's see,  
7 okay.

8 MR. STIVERS: I think you were looking  
9 at Crossroads, do you want to go down to the  
10 Greenhouse?

11 DR. BEHLING: Yes. I was looking at  
12 Greenhouse, I wasn't sure which one you were  
13 showing. Oh, that's the -- okay, at the bottom.  
14 Okay, yes.

15 Those are the numbers I just cited to  
16 you because Greenhouse, I want to reference because  
17 it identifies some of the problems that are  
18 associated with the failure to accommodate the  
19 exposures that come from fallout.

20 Anyway, let's go back. In terms of  
21 Greenhouse, this is an example of what the original  
22 PPG Site Profile would assign persons from

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1 occupational exposure and, as I said, for non-DoD  
2 participants of which there were 551 participants,  
3 you had the average exposure for that group of  
4 individual would have been half of a roentgen of  
5 0.5 as you state down there and the maximum on that  
6 people was 8.6.

7 But for the 50th percentile value, the  
8 occupational exposure would have been assigned of  
9 0.95 rem. Okay?

10 And I want you to keep that number in  
11 mind because when we now talk about what was the  
12 dose perhaps to people who were affiliated with the  
13 Greenhouse operation? And were not necessarily  
14 even monitored. What might have been their  
15 potential radiation exposure from ordinary  
16 fallout? Which was obviously not considered in  
17 the PPG.

18 And for that, I want to just briefly  
19 spend a few minutes just to show everyone what the  
20 concerns are. And I want to go to page 30, John.  
21 That shows you something that is relevant to that  
22 particular issue. If you can raise that up, John,

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1 to show the entire thing?

2 This is Enewetak Atoll which is the  
3 Ground Zero for the 42 detonations that took place  
4 during the time periods between '46 and '58.

5 And what you see down there are  
6 highlighted, the three areas below that are around  
7 5:00. And those identify locations, in other  
8 words, islands -- the island of Japtan, Parry and  
9 Enewetak.

10 And the reason I pointed those out to  
11 you is this is where many of the people who were  
12 a part of the Operation Greenhouse actually lived,  
13 they worked there, they lived here, they  
14 essentially spent all times there other than when  
15 they were on specific missions.

16 At the same time, when you look at the  
17 location of Japtan, Parry and Enewetak, there are  
18 a total of four tests that were a part of Operation  
19 Greenhouse.

20 And at the very bottom, the first one  
21 down there that's highlighted is the Test Dog that  
22 occurred on April 7th, '51.

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1           The second one is Easy which is at the  
2 very top. At the very top there you will see Test  
3 Easy.

4           And then the third one is in the middle  
5 and then that was Test George and the last one's  
6 Test Item.

7           And just to give you an understanding  
8 of what these facilities looked like that housed  
9 these people during this time frame, I would ask  
10 John to give you page 31.

11           And the first picture is a picture of  
12 what the island looked like for Enewetak Island  
13 that is subsequent to -- it used to be called Fred.  
14 And you see all the facilities, the buildings,  
15 these sort of makeshift buildings that were built  
16 specifically for the conduct of these tests in the  
17 Pacific.

18           When before 1946, these were islands  
19 that were covered by coconut groves and there were  
20 no structures there.

21           The one below that is Parry Island.  
22 Again, you will see all of the structures that had

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1 to be placed there. This is where people spent  
2 their time. They either lived there, worked there  
3 or both.

4 And on the next page, there's Enjebi  
5 Camp Greenhouse and there you even see at the lower  
6 picture, John, is that is actually just nothing  
7 more than a tent city where people actually lived  
8 there who worked and spent their time there, 24  
9 hours a day.

10 On page 33, this is where we start to  
11 see what would have been a potential exposure from  
12 background alone, not necessarily covered or  
13 registered on film badges.

14 Can you scroll -- move it down a little  
15 bit so we get the full -- no, the other way, up,  
16 I'm sorry.

17 And what you see here for the time frame  
18 between April and May, the cumulative exposure that  
19 would have been received had you stayed there for  
20 the entire time period.

21 And you realize how much radioactivity  
22 had fallen in the form of fallout on Parry Island.

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1           In more quantitative terms, I want to  
2 go to, at this point, to page 35.

3           And this was actually introduced by the  
4 Defense Nuclear Agency in the rewrites that took  
5 place in 1982 where they reconstructed the doses.  
6 And this is going to be a little difficult, but if  
7 you follow the diagonal line that says arrival date  
8 on Parry Island, you will see that the starting date  
9 comes as early as at the far bottom left on the 8th  
10 of April. Okay? 8th of April.

11           And if a person came to that island and  
12 stayed there for the full duration from April 8th  
13 to the 1st of June which is on the far right hand  
14 side at the very bottom, John, okay, you see the  
15 dose for that individual would have been a total  
16 dose of 4.28 rem.

17           And so, what I wanted to point out here,  
18 if a person had spent that time frame from April  
19 8 to June 1, his exposure for occupational  
20 radiation, but was due to strictly fallout for  
21 which he was not monitored, would have been more  
22 than 4 rem.

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1           And you compare that to what I just  
2 previously told you with the occupational exposure  
3 that would have been assigned to that person based  
4 on Appendix A or Attachment A in the PPG Site  
5 Profile, it would have been less than 1 rem.

6           And so, what I wanted to do is dramatize  
7 the significance of fallout as part of the exposure  
8 that in many instances could far exceed the actual  
9 monitored exposure based on mission badges that  
10 were defined in the PPG Site Profile by NIOSH  
11 earlier that I mentioned was less than 1 rem.

12           So, that, in essence, is what concerns  
13 the Issue Number 2, that is the occupational  
14 environmental dose that was really not addressed  
15 in the original Site Profile and, at this point,  
16 I think it needs to be looked at very carefully.

17           And that was not necessarily consistent  
18 throughout that whole 60 year period, but it did,  
19 in fact, involve certain locations, certain time  
20 frames that are documented within DNA documents  
21 that should be looked at.

22           And I guess from NIOSH's response, they

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1 agree with Section 4 and you see, they will  
2 obviously address it in Section 6 of the PPG Site  
3 Profile.

4 Are there any other comments from  
5 NIOSH?

6 MR. ROLFES: This is Mark and I just to  
7 point out also that under the current SEC in the  
8 absence of bioassay data, internal dose won't be  
9 reconstructed for individuals just because of the  
10 SEC.

11 DR. BEHLING: Okay.

12 MR. ROLFES: And I'm mentioning that  
13 since you had mentioned both external and internal  
14 doses in your findings.

15 CHAIRMAN LOCKEY: Hans?

16 DR. BEHLING: Yes?

17 CHAIRMAN LOCKEY: Chairman Lockey.  
18 This 4 rem, would you consider that the maximum dose  
19 from fallout over the whole period for each time  
20 frame or is this B

21 DR. BEHLING: No, this is strictly as  
22 the slide shows on page 35. The 4.28 rem was the

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1 calculation that was done by the Defense Nuclear  
2 Agency in 1982 when they revisited their earlier  
3 version of the issue that involved Operation  
4 Greenhouse.

5 There were two documents that defined  
6 Operation Greenhouse. The first issue was  
7 released in '51 and then there was a revision to  
8 Operation Greenhouse by the DNA in 1982.

9 And they went back and they actually  
10 looked at some of the data that they did have  
11 available and they reconstructed what the doses  
12 were at these three locations, namely the island  
13 of Enewetak, Parry and Japtan where I showed you  
14 pictures with regards to what these locations  
15 within the Atoll of Enewetak, sort of staging  
16 areas, as work areas, as housing areas, et cetera,  
17 et cetera.

18 And so, they came up with that diagram  
19 that I showed you on page 35 that allows you to take  
20 any combination of when the person may have come  
21 on site during that time frame from April to the  
22 beginning of June and when he exited.

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1           Since it's the one that is shown in  
2 darker color was one that I actually looked at on  
3 behalf of a dose reconstruction that I had to do.

4           In review of the dose reconstruction,  
5 I looked at that individual's entry which, as I  
6 said, was on -- which indicated as [identifying  
7 information redacted], hard to read, and he ended  
8 up -- that person ended up leaving on [identifying  
9 information redacted].

10           And on that basis, I concluded that that  
11 person's unmonitored exposure from fallout would  
12 have been 0.94 rem which is exactly what he would  
13 have received in addition to the occupational  
14 exposure based on what the original PPG Site  
15 Profile had that identified the value of 0.95 rem  
16 that NIOSH would have assigned him.

17           But that exposure for that duration on  
18 Parry Island, he would have also received the same  
19 amount dose from unmonitored occupational  
20 environmental dose.

21           DR. MAURO: And this is all external,  
22 Hans, right?

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1 DR. BEHLING: All external.

2 DR. MAURO: Right.

3 DR. BEHLING: And the important thing  
4 here is to understand one more thing, and that is  
5 when we look at the failure to address potential  
6 environmental dose that is not monitored is that  
7 it was very definitely significant.

8 And here I can say for those three  
9 locations that I mentioned, Japtan, Enewetak and  
10 Parry, if a person had stayed the full duration for  
11 Operation Greenhouse, he would have received a  
12 total external whole body dose of about 4 rem or  
13 slightly more than 4 rem at each of those locations  
14 from fallout.

15 And what is really significant here  
16 applies to people who do not have the presumptive  
17 cancers because their the internal exposure would  
18 have been obviously affected by these large  
19 occupational external whole body doses.

20 But, more importantly, for people who  
21 might have had a claim with skin cancer, which is  
22 not a presumptive cancer, what you also then have

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1 to add to that dose is the beta dose, that we'll  
2 talk about under Finding Number 6, and that can be  
3 ten times higher.

4 So, I wanted to emphasize the fact that  
5 Finding Number 2 has a very real significance in  
6 behalf of presumptive cancers, skin cancers as well  
7 as non-presumptive especially the skin cancer  
8 where we have to add to the additional dose that  
9 we just identified, talked about the much higher  
10 beta dose that we will discuss under Finding Number  
11 6.

12 MR. ROLFES: Hans, this is Mark. I've  
13 got a question.

14 DR. BEHLING: Yes?

15 MR. ROLFES: I presume this is the same  
16 case that you had referenced further on in the  
17 report for which you did the fallout assessment  
18 for? Is this for the same individual that's  
19 referenced further on in the report? You said yes?

20 DR. BEHLING: Yes.

21 MR. ROLFES: Okay. We have different  
22 employment dates than what you had mentioned. We

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1 have an employment end date of [identifying  
2 information redacted], 1951. And we also do, if  
3 you take a look in the DOE dosimetry records for  
4 this individual, I do see that there was a fallout  
5 assessment done for this particular individual  
6 from Operation Greenhouse.

7 DR. BEHLING: Oh, I remember that.  
8 But, this was done with 1951 data, not the 1982 DNA  
9 data.

10 MR. ROLFES: Okay.

11 DR. BEHLING: I realize there was a  
12 very marginal, I think like 60 millirem assigned  
13 to him from fallout.

14 MR. ROLFES: Correct.

15 DR. BEHLING: And he clearly stated he  
16 lived or stayed on Parry and Enewetak and he also  
17 spent time at Enjebi Island before they were  
18 removed because the fact that there was a test  
19 conducted on Enjebi.

20 So, I don't believe that that  
21 assignment of 60 millirem will clearly prove to be  
22 the correct value assigned from fallout.

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1                   MR. ROLFES:     Okay.     Yet, we can  
2 certainly take a look at what you've pointed us to  
3 here.

4                   MR. STIVER:    This is John Stiver.  I  
5 might also add that the NA unit dose assessments  
6 are available at the DTRA website for all shifts  
7 and locations for all of the PPG operations.  And  
8 these are the ones that came out in and basically  
9 were published in '83.

10                  And in addition to that, I know DTRA is  
11 graded in SOP Manual with operation specific  
12 appendices which I was involved with before I came  
13 to SC&A.

14                  Those are not available at this time to  
15 the public because they haven't been through an  
16 external review.  But they are essentially very  
17 close to the 1983 reports that are available.

18                  And I've been involved in NTPR for a  
19 number of years.  I can tell you that there's a lot  
20 of research and work that went into developing  
21 those unit dose reconstructions.  And those are  
22 probably your best bet for assessing fallout dose

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1 for people at different locations.

2 DR. BEHLING: Are we done with that  
3 discussion?

4 DR. NETON: This is Jim. I was going  
5 to summarize.

6 I think Finding 2 is in abeyance and  
7 basically all we are going to do there is to defer  
8 any dose reconstruction to Section 6 for  
9 occupational dose considering that it's all  
10 basically occupational dose.

11 DR. BEHLING: Yes. I had mentioned to  
12 you, I only brought it up because it was an issue  
13 under environmental but, in essence, you can put  
14 it in either camp, either environmental or  
15 occupational.

16 DR. NETON: I agree. I think we kind  
17 of jumped in to the next finding really. It's  
18 getting into the reconstruction of the doses in  
19 general.

20 DR. BEHLING: Yes. Finding Number 3  
21 is a broad sweeping finding that deals with what  
22 was the priority of the monitoring that was done?

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1           And there was many, many problems which  
2 I discussed in Section 7.1, 7.2 and 7.3 and I don't  
3 want to go through -- go over all of those things,  
4 but what I want to do is perhaps just summarize  
5 those things, some of the issues that I brought up.

6           And that summary is presented in  
7 Section 7.4.1 on page 41 and 42.

8           Okay, the bottom of page 41 starts and  
9 I just want to briefly go over and among -- we've  
10 already mentioned the use of mission badges.

11           For those who are not necessarily  
12 familiar with it, mission badges were those that  
13 were assigned early on because of the shortages of  
14 film dosimeters.

15           Understand, again, I want to go back.  
16 In the case of Operation Crossroads, we had 42,000  
17 personnel on location and many of these were  
18 obviously required to have monitoring done.

19           But monitoring done was oftentimes  
20 limited to select tasks when a person had to go to  
21 retrieve instruments on the very island where a  
22 surface detonation took place.

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1           They were oftentimes then brought with  
2 amphibious ships on to the shore of that island and  
3 then on a time basis, go in there, grab that thing  
4 and bring it back for us for analysis.

5           And so, the badge for that particular  
6 task would be issued on the morning of that day and  
7 would be retrieved from that person at the end of  
8 the day and that was it. And it would oftentimes,  
9 they would subtract and background radiation that  
10 was not affiliated with that particular task.

11           And those were the mission badges that  
12 we are obviously concerned about and have discussed  
13 under Finding 1 that will obviously be an issue that  
14 the DOL will have to wrestle with.

15           But, mission badges were one of the few  
16 things that oftentimes were monitored. And so,  
17 what was not monitored was the very issue that we  
18 brought out under Finding Number 2, namely the  
19 continuous exposure 24/7 when there was  
20 significant fallout for personnel who were living  
21 and staying on these other Atolls.

22           So, mission badges obviously were only

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1 assigned for select tasks and for a very  
2 restrictive time periods. And moreover, mission  
3 badges were not assigned for everybody. As I said,  
4 they were only there for those people that we  
5 considered or they considered were very likely to  
6 experience high radiation dose fields for select  
7 tasks in hand. On page 42, that summary continues.

8 The other issue was that if you read  
9 through some the DNA report was the practice of  
10 cohort badging. And cohort badging refers to the  
11 practice where, again, for reasons that these film  
12 dosimeters were not always there in large supplies.

13 As I said, when you had tens of  
14 thousands of people to monitor and oftentimes these  
15 badges have to be not only retrieved, issued,  
16 retrieved, but then they had to also read these  
17 badges and assess their readout and then  
18 redistribute it again.

19 And when you do that for that many  
20 people, you realize you can't do this at a low  
21 multiplication. All these facilities were  
22 obviously makeshift land facilities or onboard a

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1 ship.

2 So, what they did in order to be able  
3 to at least provide some measure of protection for  
4 workers was to engage in cohort badging where one  
5 person would wear the badge such as the rad-safe  
6 person who was actually overseeing the activity of,  
7 let's say, 50 to 100 men and whatever that person  
8 would register on his badge would also apply to the  
9 entire cohort which would not necessarily be an  
10 accurate assessment but, perhaps, a representative  
11 assessment.

12 But another problem with cohort badging  
13 is that not always would the people who were part  
14 of the cohort identified. So, in essence, what you  
15 had was a person who had the benefit of a cohort  
16 exposure but not necessarily was documented in the  
17 records that he was part of that cohort. So,  
18 that's another major issue.

19 And in the next bullet, the cohort  
20 badging oftentimes was not necessarily even  
21 recorded. At the time, there was limited concern  
22 about getting a definitive assessment of exposure

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1 but, perhaps, avoiding any exposure that was  
2 considered less than safe.

3 And what is the maximum permissible  
4 exposure, MPE, which is on the second bullet on page  
5 42, that value turned out to be about 100 millirem  
6 per day. So, in essence, oftentimes people were  
7 monitored strictly to avoid any exposure in excess.  
8 And if the daily exposure was below that, then it  
9 was fine.

10 And that exposure was oftentimes  
11 recorded by a dose-rate instrument. So, there  
12 wasn't even a film badge involved that would serve  
13 as a permanent record. But, it was strictly a  
14 dose-rate instrument that was monitoring the area  
15 where personnel worked and, if on a basis of the  
16 time frame that these people were in there, would  
17 suggest a dose for that day of less than a 100  
18 millirem, they were in compliance with the MPE  
19 values.

20 So, those were sometimes the mechanism  
21 by which the rad-safe people applied their practice  
22 of controlling radiation exposure among workers.

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1 Film badge, there were issues that I  
2 discussed in these other Section 7.1, 7.2, 7.3 that  
3 dealt with how these film badges were calibrated  
4 and processed and how they were interpreted.

5 And there were instances I cite where  
6 some of the film badges, we always consider film  
7 badges to have a limit of detection of around 40  
8 millirem. In some instances, as documented and I  
9 took verbatim statements out of the DNA reports,  
10 some of those badges had an LOD of 400 millirem.  
11 Below that, they were not considered reliable.

12 There were other issues regarding  
13 decontamination efforts where exposures was not  
14 necessarily one that was captured on a film badge  
15 but involved skin contamination.

16 Clearly one of the most obvious  
17 instances was the estimate of Operation Crossroads  
18 where during the Test Able, a total of 67 ships that  
19 had been amassed in the lagoon of Bikini were  
20 exposed to radiation that came from a bomb that was  
21 dropped 550 feet above them with the intent of  
22 seeing how these naval vessels would respond to a

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1 nuclear sub.

2 And of course, as a result of that,  
3 these vessels were heavily, heavily contaminated  
4 and people would go out there and pretty much then  
5 decontaminate them, oftentimes wearing nothing  
6 more than short pants and maybe a pair of shoes.

7 And they would also get obviously  
8 contaminated on their skin as well as on their  
9 clothing and, again, that is contamination --  
10 external contamination that was not captured.

11 So, all of these things were discussed  
12 here and they by and large constitute Finding  
13 Number 3. And there is a fairly extensive response  
14 on the part of NIOSH.

15 Let's see here, does anybody want to  
16 comment from NIOSH regarding the response for  
17 Finding Number 3? Mark?

18 MR. ROLFES: Let's see, I'm just going  
19 to go ahead and read through the response here.

20 It says, NIOSH understands that there  
21 are deficiencies related to the film badge  
22 dosimetry data and procedural practices identified

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1 by the NRC in 1989 and SAIC in 1989 through 2006  
2 as well as Perkins and Hammond in 1980.

3 In light of these deficiencies, NIOSH  
4 finds it intractable to achieve more accurate dose  
5 assessments than those provided by the Defense  
6 Nuclear Agency and reduced in Attachment A of ORAU  
7 Technical Basis 52 with realistic uncertainty  
8 ranges.

9 Many of the data have been lost or never  
10 captured to make such an effort feasible.  
11 However, the next revision of the Technical Basis  
12 Document will include a revision to Attachment A  
13 to provide the 95th percentile doses as  
14 appropriate.

15 And then we've got a reference to see  
16 Findings 8 and 9 below.

17 For cases where occupation on the  
18 various islands documented in the dosimetry  
19 records and their stay times are known, either by  
20 personnel badges --

21 Sorry, I just realized I had it on  
22 speaker phone. I'm talking into the receiver so

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1 hopefully you can hear me a little bit better now.

2 Let's see, where did I leave off?

3 Let's see, okay.

4 -- either by personnel or cohort film  
5 badges or reentry logs, additional dose can be  
6 calculated in accordance with the information  
7 provided in Figures 7-6 through 7-10 and added to  
8 doses assigned using Attachment A to account for  
9 unmonitored exposure to fallout.

10 It should be noted that during  
11 Operation Castle in the first half of 1954, the 85  
12 to 90 percent of all personnel were issued  
13 operational film badges. In addition, all  
14 personnel involved in the reentry activities were  
15 also issued mission badges that were read at the  
16 end of each mission.

17 For Operation Wigwam on May 15, 1955,  
18 and all subsequent tests at PPG, 100 percent of all  
19 personnel were issued operational film badges. In  
20 addition, all personnel involved in reentry  
21 activities were also issued mission badges that  
22 were read at the end of each mission.

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1 DR. BEHLING: Yes, and I think that  
2 pretty much satisfies the concern. As I mentioned  
3 beforehand, some of the issues that we are  
4 identifying on behalf of the findings were not  
5 issues that proved they were throughout the entire  
6 16 year period.

7 But oftentimes were issues that  
8 confined to a certain number of years in the early  
9 years and ceased to be a problem later on,  
10 especially the issue when in 1956 all personnel who  
11 came on site were issued film badges for the full  
12 duration of their stay at the PPG.

13 So, one had to realize that not all  
14 these findings have relevance to the entire 16 year  
15 period.

16 And in context, the recommendation to  
17 use the 95th percentile dose that are part of the  
18 Attachment A, it's the original PPG Site Profile,  
19 that certainly raises the bar considerably for a  
20 coworker dose in the event that there are no  
21 additional exposure data available for that  
22 individual.

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1                   CHAIRMAN LOCKEY: Any other comments  
2 about that?

3                   DR. BEHLING: Okay.

4                   MR. KATZ: I guess, can I just check  
5 with you, Andy, and the other Board Members,  
6 though? So, how does this finding stand for you  
7 all in terms of the context that addresses his  
8 concern, but he's speaking for SC&A?

9                   CHAIRMAN LOCKEY: Jim Lockey. I think  
10 I'm fine with this. If we're going to use the 95  
11 percent where additional data is not available, it  
12 sounds like that data is available after '54. Is  
13 that correct, Jim?

14                   DR. NETON: No, we're going to use the  
15 95th percentile of the mission badges that were  
16 summarized in Attachment A and they were recorded.  
17 Then we'll add any additional dose that we may find  
18 or the fallout doses as Hans indicated particularly  
19 in Figure 7-6 through 7-10 if we have that  
20 information.

21                   Oftentimes we don't have that kind of  
22 specific information for these folks. It's a lot

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1 more sketchy. But if it is there, that's what we  
2 will do. We'll modify the Site Profile  
3 accordingly.

4 CHAIRMAN LOCKEY: And what about after  
5 1954?

6 DR. NETON: After '55 they were  
7 operational badges.

8 CHAIRMAN LOCKEY: And that's the data  
9 you used then, correct?

10 DR. NETON: That's a good question.  
11 Gene Rollins is on the phone, I'm not as familiar  
12 with the data as he is, I think.

13 MR. ROLLINS: It should be after -- at  
14 starting with Wigwam, everybody was issued a badge.

15 DR. NETON: Right.

16 MR. STIVER: This is John. I might be  
17 able to help out a little bit here.

18 That is correct, after Wigwam and it's  
19 particularly in their PPG operations starting with  
20 Redwing.

21 All the participants had permanent  
22 badges and any additional mission badges they got

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1 for a particular activities like retrieving  
2 instrumentation and so forth were worn with the  
3 permanent badge.

4 So basically, it's going to be like  
5 raisins in the pudding. I mean whereas in their  
6 earlier years, they didn't have those permanent  
7 badges so we had the mission badges which reflected  
8 activities that did not include the fallout but  
9 particular occupational activities would then have  
10 to be added to the fallout dose to get the full  
11 picture.

12 DR. BEHLING: And like I said, you  
13 know, the issues that I addressed with regard to  
14 some of the problems involving the calibration,  
15 involving issues that were oftentimes fraught in  
16 the design of the film badge.

17 One of the major concerns that they  
18 encountered were the very, very adverse conditions  
19 that the Pacific Ocean and the latitude presents,  
20 and that is the high humidity and the constant high  
21 temperatures that these badges and oftentimes  
22 badge failures that were commonplace in those days

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1 cannot be rectified.

2 So, you have to simply live with the  
3 fact that, you know, they were certain deficiencies  
4 in the program, the design of the badges, the  
5 calibration of the badges and so forth.

6 And we can't make a change to that. We  
7 have to simply accept that that as part of the  
8 compensation as NIOSH has been doing through --  
9 offer here, is to use the 95th percentile value.  
10 Because we can't go back and change what happened.  
11 We can't undo certain problems involving faulty  
12 calibration procedures or anything else.

13 But I think the benefit of doubt can be  
14 given by using the 95th percentile as the coworker  
15 value that may be appropriate.

16 CHAIRMAN LOCKEY: One more question  
17 about Wigwam. So, we have -- so, in 1955 with  
18 Wigwam when people were issued operational film  
19 badges, was that carried through when they went  
20 back to their personal headquarters? Sleeping  
21 headquarters, et cetera? Were those badges -- did  
22 they maintain those badges during that time?

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1 DR. BEHLING: Yes, they did. From  
2 what I gathered, when they were assigned, the  
3 people were actually asked to keep them on their  
4 person for the full duration, 24 hours a day.

5 CHAIRMAN LOCKEY: While they were in  
6 the area no matter what they were doing?

7 DR. BEHLING: Yes.

8 CHAIRMAN LOCKEY: Okay, thank you.

9 MR. KATZ: So then, Work Group, is this  
10 finding in abeyance?

11 CHAIRMAN LOCKEY: Let's go around.  
12 Andy?

13 MEMBER ANDERSON: I think so.

14 CHAIRMAN LOCKEY: Loretta?

15 MEMBER VALERIO: Can you hear me?

16 CHAIRMAN LOCKEY: Yes, I hear you now.

17 MEMBER VALERIO: Okay. I believe that  
18 it is in abeyance.

19 CHAIRMAN LOCKEY: Jim Lockey. I  
20 agree.

21 MR. KATZ: Okay, thanks.

22 CHAIRMAN LOCKEY: Go ahead, Hans.

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1 DR. BEHLING: Okay. Finding Number 4,  
2 the issue there is one of, let's see here, in the  
3 PPG in Section 6 of the original NIOSH PPG Site  
4 Profile, the statements that the assignment of  
5 unmonitored dose to participants who did not  
6 receive a dosimeter should be evaluated.

7 Now, I don't know what that really  
8 means. Again, it should be evaluated but can it  
9 be reasonably evaluated by someone who is a dose  
10 reconstructor without some additional guidance and  
11 additional information? And that is really the  
12 concern I had with regard to Finding Number 4.

13 So, that beyond the recommendation that  
14 an unmonitored dose should be evaluated, NIOSH  
15 really should provide some additional guidance as  
16 well as information that may be used by the dose  
17 reconstructor to do this.

18 MR. ROLFES: This is Mark, Hans. In  
19 the next revision of the Site Profile, we'll revise  
20 the statement to read as follows.

21 It says, covered employees that  
22 participated in the various Pacific Proving Ground

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1 operations and were not badged can be assigned  
2 coworker doses as outlined in Attachment A.

3 DR. BEHLING: Okay. Now, is this the  
4 coworker dose that is referenced above under  
5 Finding 3, the 95th percentile value?

6 MR. ROLFES: That's correct, as  
7 appropriate.

8 DR. BEHLING: Okay. So, I'm going to  
9 just add that to my list here, 95th percentile value  
10 for coworker. Okay.

11 Okay, item --

12 CHAIRMAN LOCKEY: Hans, are you happy  
13 with that?

14 MR. KATZ: Hans, do you agree with  
15 that?

16 DR. BEHLING: Oh, yes, yes. I wasn't  
17 sure that I was being asked here. Yes, as I said,  
18 if the 95th percentile coworker dose and, again,  
19 I think there should be an additional statement  
20 that if there's any exposure that's associated with  
21 significant fallout as was the case with Operation  
22 Greenhouse, I think that also should be included

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1 in unmonitored exposure.

2 CHAIRMAN LOCKEY: As an add-on?

3 DR. BEHLING: Yes.

4 CHAIRMAN LOCKEY: Right? Okay.

5 MR. KATZ: Does the Work Group?

6 CHAIRMAN LOCKEY: I'm fine with that.

7 I vote for abeyance.

8 MEMBER VALERIO: I agree that it's in  
9 abeyance, too.

10 MEMBER ANDERSON: Yes, I agree. We're  
11 not closing out much.

12 MR. KATZ: Well, abeyance is  
13 effectively closing it. I mean the reason I'm  
14 trying to capture this, too, is because this  
15 relates to work being done by the Dose  
16 Reconstruction Subcommittee. And if we get these  
17 in abeyance then closure, then they can move  
18 forward with --

19 MEMBER ANDERSON: Okay, that's --

20 MR. KATZ: -- sited work.

21 MEMBER ANDERSON: I don't think  
22 there's anything more for us to do other than to

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1 --

2 MR. KATZ: Right.

3 MEMBER ANDERSON: -- verify that it's  
4 occurred.

5 MR. KATZ: Right.

6 CHAIRMAN LOCKEY: That's correct.

7 MR. KATZ: Okay, thanks. Hans?

8 DR. BEHLING: Okay. Finding Number 5,  
9 the issue here is one where I think the PPG Site  
10 Profile recommended the assignment of 30-250 keV  
11 for external photon dose.

12 And when I look at the average energy  
13 from fission products that are obviously the  
14 principle source of the external photon dose, the  
15 average photon dose is more along the lines of 700  
16 keV.

17 And when I look at the radiation  
18 exposure geometry, when you have fallout, it occurs  
19 over the infinite plane, meaning that if you're  
20 standing on infinite plane and fallout is all  
21 around you, front, back, side, you are in essence  
22 exposed to a rotational isotropic exposure

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1 geometry.

2 And when I look at the DCF values in  
3 Implementation Guide 1 for all organs, you were  
4 inclusive of skin dose, you will find that the DCF  
5 value is consistently higher for the exposure  
6 geometry of isorotation for a 250 keV photon dose  
7 as opposed to 30-250.

8 MR. ROLFES: This is Mark. And I'll go  
9 ahead and start with the response here that we have.

10 And that is that, although the  
11 isotropic or rotational geometries might be more  
12 realistic, the general approach taken in our dose  
13 reconstructions is to apply the dose conversion  
14 factor which yields the highest Probability of  
15 Causation.

16 And with the exception of the lungs,  
17 esophagus, red bone marrow and bone surfaces which  
18 are referenced in Guide 1, Section 4.4, the highest  
19 dose conversion factor is typically associated  
20 with the 30-250 keV photon energy range and the AP  
21 geometry when we're converting exposure to organ  
22 dose as you would with the film badge.

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1           In addition, that's described in Table  
2           5A of the NIOSH IREP Technical Documentation, the  
3           radiation effectiveness factor is significantly  
4           higher for photons in the 30-250 keV energy range  
5           compared to the greater than 250 keV energy range.

6           These two factors lead to the  
7           recommendation given in Section 6.

8           DR. BEHLING: Well, I don't agree with  
9           it. If you look at the DCF for rotation and ISO  
10          for any organ and, I'm looking at the exposure R  
11          to organ. In other words, a roentgen to rad dose  
12          value, the DCF's the higher for the two 250 keV.

13          MR. SMITH: Well, this is Matt Smith  
14          with ORAU team.

15          I'm looking at the same things. I  
16          picked the colon just to grab an organ that doesn't  
17          have any correction factors that need to be applied  
18          per the IG.

19          And, you know, if we take a look at what  
20          the AP DCF would be with the colon, it's a value  
21          of about 1. It's 1.06 at 30-250 keV.

22          Now, if we were to assume a geometry of

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1 exposure that is either rotational or isotropic,  
2 it certainly could be the case in the conditions  
3 that are discussed here, the highest value would  
4 be, as you said, for greater than 250 keV, it would  
5 be a value of 0.720 and that would be for a  
6 rotational assumption.

7 Certainly, if you look at rotational on  
8 its own as a geometry assumption, the 30-250 value  
9 would be .68 and the greater than 250 would be .72.

10 So, certainly, choosing that higher  
11 energy range would be appropriate if he were just  
12 going to go with limiting your assumption to  
13 rotational.

14 But, as Mark said, on this program from  
15 a very early date, we've gone ahead and gone with  
16 an assumption of the DCF that gives us in most all  
17 cases a higher dose. And in this case, that would  
18 be using a DCF of 1 under the AP 30-250 criteria.

19 And also, per the IREP Technical Guide,  
20 when you're in that mid-range photon category,  
21 you're getting a greater REF factor which affects,  
22 you know, which drives the PoC higher.

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1 DR. BEHLING: Yes. Well, as I said,  
2 when I look at the historical data in some of the  
3 DNA documents, they oftentimes mix roentgens, rad  
4 and rem interchangeably and so it's very difficult  
5 to see what you're really measuring.

6 I realize some badges were used but were  
7 they calibrated in units of roentgens or rem or rads  
8 or rems? I don't know.

9 MR. SMITH: Well, we're certainly  
10 assuming exposure or --

11 DR. BEHLING: Okay.

12 MR. SMITH: -- the quantity being  
13 measured in the field.

14 DR. BEHLING: I guess I would consider  
15 this a minor issue given the uncertainty of the  
16 dosimetry program as a whole and then I think we  
17 can possibly put this just away and not spend a lot  
18 of time addressing that particular issue.

19 DR. MAURO: This is John. Just a quick  
20 question. Is this explanation you just gave in the  
21 Site Profile or is this something -- a position you  
22 have taken, of course, more recently and will be

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1 applied in this circumstance?

2 MR. ROLFES: This is Mark. And this is  
3 something that has been done essentially from day  
4 one when converting exposure to organ dose.

5 The only change to it essentially is the  
6 accepted four organs which we had mentioned here,  
7 the lungs, the esophagus, red bone marrow and bone  
8 surfaces.

9 DR. MAURO: Okay, so, then this  
10 description is in the current Site Profile?

11 MR. ROLFES: It wouldn't be in the Site  
12 Profile.

13 DR. MAURO: Oh, okay.

14 MR. ROLFES: It would be in our  
15 Implementation Guideline B

16 DR. MAURO: Okay.

17 MR. ROLFES: -- or in dose  
18 reconstructors instructions on how to interpret  
19 the --

20 DR. NETON: But it does say -- this is  
21 Jim -- to use the 30-250 keV energy range which is  
22 claimant-favorable. I mean I think we've

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1 established that, that this is a  
2 claimant-favorable approach. I don't think  
3 there's any modification required here.

4 DR. MAURO: So, 30-250 and AP is your  
5 approach to the dose conversion factor strategy  
6 for, let's say, this large surface area  
7 contamination?

8 MR. STIVER: I think this would be an  
9 isotropic or I think you can also probably use the  
10 --

11 DR. NETON: No, you could -- if you went  
12 for isotropic or rotational, you would end up with  
13 a lower --

14 DR. MAURO: Lower dose, yes.

15 DR. NETON: -- lower dose. I mean --  
16 (Simultaneous speaking.)

17 MR. STIVER: We're going to go with  
18 whatever geometry gives you the highest dose in the  
19 most claimant-favorable outcome.

20 DR. NETON: But -- in almost all cases,  
21 it will be 30-250 AP geometry with the exception  
22 of the lung, esophagus, red bone marrow and bone

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1 surface.

2 DR. MAURO: Oh, okay. Well, unless  
3 anyone else -- the way I see it is that you're taking  
4 the most bounding set of assumptions.

5 DR. NETON: That's the idea.

6 DR. MAURO: Yes. Okay, got it. Thank  
7 you.

8 MEMBER ANDERSON: Even if it perhaps  
9 doesn't most accurately reflect what it actually  
10 was?

11 DR. NETON: Well, we just don't know.  
12 I mean, yes, it could be it's more likely  
13 rotational, but we don't know. I mean --

14 MR. ROLFES: Yes, we certainly agree  
15 that the exposure geometry could be different than  
16 the AP geometry, but the AP geometry is essentially  
17 giving us a dose conversion factor two times higher  
18 than the isotropic and a little bit higher than the  
19 rotational for the colon for the organ that Matt  
20 Smith had mentioned when converting exposure to  
21 organ dose.

22 CHAIRMAN LOCKEY: So, how do we resolve

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1 this? Is the SC&A willing to say they accept the  
2 NIOSH approach here?

3 MEMBER ANDERSON: Or the NIOSH  
4 explanation?

5 DR. BEHLING: Yes, I think it's one  
6 that we will go along with, the approach that NIOSH  
7 is taking.

8 CHAIRMAN LOCKEY: Okay.

9 MR. KATZ: So, the Work Group Members?

10 MEMBER ANDERSON: That's fine with me,  
11 yes. I understand the rationale.

12 CHAIRMAN LOCKEY: Jim Lockey. I do  
13 too. I'm fine with that.

14 MEMBER VALERIO: This is Loretta. I'm  
15 fine with that as well.

16 MR. KATZ: Okay, good. Thanks. Back  
17 to you, Hans.

18 DR. BEHLING: Okay. Finding Number 6,  
19 and this is a very important one here for at least  
20 a couple of special cases and that involves the  
21 beta-gamma dose ratios.

22 If we go to on page 44, John, we will

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1 see what was at least in a summary fashion  
2 recommended in behalf of supplying a beta-gamma  
3 dose ratio for those instances where we had a deep  
4 dose available.

5 And in that particular table there, you  
6 see is Table 7-3, gives you an understanding of what  
7 the ratio was between beta and photon for various  
8 time frames following a detonation.

9 So that between zero and 50 days after  
10 detonation, if you had a dose rate that -- or a dose  
11 measurement that involved a photon deep dose, the  
12 beta dose or the beta dose rate would be a factor  
13 of ten higher.

14 And again, you see on that table, there  
15 were different time frames, 50-365 days, one to  
16 five years greater and five years.

17 The latter years are not really  
18 relevant with regard to the PPG. These were --  
19 these tables were developed for the Nevada Test  
20 Site.

21 When you a facility such as the PPG  
22 where you had, especially in later times,

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1 detonation after detonation, what you have to  
2 understand is the dose rate for both gamma and beta  
3 diminishes exponentially.

4 And so, if you have a detonation that  
5 took place, let's say, two months ago, and then you  
6 were subject to a fallout from a recent one a day  
7 or two old detonation, the fallout from that, the  
8 ratio may increase for the beta-gamma for the  
9 earlier one because of the time frame.

10 But the actual absolute quantity in  
11 terms of dose or dose rate would be so severely  
12 diminished so as not to really contribute very much  
13 to the new dose that was generated from a detonation  
14 yesterday where the beta to gamma ratio was only  
15 a fact of ten as opposed to, let's say, 25.

16 And so, what we really have to focus  
17 here with regard to PPG is the beta-gamma ratio of  
18 ten because of the large number and frequency of  
19 detonations.

20 But anyway, what I wanted to -- there  
21 are much more detailed information in the Nevada  
22 Test Site Profile in Appendix C, I believe.

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1           But what I really wanted to point out  
2 here with regard to my finding was that the  
3 refinement that you could introduce here for skin  
4 doses that involve certain parts of the body and  
5 that is defined by a document that was published  
6 in Health Physics by Barss and Weitz in 2006 and  
7 that is on page 45. And that is really the issue  
8 that I wanted to bring up here.

9           And what they have here is also a ratio  
10 that is defined by time from everything from a  
11 fraction of an hour all the way to two years.

12           But in addition to that, there is also  
13 the distance from the plane source to a particular  
14 part of the external body.

15           And so, you see distances from one  
16 centimeter to 200 centimeters. In other words, a  
17 six foot person or more would be essentially, you  
18 know, or more than that, a basketball player would  
19 reach that height.

20           But when you have, for instance, a skin  
21 cancer that occurs at the level of the knee or the  
22 calf, you will might also then have a secondary way

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1 of increasing or defining that dose based on the  
2 lower level that would obviously represent a higher  
3 dose than that's represented by the dose ratio in  
4 Figure 7.3 or 7-3 that we just looked at.

5 And so, I wanted to just introduce that  
6 table and this, in fact, introduced, I believe, in  
7 the NTS Site Profile.

8 Now, one of the things that I really  
9 wanted to bring out here, however, and that is much  
10 more important than this refinement that  
11 identifies the height above the plane ground as  
12 given here in Table 7-4 by Barss and Weitz is the  
13 fact that I looked at the NTS Site Profile and on  
14 page 49 of that Profile, it gives you yet another  
15 option and this is an option that was, in fact,  
16 exercised by the dose reconstruction that I  
17 audited.

18 And when I looked at that, I sort of was  
19 concerned that this might be used more frequently.  
20 I don't know how much it was used in existing cases  
21 where there was a need to assess the beta components  
22 of a photon exposure.

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1                   But on page 49, and I'll just read it  
2 to you, there -- I don't have it available, so I'm  
3 going to have to read it for portions that are  
4 relevant here.

5                   It says on the second paragraph of page  
6 49 it states in the NTS Site Profile the following,  
7 no routine beta monitoring data exists for NTS  
8 prior to 1966. For the time period from 1966 to  
9 1987, 368 of data pairs were identified from 84  
10 claim files with positive beta and gamma results.

11                   In other words, between 1966 and 1987,  
12 there were claims filed where there was both a  
13 photon dose and a beta dose. And they paired those  
14 and they said on the basis of that pairing, the 50th  
15 percentile beta to gamma dose ratio was 1.04  
16 essentially unity, 1-to-1, and the 95th percentile  
17 was 4.59.

18                   And in the case that I looked at, they  
19 actually assessed the person with a skin melanoma  
20 and there they assigned a beta to gamma dose of 1  
21 unity, one.

22                   And I looked at that and the use of NTS

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1 data that involves empirical data, they apply to  
2 NTS but understand one thing, when I looked at these  
3 paired beta and gamma dosimeter readings that  
4 occurred between 1966 and 1987, you have to realize  
5 that the Nuclear Test Ban Treaty that says no more  
6 atmospheric testing was signed on September 24,  
7 1963 and was enacted in October 10, 1963.

8 So that even the earliest of those  
9 paired -- of beta-gamma doses were essentially  
10 established three years after the test ban treaty  
11 and up to, obviously, 20-some years later when we  
12 talk about 1987.

13 Not to mention the fact that people at  
14 NTS were not camped out out there where they  
15 detonated in years past prior to, you know, 1963  
16 and were exposed to purely fallout.

17 So, I would recommend very strongly  
18 that the issue or the option to assign a beta to  
19 gamma dose ratio of one, that might be applicable  
20 for the other years at NTS should not be used for  
21 PPG.

22 I mean, after all, the pictures that I

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1 showed earlier, these people were there in the  
2 aftermath of Operation Greenhouse that had four  
3 detonations in rapid succession over a period of  
4 two months= time frame and they were exposed to  
5 fresh fallout. That is it. I mean there was no  
6 alternative.

7 At NTS a person might have had their  
8 badge exposed to radiation that had nothing to do  
9 with fallout, but may have been exposed to  
10 radiation sources inside buildings as opposed to  
11 sitting out there in the field.

12 So, the most important point I want to  
13 make here is that goes outside the finding that I  
14 had for Finding Number 7, but in essence, I wanted  
15 to make sure that the use of a beta-gamma ratio that  
16 was in fact used in a dose reconstruction, a PPG  
17 dose reconstruction, actually did use the issue of  
18 the 360-some badges, paired badges, that showed a  
19 50th percentile value of essentially 1.0 in terms  
20 of beta to gamma, and I hope that that will not be  
21 used.

22 MR. ROLLINS: This is Gene Rollins. I

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1 own both of those documents, the NTS and the PPG.  
2 And I agree with you entirely and I think it's  
3 wholly inappropriate to use the 1.04 at PPG and  
4 we'll be making changes to the TBD to make sure that  
5 doesn't happen again.

6 DR. BEHLING: Okay. Okay, Finding  
7 Number --

8 CHAIRMAN LOCKEY: So, before we go on,  
9 then from the Board's perspective, any other  
10 questions about Finding Number 6?

11 MEMBER ANDERSON: No, I don't.

12 MEMBER VALERIO: No, I don't. I was  
13 just taking some notes, no.

14 CHAIRMAN LOCKEY: Okay, so we're -- and  
15 Ted, we're in abeyance with this also?

16 MR. KATZ: Yes, that sounds right.

17 CHAIRMAN LOCKEY: Okay.

18 MR. KATZ: Thanks. Hans?

19 DR. BEHLING: Okay, where are we here  
20 now? This is Finding Number 7, okay.

21 My Finding Number 7 comes in context  
22 with the statement that I paraphrased on page 45.

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1 John? Okay, are you on page 45, John? Okay.

2 Okay, Statement Number 5 that I can read  
3 for you here. Statement Number 5 appeared in  
4 Section 6 of the PPG Site Profile and states the  
5 following.

6 Assign missed dose based on the number  
7 of exchanges found in the dosimetry records.  
8 During these tests there were operation badges that  
9 were worn for the entire test sequence, and so  
10 forth.

11 By the way, you realize afterward,  
12 we've talked about the use of a photon badge  
13 assignment did not occur until about 1956 or so time  
14 frame. So, when we talk about assignment of missed  
15 doses, one cannot really rely on that statement  
16 because these badges were oftentimes not  
17 available, if they were available at all.

18 And when they were available prior to  
19 '55 may have been associated with a mission badge.

20 And so, the missed dose as it's stated  
21 here, the assignment of a missed dose which would  
22 not necessarily apply here.

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1           And this obviously is more important  
2 when we talk about exposures that were not  
3 monitored at all.

4           So, my reference to the issue of the  
5 missed dose here based on that guidance is the  
6 Finding of Number 7.

7           And also, I wanted to -- there was a  
8 correction. If I go back, that was the second  
9 issue, and that, I have to go back to page -- oh,  
10 John, if you can go back to page 22? That was  
11 another part of that issue.

12           Okay, one of the things that I looked  
13 at was the actual calculation of the 50th  
14 percentile.

15           If you look at the equation up top here  
16 that says 50th percentile is the sum of A times B  
17 over C and you look at that and then you realize  
18 what A times B can represent and when you look at  
19 the bottom of the -- and this is for each cell that  
20 is for each of the cells A and B and over C.

21           For each of the cells, if you go to the  
22 bottom of that page, John, you will see, for

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1 instance, that one of the things that you look at  
2 for each cell, the first cell has 0R. And I pointed  
3 out that there's no such thing as a 0R, it's below  
4 LOD.

5 And so, what in effect that really  
6 should mean, and that's given on page -- go back  
7 now to page 47 where I made use of that example --  
8 if you go back to page 47.

9 There you have the, let me see, so, and  
10 you have the first cell as zero dose and the second  
11 cell as 1 milli-R to 1-R and so forth.

12 The first two really should be adjusted  
13 in the sense where you have zero to 0.04-R and it  
14 may mean that that's the LOD and the second cell  
15 should be 0.04 to 1-R and those should be the one  
16 -- those should be the values that should be applied  
17 to the equation that I showed you on page 22.

18 And I'm not sure the response to that.  
19 What was the response? I'm not sure that there is  
20 a response.

21 For, let's see here, as I said, they  
22 actually bridge both Finding 7 and 8. As far as

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1 Finding 7, I said that the guidance for assigning  
2 missed dose is based on assumption and not  
3 supported by facts, and that really references the  
4 issue of mission badges and an issue that may  
5 involve coworker data that if it is available.  
6 That's really Number 7 and the issue of the 50th  
7 percentile value is really Finding Number 8.

8 CHAIRMAN LOCKEY: Number 8. So, we've  
9 addressed in 8 the 95 percentile?

10 DR. BEHLING: Yes, yes. I think for  
11 Number 8 that minor error involving that  
12 calculation is obviously no longer the issue if you  
13 assign the 95th percentile value.

14 With regard to Finding Number 7, I'm not  
15 sure I know what you can do to identify missed doses  
16 when you have a time period when mission badges were  
17 assigned when exposure was defined by a cohort  
18 badge or, worse yet, a dose-rate instrument that  
19 may have assigned a dose because there are no film  
20 badges assigned.

21 We think they don't represent film  
22 badges or missed doses. You don't know what they

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1 are.

2 So, when we talk about missed dose, we  
3 always talk about the film badge that comes back  
4 as below LOD. In those cases -- in all instances,  
5 I believe, throughout the time period, film badges  
6 were routinely processed with the subtraction of  
7 background doses. So, you don't really have  
8 anything to work with in terms of film badges coming  
9 back zero.

10 CHAIRMAN LOCKEY: Okay.

11 DR. BEHLING: I'm not sure what you can  
12 do about that. Obviously this is an inherent  
13 problem when you have obviously for many years  
14 monitoring that was done by cohort badging by  
15 dose-rate instruments or, in many instances, there  
16 was no monitoring.

17 DR. NETON: Well, Hans, this is John.  
18 I think we're going to have to talk about the  
19 difference between missed dose and unmonitored  
20 dose. I mean in the finding here you're  
21 specifically talking about missed dose which is a  
22 badge that was read that has no recorded dose on

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1 it.

2 DR. BEHLING: Yes, as I said, the fact  
3 is they subtracted background anyway. In which  
4 case you would almost have -- if a badge had nothing  
5 above the background -- I would see what they had  
6 were lots of film badges that were distributed to  
7 people as mission badges, et cetera and then there  
8 were badges that were also kept on location which  
9 were subject to fallout.

10 I read DNA reports on behalf of  
11 Operation Greenhouse where they processed some of  
12 the badges on locations that were subject to fairly  
13 high fallout and background radiation that was  
14 substantial.

15 And what they would then do, is take  
16 those badges that had not been assigned, use them  
17 as control badges and subtract the radiation that  
18 was -- the dose that was registered on the so-called  
19 control badges from those that were issued.

20 So, you would almost invariably end up  
21 with a dose that was zero if there wasn't any  
22 significant dose other than what was already

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1 registered on the control badges subject to  
2 fallout.

3 CHAIRMAN LOCKEY: So, Jim, how do we  
4 handle -- this doesn't seem like you can answer this  
5 question, is that correct?

6 DR. NETON: I'm not sure where we go.  
7 I guess I'm still a little confused as to what the  
8 finding is here. I mean --

9 DR. BEHLING: Well, you know, the  
10 finding of it, Jim, is essentially was based on the  
11 following statement, I read Statement 5 on page 45  
12 that says assign missed doses based on the number  
13 of exchanges found in the dosimetry records.

14 Well, you know, that's the  
15 recommendation that applies to conventional DOE  
16 facilities where you have an exchange rate and  
17 there may be instances where in a person's  
18 dosimetry record you will find that there are doses  
19 that involve film badges or TLD badges that came  
20 back with zero.

21 In that which case you say, well, what  
22 was the LOD for that particular time frame for a

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1 film badge? And you would say, well, it was 40  
2 milli-R and if it came back zero, you'd take the  
3 midpoint and assign him 20.

4 Well, that kind of policy doesn't work  
5 for PPG where the routine film badges were not even  
6 assigned on a routine basis. And therefore, you  
7 know, what you do is reduce the assigned doses when  
8 this guidance, as I read it to you, really just  
9 simply doesn't apply.

10 DR. NETON: Well, but the next sentence  
11 I think recognizes what you just said which it says,  
12 also compare the total of the recorded doses plus  
13 the missed dose to the 50 percent dose in Attachment  
14 A and assign the larger dose.

15 So that accommodates, I think, what you  
16 were just discussing is that we don't really know  
17 the missed dose very well so we'll look at the  
18 values in Attachment A and use the larger of the  
19 two numbers.

20 DR. BEHLING: Well, I can say it seems  
21 the two badges were worn, you know, I don't see that  
22 either as a probability since both badges were to

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1 be worn at the same time, only one's there. I mean  
2 these people weren't assigned two badges.

3 You talk about a time frame when a  
4 full-time badge was assigned in addition to perhaps  
5 a specific task where they wanted to just in a very  
6 discrete way identify what was the dose associated  
7 with that particular task which would be recorded  
8 on both the full-time badge and the mission badge  
9 that was assigned simultaneously for that  
10 duration. That didn't occur until many, many  
11 years later.

12 MR. KATZ: So, it sounds like what Hans  
13 is saying is, is you might as well drop this  
14 guidance because there's nothing to implement  
15 here.

16 DR. BEHLING: Exactly, exactly.

17 MR. KATZ: Right.

18 DR. BEHLING: Yes, I think we should  
19 just simply ignore that guidance because I'm not  
20 sure you can do anything about that.

21 DR. NETON: Okay.

22 DR. BEHLING: So, I think we covered --

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1 MR. KATZ: So, I'm sorry, before we  
2 move on, does this cover Finding 7?

3 CHAIRMAN LOCKEY: So, the results are,  
4 we're going to ask NIOSH to drop this guidance. Is  
5 that correct?

6 DR. BEHLING: I think so. There's no  
7 way you can implement this guidance, at least not  
8 in the first ten or so years, from '46 to '56.

9 CHAIRMAN LOCKEY: Yes.

10 MR. KATZ: So, I think Jim just said  
11 okay to that.

12 MEMBER ANDERSON: Just dropping it and  
13 doing nothing, is that better than --

14 MR. KATZ: Well, there's nothing to do  
15 for that period, '46 to '56.

16 MEMBER ANDERSON: Oh.

17 MR. KATZ: Yes.

18 CHAIRMAN LOCKEY: All right, so we'll  
19 drop the NIOSH guidance from '46 to '56, but it's  
20 applicable after that, correct? Correct?

21 MR. KATZ: That, I'm not going to  
22 answer. I can't answer that but that sounds like

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1 what Hans was --

2 MEMBER VALERIO: So, Ted, I have a  
3 question. Can you hear me?

4 MR. KATZ: Yes.

5 MEMBER VALERIO: Why the '56 date? I  
6 got lost on that when under Finding Number 3 it does  
7 say that on May 15th of 1955 and also for ten tests  
8 at the Pacific Proving Ground they were issued film  
9 badges? So, why the difference in the years? I  
10 got lost there between '55 and '56.

11 MR. ROLLINS: We should be able to  
12 start using that guidance with Wigwam which is in  
13 '55.

14 MEMBER VALERIO: Okay.

15 MR. ROLLINS: Everybody was 100  
16 percent badged at Wigwam and from there forward.

17 MR. STIVER: One thing to keep in mind  
18 for Wigwam is that really it wasn't in the PPG, it  
19 was about 400 miles south of San Diego and it was  
20 a deep water detonation, an underwater detonation  
21 for a one day event.

22 And so, you don't have this issue of

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1 fallout. There wasn't mission badges versus  
2 permanent badges.

3 MEMBER VALERIO: Okay.

4 (Simultaneous speaking.)

5 MR. STIVER: Yes, in the NTPR program  
6 beyond '56, you know, we've run in to quite a few  
7 situations where there were zero readings and we've  
8 used the same approach, the half of the NDL. So,  
9 I think at that time, it's actually a situation  
10 where you deal with the detection limit of the  
11 badge. It's not a matter of what we see earlier  
12 where they're subtracting out really large fallout  
13 doses from the contaminated controls.

14 MEMBER VALERIO: Okay, thank you.

15 CHAIRMAN LOCKEY: So, Loretta, so were  
16 the dates between '46 to '54 or '46 to '55?

17 MEMBER VALERIO: See, I would say, well  
18 --

19 MR. STIVER: From an administrative  
20 standpoint, I would say up to '55 because at that  
21 point everybody's badged.

22 MEMBER VALERIO: Right.

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1 MR. ROLLINS: Yes, the middle of '55 is  
2 when they made a decision to badge everybody.

3 MEMBER VALERIO: Right, and that's the  
4 date that I'm looking at.

5 CHAIRMAN LOCKEY: All right, so drop  
6 the NIOSH guidance from '46 to June of '55 and  
7 except -- just drop it from '46 to June of '55. Is  
8 that an appropriate date?

9 MR. ROLLINS: Now, you're sticking up  
10 this guidance that we put in a response here?

11 CHAIRMAN LOCKEY: Yes, from looking at  
12 Finding Number 7.

13 MR. ROLLINS: Okay, now, what would we  
14 do up to June of '55? What would be your  
15 recommendation there?

16 CHAIRMAN LOCKEY: Well, what I heard  
17 from -- what I heard was that the NIOSH -- we really  
18 couldn't apply the NIOSH guidance to those earlier  
19 years. It would be impossible to do that, so why  
20 mention it?

21 MR. ROLLINS: I understand that, but  
22 how did we account for the dose?

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1 DR. BEHLING: Well, I agree, again,  
2 with the fact that it can't be applied when you  
3 don't offer a film badge dosimeter routinely on a  
4 monthly basis or whatever time and during the early  
5 years up until '55, '56, mission badges were  
6 issued.

7 And from mission badges, all background  
8 exposures were subtracted. So, you don't really  
9 have the option of saying what's a missed dose? I  
10 mean they were -- they only selectively assigned  
11 mission badges and from those, the background from  
12 fallout was subtracted anyway.

13 So, I think there is no way to even deal  
14 with missed dose because they don't exist. I mean  
15 missed dose is the only dose as we normally applied  
16 to those film badges or TLDs were the processing  
17 of that badge turns out to be a value that is below  
18 LOD, and that didn't exist there.

19 MR. ROLLINS: Okay, so, what I'm  
20 hearing is that we need to put a statement in the  
21 TBD that says prior to June of '55, missed doses  
22 cannot be reconstructed.

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1 DR. BEHLING: There are no missed  
2 doses. Yes, it can't be reconstructed since there  
3 are no missed doses. They didn't issue badges and  
4 then send them back and said, oh, your badge was  
5 below LOD and we record it zero. That doesn't  
6 exist. So, there's no point in injecting that.

7 MR. KATZ: Right, there's a  
8 distinction between it's not -- cannot be  
9 reconstructed is that they don't exist.

10 DR. BEHLING: They don't exist,  
11 exactly.

12 MR. ROLLINS: Okay. We can put that  
13 statement in there.

14 CHAIRMAN LOCKEY: But July 1st '55 on,  
15 we can do that?

16 DR. BEHLING: Yes.

17 CHAIRMAN LOCKEY: Okay.

18 MR. KATZ: So, is that good with all the  
19 Board Members?

20 MEMBER ANDERSON: Yes.

21 MR. KATZ: Okay. Okay, thanks.

22 Hans?

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1 DR. BEHLING: Yes, and you know, I kind  
2 of garbled Finding Number 8.

3 I had mistakenly identified Finding  
4 Number -- I've got so many documents here on my desk  
5 it became very confusing.

6 But Finding Number 9 has already been  
7 addressed and that is the issue that we discussed  
8 under the issue of assigning zero to 40 millirem  
9 in cell one and 40 millirem of milli-R and 40  
10 milli-R to 1-R in cell two.

11 That was actually Finding Number 9, the  
12 last one and I'm looking at NIOSH's response and  
13 they said Attachment A will be revised to ensure  
14 the coworker dose approach follows the guidance of  
15 ORAU-OTIB-20 with respect to the treatment and  
16 inclusion of potential missed doses.

17 I guess that does address potential  
18 missed doses when you have that first cell in that  
19 calculational methodology on page 22 that says cell  
20 one was really zero.

21 Well, it's zero to some value up to 40  
22 millirem. And if I look at the guidance that was

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1 issued in the -- let me just take a look here, go  
2 through my shelf here -- I mean I look at the film  
3 badge, there's symmetry in atmospheric nuclear  
4 tests that were done by the National Research  
5 Council, they at least consistently talk about a  
6 40 millirem LOD value.

7 I think that should be either amended  
8 so that the zero should be replaced with a solid  
9 zero to 40 millirem because that is the designated  
10 LOD value that is cited commonly for all operations  
11 during the atmospheric testing period in the PPG.

12 And so, the second cell should also  
13 then read instead of 0.01-to-1 R, it should read  
14 0.04-to-1 R, and therefore, any calculations as  
15 defined on page 22 that I'd previously shown to you  
16 in the -- that comes from Appendix A from the PPG  
17 Site Profile, that calculation methodology should  
18 amend those cells that have zero in the first cell  
19 and then some value that is less than 40 millirem  
20 as the starting point for cell number two.

21 I'm not sure, does anybody -- everybody  
22 follow me or am I --

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1 DR. NETON: This is Jim, Hans. I don't  
2 think it'll make a huge difference in the --

3 DR BEHLING: No, it won't make a huge  
4 difference and I'm not sure, Jim, tell me what is  
5 OTIB-20 again?

6 DR. NETON: Matt Smith probably knows  
7 that better than I do.

8 MR. SMITH: Yes, this Matt Smith of  
9 ORAU team.

10 OTIB-20 is the, I'll call it kind of  
11 like guidance document, that sets forth the  
12 methodology to do external coworker analyses. It  
13 kind of gives the layout --

14 DR. NETON: It certainly includes the  
15 guideline on using missed dose in the calculation.

16 DR. BEHLING: Okay, okay. If a missed  
17 dose.

18 But, in this case, I think we can use  
19 real numbers because, as I said, according to the  
20 National Research Council and their study of all  
21 of the nuclear tests that were done in the PPG, they  
22 consistently cite 40 millirem as the LOD for the

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1 film badges used, so you can use that.

2 So, cell one would then become 0.0 to  
3 0.04 R and the second cell from 0.04 to 1 R and then  
4 use that equation as defined on page 22 of my report  
5 would then apply than using the numbers that are  
6 currently identified for calculation.

7 It's a marginal difference admittedly.

8 CHAIRMAN LOCKEY: Okay, any other  
9 questions? So, then I see 8 and 9 similar, both  
10 in abeyance, is that correct?

11 DR. BEHLING: Yes, I think so.

12 CHAIRMAN LOCKEY: You like those  
13 numbers? Andy?

14 MEMBER ANDERSON: Yes, okay.

15 CHAIRMAN LOCKEY: Loretta?

16 MEMBER VALERIO: Yes.

17 CHAIRMAN LOCKEY: Before I give this  
18 up, anything else we need to cover today?

19 MR. KATZ: Hans?

20 DR. BEHLING: No, as I said, I think the  
21 major outstanding issue that I'm hoping we can  
22 resolve is the issue that's now going to be in the

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1 hands of the DOL.

2 MR. KATZ: Right, right.

3 (Simultaneous speaking.)

4 MR. KATZ: And I understand that and I  
5 will copy the Work Group and SC&A, everybody as I  
6 do that as soon as I get the memo from SC&A to work  
7 with.

8 DR. BEHLING: Yes, and just -- if I can  
9 take a couple of minutes, I can at least offer  
10 something here with regard to that issue. Stop me  
11 if you think I'm, you know, talking out of hand here  
12 or out of turn.

13 But, you know, when you have even  
14 mission badges as was defined in the second  
15 bulletin, you can at least do one thing. One thing  
16 is for sure we do know, when a person is assigned,  
17 let's say, over a six month period, let's assume  
18 he was truly there for six months and he was  
19 assigned a mission badge.

20 Let's say he was there for March to  
21 September and he was assigned one mission badge in  
22 March and he was assigned a mission badge in

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1 September or August sometime towards the end of  
2 that six month period.

3 One thing we do know, that that's a  
4 given, we don't have to be or make any assumptions  
5 that when people were assigned there, as I had  
6 mentioned to you before, the Marshall Islands is  
7 in a remote part of the world and in the 1940s, there  
8 was no commercial air flight there. There was no  
9 landing strips for commercial airlines. People  
10 were transported there by ship mostly, military  
11 ships and so forth.

12 And when they were there, if a person  
13 was there for six months and his first badge was  
14 assigned, let's say, in March, you can be very sure  
15 that person is there until the second -- at a  
16 minimum, the second badge was issued because they  
17 don't shuffle people around for a day trip or for  
18 a single assignment of a day task that involves a  
19 mission badge.

20 So, one of the things that should be as  
21 a minimum applied when, if in the end, we can only  
22 establish employment periods on site by virtue of

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1 badges in the early days which would have involved  
2 mission badges, then at least accept the fact that  
3 any time interval between two successive missions  
4 badges that were assigned was also time spent on  
5 site. That, as a minimum, is just a no-brainer for  
6 me.

7 And so, if we have to assist the DOL on  
8 that issue in understanding that people weren't  
9 shuffled back and forth for a single day's worth  
10 of work where a mission badge was assigned, in all  
11 likelihood, that person was there the full duration  
12 between mission badges as a minimum and there may  
13 be times before and after the first and the last  
14 mission badge that he was there. But as a minimum,  
15 you can conclude that he was there between the time  
16 frame of two successive mission badges.

17 So, it's just, you know, a  
18 recommendation that I would at least pose to them  
19 if it turns out that they are really no other ways  
20 to establish employment periods at PPG if the only  
21 option is to use mission badges as they were issued  
22 during the earlier years of the PPG time frame.

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1 MR. KATZ: Right. Hans, if you just  
2 lay out everything as clearly as possible in the  
3 memo and I will get that to DOL.

4 DR. BEHLING: Will do.

5 MEMBER VALERIO: Okay, Ted, this is  
6 Loretta, I have a quick question.

7 MR. KATZ: Yes?

8 MEMBER VALERIO: What -- I don't know  
9 what the likelihood and it's kind of hard for me  
10 to wrap my mind around it, is say a cafeteria worker  
11 would be issued a mission badge, how are they  
12 verifying those employments for those claimants?

13 DR. BEHLING: Well, that's a good  
14 question. And then for people who were never  
15 monitored, you're kind of, you know, Holmes &  
16 Narver, I'm very familiar with Holmes & Narver,  
17 I've worked with some of those people, they have  
18 pretty good records in terms of employment.

19 But there were some people inclusive of  
20 Marshallese who were used oftentimes for doing  
21 menial kinds of things and I can guarantee you  
22 there's no employment records for those

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1 individuals.

2 And I'm sure there were people who were  
3 hired at various locations for whom we don't have  
4 a documented employment record and they may not  
5 have been ever issued a single dosimeter.

6 Now, the question is, would they also  
7 be among the claimants who are at this point of  
8 concern? I don't know.

9 I mean I'm sure that any person among  
10 the Marshall Islands is who oftentimes did work for  
11 the AEC in those days. But, you know, I don't think  
12 you have any claims coming from that direction.

13 But there may be, as you just mentioned.  
14 A person who was there who provided food services  
15 and preparation of things like where he was never  
16 in a position where a mission badge was assigned  
17 to them. That's possible.

18 MEMBER VALERIO: Right, but they still  
19 -- there was a potential of exposure to fallout.

20 DR. BEHLING: Absolutely. As I had  
21 mentioned, just for Operation Greenhouse, if a  
22 person had stayed at any of those four locations

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1 for the period of April and May, two months, he  
2 would have potentially been exposed to around 4 rem  
3 and that dose -- that exposure is not recorded  
4 anywhere other than in a reproduced document that  
5 DNA put out in 1982.

6 And if he can prove he was there, he  
7 would obviously be in a position to take credit for  
8 that exposure. But the fact is, is there any  
9 record for that individual at this point in time?  
10 I don't know.

11 MEMBER VALERIO: Okay.

12 CHAIRMAN LOCKEY: Good question. I  
13 don't know, how do we handle that, Ted?

14 MR. KATZ: Well, there's nothing to  
15 handle here, I mean, really. This is -- the DOL  
16 will have as much information as they have  
17 available to make these, you know, 83 day  
18 determinations and that'll be that. That's really  
19 their territory.

20 So, all we can do is give them some  
21 guidance on for the information they have  
22 available, how to use it and that's what we'll be

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1 doing. But there's -- it's a DOL issue, it's  
2 really, it's not our issue and it's -- you can't  
3 -- there's nothing to be done in the absence of  
4 information, I mean for some situations.

5 I don't how DOL handles that and, you  
6 know, guys, you're welcome to inquire with DOL how  
7 they handle that but it's really, it's not  
8 something for the Board to struggle over.

9 CHAIRMAN LOCKEY: Okay. Any other  
10 questions or issues that somebody wants to raise?

11 Okay, the action forwarded then is,  
12 what, wait until hear back from DOL?

13 MR. KATZ: Yes, I will copy you on my  
14 correspondence with them including their response  
15 and then you'll get to see what goes on there.

16 And it's been a lot of time since, you  
17 know, since Hans did the review in the first place  
18 and, who knows, you know, what DOL is doing right  
19 now anyway.

20 So, you know, they may already be doing  
21 things that have sort of remediated the situation.  
22 I have no idea.

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1                   CHAIRMAN   LOCKEY:           Very    good.  
2   Anything else we need to cover today?

3                   MR. KATZ:    No, but I want to thank --  
4   I thought this was very efficient and great job on  
5   everybody's part.   So, I just want to thank you all  
6   for that.

7                   CHAIRMAN LOCKEY:   I concur, thank you,  
8   everybody for their time and effort.

9                   DR. BEHLING:   Thank you.

10                  MR. KATZ:    And have a good weekend.  
11   Have a good holiday weekend.

12                  CHAIRMAN LOCKEY:   You too.   Take care,  
13   bye-bye.

14                  MEMBER VALERIO:   Bye.

15                  MR. KATZ:    Take care.   Bye-bye.

16                               (Whereupon, the above-entitled matter  
17   went off the record at 3:34 p.m.)  
18  
19

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