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
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
Welcome and Introductions

Discussion:
  Overview of SC&A Site Profile
  Finding Number 1
  Observation Number 1
  Finding Number 2
  Finding Number 3
  Finding Number 4
  Finding Number 5
  Finding Number 6
  Finding Number 7
  Finding Number 8
  Finding Number 9

Actions/Path Forward

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

(Roll call.)

Okay then, that takes care of matters.

Everybody, while you're listening, please keep
your phones on mute just to help the audio quality
and, Jim, it's your meeting.

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

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

DR. BEHLING: Yes, I am.

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

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

I can only say that we do have a total
of hours for completing this conference call and
are there any scheduled breaks that we're looking
to introduce somewhere in between the four hours?
MR. KATZ: Well, Hans, I think we're hoping not to go for four hours, but I mean we'll take breaks as people need comfort breaks.

DR. BEHLING: Okay.

MR. KATZ: Yes.

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

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

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

And in order to really fully understand the findings that we're about to discuss, it's
important to address some of the conditions under which personnel at the PPG were exposed to radiation and that not only is different but very unique from all the other DOE and AWE facilities that are part of the Energy Employee Compensation program.

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

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

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

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

DR. MAURO: I do.

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

DR. MAURO: Okay.
MR. KATZ: I'll forward you, if you don't have that, I'll forward you the address for the Live Meeting.

DR. MAURO: Oh, I have --

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

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

MR. KATZ: Okay.

DR. MAURO: Yes, I'm fine.


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

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

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

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

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

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

Also, the third area was Christmas Island and Johnson Atoll and there's a couple of other tests that were done in the middle of the ocean.
And important to note when you look at those numbers that follow, not only just the number of tests at each of those sites, but the explosive yield. And below that, you have minimum, maximum, mean and median and total.

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

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

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

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

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

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

So, it gives you an understanding of
just how much of the differences exist between the nuclear tests that were conducted at the Nevada Test Site versus those that were conducted at the Pacific Proving Grounds.

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

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

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

And there, I'll just briefly make mention of some of the things that happened and why some of these things became a very significant problem for the rad-safe personnel that were expected to protect the workers and safeguard them from radiation exposures.
And one of the things you realize is that the first series of tests, there was enough spacing in between to provide at least some adequacy in presenting some kind of program for safeguarding personnel and monitoring them.

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

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

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

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

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

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

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

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

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

Among the limitations that prevent us from a complete dose reconstruction at the PPG for workers was the issue that we do not have any kind of internal monitoring at the time of the PPG. And therefore, this inability to assign internal dose from inhalation, ingestion of fallout that personnel were exposed to, and that includes obviously, fission products as well as unfission weapon-grade fuel, uranium, plutonium.
And as a result of that inability to assess or by any means any potential internal exposure, it was acknowledged early on that the people at -- the workers exposed to it could not be adjusted for internal exposure and, therefore, an SEC was declared.

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

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

And it’s important to note, as I said, that the PPG Site Profile that NIOSH developed in 2006 pre-dates any discussions that we had about
the issue of 250 workdays.

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

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

But, the other thing that the Bulletin No. 06-15 states, and that's in the second -- the last paragraph on page 15, that by and large says that in determining the actual employment period, the CE must have clear and convincing evidence of a beginning date (hire) and end date (termination) of employment at the PPG.
And it goes on further, where the evidence is not clear and convincing or consists only of film badge data, without the beginning date or the end date he must wait for the policy guidance before proceeding with the verification of covered SEC employment at the site.

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

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

And that gave rise to the next bulletin which is on -- cited on a summary of status site on page 16. And that's Bulletin No. 07-05.
And it once again talks about what this problem concerns and then offers a solution and that solution was considered to be one that was viable for establishing employment dates in the sense that this involves dosimetry assignment.

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

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

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

I mean, I'm sorry to interrupt on this, but I had a lot of exchanges with SC&A about this topic. This is really a DOL issue. We've already agreed we're going to send a memo to DOL about issues related to how they administer this matter and our information related to that.
But, it really is not a good use of the Work Group's time to be spending a lot of discussion about this matter. It's not related really to the Site Profile Review.

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

MR. KATZ: Right.

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

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

And that's all I wanted to do here.

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

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

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

MR. ROLFES: This is Mark Rolfes, from NIOSH. We agree that an update is needed to
reflect the 83, you know, days where an individual was on site for 24 hours a day.

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

MR. ROLFES: Okay. Is that any better?

CHAIRMAN LOCKEY: That's much better.

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

And we will update the TBD with that information.

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

I mean as Ted suggested, we don't qualify workers for the SEC. We receive cases for dose reconstruction that are qualified already by
DOL. So, it really would just be for background clarification more than anything. I mean we would never use that number ourselves to qualify someone.

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

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

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

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

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

DR. KATZ: Right. So, the DOL issue anyway is not really the Work Group's issue. But
that I'll take care of independently and keep the
Work Group in the look as to how DOL responds.

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

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

DR. NETON: Right.

CHAIRMAN LOCKEY: Okay, thank you.

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

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

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

There have been changes to the issue of
assigning x-ray doses to personnel where even if
the x-ray existed but it wasn't done at an EEOICPA
facility that it was not granted.

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

MR. SMITH: That's correct.

CHAIRMAN LOCKEY: Any questions about Observation 1?

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

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

DR. NETON: Right.

MR. KATZ: Yes.

DR. NETON: So, Finding 1 and Finding 2 then I have listed as in abeyance meaning we'll revise the Site Profile and I mean some point the
MR. KATZ: The finding -- just to clarify, Jim, Finding 1 is simple enough that you can close it because there's no question as to how that gets spelled out.

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

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

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

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

MEMBER ANDERSON: Moving right along.

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

And the term environmental dose may not even be applicable but we'll address it as environmental dose here. It is more likely to be regarded as an occupational external dose, but let's discuss it anyway under Finding 2 what is
really meant here and what's involved here when we talk about environmental dose at the PPG.

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

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

And that's really the very important one and I think I'm going to spend just a few minutes here discussing why it's very important with regard to keeping that also as part of the occupational dose for people who were exposed at the PPG but who
may not have been monitored.

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

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

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

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

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

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

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

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

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

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

Anyway, let's go back. In terms of Greenhouse, this is an example of what the original PPG Site Profile would assign persons from
occupational exposure and, as I said, for non-DoD participants of which there were 551 participants, you had the average exposure for that group of individual would have been half of a roentgen of 0.5 as you state down there and the maximum on that people was 8.6.

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

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

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

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

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

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

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

And at the very bottom, the first one down there that's highlighted is the Test Dog that occurred on April 7th, '51.
The second one is Easy which is at the very top. At the very top there you will see Test Easy.

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

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

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

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

The one below that is Parry Island.

Again, you will see all of the structures that had
to be placed there. This is where people spent their time. They either lived there, worked there or both.

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

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

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

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

And you realize how much radioactivity had fallen in the form of fallout on Parry Island.
In more quantitative terms, I want to go to, at this point, to page 35.

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

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

And so, what I wanted to point out here, if a person had spent that time frame from April 8 to June 1, his exposure for occupational radiation, but was due to strictly fallout for which he was not monitored, would have been more than 4 rem.
And you compare that to what I just previously told you with the occupational exposure that would have been assigned to that person based on Appendix A or Attachment A in the PPG Site Profile, it would have been less than 1 rem.

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

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

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

And I guess from NIOSH's response, they
agree with Section 4 and you see, they will obviously address it in Section 6 of the PPG Site Profile.

Are there any other comments from NIOSH?

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

DR. BEHLING: Okay.

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

CHAIRMAN LOCKEY: Hans?

DR. BEHLING: Yes?

CHAIRMAN LOCKEY: Chairman Lockey.

This 4 rem, would you consider that the maximum dose from fallout over the whole period for each time frame or is this B

DR. BEHLING: No, this is strictly as the slide shows on page 35. The 4.28 rem was the
calculation that was done by the Defense Nuclear Agency in 1982 when they revisited their earlier version of the issue that involved Operation Greenhouse.

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

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

And so, they came up with that diagram that I showed you on page 35 that allows you to take any combination of when the person may have come on site during that time frame from April to the beginning of June and when he exited.
Since it's the one that is shown in
darker color was one that I actually looked at on
behalf of a dose reconstruction that I had to do.

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

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

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

DR. MAURO: And this is all external,
Hans, right?
DR. BEHLING: All external.

DR. MAURO: Right.

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

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

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

But, more importantly, for people who might have had a claim with skin cancer, which is not a presumptive cancer, what you also then have
to add to that dose is the beta dose, that we'll talk about under Finding Number 6, and that can be ten times higher.

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

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

DR. BEHLING: Yes?

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

DR. BEHLING: Yes.

MR. ROLFES: Okay. We have different employment dates than what you had mentioned. We
have an employment end date of [identifying information redacted], 1951. And we also do, if you take a look in the DOE dosimetry records for this individual, I do see that there was a fallout assessment done for this particular individual from Operation Greenhouse.

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

MR. ROLFES: Okay.

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

MR. ROLFES: Correct.

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

So, I don't believe that that assignment of 60 millirem will clearly prove to be the correct value assigned from fallout.
MR. ROLFES: Okay. Yet, we can certainly take a look at what you've pointed us to here.

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

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

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

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

DR. BEHLING: Are we done with that discussion?

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

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

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

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

DR. BEHLING: Yes. Finding Number 3 is a broad sweeping finding that deals with what was the priority of the monitoring that was done?
And there was many, many problems which I discussed in Section 7.1, 7.2 and 7.3 and I don't want to go through -- go over all of those things, but what I want to do is perhaps just summarize those things, some of the issues that I brought up. And that summary is presented in Section 7.4.1 on page 41 and 42.

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

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

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

But monitoring done was oftentimes limited to select tasks when a person had to go to retrieve instruments on the very island where a surface detonation took place.
They were oftentimes then brought with amphibious ships on to the shore of that island and then on a time basis, go in there, grab that thing and bring it back for us for analysis.

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

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

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

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

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

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

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

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

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

And in the next bullet, the cohort badging oftentimes was not necessarily even recorded. At the time, there was limited concern about getting a definitive assessment of exposure.
but, perhaps, avoiding any exposure that was considered less than safe.

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

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

So, those were sometimes the mechanism by which the rad-safe people applied their practice of controlling radiation exposure among workers.
Film badge, there were issues that I discussed in these other Section 7.1, 7.2, 7.3 that dealt with how these film badges were calibrated and processed and how they were interpreted.

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

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

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

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

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

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

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

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

It says, NIOSH understands that there are deficiencies related to the film badge dosimetry data and procedural practices identified
by the NRC in 1989 and SAIC in 1989 through 2006 as well as Perkins and Hammond in 1980.

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

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

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

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

Sorry, I just realized I had it on speaker phone. I'm talking into the receiver so
hopefully you can hear me a little bit better now.

Let's see, where did I leave off?

Let's see, okay.

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

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

For Operation Wigwam on May 15, 1955, and all subsequent tests at PPG, 100 percent of all personnel were issued operational film badges. In addition, all personnel involved in reentry activities were also issued mission badges that were read at the end of each mission.
DR. BEHLING: Yes, and I think that pretty much satisfies the concern. As I mentioned beforehand, some of the issues that we are identifying on behalf of the findings were not issues that proved they were throughout the entire 16 year period.

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

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

And in context, the recommendation to use the 95th percentile dose that are part of the Attachment A, it's the original PPG Site Profile, that certainly raises the bar considerably for a coworker dose in the event that there are no additional exposure data available for that individual.
CHAIRMAN LOCKEY: Any other comments about that?

DR. BEHLING: Okay.

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

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

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

Oftentimes we don't have that kind of specific information for these folks. It's a lot
more sketchy. But if it is there, that's what we will do. We'll modify the Site Profile accordingly.

CHAIRMAN LOCKEY: And what about after 1954?

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

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

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

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

DR. NETON: Right.

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

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

All the participants had permanent badges and any additional mission badges they got
for a particular activities like retrieving instrumentation and so forth were worn with the permanent badge.

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

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

One of the major concerns that they encountered were the very, very adverse conditions that the Pacific Ocean and the latitude presents, and that is the high humidity and the constant high temperatures that these badges and oftentimes badge failures that were commonplace in those days
cannot be rectified.

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

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

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

CHAIRMAN LOCKEY: One more question about Wigwam. So, we have -- so, in 1955 with Wigwam when people were issued operational film badges, was that carried through when they went back to their personal headquarters? Sleeping headquarters, et cetera? Were those badges -- did they maintain those badges during that time?
DR. BEHLING: Yes, they did. From what I gathered, when they were assigned, the people were actually asked to keep them on their person for the full duration, 24 hours a day.

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

DR. BEHLING: Yes.

CHAIRMAN LOCKEY: Okay, thank you.

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

CHAIRMAN LOCKEY: Let's go around.

Andy?

MEMBER ANDERSON: I think so.

CHAIRMAN LOCKEY: Loretta?

MEMBER VALERIO: Can you hear me?

CHAIRMAN LOCKEY: Yes, I hear you now.

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

CHAIRMAN LOCKEY: Jim Lockey. I agree.

MR. KATZ: Okay, thanks.

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

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

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

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

It says, covered employees that participated in the various Pacific Proving Ground
operations and were not badged can be assigned
coworker doses as outlined in Attachment A.

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

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

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

    Okay, item --

    CHAIRMAN LOCKEY: Hans, are you happy
with that?

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

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

CHAIRMAN LOCKEY: As an add-on?

DR. BEHLING: Yes.

CHAIRMAN LOCKEY: Right? Okay.

MR. KATZ: Does the Work Group?

CHAIRMAN LOCKEY: I'm fine with that.

I vote for abeyance.

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

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

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

MEMBER ANDERSON: Okay, that's --

MR. KATZ: -- sited work.

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

MR. KATZ: Right.

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

MR. KATZ: Right.

CHAIRMAN LOCKEY: That's correct.

MR. KATZ: Okay, thanks. Hans?

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

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

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

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

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

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

And with the exception of the lungs, esophagus, red bone marrow and bone surfaces which are referenced in Guide 1, Section 4.4, the highest dose conversion factor is typically associated with the 30-250 keV photon energy range and the AP geometry when we're converting exposure to organ dose as you would with the film badge.
In addition, that's described in Table 5A of the NIOSH IREP Technical Documentation, the radiation effectiveness factor is significantly higher for photons in the 30-250 keV energy range compared to the greater than 250 keV energy range.

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

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

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

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

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

Now, if we were to assume a geometry of
exposure that is either rotational or isotropic, it certainly could be the case in the conditions that are discussed here, the highest value would be, as you said, for greater than 250 keV, it would be a value of 0.720 and that would be for a rotational assumption.

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

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

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

And also, per the IREP Technical Guide, when you're in that mid-range photon category, you're getting a greater REF factor which affects, you know, which drives the PoC higher.
DR. BEHLING: Yes. Well, as I said, when I look at the historical data in some of the DNA documents, they oftentimes mix roentgens, rad and rem interchangeably and so it's very difficult to see what you're really measuring.

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

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

DR. BEHLING: Okay.

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

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

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

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

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

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

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

DR. MAURO: Oh, okay.

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

DR. MAURO: Okay.

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

DR. NETON: But it does say -- this is Jim -- to use the 30-250 keV energy range which is claimant-favorable. I mean I think we've
established that, that this is a claimant-favorable approach. I don't think there's any modification required here.

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

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

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

DR. MAURO: Lower dose, yes.

DR. NETON: -- lower dose. I mean --

(Simultaneous speaking.)

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

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

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

DR. NETON: That's the idea.

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

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

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

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

CHAIRMAN LOCKEY: So, how do we resolve
this? Is the SC&A willing to say they accept the
NIO SH approach here?

MEMBER ANDERSON: Or the NIOSH
explanation?

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

CHAIRMAN LOCKEY: Okay.

MR. KATZ: So, the Work Group Members?

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

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

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

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

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

If we go to on page 44, John, we will
see what was at least in a summary fashion recommended in behalf of supplying a beta-gamma dose ratio for those instances where we had a deep dose available.

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

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

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

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

When you a facility such as the PPG where you had, especially in later times,
detonation after detonation, what you have to understand is the dose rate for both gamma and beta diminishes exponentially.

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

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

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

But anyway, what I wanted to -- there are much more detailed information in the Nevada Test Site Profile in Appendix C, I believe.
But what I really wanted to point out here with regard to my finding was that the refinement that you could introduce here for skin doses that involve certain parts of the body and that is defined by a document that was published in Health Physics by Barss and Weitz in 2006 and that is on page 45. And that is really the issue that I wanted to bring up here.

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

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

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

But when you have, for instance, a skin cancer that occurs at the level of the knee or the calf, you will might also then have a secondary way
of increasing or defining that dose based on the lower level that would obviously represent a higher dose than that's represented by the dose ratio in Figure 7.3 or 7-3 that we just looked at.

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

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

And when I looked at that, I sort of was concerned that this might be used more frequently. I don't know how much it was used in existing cases where there was a need to assess the beta components of a photon exposure.
But on page 49, and I'll just read it to you, there -- I don't have it available, so I'm going to have to read it for portions that are relevant here.

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

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

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

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

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

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

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

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

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

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

MR. ROLLINS: This is Gene Rollins. I
own both of those documents, the NTS and the PPG. And I agree with you entirely and I think it's wholly inappropriate to use the 1.04 at PPG and we'll be making changes to the TBD to make sure that doesn't happen again.

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

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

MEMBER ANDERSON: No, I don't.

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

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

MR. KATZ: Yes, that sounds right.

CHAIRMAN LOCKEY: Okay.

MR. KATZ: Thanks. Hans?

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

My Finding Number 7 comes in context with the statement that I paraphrased on page 45.
Okay, Statement Number 5 that I can read for you here. Statement Number 5 appeared in Section 6 of the PPG Site Profile and states the following.

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

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

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

And so, the missed dose as it's stated here, the assignment of a missed dose which would not necessarily apply here.
And this obviously is more important when we talk about exposures that were not monitored at all.

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

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

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

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

For each of the cells, if you go to the bottom of that page, John, you will see, for
instance, that one of the things that you look at for each cell, the first cell has 0R. And I pointed out that there's no such thing as a 0R, it's below LOD.

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

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

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

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

For, let's see here, as I said, they actually bridge both Finding 7 and 8. As far as
Finding 7, I said that the guidance for assigning missed dose is based on assumption and not supported by facts, and that really references the issue of mission badges and an issue that may involve coworker data that if it is available. That's really Number 7 and the issue of the 50th percentile value is really Finding Number 8.

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

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

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

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

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

CHAIRMAN LOCKEY: Okay.

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

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

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

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

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

So, you would almost invariably end up with a dose that was zero if there wasn't any significant dose other than what was already
registered on the control badges subject to fallout.

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

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

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

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

In that which case you say, well, what was the LOD for that particular time frame for a
film badge? And you would say, well, it was 40 milli-R and if it came back zero, you'd take the midpoint and assign him 20.

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

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

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

DR. BEHLING: Well, I can say it seems the two badges were worn, you know, I don't see that either as a probability since both badges were to
be worn at the same time, only one's there. I mean these people weren't assigned two badges.

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

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

DR. BEHLING: Exactly, exactly.

MR. KATZ: Right.

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

DR. NETON: Okay.

DR. BEHLING: So, I think we covered --
MR. KATZ: So, I'm sorry, before we move on, does this cover Finding 7?

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

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

CHAIRMAN LOCKEY: Yes.

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

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

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

MEMBER ANDERSON: Oh.

MR. KATZ: Yes.

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

MR. KATZ: That, I'm not going to answer. I can't answer that but that sounds like
what Hans was --

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

MR. KATZ: Yes.

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

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

MEMBER VALERIO: Okay.

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

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

And so, you don't have this issue of
fallout. There wasn't mission badges versus permanent badges.

MEMBER VALERIO: Okay.

(Simultaneous speaking.)

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

MEMBER VALERIO: Okay, thank you.

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

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

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

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

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

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

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

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

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

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

MR. ROLLINS: I understand that, but how did we account for the dose?
DR. BEHLING: Well, I agree, again, with the fact that it can't be applied when you don't offer a film badge dosimeter routinely on a monthly basis or whatever time and during the early years up until '55, '56, mission badges were issued.

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

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

MR. ROLLINS: Okay, so, what I'm hearing is that we need to put a statement in the TBD that says prior to June of '55, missed doses cannot be reconstructed.
DR. BEHLING: There are no missed doses. Yes, it can't be reconstructed since there are no missed doses. They didn't issue badges and then send them back and said, oh, your badge was below LOD and we record it zero. That doesn't exist. So, there's no point in injecting that.

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

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

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

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

DR. BEHLING: Yes.

CHAIRMAN LOCKEY: Okay.

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

MEMBER ANDERSON: Yes.

MR. KATZ: Okay. Okay, thanks. Hans?
DR. BEHLING: Yes, and you know, I kind of garbled Finding Number 8.

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

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

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

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

Well, it's zero to some value up to 40 millirem. And if I look at the guidance that was
issued in the -- let me just take a look here, go through my shelf here -- I mean I look at the film badge, there's symmetry in atmospheric nuclear tests that were done by the National Research Council, they at least consistently talk about a 40 millirem LOD value.

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

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

I'm not sure, does anybody -- everybody follow me or am I --
DR. NETON: This is Jim, Hans. I don't think it'll make a huge difference in the --

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

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

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

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

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

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

But, in this case, I think we can use real numbers because, as I said, according to the National Research Council and their study of all of the nuclear tests that were done in the PPG, they consistently cite 40 millirem as the LOD for the
film badges used, so you can use that.

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

It's a marginal difference admittedly.

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

DR. BEHLING: Yes, I think so.

CHAIRMAN LOCKEY: You like those numbers? Andy?

MEMBER ANDERSON: Yes, okay.

CHAIRMAN LOCKEY: Loretta?

MEMBER VALERIO: Yes.

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

MR. KATZ: Hans?

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

MR. KATZ: Right, right.

(Simultaneous speaking.)

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

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

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

Let's say he was there for March to September and he was assigned one mission badge in March and he was assigned a mission badge in
September or August sometime towards the end of that six month period.

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

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

So, one of the things that should be as a minimum applied when, if in the end, we can only establish employment periods on site by virtue of
badges in the early days which would have involved mission badges, then at least accept the fact that any time interval between two successive missions badges that were assigned was also time spent on site. That, as a minimum, is just a no-brainer for me.

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

So, it's just, you know, a recommendation that I would at least pose to them if it turns out that they are really no other ways to establish employment periods at PPG if the only option is to use mission badges as they were issued during the earlier years of the PPG time frame.
MR. KATZ: Right. Hans, if you just
lay out everything as clearly as possible in the
memo and I will get that to DOL.

DR. BEHLING: Will do.

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

MR. KATZ: Yes?

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

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

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

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

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

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

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

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

DR. BEHLING: Absolutely. As I had mentioned, just for Operation Greenhouse, if a person had stayed at any of those four locations
for the period of April and May, two months, he
would have potentially been exposed to around 4 rem
and that dose -- that exposure is not recorded
anywhere other than in a reproduced document that
dNA put out in 1982.

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

MEMBER VALERIO: Okay.

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

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

So, all we can do is give them some
guidance on for the information they have
available, how to use it and that's what we'll be
doing. But there's -- it's a DOL issue, it's really, it's not our issue and it's -- you can't -- there's nothing to be done in the absence of information, I mean for some situations.

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

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

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

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

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

So, you know, they may already be doing things that have sort of remediated the situation. I have no idea.
CHAIRMAN LOCKEY: Very good.
Anything else we need to cover today?

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

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

DR. BEHLING: Thank you.

MR. KATZ: And have a good weekend.

Have a good holiday weekend.

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

MEMBER VALERIO: Bye.


(Whereupon, the above-entitled matter
grew off the record at 3:34 p.m.)