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

convenes the

WORKING GROUP MEETING

ADVISORY BOARD ON

RADIATION AND WORKER HEALTH

DAY ONE

The verbatim transcript of the Meeting of the Advisory Board on Radiation and Worker Health held at the NIOSH, Cincinnati, Ohio, on May 31, 2005.

C O N T E N T S

May 31, 2005

TASK 4: DOSE RECONSTRUCTION CASE AUDITS
REVIEW OF SECOND SET OF 18 CASE AUDITS
ADVISORY BOARD WORKING GROUP
STUART HINNEFELD, NIOSH
HANS & KATHY BEHLING, SC&A

TRANSCRIPT LEGEND

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

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

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

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

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P A R T I C I P A N T S

ABRWH MEMBERS:

GIBSON, Michael H.
President
Paper, Allied-Industrial, Chemical, and Energy Union
Local 5-4200
Miamisburg, Ohio

GRIFFON, Mark A.
President
Creative Pollution Solutions, Inc.
Salem, New Hampshire

ROESSLER, Genevieve S., Ph.D.
Professor Emeritus
University of Florida
Elysian, Minnesota

OTHER ATTENDEES:

MR. DAVID ALLEN, NIOSH
DR. HANS BEHLING, SC&A
MS. KATHY BEHLING, SC&A
MR. STUART HINNEFELD, NIOSH
DR. ARJUN MAKHIJANI, SC&A
DR. JIM NETON, NIOSH

STAFF/VENDORS

STEVEN RAY GREEN, Certified Merit Court Reporter

P R O C E E D I N G S

(9:30 a.m.)

MR. HINNEFELD: Shall we get started, then we can be home -- get done before supper time. I think we all know each other. We won't do any more introductions. We're here to go through the second set of 18 dose reconstructions. We can -- there's some housekeeping things we probably ought to worry about at some point, like lunch. Do we want to try to go out for lunch? Do you want to bring lunch in? There -- we can order -- there's a pizza place, a Dewey's pizza place that probably delivers here. There's a Subway just down the street that we can pick something up from and bring it back if we want to work through lunch, or we could break for lunch. There's a restaurant probably close as well. I could escort a group to either the Tumbleweed or something. So, you know, we want to see how we're going --

DR. BEHLING: Yeah.

MR. HINNEFELD: -- decide if we need to work through?

DR. BEHLING: I'm -- both Kathy and I usually skip lunch anyway, so we're out of the picture

for making a decision.

DR. ROESSLER: I say work through lunch and get done before midnight.

MR. HINNEFELD: Okay. Well, I think we can do that anyway, but -- I think I'm -- maybe I'm more optimistic maybe than I should be. Okay. Well, we'll worry about the situation in a little while -- in a little bit, and if need be we can always -- like we can always call Subway and run down and pick up some sandwiches.

THE COURT REPORTER: Well, let me just put in my -- I've got to have something to eat. I've been up since 3:00 and haven't eaten a thing, so I'll need something, intravenous or whatever.

MR. HINNEFELD: We gave you coffee. What more do you want?

I also, Ray, will need to eat some lunch. I get -- if nothing else, I won't feel well for not doing lunch. So we'll have some lunch.

THE COURT REPORTER: Okay.

MR. HINNEFELD: Okay. Well, let's just -- I would just propose we go through these in order.

MS. BEHLING: Yes, that's what we're going to do.

MR. HINNEFELD: And then you give whatever summary you have and we can talk about anything

that we have as well.

MS. BEHLING: Okay, good. As we said, we're going to try to keep it brief, but I have the first one, which is tab 21, and this is a Rocky Flats case. And in this case, I'll give you just a brief overview to start with and then we'll go through the few findings in this case. The -- the employee was a master electrician. He worked from -- let's see here, from '69 through 1990 and he was diagnosed with prostate cancer in 1997. NIOSH estimated a dose of about 57 rem to the bladder and he -- that resulted in a Department of Labor POC of 40.8 percent. Now, we'll just through the findings unless anyone else has any types of questions, but the very first finding that we had, which is on page 9 under the recorded photon dose -- we were not able -- based on the procedure that was used, we were not able to reproduce the photon dose. In fact, we -- in Section 2.1 -- were able to calculate -- we actually gave you the equation and showed exactly what the dose reconstructor did in calculating that dose. And in some cases, we were able to reproduce it. And there were actually eight entries in which -- in which we could not

reproduce the 30 to 250 keV photon dose, and eight entries which we couldn't reproduce the low energy photon dose. And it just so happened that the -- see, in each case, the 30 to 250 keV photon dose was an underestimate, and the less than 30 keV photon dose was an overestimate and I assume it was an arithmetic mistake, but we just could not reproduce those.

MR. HINNEFELD: Well, I -- I -- I think I know what the -- what the dose reconstructor did to get to the numbers he got, and I don't know if it's correct or not because I haven't had a chance to sort out exactly the Rocky Flats Technical Basis Document, the various reports. But I brought along a couple sheets of paper that are from this case. The two different ways of describing the exposure history is the first. This is the one that you provided.

MS. BEHLING: Yes.

MR. HINNEFELD: And then these sheets also relate to the same person and they're also in -- in the DOE response for this case. And these are individual -- well, at some point they're annual summaries and then they break into badge readings that -- in some year. And this sheet -- and this

sheet with the handwritten numbers shows penetrating number and a skin number. The printout from the record shows deep dose equivalent/shallow dose equivalent, hyphen skin, and then has an additional neutron column on the right side. And what we noticed was whenever there was a neutron recorded on this sheet, it was added to the DDE penetrating on the -- or DDE on this same sheet to get 24, and you got the value on the handwritten sheet. So at some point they added the neutron deep and this DDE value together, or they broke the neutron out of the original number and -- and recorded it that way. So it was -- it was a difference in the two reporting, so what the dose reconstructor did was take the difference between this DDE and SDE skin to get the 30 keV and then do the arithmetic as described in your review.

MS. BEHLING: Okay.

MR. HINNEFELD: Now, that's the difference. I don't know which one is the right -- the way it's supposed to be done. Okay.

DR. BEHLING: And -- and for the record, some of these things will result in very trivial differences and I think we should have started

out by saying that our audit was first to see can we reproduce it based on the information provided, and we didn't really say whether or not that would result in any even significant dose.

MR. HINNEFELD: Right.

DR. BEHLING: It's just whether or not we could, and understand the process.

MR. HINNEFELD: Uh-huh.

DR. BEHLING: And -- and of course, you know, as you see in almost all the cases here, our findings result in impacts that are very low, meaning that it has a very modest effect on dose and certainly not on the POC. And I just want to be on record for saying that we're not saying these are monumental issues; it's just that our attempt to reproduce them, these numbers, based on information provided in the text, did not allow us to do that --

MR. HINNEFELD: Right.

DR. BEHLING: -- regardless of whether or not there was a significant difference in our -- our dose assessment.

MR. HINNEFELD: Well, I would hope that before -- you know, before you leave Thursday or Friday I'll be able to sort out the various reporting --

these two different reports from Rocky Flats and which is the appropriate way to -- which is the appropriate subtraction. Because it's not clear to me today which one is the appropriate way to do it.

DR. BEHLING: Yes, yes.

MR. HINNEFELD: Whether it's subtract these numbers or subtract those numbers.

DR. BEHLING: And -- and I think we will see that later on, too. The methodology for reporting doses changed over the years. You will see -- early on you see penetrating dose and non-penetrating doses. And of course, the skin dose would be the summation of penetrating/non-penetrating. And oftentimes later on you would throw in slow neutrons, fast neutrons, and even X-rays. And so the methodology for reporting doses changed over the years.

MR. HINNEFELD: Right.

DR. BEHLING: And -- and sometimes when you look at the composite annual doses, you don't get a full understanding of what really went into those until you get to the actual cycle itself, individual reporting, that you get to understand how these numbers came to be.

MR. HINNEFELD: Right.
DR. BEHLING: And -- and, you know, as I said, in most instances these are quite trivial.
MR. HINNEFELD: And these are small differences.
DR. BEHLING: Yes.
MR. HINNEFELD: These particular differences are pretty small. Yeah. Okay.
MS. BEHLING: Okay. The second finding -- and this is under missed dose on page 10 of tab 21. And this is one of these issues that we seem to encounter a lot of times when we're dealing with procedures such as the TIB-10 and TIB-8 procedures. And in this particular case, we're really not sure. What -- what we feel the dose reconstructor should have done if they wanted to maximize the missed photon dose was to take the LOD value times N exchange periods and enter that into IREP as a constant with no uncertainty. However, what was entered was a -- what appears to be a geometric mean with a geometric standard deviation of 1.52. And this is something that we see on a routine basis on -- in this particular area, especially with missed photon dose.
MR. HINNEFELD: Right.
MS. BEHLING: When they use the LOD value and --

times the N, that is already your 95th percentile value and should be entered as a constant without the uncertainty.

MR. HINNEFELD: Yeah, and that's -- I guess my comment on this was that's -- you're correct, and that since this was an error in the high dose side on a non-compensable outcome, we wouldn't necessarily correct it. We might -- we would just send it on.

MS. BEHLING: Okay.

MR. GRIFFON: On that -- on that -- along those lines of missed photon dose, it's not so much the uncertainty, but I had a question on this case of missed versus unmonitored. And in 1972, '78, '81, '82, '85 -- if my notes are right here -- there was no data. And I was -- I didn't have a chance, but either -- this is either SC&A or to NIOSH, did the dose reconstructor just assume it was a missed dose and a -- and assign the LOD over two, or whatever technique, or did they assume it was unmonitored and assign some other value like co-worker data or something like that?

MR. HINNEFELD: My -- my judgment on this is since this employee went from monitored to unmonitored and -- and then back to monitored on

a -- what seems to be a relatively consistent work assignment, that there were certain years when he would just not get assigned to places where he needed a badge. And in those cases, the -- the missed dose of a badged person we would consider an upper estimate or a bounding estimate on what the person's exposure might have been for those years, and so it would be an appropriate way to -- to do the unmonitored. Yeah, he was -- there were a handful of years where he does appear to be unmonitored, given this work situation and particularly given '81, '85, you know, that work era --

MR. GRIFFON: Yeah.

MR. HINNEFELD: -- we would say that okay, well -- if he -- since he was unmonitored, he would no more dose than someone who was monitored all the time and had zeros, you know --

MR. GRIFFON: Right.

MR. HINNEFELD: -- every cycle and all that. So it's an appropriate bounding dose for those years.

MR. GRIFFON: Okay. I guess what I -- what I was wondering is, was there any attempt to find out -- I don't know if the person in this case is

alive, but was there any attempt to find out from the CATI interview whether he did go on and off badging like that or was there anything in his work history that would have dictated necessarily -- my -- my concern, again, is that if -- if there's data missing, how do we know it was simply that he got off the monitoring program and not that data is just simply missing and for whatever reason -- a lost badge, a whatever.

MR. HINNEFELD: Okay.

MR. GRIFFON: There's really no way to verify that I guess, or --

MR. HINNEFELD: I don't know of any way right now. We certainly read the CATI. I don't -- I haven't read it recently, but certainly the dose reconstructor would have read the CATI and our reviewer would have read the CATI and probably would have, and should have, commented and the dose reconstruction -- or the dose from the incidents would have reflected some sort of -- you know, something saying then that he was continuously monitored but -- but that it's missing for some years or -- it would seem like it would have been annotated in some fashion. I don't recall sitting here today because I -- I

don't know that I actually read it when I was preparing for this. Certainly the dose reconstructor would have done it and our reviewer would have read it. I just felt like with this person's assignment being an electrician, and presumably working all over --

MR. GRIFFON: Right.

MR. HINNEFELD: -- you know, he could be assigned to, you know, clean side maintenance. I mean there was a -- Fernald was a clean side maintenance and while Fernald and Tippy (sic) were badged for most of the history -- well, everybody was badged, but you just didn't go in the process area. They only worked maintenance on the clean side. So I would suspect it would be consistent with that kind of approach.

MR. GRIFFON: It could well be. I'm -- I'm just asking whether that was checked or not.

MR. HINNEFELD: Yeah. I'd say -- I'd say, to answer your question, our approach would be -- in a situation like this, we would probably conclude that assigning a missed dose rather than a monitored dose for this kind of situation would be an appropriate bounding approach.

MS. BEHLING: Okay. We'll move on into finding

3, which is missed neutron dose section on page 12. In this case, the dose reconstructor specified the formula that he was actually following for calculating missed photon dose, which was N for the badge exchanges times LOD over two times two times 1.91. And this methodology is not endorsed in either the implementation guide or the Technical Basis Document. And here again, he had two options. If he was going to maximize that missed dose, he would have followed the N times LOD formula and entered it into IREP as a constant. Or, if he wanted to use the best estimate approach, he would have used N times LOD over 2, entered that as geometric mean with standard -- geometric standard of deviation of 1.52.

MR. HINNEFELD: Yeah. Same comment as before, that since it's an error on the high dose side on a non-compensable case, we wouldn't necessarily correct it.

MS. BEHLING: Okay. Finding 4 has to do with the occupational medical dose. And here there was what we felt an underestimation of the dose, because apparently the dose reconstructor only calculated one chest X-ray for 1969. And I -- if

I recall, I think the dose reconstruction indicated that he was going to assume an annual chest X-ray, which he did not do and that would have resulted in additional 7 or .700 millirem.

MR. HINNEFELD: Okay. Now, in this case, they did use the -- the tables from the site profile on these dose numbers. But 33 millirem was assigned in 1970, right, the first year of employment? Isn't that where we are on this one? The table on the appendix would be --

MS. BEHLING: Yeah.

MR. HINNEFELD: -- where it would be. In line 212, line 212 of the dose reconstruction.

MS. BEHLING: Yeah, I -- I didn't have that information on this one. I don't know why.

MR. HINNEFELD: Line 212 of the dose reconstruction is the 33 millirem and then there's a whole series of zeroes --

MS. BEHLING: Yes.

MR. HINNEFELD: -- after that. On the Technical Basis Document for Rocky Flats -- this is the medical section -- there's the -- this is later years. Here's '70 to '85 and there's pre-'70 for a PA chest and --we're looking at bladder -- right? -- urinary bladder for the surrogate.

Isn't that what we're doing here? Urinary bladder?

MS. BEHLING: Yes.

MR. HINNEFELD: So pre-'70 we have a 25 millirem --

DR. BEHLING: And you multiply it times --

MR. HINNEFELD: Times 1.3, which gives us the 33 for that entry.

MS. BEHLING: Yes. Yes.

MR. HINNEFELD: Okay. When you get to '70 --

MS. BEHLING: Through '84?

MR. HINNEFELD: -- '70 to '85, urinary bladder goes to less than a millirem. So even with the 1.3 multiplication, it will be -- it will be less than one, and IREP rounds to the nearest millirem, so it appears as a zero. Now on the -- appears as a zero on this printout. Now if you open the SL workbook that is actually the IREP input and you highlight that field, you'll see that it's not actually a zero. It's actually a calculated value based on some -- and just is less than one so it rounds down to zero in the IREP printout. So from -- for the years, except for the first year, the numbers for -- you know, the medical dose based on the TBD are less than

one, so you get all those zeros down there. Okay. And that also explains the arithmetic, why the dose reconstructionist assigned a total of like 38 millirem for this report -- medical exposure -- when in fact you only can see the 33 on the -- on the spreadsheet.

MS. BEHLING: Yes.

DR. BEHLING: And (unintelligible).

MS. BEHLING: Right.

MR. HINNEFELD: Yeah. Now -- and then there's another comment about the lumbar spine exam, which is way down at the end. It's line 234 of the dose reconstruction, his lumbar spine. The dose reconstructor appears to have shortcut it and on a -- on a high side, which would be assigned as a -- as the lumbar spine. The Technical Basis Document says they had a two-view lumbar spine, an AP and a lateral. And he gives a value for both the AP and the lateral on the lumbar spine in the -- in the years when they were given, '52 to '74, so you may want to give him higher if you want to give him anything. And the urinary bladder, as you can see, is -- you have an AP value and these are lung only, and then a lateral number. The dose reconstructor

just took two AP.

MS. BEHLING: Uh-huh. I see.

MR. HINNEFELD: Two times the AP value and kept that GSD rather than, you know -- your other alternatives would be list them on separate lines or do a combination of these two means and then geometric -- you know, some sort of combination of the distribution.

MS. BEHLING: No. No, we didn't --

DR. BEHLING: I -- I think I did make a comment later on about the lumbar spine as it's being calculated here versus for Iowa, which is like a factor of ten higher, and I couldn't figure out why one --

MR. HINNEFELD: I'm not sure -- see, I can -- yeah, that was in the Iowa I think.

DR. BEHLING: Yeah. Yeah, I think they go up to like 2.9 rem --

MR. HINNEFELD: As I recall, it had to do with the number of views.

DR. BEHLING: Yes.

MR. HINNEFELD: Certain places took like five views for the lumbar spine, and that I think is -- explains the magnitude of the difference. And this was -- so in this case, the lumbar spine was

counted for as if it were two AP's as opposed to an AP and a lateral. I think the dose reconstruction incorrectly says they accounted for two lumbar spine exams. And they didn't have two lumbar spine exams, they did two views.

DR. BEHLING: Views.

MR. HINNEFELD: So that's -- so that's part of the comment (unintelligible).

DR. BEHLING: Yeah.

MS. BEHLING: Okay.

UNIDENTIFIED: This is yours, too.

MR. HINNEFELD: Oh, yeah. Sorry. I need just a few more things in front of me.

MS. BEHLING: All right. And finding number 5 is we could not reproduce -- based on the information that was provided in the dose reconstruction report, we could not reproduce the on-site ambient dose. I believe NIOSH calculated 73 millirem, and based on using the Technical Basis Document, we calculated 202 millirem. No. No, I'm sorry. We did not. We calculated 60 millirem.

MR. HINNEFELD: Yeah, there's two.

MS. BEHLING: Sixty, yes.

MR. HINNEFELD: Yeah.

MS. BEHLING: Trivial, however -- as Hans said -- one of the things we're trying to do is just reproduce all of the numbers.

MR. HINNEFELD: Okay. What I think they did was took the 1985 dose from their -- from the TBD table and they used the 1985 dose of -- is that the highest one? I may have these wrong -- 1989 dose. 1989 dose had the highest mean value of 167 and the recommended 1 sigma value is this value all the way over here.

MS. BEHLING: Yeah, 36 and 39.

MR. HINNEFELD: So if you add those two, 167 and 2 sigma 78, you get 245 for an 1860-hour year, and that's 73 millirem for the 26-hour -- 26-hour work period. So that seems to be how they did the arithmetic. Again, the number is trivial and it doesn't really matter.

MS. BEHLING: It is.

MR. HINNEFELD: But that seems to be how they did (unintelligible).

MS. BEHLING: Okay. Okay. And then the last finding is with regard to the internal dose. And in this particular case, and I know that dose reconstructors do this a lot when they're maximizing the hypothetical internal dose, they

use the TIB-2 when they select the 28 radionuclides for the hypothetical internal. However, since Rocky Flats is a facility without a reactor, procedurally they should have selected the model with the 12 radionuclides, which would have obviously reduced the internal dose.

MR. HINNEFELD: Yeah, you're right.

MS. BEHLING: I believe that's it for this one.

MR. GRIFFON: Can I -- yeah, just one more thing on this. Not to beat a dead horse, but I -- this is my horse to beat. I'm looking at the CATI interview with this guy, and -- and Stu, I mean he is an electrician, but there's also a statement in here that says he was -- he did odd jobs until he became a -- got his license --

MR. HINNEFELD: Okay. All right.

MR. GRIFFON: -- as a master's electrician --

MR. HINNEFELD: That's right. That's right.

MR. GRIFFON: -- and then he worked on -- did glove box work in 7/71.

MR. HINNEFELD: Glove box maintenance, sure.

MR. GRIFFON: Now, did he -- was he assigned there permanent -- you know, I mean, is there -- is there a black line or is it -- did he go back and forth? I don't know. It seems like he's

saying I did odd jobs to a certain point, then I was a master's electrician, then I was assigned to glove box work. Maybe it's not that clean, but I -- I just wondered if --

MR. HINNEFELD: I believe probably our interpretation was that he at times did maintenance on things in glove boxes.

MR. GRIFFON: Right.

MR. HINNEFELD: Electrician work on things in glove boxes --

MR. GRIFFON: Right.

MR. HINNEFELD: -- as part of his master electrician assignment.

MR. GRIFFON: Yeah.

MR. HINNEFELD: And so --

MR. GRIFFON: But that doesn't necessarily mean --

MR. HINNEFELD: -- our approach would be that that comment or that information would not necessarily cause us to change the judgment that I described early on.

MR. GRIFFON: Okay. I -- I was just -- you know, the other note that I have was I don't think there's any original records of -- of -- they're all annual summary records, right, for the --

MR. HINNEFELD: For the dose, you mean?
MR. GRIFFON: -- exposure data. Yeah.
MR. HINNEFELD: There is actually the printed page from the person's record that actually includes -- after a particular year, and I forget what it is, '78 or '79. After that year it shows what appears to be monitoring cycle by monitoring cycle. So the printed -- you know, it looks like a printout from a computer database --
MR. GRIFFON: Uh-huh.
MR. HINNEFELD: -- does in fact show that. The early on is annual summary even on that report. The handwritten numbers are annual summaries. But that report does seem to show what appears to be monitoring cycle by monitoring cycle. It usually is like a quarter or every couple months or something like that, and it's got an unusual nomenclature becau-- or unusual designation because it has two dates, activity start and activity end, which you normally think would be start of the wear period and end of the wear period, but it's not. It's like the day before and the day after the -- the badge was collected. So -- and those things are only like a day apart, so it's a little bit -- kind of throws you off

but the Technical Basis Document does actually describe that report in that fashion and it's -- so it's a little unclear what the start of each wear period was, but it's pretty clear what the end of each wear period was.

MR. GRIFFON: But again, this may not be that critical in this case, but in -- in general, I -- I guess one concern is if you have the -- if you have borderline -- if we run up against borderline cases, I think -- because we've heard so many stories about people being asked to put their badge down to do certain work or whatever.

MR. HINNEFELD: Yeah. Yeah.

MR. GRIFFON: So it -- it would make sense in those situations to maybe go back and ask the person. Often they're not going to remember because --

MR. HINNEFELD: And in fact, that person actually has a different problem than the one you're describing, because the one you're describing, he'll have exposure on it.

MR. GRIFFON: Right.

MR. HINNEFELD: It will -- he won't look like an unmonitored person; he'll have an exposure record. And so it's another issue and we look

for that comment.

MR. GRIFFON: Yeah. Yeah.

MR. HINNEFELD: And we -- and we don't just ignore that comment when we see it.

MR. GRIFFON: Okay. Right, right.

MR. HINNEFELD: In this particular case, if the person has no record for monitoring, we kind of go with the -- the site in general, how -- how they seem to, you know, badge people and not, the -- the era. You know, if you're well into the '80s, we have a little more confidence. So if a guy doesn't have an exposure record in the '80s, he probably wasn't monitored that year --

MR. GRIFFON: Right. The one that really caught my eye on this situation -- the one that caught my eye was the '72 because he had --

MR. HINNEFELD: There was one in '72. Right.

MR. GRIFFON: He had his higher exposure in '69, '70, then there was a -- like a blank and then it went one more high year, and then it kind of lowered, you know, tailed off.

MR. HINNEFELD: Right.

MR. GRIFFON: In the '80s like -- yeah, I agree. It wouldn't surprise me that much. But anyway, I'll leave it at that.

MR. HINNEFELD: Okay.

DR. BEHLING: Okay, kind of move this through, we're on tab 22, the next case, which is case number 10610. This is an individual who worked at Y-12. And if I can just quickly go through it here, it's a female worker who worked there from 1980 through 1998 for a period of about 19 years, and this person was diagnosed with breast cancer in the year 2000, shortly after she terminated employment. Her job at Y-12 was a machine cleaner, so she was in contact with materials that may have involved external as well as internal exposures. The total assigned dose to this individual was 31.85 rem. And for her breast cancer that translates to a POC value of 32.13 percent. And just quickly going through Table 1 on page 5 of the report you'll obviously come to some conclusions just looking at the doses. She had very little measured doses. Most of the external dose was assigned to her from photon missed dose. So she had a total of only 26 millirem of measured dose and a total of 6.84 rem of photon missed dose. And she received quite a bit of exposure from electron missed dose, which was also calculated. And on top of

it, a very, very hefty dose from internal exposures that was based on a hypothetical model. So again, the -- the doses are -- in most instances here, the overwhelming majority of dose contributing to her 31.85 rem were -- were basically assigned doses for missed doses, as well as hypothetical internal.

Let me just point out an -- an error. I don't know if Kathy had sent you an errata sheet, but in Table 2, our case review list, for -- for the category of C.2.2, missed dose. You should have had a no and a low instead of the yes, and that is exchanged with value C.3.2 where we had the -- the no and low, and you should have a checkmark on your yes. So it's a reversal of those two.

MS. BEHLING: Same number of findings.

DR. BEHLING: Same -- same findings.

MR. HINNEFELD: Yeah, okay. I got it.

DR. BEHLING: Again, if you look at the bottom of that checklist, we find eight findings. The majority of them had low impact, but there were a couple of instances where we concluded that we can't really identify what the impact is. And so they were category 4 under review, and we'll briefly talk about that when we get there. Let

me just quickly focus on the findings. The first finding is identified on page 10, and it's misinterpretation of procedure resulting in improper assignment of uncertainty for missed dose. And again, this is one of those cases that I think we're going to be hearing again and again, and then Stu is going to say enough, I heard. This is the misinterpretation of TIB-8 and 10 where people are looking at those tables and confusing what needs to be done in maximizing doses based on recorded dose versus missed dose. And here they -- again there's three things that they do. They multiply -- they used N times LOD, which should be enough if you're going to maximize missed dose, and -- and what they do is they multiply it by 2 and then they introduce implementation guide number 2, which divides by 2. And then they obviously still have the uncertainty, so you have three errors. So you have the multiplier, a -- a correction -- standard correction factor which does not belong. They correct that by dividing by two, so error one -- number one is corrected by error two, and you're left with error number three, which is uncertainty which doesn't belong. And that is

the routine error that has been made. And, you know --

MR. HINNEFELD: Which I -- I still think they made one error which --

DR. BEHLING: They made one error.

MR. HINNEFELD: -- which was adding the -- which included the multiplier of 2 which didn't belong. You know, they -- and then -- and then the language that they chose to describe what they did kind of leads me to believe --

MS. BEHLING: That's the other thing. The language sometimes --

DR. BEHLING: You can either do it two way. You can say the multiplier 2 doesn't belong.

MR. HINNEFELD: Doesn't belong.

DR. BEHLING: Or you can say the multiplier and the divider doesn't belong, which leaves it with LOD as a -- as a constant. So -- so you can do it in either direction, but -- and I -- I've gone on record in saying that when I read those two Technical Information Bulletins I, too, was confused until I realized that table needs to be segregated that says this is for recorded dose; this is for missed dose.

MR. HINNEFELD: I -- I at least agree with you, I

mean unless somebody around here can change my mind. But I at least agree with you on your reading of this document.

DR. BEHLING: Yeah, yeah. And this is a constant. It's one that we routinely -- so we want -- the next time, we'll just say this is, you know, something we've already discussed. The next finding, finding 22.2, C.2.2, that should also have inappropriate assumption used for calculating not recorded dose but missed photon dose. The word "recorded" should be replaced with "missed photon" dose. Again, here -- and I don't want to come across as not being, you know, claimant-favorable, but my assumption is always when you have the real data, use it. Don't necessary (sic) -- even if it's claimant-favorable, and in this case we -- we talk about 12 cycles per year as the number of cycles for calculating missed dose. But if you look at the individual dosimetry records, the first number is monitored on a quarterly basis. So use the quarterly, and obviously it's going to reduce the dose and won't be as claimant-favorable, but -- but it's the real information and should be used.

(Whereupon, Mr. Gibson enters the

proceedings.)

MR. GIBSON: Hello.

MR. HINNEFELD: Hey, Mike.

MS. BEHLING: Hello.

DR. BEHLING: Okay. The next one is page 12, finding 22.3, D.1.1, incorrect procedure used to estimate electron dose.

MS. BEHLING: Can I stop you for just one second? Can I assume that on this -- on the finding 2, you're in agreement with the fact that we feel that that is an overestimate --

MR. HINNEFELD: Yeah.

MS. BEHLING: Oh, okay.

MR. HINNEFELD: Yeah.

MS. BEHLING: Just want to be sure.

MR. HINNEFELD: That's just, you know, as a -- as a matter of course, if we see an overestimate in a -- in a noncompensable case, even more so than needs to be there, we'll --

MS. BEHLING: Just let it go.

MR. HINNEFELD: -- just let it go, sure.

MS. BEHLING: Okay. And we don't.

MR. HINNEFELD: Yeah. Right.

DR. BEHLING: The -- the -- as I said, the next finding is on page 12, and it's finding 22.3,

D.1.1, incorrect procedure used to estimate electron doses. The reference cited was ORAU-OTIB-0008 for reconstruction of missed shallow dose. That procedure basically tells you you cannot use this for measuring a skin dose or shallow dose. It's one of the statements up front. In essence he should have used TIB-17 as -- as the correct one.

MS. BEHLING: For the breast.

DR. BEHLING: Yeah, for the breast.

MR. HINNEFELD: Right.

DR. BEHLING: Just a technical oversight. Finding 22.4, LOD value could not be verified. I think the individual used 40 millirem. And of course if you use TIB-17, the LOD should have been 50. Again, it's a modest difference which would change the dose by about 200 millirem.

MR. GRIFFON: Let me stop at each one of these. Are -- are you in agreement or...

MR. HINNEFELD: Yeah, I -- I believe that is one -- I believe that is right. I believe that... yeah.

DR. BEHLING: Yeah.

MS. BEHLING: Yeah.

DR. BEHLING: There's two things that cancel each

other out, 40 versus 50, but then I also say it's quarterly instead of 12 cycles. So in essence you actually lose, again, dose. So we're actually talking about dose reduction here if you comply with my -- my statements.

The next finding is on page 14. It's 22.5, incorrect selection of hypothetical. We just already talked about that in the previous one. Whenever you have a facility that is not a non-reactor, the correct choice based on TIB-2 is to use 12 radionuclides instead of 28. Again, this would reduce the dose.

The next finding is finding 22.6, F.3, hypothetical dose value incorrectly derived. And again, when you look at the hypothetical dose model, it offers here I believe 13 organs that you can select from. And of course that does not allow for all organs that are defined in -- in DC-9 code, which means that when you have an organ that is not among the 13, you're supposed to use a surrogate organ. That is, a non-metabolic organ that would serve as a maximizing dose. I guess the experience has shown that the colon is always the maximal organ for a surrogate, but in this case the person has breast

cancer and the breast tissue is among the 13 tissues that can be used to identify the real dose. And so based on that, we calculate the -- the dose for the breast using the 28 radionuclides would have been 8.75 rem which is considerably lower than the ones for the colon.

MR. HINNEFELD: It was -- I think this is a holdover from the original -- original use of the TIB-2 --

DR. BEHLING: Yeah.

MR. HINNEFELD: -- was use the highest non-metabolic.

DR. BEHLING: Yeah.

MR. HINNEFELD: Or it's available for -- these non-metabolic organs, use the highest non-metabolic dose, and that was the approach.

MS. BEHLING: Yes.

MR. HINNEFELD: And this remains from that. In -- in the interim, TIB-2 has evolved to provide -- and the tools now provide doses to a variety of organs --

DR. BEHLING: Yes.

MS. BEHLING: That's right.

MR. HINNEFELD: -- specific organs, and this -- this probably is -- the dose reconstructor would

relate me on -- you know, going back to previous activities, I believe he's used the maximum non-metabolic.

MS. BEHLING: Yes.

DR. BEHLING: And the only -- only issue here is that when people -- and we've seen those through the meetings that we've attended during the public speaking sessions, and you realize that oftentimes these people who are claimants congregate and -- and compare notes. And I guess it would be nice to know that when they do talk to each other and they have common cancers, that one doesn't say oh, they gave me this dose based on a colon, but the other one says no, they used a real -- and -- and it's just consistency and so forth. So basically what we found here is that almost -- most of the findings would reduce the person's exposure.

MR. HINNEFELD: Yeah.

DR. BEHLING: And -- and we've made that statement before. We're not afraid to say when the doses are in excess of what they should be based on available information, we're going to cite that as a finding even though it may prove to be not claimant-favorable.

MR. HINNEFELD: Yeah, I think there's something to be said for that, for saying that hey, look, if you've got a way -- if you have a way to do the dose to the breast, it's not -- and it's the same approach as the dose to the colon that they gave more worth --

MS. BEHLING: Exactly.

MR. HINNEFELD: -- why bother to have these artificial (unintelligible) thrown in. And I think there's some -- that's certainly worth carrying into our conversation with ORAU is that they -- because of the consistency of the dose reconstruction --

DR. BEHLING: Yeah.

MR. HINNEFELD: -- I think we'll get --

DR. BEHLING: I -- I think for --

MR. HINNEFELD: -- (unintelligible) dose reconstruction, even if they're all (unintelligible), it doesn't help us out.

MS. BEHLING: And I -- I believe the other philosophy that we've taken is, as Hans was saying, we don't always go with the maximal dose, especially when it is a known. And that's also consistent with the regulations, and it keeps the dose reconstructions consistent among one another

if you follow that philosophy.

MR. HINNEFELD: Right.

DR. BEHLING: Okay. The next -- I guess final two are on page 15. And the first one, 22.7-B.3, is unresolved discrepancies between CATI report and DOE records. The claimant indicated in the interview that she was subject to in vitro biological monitoring; that is, urinalysis. DOE records, however, did not identify any bioassay records. The claimant also stated that a medical X-ray was taken in all but the last year of employment. However, the DOE records provide no evidence of any chest X-rays. And the claimant stated that the worker had whole-body counts annually through 1992, and DOE records only provide in vivo data for four measurements. So whether or not she's correct, it's always difficult when you talk about a person's testimony over the -- over the phone during an interview. And at this point you're only left with a discrepancy that you can't really assess in terms of who's right or wrong. Are the records complete and is the person who has provided these statements during the interview suffering from a lapse of memory, or is it the

fact that these records are in fact incomplete and therefore are missing certain records is something we can't really discuss or make a judgment call other than to say it's a discrepancy that is unresolved and that's why we identify these deficiencies as having an uncertain impact because we really don't know. I mean the -- the -- obviously, one could cap, for instance, a chest X-ray for breast cancer and say well, we could assume an annual one and take the dose to the breast as a function of time using obviously TIB-6. That's not a problem. We could account for that. But what is more difficult to account for, if there are urinalysis data that are simply not there, which the interviewee claims to have been there, because that is basically an open-ended question for which we have no way of providing an answer.

MR. HINNEFELD: Yeah, and I don't know right now what efforts, if any --

DR. BEHLING: Yeah.

MR. HINNEFELD: -- were taken to try to resolve that.

DR. BEHLING: No, given the fact -- and I will again -- come full circle again, is that this

person was given a very healthy hypothetical internal exposure. And based on that large dose, which is not only 12 but 28 radionuclides, one could reasonably conclude that it's likely a gross overestimate of whatever it is she might have missed, and therefore one could come again with the conclusion that the assigned dose is more than likely to have bounded any internal exposure. No question of that.

MR. HINNEFELD: Yeah. Well, certainly we would feel that way, but I don't know what was done to try to resolve any discrepancy. I will say that not every site gives us X-ray information. And so the fact that the DOE response didn't include any evidence of medical X-rays would not necessarily be surprising because a lot of sites don't send -- it all -- it just depends on how they keep -- do their record-keeping. So we would -- I would -- I would expect that medical X-ray was assigned for this person in the dose reconstruction for each year of her employment and so ...

DR. BEHLING: Yeah. And again, in conclusion, when you look at Table 1 and the report at 5 and you just scan through and you realize that

measured photon doses were 26 millirem and in the end she was assigned to internal/external dose of nearly 32, it clearly suggests that we bounded her exposure.

MR. HINNEFELD: Right, right.

MR. GRIFFON: I guess the part where the CATI interview goes back to comments we made in first 22, Stu, that -- you know, when you come out with a DR report, I think -- I mean one concern that we raised last time was this boilerplate type of language that says the CATI was considered.

MR. HINNEFELD: Right.

MR. GRIFFON: And -- and it doesn't really speak personally to that person, but you don't give the details. For instance, she said in one of her phone interviews that in '83/'84 I worked in some really bad stuff. And, you know, that -- that doesn't tell us much at all, but if you said that, you know, we looked at these records, we looked at these records and, you know, we couldn't find any incidents in that time period. However, we've assigned the 12 radionuclide, you know --

MR. HINNEFELD: Right.

MR. GRIFFON: -- worst case dose as a claimant-

favorable measure, you know --

MR. HINNEFELD: Right.

MR. GRIFFON: -- that at least speaks to that you're -- you're at least listening to them when -- when they ask -- when you ask them what they worked in, you know.

MR. HINNEFELD: Right. And of course all 60 cases have been selected before any feedback from this review --

MR. GRIFFON: Right, right.

MR. HINNEFELD: -- has gotten back to our (unintelligible) --

MR. GRIFFON: I understand. I understand.

MR. HINNEFELD: -- and so we'll see the same kinds of things --

MR. GRIFFON: That's what I'm saying.

MR. HINNEFELD: -- from the entire --

MR. GRIFFON: It's the same comment.

MR. ALLEN: I was just going to say this one was sent through December of '03.

MR. HINNEFELD: Right.

MR. ALLEN: So when this was sent to the claimant, so there is a lag time.

DR. ROESSLER: Well, the book --

MR. ALLEN: I'm sorry. Go ahead, Gen.

DR. ROESSLER: It would be helpful on all of these, I think, to have the date that the dose reconstruction took place and then we could kind of track what's happening with time.

MR. HINNEFELD: Okay. Well, we can provide that. I mean we've got -- we can get them. But --

DR. ROESSLER: Just in a general way, I think.

MR. HINNEFELD: Yeah.

MS. BEHLING: There's a date on the dose reconstruction report, completion date, so we could incorporate that into our --

MR. ALLEN: Right. Well, we have --

MS. BEHLING: -- report, also.

DR. ROESSLER: Yeah, I think that would be helpful.

MR. ALLEN: I don't know how much information we'll put in the report for Privacy Act...

DR. ROESSLER: Well, I think maybe kind of a general -- like the year, even, would help so we could --

MR. ALLEN: The date it was -- the date the DR was approved is probably okay. I wouldn't think there'd be any particular --

DR. ROESSLER: Privacy.

MR. ALLEN: -- privacy issue with that. What do

you think?

MR. HINNEFELD: I don't think so. I just think if you keep --

MR. GRIFFON: Yeah.

MR. HINNEFELD: -- taking everything that's okay to put in --

MR. GRIFFON: Yeah.

MR. HINNEFELD: -- eventually you could supply more--

MR. ALLEN: The more information that's okay by itself --

MR. GRIFFON: Certain sites, certain cancer approved --

MR. ALLEN: -- at some point --

DR. ROESSLER: Yeah, yeah.

MR. HINNEFELD: Yeah, at some point it's not okay anymore.

DR. ROESSLER: Protective.

DR. BEHLING: Just as a final statement for this case, on page 15 I make a statement here that says SC&A concludes that the technically inappropriate parameter selected for hypothetical internal dose, which included 28 instead of the 12 radionuclides and the use of colon as a surrogate for the breast, may have been motivated

by the potential for missed internal dosimetry records. Meaning that maybe the guy said well, in the absence of -- of dosimetry records on all the internal --

MR. HINNEFELD: Right.

DR. BEHLING: -- I will opt to go and aim high on two counts. One, the use of 28 radionuclides and the use of colon instead of the breast, both of which are obviously very claimant-favorable with -- with -- and provide a dose beyond what's -- the procedures would have dictated.

MR. HINNEFELD: Right.

MS. BEHLING: Okay. I guess we'll move on to tab 23, which is case number 004747. And this employee worked at both the Y-12 plant and the Oak Ridge gaseous diffusion, the Y-25 plant. And he worked between 1954 and 1992 in three uninterrupted employment periods. In 1997 the worker was diagnosed with prostate cancer. And he was a machinist and worked at various buildings and plants throughout the facility. His -- NIOSH calculated a dose of 24.7 rem and that resulted in a POC of 24 percent. And as you can see from Table 1, the majority of the dose was the hypothetical internal dose that this

person was assigned. But starting with the first finding, 23.1-C.1.1 on page 9, in this particular case we found a discrepancy between the two different guidance documents -- and when we're talking an incorrect assignment or what we consider an incorrect assignment of a surrogate organ, this was a prostate cancer and the dose reconstructor selected the testes as the surrogate organ. If you look at TIB-0005, they recommend using the bladder as the surrogate organ for the prostate, and OCAS -- the implementation guide, OCAS-IG-001, actually recommends the testes. So I guess the dose reconstructor wasn't wrong in using the testes here because one guidance document does recommend that. But I think obviously there's -- has to be a correction to --

MR. ALLEN: Okay. At the time this was done, they both recommended that and it was changed in one and, you know, we hadn't got it changed in the other yet.

MS. BEHLING: They both recommended testes? Is that --

MR. HINNEFELD: Early on -- early on the testes was --

DR. BEHLING: Clearly, the bladder is the more correct one.

MR. HINNEFELD: Yeah. And you're right, the end value should be modified to reflect that.

MS. BEHLING: Okay. The second finding -- now this particular case, the dose reconstructor entered the recorded dose as a constant with no uncertainty. And this is another one of these procedural issues that Hans and I have been challenged by, and that's the implementation guide which recommends when you have a recorded dose, you enter it as a normal distribution with a -- you have a numerical standard deviation and the guidance provided in that implementation guide is -- is very, very complex and difficult. And we have never seen -- at least in these 38 cases we haven't seen one dose reconstructor even attempt it.

MR. HINNEFELD: Right. That's where he used an uncertainty area reading -- right? Isn't that what it describes to do and -- and --

MS. BEHLING: Yes.

MR. HINNEFELD: -- propagate the uncertainty for everyone...

MS. BEHLING: Yes.

MR. ALLEN: And for TLD to contact your local DOE --

MR. HINNEFELD: (Unintelligible)

MS. BEHLING: (Unintelligible)

DR. BEHLING: And I look at that and say, come on now. Let's use something more realistic. Use a 30 percent --

MR. HINNEFELD: We were a lot more naive in those days, and I think that was probably written before Dave -- even Dave maybe wasn't on the program yet when that was done. I certainly wasn't. Yeah, the point being though, you'd have a == you know, there is the issue that still -- it's still kind of outstanding; they haven't resolved it yet from the first set of 20 -- about in the situation where you have a measured dose and -- which is supposed to be normally distributed. And we have some sort of guidance usually that in a particular Technical Basis Document what's a good standard deviation to choose as a shortcut, and I think it's 30 percent for most years.

MS. BEHLING: That makes sense.

MR. HINNEFELD: And maybe 50 percent on very early years or something.

MR. ALLEN: Yeah, I think it's in one of these cases. I don't remember the number.

MR. HINNEFELD: Yeah.

DR. BEHLING: I mean the medical usually uses 30 percent --

MR. HINNEFELD: Yeah. There is some standard --

DR. BEHLING: -- as a default value.

MR. HINNEFELD: We do have to have some standard guidance out there on how to use it, and then the dose reconstruction technique we're talking about is that the don't use the uncertainty. They enter the measured value as a constant and then they don't apply the dose conversation factor -- the organ-specific dose conversion factor, but they'll apply a 1, a 1 as a conversion factor, which is higher than the entire range --

DR. BEHLING: Offsets.

MR. HINNEFELD: -- of dose conversion factors by organ saying that this is an overestimating approach and so we're going to leave it as a constant, and is that in fact the right thing to do. Is that in fact -- (unintelligible) we haven't resolved it. I don't know of any way to do it other than to do a whole bunch of Monte Carlo combinations and just see, you know, case

by case for all these -- for all these organ DCFs that wouldn't be utilized in this fashion where the range is below 1 or below .8 or something like that -- is that does it in fact work out that way, and we haven't finished that yet. And it's still kind of the same hanging-over issue from the first 20. So that issue -- you're right on that.

DR. BEHLING: I mean it should be --

MR. HINNEFELD: We're not arguing with that.

DR. BEHLING: -- deleted because it's too complex. It's too time-consuming --

MR. HINNEFELD: All that -- all that discussion, yes.

DR. BEHLING: -- and it doesn't -- certainly it doesn't warrant that kind of investment of time for developing a sigma value. I think it's reasonable to conclude that a surrogate approach is too high at 30 percent sigma value and say that's it, that's good enough.

MR. HINNEFELD: Right.

DR. BEHLING: It's claimant-favorable.

MR. HINNEFELD: Right.

MR. GRIFFON: Well, but it has to be -- I mean you said delete it. It has to be replaced --

DR. BEHLING: Yeah.
MR. GRIFFON: -- with something. Yeah.
DR. BEHLING: Yeah.
MS. BEHLING: Yeah. This is where I think we can hopefully give you some guidance as to the procedures that are giving the -- the dose reconstructors the most problem, because we -- after going through these first 38 cases, we can certainly list for you these are the procedures that the dose reconstructors seem to -- to be most difficult for them is just that the guidance isn't clear and that they do it wrong.
MR. HINNEFELD: Okay. Yeah, okay.
MS. BEHLING: Okay. Now if we move on to the neutron dose, in this particular case, the -- there was no neutron dose calculated. However, when we looked at the DOE records, it -- it showed zeroes for neutron readings or -- or -- yeah, it was 52 zero neutron readings and this -- these occurred between 1961 and 1974. And based on the fact that this person was a machinist and worked in various areas of the plant, we thought that there was some potential for neutron exposure.
DR. BEHLING: And -- and I guess you can clarify

this issue, because obviously post-'70, the HMPD dosimeter was used that was capable of measuring obviously shallow dose, deep dose, photon dose, as well as neutron dose. And it may very well have been a badge that was assigned to people with or without any potential for neutrons, meaning that it was processed regardless, and the zero dose didn't mean he was exposed to neutrons except that that was a dosimeter that was assigned to everyone independent of whether or not there was a potential. And so we have to know what the difference is.

MR. HINNEFELD: Well, that certainly happened a lot of places, where they'd hang a badge on someone regardless of their -- and then the badge could measure neutrons regardless of the person's potentials 'cause everybody wore that badge.

DR. BEHLING: Yes.

MR. HINNEFELD: Now I -- I'll have to do some more research this week to sort this particular case out on why the dose -- in the dose reconstructor's judgment he decided that this person wasn't reasonably exposed to neutrons so we don't have to do the neutron missed dose. There's also another limiting -- you know, could

be another limiting factor rather than doing just your -- your -- if neutrons are assigned, one approach would be to use the neutron -- the standard missed dose calculation for neutrons, and the other would be -- that may be too high based on his external photon exposure and the neutron to photon ratios. So there may be another bounding step that would be done in assigning it because the neutron to photon ratio would indicate that the -- the -- if he doesn't have any measured photon dose, his neutron dose can't be as high as the standard missed dose calculation would tell you. So there might be another bounding step in there, but I'll just have to go look at the case and see what the judgment was for determining that this person was really not exposed to neutrons and therefore it's okay to (unintelligible).

DR. BEHLING: And it can be quite substantial if a person --

MR. HINNEFELD: Oh, yeah. It's going to be big.

DR. BEHLING: -- worked in the area and he was monitored 12 cycles a year, missed neutron dose can be very substantial, which if he wasn't exposed, shouldn't be there. But if he was, it

should be there.

MR. HINNEFELD: Right.

MS. BEHLING: In fact I think we calculated about 7 to 8 rem in this particular case. And I guess another question that comes up, and I may have misstated this, because in the records it's sometimes confusing, and this is something that we talked about, when there's a blank as opposed to a zero --

MR. ALLEN: Yeah.

MS. BEHLING: -- and how do we treat that. And I guess it's probably site-specific --

MR. ALLEN: And error.

MS. BEHLING: -- and error-specific.

MR. ALLEN: Error specific.

MS. BEHLING: Error specific, yes.

MR. ALLEN: It varies with time from each site and --

MS. BEHLING: Yeah.

DR. BEHLING: Especially for -- for Savannah River between '70 and 1988, there was that blank spot that involved the recording of doses, that if they were below a certain value they didn't even bother reporting them.

MS. BEHLING: Yeah, so --

MR. GRIFFON: I know this one jumped out at me because I -- I thought I remembered hearing some issues with this at Y-12 specifically, so --
MR. HINNEFELD: You've gone through Y-12, or...
MR. GRIFFON: Not necessarily on neutrons, just the -- the practice of whether they were entering blanks as opposed to zero values or -- or --
MS. BEHLING: For the dosimeter records.
MR. GRIFFON: Yeah, trying to -- I think it was for deep -- you know, photon dose. But I don't -- I don't recall, you know.
MR. HINNEFELD: But they were recording zeroes when the reading didn't really indicate a zero? Is that what you're saying?
MR. GRIFFON: Yeah, whether they were recording blanks --
MS. BEHLING: Blanks.
MR. GRIFFON: -- when they were measuring less than detectable.
MR. HINNEFELD: Oh, so it looks like there was no read --
MR. GRIFFON: Right.
MR. HINNEFELD: -- but in fact it was a zero read.
MR. GRIFFON: When it was -- yeah, when it was

less --

MR. HINNEFELD: Or a less than detectable reading.

MR. GRIFFON: -- than detectable, right.

MR. HINNEFELD: Oh, okay.

MR. ALLEN: Well, the Y-12 report that I'm thinking of only sees -- there's always a zero there, the ones I'm thinking of.

MR. HINNEFELD: The ones I'm thinking of too, but I can't really -- I've seen too many sites, too many (unintelligible).

MR. ALLEN: Yeah, that's my problem too.

MS. BEHLING: Okay. The finding 4 on page 12, again, this is what we discussed before. The Y-12 and K-25 plant do not have a reactor, therefore we felt they should have selected the hypothetical dose model with the 12 radionuclides as opposed to the 28. I think we've come to agreement on that. In this -- well, when we go on to now the CATI report and to our finding number 5. In -- in this particular case, we did identify the fact that there -- there was -- there was an inconsistency between at least what the employee indicated in the CATI regarding two incidents that he was involved in. One he

describes as a critical spill of mop water, and also a fire, a uranium fire. And it just stresses that in some of these cases we don't always see a lot of follow-up with information that's provided in the CATI report. And it just -- when there's situations like this, we just think it would be best if they did go back and -- and try to contact DOE and see if there's, you know, more extensive records than -- than what you received the first time.

MR. HINNEFELD: Okay. We -- we think we have a pretty complete record of the Y -- if we're talking about the 1958 Y-12 criticality, which was -- there was a criticality at Y-12.

MS. BEHLING: Yes. Oh, yes.

MR. HINNEFELD: And we think we have pretty complete records of the involved person on that.

MS. BEHLING: Yeah.

MR. GRIFFON: It's pretty well-described, et cetera.

MS. BEHLING: Yes.

MR. HINNEFELD: And so that turned out it's the only criticality for Y-12. So he may have worked -- I mean he may have been at Y-12 learning that, but we think we know pretty much who was, you

know, affected by or in that building. So --

DR. BEHLING: In and around.

MR. HINNEFELD: Yeah, in and around that building.

MS. BEHLING: Yeah.

MR. HINNEFELD: So I would think that the criticality of -- of -- what did you say, mop water or something, was actually -- they were in fact -- I think it's the cleaning.

MR. ALLEN: Critical spill of --

MR. HINNEFELD: Critical spill of mop water.

MS. BEHLING: Yeah.

MR. HINNEFELD: They were in fact I think doing some cleaning of tanks.

MS. BEHLING: I understand. And we also recognize that you did assign the hypothetical internal dose and used 28 radionuclides and it's a very conservative assumption. I guess, as we had mentioned earlier, when you come to these meetings and, you know, you -- you hear the claimants speak, it's just it would sometimes I think help them if they were convinced that we really did --

MR. GRIFFON: No, but that -- that particular one --

MS. BEHLING: -- look through these records.
MR. GRIFFON: -- the claimant -- I didn't read that one, but was he claiming some sort of criticality of --
MR. HINNEFELD: Well, I think he claimed he was exposed a couple times early on --
MR. GRIFFON: Oh, okay.
MR. HINNEFELD: -- through a couple of events. He -- you said he mentioned a uranium fire?
MS. BEHLING: Yes. He mentions that's where the uranium fire (unintelligible), so...
MR. GRIFFON: Oh, okay.
MR. ALLEN: And that mop water, I think it was pretty much the description right there, wasn't it? A critical spill of mop water --
MS. BEHLING: It is.
MR. ALLEN: -- involved with this.
MR. HINNEFELD: Yeah.
MR. ALLEN: It was -- I don't even think he said 1958, but it was in that era. Or he might have said --
MR. HINNEFELD: He worked there during that period. I don't think he -- I don't know if he ever gave a date for that.
MS. BEHLING: I believe he said 1958.

MR. ALLEN: Definitely need to look at that and the documentation in the dose reconstruction as far as what they looked at is lacking.

MR. HINNEFELD: Yeah, well, we'll look at it.

MS. BEHLING: Yeah. Okay.

MR. MAKHIJANI: Could I ask a question? How did you -- how did you handle the fire, the uranium fire?

MR. HINNEFELD: The uranium fire? Well, I mean the uranium fire would probably -- he said multiple uranium fires.

MR. MAKHIJANI: Yeah.

MR. HINNEFELD: Which is probably, you know, burning chips or --

MR. MAKHIJANI: Yeah, the chips.

MR. HINNEFELD: -- (unintelligible) and things like that. The dose reconstruction included the hypothetical maximizing intent, which we believe would bound exposure from that situation. And I don't know if -- do we have any internal monitoring information on this guy? I don't remember if we have an internal monitoring record or not.

MS. BEHLING: I don't know.

MR. HINNEFELD: I don't remember if this person

had any. I mean our view would be, you know, in a situation like that, that 12 -- that hypothetical intake -- intake bounds the kind of intakes you would see at -- even at a relatively chronic episodic set of events like that.

MR. MAKHIJANI: Can I ask if --

MR. ALLEN: He did have -- he did have urinalysis and the hypothetical intake is higher.

MR. HINNEFELD: It's higher?

MR. ALLEN: It's higher.

MR. HINNEFELD: Then okay, that is your number. Okay?

MR. GRIFFON: Can I ask a silly question, maybe a silly question? In the -- in your report, SC&A's report, it says that claimant received radiation exposure during employment as a machinist, as a machinist that came to perform work at the K-25 plant in Buildings Alpha 1-5; Beta 2-4, and 9212, 9215, and he also worked as a machinist at Y-12. Is that from the DR report? Because if that's from the DR report, you're going to lose credibility right away because those are -- those buildings are all Y-12 buildings that you mentioned under K-25. The claimant's going to say, they don't even know where I work, you know.

MS. BEHLING: Yeah.

MR. GRIFFON: Now, it might -- it might be that -- I don't know. I haven't got it wrong here, I just want to --

DR. BEHLING: I have to look to see if that comes out of the CATI report.

MR. GRIFFON: I didn't see it on the -- I don't have the DR report on mine.

MR. HINNEFELD: I've got it right here.

MR. GRIFFON: It's just worth double-checking. If you mentioned the wrong buildings, I think you lose credibility with these people.

MS. BEHLING: Up front.

DR. ROESSLER: So all those buildings --

MR. GRIFFON: All those -- that list of buildings are all Y-12.

DR. ROESSLER: -- all in Y-12?

MR. GRIFFON: Except I don't know about H-2. I never heard of that one.

DR. ROESSLER: That might have been just a shorthand way of writing that.

MR. ALLEN: Says he worked as a machinist before, Building 1401 at K-25. And all the others say Y-12.

MR. GRIFFON: Y-12, okay.

MR. ALLEN: In the DR report.
MR. GRIFFON: All right. So you just got a little --
MS. BEHLING: Yeah.
MR. GRIFFON: -- or -- or --
MS. BEHLING: Okay. We're going to make that change.
MR. GRIFFON: As long as it's correct on the DR report. I just wanted to double-check.
MS. BEHLING: Okay.
UNIDENTIFIED: (Unintelligible)
MS. BEHLING: Yeah, uh-huh. Okay. I think we're done with -- unless there's other questions on tab 23. Okay. We'll move on into tab 24, and in this particular case, this is case number 012943. And this individual worked at the Y-12, K-25 and the X-10 sites at Oak Ridge.
MR. GRIFFON: Can --
MS. BEHLING: I'm sorry.
MR. GRIFFON: I'm sorry. I'm just a little behind, a little slow this morning, tired. Was 4747, the last case we did, the person worked there from '54 on; is that correct? From '54 to whatever? I have a note on my -- my hand-scratched notes here about --

MS. BEHLING: '54 to --
MR. ALLEN: '90.
MR. GRIFFON: Okay. The unmonitored dose prior to 1961, you might have already -- I think you passed by it, Kathy. I'm sorry.
MS. BEHLING: That's all right.
MR. GRIFFON: But my question is, is that something -- I mean I know there's -- there's Technical Information Bulletins that have come out on Y-12 and how to handle that. It was and -- it wasn't available at the time --
DR. BEHLING: At the time of this (unintelligible)?
MR. GRIFFON: Right.
DR. BEHLING: Yeah, there was no -- no procedure, and he did something that I considered reasonable and claimant-favorable by taking the maximum year in 1962 and multiplying that yet by 2 --
MR. GRIFFON: Right.
DR. BEHLING: -- and assigning it to all years prior to '61. And based on the more current guidance, he got a much larger dose than he would have gotten under the current guidance.
MR. GRIFFON: Right, right. Well, I guess my -- my question here is just -- just how to -- how to

handle this finding more -- more than -- because I don't necessarily -- I mean Hans, you explained this to me on our conference call that -- and I don't necessarily disagree with you, that he had -- sorry. I'm covering up the mike. You know, he had the -- a similar job all throughout that period and -- and they doubled his highest -- his highest annual dose I guess and applied it to the time periods. However, now there's a -- a new Technical Information Bulletin coming out on how to deal with that. I wonder if -- if resolution on -- on that kind of finding shouldn't be reserved for the Y-12 site profile review, as we've done in the past, because I wonder if it's a broader description of how -- how should that be handled. Is it appropriate just to assign, you know, a factor -- just multiply it by 2 and -- and assign a dose for those earlier periods? Maybe in this particular instance where he's got the same job and the same, you know, situation, it might be appropriate. But I just think there's a broader discussion there that -- that back extrapolation from time periods when you had data to time periods where you didn't have any -- any monitoring records. There's a broader

discussion. I'm not disagreeing with what Hans said about this case, but --

MR. HINNEFELD: I think certainly the -- that discussion certainly should be I think a Technical Basis Document type of discussion because it will -- it will certainly happen at Y-12.

MR. GRIFFON: Right.

MR. HINNEFELD: I don't know of a similar type of period at Savannah River, but -- so it wouldn't necessarily come up there, but that kind of -- the discussion of what's appropriate in those situations will certainly come out during the Y-12 TBD review, so maybe we can defer it to that.

MR. GRIFFON: I just wonder if for this particular situation, you know, if -- if -- I'm not sure what the activities were that were going on prior to '61, but I imagine they were pretty similar if not less than what he was doing in '61.

MR. HINNEFELD: I -- I would -- I would think --

MR. GRIFFON: In the same job, I think multiplying by 2 is probably pretty darn conservative, like you said. But it also -- to some people, I think they could say well, that's

-- boy, they had no data and they just threw in a factor of two swag and -- and assigned this. What's your basis, you know.

DR. BEHLING: Well, I think the assumption -- again, if I look at the new procedure, it says the procedure is only applicable under conditions where the individual didn't switch job and he has at least five cycles post-'62 on which you -- you extrapolate the data. And so it doesn't answer all the questions, but for instance let's assume a person worked between '54 and stopped in '61. Well, you have no data now. You're not going beyond the '61 time frame where you can say well, you know -- and he -- assuming he didn't switch jobs, then extrapolating backwards using the protocol, that -- that's not available to you, and I don't know how you will deal with Y-12. The only issue is that apparently the assignment of badges was based on certain potential for exposures, meaning that if you were not badged prior to '61, you were considered a low-exposure worker as opposed to those who were badged who had -- and I don't remember what the criteria was --

MR. HINNEFELD: That seems to be the case at Y-

12.

DR. BEHLING: Yes.

MR. HINNEFELD: Y-12 did in fact, before '61, badge the people they felt had the highest --

DR. BEHLING: High potential.

MR. HINNEFELD: So there -- I mean there will be -- there may be a variety of approaches that, when they come up, can deal with those kinds of periods, those data gap kinds of periods. But again, I think that the discussion of what are appropriate approaches for those kinds of things is maybe a TBD type of discussion --

MR. GRIFFON: Right.

MR. HINNEFELD: -- or topic, more so than individual case kind of topic. Certainly it will influence -- you know, it would influence a good deal of the work that we will do and, to a certain extent, what we have done. It all comes up on those same -- so -- or whatever -- whatever the whole determination of it.

MR. GRIFFON: I guess -- I guess my feeling on this is -- is, you know, my -- my gut tells me this -- this method that they used, that they applied, was probably claimant favorable, but what is the basis for it? You know, it seems

like it was kind of pulled out of the -- you know.

MR. HINNEFELD: I guess there is a sort of --

MR. GRIFFON: Throw in a factor of 2 --

MR. HINNEFELD: -- kind of a judgment of --

MR. GRIFFON: Or individual judgment, yeah.

MR. HINNEFELD: -- if he's exposed to these levels from here on, he probably wasn't exposed to more than double that --

MR. GRIFFON: Right.

MR. HINNEFELD: -- each year back farther, so I mean it's probably just a --

MR. ALLEN: As far as I know --

MR. HINNEFELD: -- considered equal judgment.

MR. ALLEN: As far as I know that technique was always used -- only used case by case.

MR. GRIFFON: Yeah.

MR. ALLEN: I mean that particular one, it wasn't used that much. Like in this particular case, they looked at it and said, you know, does this kind of technique work for this individual, and then used it.

MR. GRIFFON: I think it might have even been -- you know, that's what I'm saying is that it may necessarily not -- doesn't likely affect this

individual case, but I think there is a broader discussion that has to take place, and I don't want to lose that as an item. I think we're covering Y-12 site profile anyway --

MR. HINNEFELD: Yeah, I think there are interviews going on down there this week.

MR. GRIFFON: Right, right, right. So...

MR. MAKHIJANI: I -- I agree with Mark in the sense that, you know, I -- I haven't looked as many records as Mark, but one of the difficulties in extrapolating -- say you start in '62 and your records for five years beyond that point back is in a lot of places the conditions in the '50s were worse than in the '60s. Because I mean from the '50s, '60s, and '70s, overall there seemed to be an improvement. So -- and I think how much of an improvement is probably site-specific and work-specific. So I think this factor of two in fact may be claimant-favorable in some circumstances and may not be -- and so I would wonder whether something like area monitoring information --

MR. HINNEFELD: Well, at Y-12 and K--

MR. MAKHIJANI: -- area badges and things like that might not be a suitable base to establish

this factor rather than a factor of two.

MR. HINNEFELD: Well, the basis for the extrapolation of Y-12, which is -- was not available at the time this dose reconstruction was done but which is available now -- is the work -- workers who were monitored from the early '50s on through into the -- well into the '60s had -- the monitored cohort, in other words. And what happened to their doses as you go earlier from '61 out of what -- at what rate do those doses go higher. And so that back extrapolation was based on the monitored cohort and then that -- people who joined the monitored cohort in '61 and had a consistent job back earlier, that their -- you know, there's this analog of theirs would extrapolate backwards at approximately the same rate as the monitored population that was monitored for the entire period. So that's the basis for (unintelligible) --

MR. GRIFFON: So you have some priors. You have --

MR. HINNEFELD: Yeah.

MR. GRIFFON: Yeah.

MR. HINNEFELD: There was a -- there was a set of monitored -- there was a monitored cohort

identified, 100 and some-odd people who were monitored early -- from early in the '50s in -- well into the '60s and so they spanned that '61 date. And that -- the -- their -- the behavior of their dose, as it declined over time, was the basis for the back extrapolation of the people who started monitoring in '61.

MR. GRIFFON: In the same area?

MR. HINNEFELD: I mean I don't know where these people (unintelligible).

MR. GRIFFON: Okay.

MR. HINNEFELD: In Y-12. I know they're Y-12.

DR. BEHLING: I don't think they segregate on the basis of job description. There was 50 monitored workers, which assumably involved the most exposed population of workers.

MR. HINNEFELD: Like I said, that seems to be the case that Y-12 attempted in the '50s to monitor the people that they thought would be more highly -- that seems to be what they were doing.

MR. GRIFFON: Yeah, I just -- I think we'll leave it at that. I think it needs the discussion in the TBD. This likely would not affect this case, I tend to agree. But further the discussion in the TBD -- I mean the other thing to remember at

Y-12 was that all these people were at X-10 hanging out and there was about one to cover the whole Y-12 facility for most of those early years.

MR. HINNEFELD: It's just a uranium plant.

MR. GRIFFON: Yeah, I know, I know. They had a plant with the californium and einsteinium at X-10 there --

MR. HINNEFELD: All the fun stuff at X-10.

MR. GRIFFON: Yeah, that's right.

MS. BEHLING: Okay. Can we move on now since (unintelligible)?

MR. HINNEFELD: Yeah.

MS. BEHLING: Okay. I'll go back to tab 24. As I said, that's case number 012943. The individual worked in Y-12, K-25 and the X-10 facility for a 21-year period and was diagnosed with prostate cancer in 2000. The dose calculated by NIOSH was 41.6 rem and the POC was 31.45 percent. This -- we only have two findings on this particular case, and the first one I believe we've covered on previous cases, reoccurring problem with -- for the photon, you know, misinterpretation of the -- of the TIB-8 and TIB-10 procedures and the improper assignment

of the uncertainty, so (unintelligible). And the second finding in this --

MR. GRIFFON: Well, you know, this uncertainty in this one -- I think you said the POC was 41 percent (unintelligible) -- 41 percent, and you add in uncertainty on 8 rem or whatever you've got here.

MS. BEHLING: Okay, 31 percent is the POC on this one.

MR. GRIFFON: Oh, 31 percent? Okay, so it still may not...

DR. BEHLING: And the -- actually, the uncertainty that was added to it shouldn't have been added. Therefore, the POC will come down.

MS. BEHLING: Come down.

MR. GRIFFON: Okay.

MS. BEHLING: And the second and last finding in this case, here again it -- this speaks to using his professional judgment in the dose reconstruction reports. And something came to mind when we were talking about Mark's issue with the Y-12, it seems to me that when the dose reconstructor does use professional judgment to make certain assumptions or decisions, it would be nice if -- I assume he has to have some basis

for making that professional judgment. Once again, the dose reconstruction report would benefit from a little bit more explanation, as we've belabored on the first Y-12 case. In this particular case, the -- the dose reconstructor assigned an on-site ambient dose of 1 rem per year. And we went into each of the three Technical Basis Documents for the Y-12, K-25 and X-10 facilities. And for example, at the Y-12 facility we calculated a median and a 95th percentile value for an annual dose of 55 millirem with a 95th percentile of 335 millirem at that particular facility. So it just seems a bit excessive and inordinately conservative to use the 1 rem per year and it was -- I just could not understand what his basis was or -- or -- I think he stated in their professional judgment.

MR. ALLEN: Yeah, I think that's, again, early on when you -- all you had was a cursory review of data and you bound it based on the cursory review, and you wouldn't bound it very high. That's essentially all that (unintelligible).

DR. ROESSLER: On this one you just got done --

MS. BEHLING: Yes.

DR. ROESSLER: In the table there, there's a bold

under the occupational medical dose. In Table 1, is that -- is there any significance to that, on page 4? It doesn't appear to be as you read back.

UNIDENTIFIED: What's the number?

DR. ROESSLER: The number? Seven millirem, probably just a --

MS. BEHLING: No significance other than -- to be pointed out?

DR. ROESSLER: Okay. I was looking for something and didn't find it yet.

DR. BEHLING: (Unintelligible) --

MS. BEHLING: Yeah.

DR. BEHLING: -- on the issue of... Sometimes we deal with trivia and I noticed that in the TIB-6 that involves the generic occupational medical exposures, we have certain (unintelligible) that are outside the primary field, especially in latter years when there was collimation and then everything else. We have doses that -- for certain tissues, each of them minus six or even seven rem --

MS. BEHLING: Yeah, yeah.

DR. BEHLING: -- and you get to the point of saying why are you saying that (unintelligible)

millirem because -- and my criticism is in -- in so many instances we try to impart a feeling we have, this level of precision that doesn't exist. And as I said, it's like saying well, your exposure was approximately (unintelligible) whole body, but you're -- based on the (unintelligible), we have to divide it by three and then you end up dividing about 10 by three and come up with 3.3333 to ad infinitum and you realize that -- that doesn't make it. The -- the limiting factor is the about 10 rem so if you divide by three, don't go beyond the first decimal point because it's a (unintelligible) precision that has no meaning.

DR. ROESSLER: So if anything, this number should have been (unintelligible).

MS. BEHLING: I think what maybe we're talking about is that this issue of balancing precision against (unintelligible) as stated in the regulations. I'm surprised we get carried away here trying to calculate seven millirem.

UNIDENTIFIED: (Unintelligible)

DR. ROESSLER: I'm going to have to leave for a few minutes.

MS. BEHLING: Okay. I believe that's it for this

case unless there's any other questions.

MR. HINNEFELD: We'll take a break.

(Whereupon, a recess was taken.)

DR. BEHLING: We're at tab 25, which is the claim number 4567. The individual worked at Oak Ridge K-25 site and if we could go over with the background of this individual, this guy worked from October 22nd, 1953 to January 4th, 1954 and that represents a total of 11 weeks of -- of employment. The individual was diagnosed in the year 2001, which is now really about 47 years later, with a skin cancer. In behalf of this individual, a skin dose of 28.78 rem was calculated, which results in a POC value of about 13 and a half percent. And if you look at Table 1 on page 5, you look -- you see what the assigned dose is for. He was -- for external exposure he was given 3.3 rem for photons and another 3.3 rem for electrons, and also an occupational medical exposure of 10.5 rem, and also internal hypothetical exposures which also give him another 11.65. So we've got a total of 28 -- really 29 rem of assigned dose to the skin for this individual. And let's just briefly go over.

As you can clearly see in context with 11 weeks, an assigned dose of almost 29 rem is obviously a very, very high dose. And in Table 2 we have the checklist where we identify what we considered were potential issues that we wanted to discuss, and there were a total of five of them. And so let's quickly go over them. This individual was not monitored. So again, this was 1954, very early on and he worked -- I assume he was a chemist working with uranium and he was not monitored, so now the question is what could have been his exposure. And for claimant favorability, the individual elected to assign what at that time was a regulatory limit. And he assigned it not just once, but twice. He assigned 300 millirem from external photon per week, plus an additional 300 millirem external to electron, meaning that he was given a total of 600 millirem every week for the 11 weeks for which he was -- during which he was employed. And I looked at that and I sort of said the procedures allow you to do that. It is a default approach that is considered very claimant-favorable and, as stated here on page 9, the dose reconstruction based on administrative or

radiological monitoring (unintelligible) result in a gross overestimation of the claimant's dose. And I wasn't really sure to what extent we were basically excessively so, because one could conclude that a deep dose and a skin dose may very well represent two different types of radiation that could in essence be effective to a part. But then I also looked at the NBS guidance document, which was appropriate at the time, and they give you essentially a 300 millirem skin dose which in essence should have been a bind -- a bounding value. And so instead of giving the guy a total of 600 millirem, I think it would have been more than claimant-favorable by giving him only 300 because at the time it was in fact an NBS dose limit. And so again, we're being excessive here in giving him a -- an exposure dose limit, regulatory limit on two counts as opposed to one.

The next one is the issue of assessing on-site ambient dose. No on-site ambient dose was estimated. Again, this is an area that could have been because on-site ambient dose is intended for those instances when a person is not monitored, which he clearly wasn't. So in spite

of this overwhelming claimant-favorable approach to assigning external exposure based on regulatory limits twice, which I consider is perhaps excessive, there was a deficiency when the person maybe should have been given a assigned ambient dose which is appropriate for a person who was not monitored. Those were the two issues on -- on -- under 2.2.1.

The next one was occupational medical exposure, and that was clearly an issue here because this person was there for 11 weeks which bridged two years, 1953 and also 1954. And you could reasonably -- as an outside limit -- say well, he was given a chest x-ray on the day he took employment and maybe after the first of the year in 1954 where he only was there for four more days, he was yet given another medical occupational exposure of the chest x-ray. But nowhere can you come up with a dose of 5.265 rem for a chest X-ray. And so my concern here is that this dose of a total of 10.5 rem for medical occupational exposure is clearly a -- an error here that cannot be supported by any procedure or any documentation. And I guess my concern is that this should have been caught as part of an

in-house audit before this -- this document was released.

MR. HINNEFELD: Did -- did they use the photofluoro or something? I can't imagine that dose unless there's a photofluoro.

MR. ALLEN: It has to be to get that high.

DR. BEHLING: I mean I cannot imagine where this dose comes from.

MR. ALLEN: It says flat out what table it came from and I have to check that. I don't know the numbers off the top of my head, but I can go (unintelligible).

DR. BEHLING: He -- he lists the TIB-6 obviously as his reference, and clearly nowhere in TIB-6 do you come up with this kind of a dose. In fact, if you look at the actual skin cancer -- which turns out to be on the face -- which is on the anterior side and you realize, you know, two chest x-rays is possibly not even in the primary beam and is on the exit side of the body. Clearly, even if he had elected to use the skin dose, which would have been on the posterior or entrance side, that in itself would have been excessive but certainly claimant-favorable --

MR. HINNEFELD: Yeah. Yeah, for a cancer high up

on the face.

DR. BEHLING: -- and how you come up with 5.6 some rem for each of the two exposures is something that, you know, is a glaring error here that should have really been caught by somebody since you don't get that kind of a dose from two X-rays. But anyway, so that was my concern here is that somebody didn't catch this one as part of the sign-off sheet.

MR. HINNEFELD: It's got to be a photofluoro assumption, but even then it's got to be right in the beam, too.

DR. BEHLING: I'll take a look at the DR report and see what he states, whether it's not a chest x-ray that he's making reference to. I don't know if I quote him. I think he -- he makes mention of a chest X-ray in the dose reconstruction report, so...

MS. BEHLING: I guess the other question that I have, the initial findings that Hans discussed, are you in agreement with our conclusions or -- you know, because in this particular case there's some -- this administrative -- this again opens up some question to me as to when should they use this administrative (unintelligible) --

MR. HINNEFELD: Well, the implementation guide says that you really should probably only use that for a period up to a year or less when you apply the control limit. And so with 11 months, that --

DR. BEHLING: Actually it's 11 weeks is --

MS. BEHLING: Eleven weeks.

MR. HINNEFELD: So 11 weeks there, they would conform to the implementation guide --

DR. BEHLING: Yes.

MR. HINNEFELD: -- instruction on that.

DR. BEHLING: 300 millirem is --

MR. HINNEFELD: It would be 300.

DR. BEHLING: Yes.

MR. HINNEFELD: It wouldn't have been 600.

DR. BEHLING: 600 I'm sure is...

MS. BEHLING: Right.

MR. HINNEFELD: So I -- I think that's probably correct. I think that's -- that's -- you're right.

MS. BEHLING: Okay.

MR. HINNEFELD: But the approach for a short period of time like that, for a few weeks, applying the -- the radiation protection standard that was in effect at the time is -- is a method

that's described in the implementation guide.

DR. BEHLING: I mean they were clearly claimant-favorable on every turn.

MR. HINNEFELD: Right.

DR. BEHLING: The assigned dose, the -- the -- obviously I can't account for 10.5 rem for medical occupational. And then you've got 20 radionuclides internal for a facility that doesn't have a reactor. So all in all, I mean this is --

MR. HINNEFELD: Right.

DR. BEHLING: -- unbelievably excessive dose assigned to someone who may not have received much of any kind of dose.

MR. HINNEFELD: Right.

MR. GRIFFON: Just a question on the implementation guide, though. Does -- would that apply to individuals -- say you had individuals -- not this individual, but you had a case where you had missing weeks or months in those early years. Would you apply the administrative limit that would be --

MR. HINNEFELD: Well, it would -- it would be an option.

MR. GRIFFON: It would be an option.

DR. BEHLING: Co-worker data would be another option.

MR. HINNEFELD: There may be other options --

MR. GRIFFON: Or other options.

MR. HINNEFELD: -- depending upon that particular person.

DR. BEHLING: Maximum exposure for on-site for anybody -- you know, these are all options. Clearly this is the most extreme approach for filling in gaps using regulatory limits.

MR. GRIFFON: Well, for this case I would -- I would tend to agree with you. I'm not sure that that's always the case.

DR. BEHLING: Yeah.

MR. GRIFFON: That's why -- that's why I raised that point.

DR. BEHLING: Yeah.

MR. GRIFFON: Right.

MR. HINNEFELD: Right. It -- it -- like I said there, it will either depend on, you know, the case and what else do you know about the person. And if it's a person who has some monitoring and then gaps in their monitoring record, it -- that -- it may be less likely to be used in that -- in that context than in the context like this where

the person just worked for a few weeks.

DR. BEHLING: Okay. The next one is the one that Mark had already raised the issue. It's the Iowa claim and you may want to go on records to stating we're not even going to discuss it.

MR. HINNEFELD: Yeah. I think that, based on the Secretary's recent recommendation or finding of Congress, that we won't be going through any Iowa dose reconstruction approaches.

DR. BEHLING: We're now on tab 26, which is case number 2668. And this involves a claim by a person who was employed at the Savannah River Site. And this person was there from early on in 1953 through the end of 1986. This person was an operator/foreman/supervisor, so he held a number of different jobs over that period of time. He was diagnosed with colon cancer in 2001 which was obviously there for about 15 years after he terminated his employment. He worked in the 400-D Area, as well as in 420-D facility. The dose reconstruction -- and I always look at this. Oftentimes they state up front whether or not they're going to maximize the dose based on obviously the type of cancer and potential exposures in order for making the process more

efficient. They will tell you up front that exposures were maximized as opposed to best estimate where obviously the potential exists that this person's exposure may bring him close to the 50 percentile probability value, in which case they tend to focus more on a best estimate as opposed to a maximized estimate. And so on the basis of that approach, they came up with a dose of about 23.6 rem to the colon, and that generated a POC value of 43.21 percent.

When you look at table number 1 on page 5 of the review, you can kind of scan over the elements that gave rise to his exposure. He was -- he had a photon recorded dose and missed dose -- and we're going to discuss that briefly -- so it's both recorded and missed dose of about 7.3 rem. He also had an environmental dose, external photon, of about 1.3 and he was given a hypothetical internal exposure which, when you add the tritium and the alpha electron doses, you end up with another 14.3. So it's really -- I wouldn't say it's necessary (sic) a best estimate. Anytime I see hypothetical, I tend to say that this was also a combination of best estimate and perhaps for external, but not

necessary for internal whenever I see hypothetical, which is usually done for expediency and is oftentimes an overestimate of potential real exposure.

But anyway, if you go to Table 2, which is our case review checklist, you'll see quite a few checkmarks on the first page. And some of these checkmarks have an asterisk on it, which on the bottom explains that NIOSH employed workbooks in lieu of procedures. And this perhaps is one of the principal reasons for these numerous checkmarks which you -- when you total them up, they were a total of 13. Was it really 13? One, two, three, four... Yeah, 13. And at this point I guess we'll go through them with the expectation that over the next few days we're going to have a look at the workbooks and perhaps resolve many of these checks. We only checked them because at the time when we did the audit we were not aware of the existence of workbooks --

MR. HINNEFELD: Right.

DR. BEHLING: -- what they represented, to what extent they paralleled the intent of the procedures that they tend to replace and -- and so forth. So we may come back to this one and

resolve many of these concerns based on what we'll be hearing in the next few days regarding the use of workbooks and to what extent they follow and -- and make use of parameter values as defined in written procedures. So treat these checkmarks with a certain amount of -- of caution because they may very well change as a result of what we find out over the next few days.

MR. ALLEN: And do you have access to the -- I'm not sure what files we've given you. Did we give you everything we've got? Or --

MR. HINNEFELD: I believe they have -- yeah, everything in the analysis records, so I'm not sure -- on the disk we sent you.

MS. BEHLING: Well, in this particular case, what happened with this Savannah River Site case is, as Hans said, we sat down and we tried to reproduce all of the numbers. And we took the procedures and the TBD and we tried reproduce these numbers, tried to do the uncertainty, and we just couldn't get there.

MR. HINNEFELD: Right.

MS. BEHLING: And we came to the conclusion that there must be some computer-generated -- and then I requested the workbooks and I was sent a CD --

I'm trying to remember the date on that CD, I don't know -- of the DR tools that were being used for the cases that we were reviewing. Now since then, in preparation for coming to this meeting and asking for a list of which workbooks we wanted training on, when I sent in that list I don't -- I think it was Dick Toohey may have sent back that not all of these -- not all of these workbooks are currently being used. And I guess that's going to be another question that we're going to be asking during this training session, which ones are in use; how do we know which ones are in use; how do we know which ones have been retired and no longer --

MR. HINNEFELD: Well, that would be -- that would certainly be questions to ask over there. I think Dave's question though, was in -- on the administrative record there's a DR development folder. Have you ever looked -- in the DR development folder there's a work-- a spreadsheet. Is that where you're going on this?

MR. ALLEN: Yeah. I'm not sure what they're getting.

MR. HINNEFELD: I don't know whether you get that or not.

MS. BEHLING: In -- yeah, we do get -- in some cases we get that. We do get that.

MR. HINNEFELD: To me, that --

MR. ALLEN: Should be a monster spreadsheet.

MS. BEHLING: It is a monster spreadsheet, super max.

MR. ALLEN: That's the tool.

MS. BEHLING: Super max.

MR. HINNEFELD: My view of that, though, is just --

MS. BEHLING: That's what it's called.

MR. HINNEFELD: -- seeing that spreadsheet doesn't -- is not very informative about what was done.

MS. BEHLING: Exactly.

MR. HINNEFELD: You know, you can see the spreadsheet. It doesn't really explain to you how those numbers came out, though. They may be on the spreadsheet someplace, but there's a lot of numbers on that spreadsheet that weren't --

MR. ALLEN: Right.

MR. HINNEFELD: -- used in this dose reconstruction.

MS. BEHLING: Yes.

MR. HINNEFELD: And so I don't think the presence

of that worksheet is very explanatory.

MR. ALLEN: No, I just wanted to know if they had it and --

MS. BEHLING: We do get them.

MR. ALLEN: -- with some familiarization --

MS. BEHLING: Yes.

MR. HINNEFELD: I think with the training -- with the training in the next few days, you know, of the tools and how they go about that and what's being done by these workbooks, I think with that and the -- and checking DR development in these folders to make sure, you know, if there should be a worksheet in there. I think the combination of the two would -- would be explanatory for a lot of these.

MS. BEHLING: Right.

DR. BEHLING: Normally as part of our audit I essentially check every single entry, which in this case would have amounted to 268 dose entries in the IREP. Given the fact, however, that I realized -- and that -- that clue came right away when I looked at the IREP input and I said for the column that's supposed to be recorded photon dose and missed dose, you see a myriad of entries that says okay, in one case it's normal, in other

ones --

MS. BEHLING: It's lognormal.

DR. BEHLING: -- the lognormal. In some cases, it's a sigma value and other ones it's a geometric standard deviation. And I said this is a computer-driven code because no one could do this. And whenever you did have a GSD instead of the standard 1.52 value, it oscillated a little bit above, a little bit below, and you realized somebody obviously had the benefit of a computer program to generate that data that I couldn't reproduce. But nevertheless, I said well, are we in the ballpark. So in one instance I did -- I made a few spot checks rather than verify each one. And as you see on page 9, I looked at the assigned values, parameter values, that were selected. That is 50 percent at different energies -- 30 to 250 -- 50 percent greater than 250. I used the colon DCF for each of the appropriate energies and -- and so forth, and I came up with values that you see on this page. And they turn out to be very, very close to the assigned value but not obviously on the money. The -- the problem here was also one of merging recorded dose with missed dose, which obviously

then left me in no-man's land to try and figure out how to do this. But as I said, my values based on spot checks clearly showed that we were in the ballpark and that the spreadsheet must be linked to the generic procedures that I would have used in the absence of spreadsheets.

MR. HINNEFELD: Now, do -- I'm trying to follow the report. I'm going through it quickly. It looks like findings 1 through 5 at least, maybe 1 through 8 --

DR. BEHLING: Yeah, it --

MR. HINNEFELD: -- all relate to this --

DR. BEHLING: Yes, all relate because --

MR. HINNEFELD: -- particular topic, is that right?

DR. BEHLING: -- as you see in most -- it's, you know, I'm stating basically unclear if -- and this basically just leaves me in the situation where I can't reproduce (unintelligible) spreadsheet.

MR. HINNEFELD: Right.

DR. BEHLING: It's too complex for me to reproduce on a manual level.

MR. HINNEFELD: Right.

DR. BEHLING: And so as I said, most of these

issues will probably fall by the wayside when we look at those.

MR. HINNEFELD: Okay.

DR. BEHLING: And so to say is this -- is this a -- a -- an appropriate facsimile of the generic procedures that one might use as a surrogate for the spreadsheet or workbooks.

MR. HINNEFELD: Okay. Do you plan to like take this case later in the week? Could I suggest that maybe as you take it to the training --

DR. BEHLING: Yeah, yeah.

MR. HINNEFELD: -- with -- with ORAU --

MS. BEHLING: That's very good.

DR. BEHLING: Yeah

MR. HINNEFELD: -- and then say okay, let's -- whatever tools were used on this case --

MS. BEHLING: That's very good, and then --

MR. HINNEFELD: -- help us understand how this works.

MS. BEHLING: And then if --

DR. BEHLING: As I said, if we end up with the same numbers they came up, well, then this gets all changed. All the checkmarks come off the table.

MR. HINNEFELD: Okay.

MR. ALLEN: But you've evaluated and got roughly the same numbers that --

DR. BEHLING: Yes, yes.

MS. BEHLING: So therefore if we couldn't -- if we couldn't account for the dose and we said it was unclear whether we could account for uncertainty in organ dose. That's why you see a series of three --

MR. HINNEFELD: Right.

MS. BEHLING: -- in a row for the photon, the missed photon in vitro and so on.

MR. HINNEFELD: That's right. Yeah. I think -- I think it would be best if they -- if they were set up to go through like this exact case, and say -- maybe I'll call over there and see --

MS. BEHLING: Okay.

DR. BEHLING: I mean --

MR. HINNEFELD: -- if they are ready to do that.

DR. BEHLING: Yeah. The summary of my findings are on page 12. If you look at Table 3, this is where I essentially compared SC&A manual values to NIOSH computer-generated values and you see -- for instance, I segregated my dose on the basis of recorded dose between 30 and 250 and missed dose between 30 and 250 and -- and so forth. And

you, on the other side, see NIOSH computer values which obviously are a combination, and you realize that they are very, very similar. Very, very similar.

MR. HINNEFELD: Uh-huh.

DR. BEHLING: In other words, for instance, I -- you look at 0.204 rem versus 0.191 rem. Now if we're talking about less than -- well, we're talking 13 millirem difference. And so I know that I'm close. I just, you know -- and of course that may be due to the uncertainty that was assigned and so forth. So in doing this manually, which took me quite a long time to do, I was able to at least say we're in the ballpark. The workbooks obviously must be very close to what the generic procedures would dictate you do, and therefore I can walk away from a few spot checks and say the numbers are correct. But again, we only wanted to point out that the workbooks are something that we need to have access to so when we encounter this we can go and punch in the same numbers that these guys do and say okay, rather than spend two days trying to reproduce numbers here manually, we can -- we can sign off on this.

Okay. Yeah. Well, there's -- there's -- the next one is on-site ambient. And here's where I guess I made a few comments about the various options for on-site ambient doses. There are so many options and again, I'm looking back on Task 3 that says okay, what are the procedures. Are they functional? Are they user-friendly? Are they consistent? Are they -- are they in a position where you can say we balanced precision against efficiency, meaning that let's not spend an inordinate amount of time for things that really don't matter significantly. And I sort of looked at the TBD in that light and looked at the options that are described in the TBD. And in the case of on-site ambient -- again, if you look at Table 4, you see the various ORAU-TBD-3 procedures that allow you to calculate the on-site ambient dose as under option 1, and then under option 2, 3, and 4. And based on these different options and you compare that to the very bottom, it has NIOSH dose reconstruction report maximized where you see a parameter one input of 39 millirem as opposed to 58, 52, and 65. And -- and again, I was not in a position to -- to reproduce these numbers. Again, the

question is, is it really worth all these efforts to come up with a dose that varies between 39 and 52 or 58, especially when you realize the effort you have to go through in coming up with these values and the various tables you have to consult and so forth. The truth is, perhaps there should be -- like they have done in so many instances for others, like Hanford where you say where's the maximum annual dose for on-site ambient and we'll just generously put the guy always there every year regardless of where he may have worked. And the truth is, in most instances it's your real dose that doesn't require or -- or that shouldn't require a large investment of time. And that was my point here is that we have all these different options, and 50th percentile and 95th percentile and GSD values. And for a guy who worked there for 15, 20 years in different locations, you can spend a lot of time chasing these numbers down and trying to enter them into IREP. And I question again, based on this regulatory requirement to balance precision against efficiency, is this efficiency? Or is this an awful lot of time spent in trying to calculate a dose that in the end contributes only

marginal. And I say this in context with the fact that when you get to the point where you give a hypothetical internal for 20 years, all of a sudden you're dealing with this huge dose that we know for a fact is not a real dose. And in one instance you're trying to be definitively accurate and chasing this guy from one location to the other and giving values of geometric standard deviations, and then in the next instance say, oh, what the hell, give him 28 radionuclides for hypothetical and -- and -- and realize that that level of accuracy has just been tossed to -- to the winds. And that was the point here in going through that exercise.

MR. HINNEFELD: Yeah.

MS. BEHLING: One of the other issues that I might raise here is it appears, once we found out about the workbooks and the spreadsheets, that they are starting to develop a lot of the spreadsheets I believe or workbooks for the on-site ambient environmental doses for site-specific cases. So possibly this type of thing, after we get some training here, helps to eliminate all of these options that these -- that these people, the dose reconstructors, have at

this point in time. I don't know if that was their thinking in developing these workbooks.

MR. ALLEN: The tools you're going to see --

MS. BEHLING: Yes.

MR. ALLEN: -- it includes ambient; it includes X-ray. And they have an option to basically maximize things or to go hardcore. Monte Carlo, if they hit that then it takes a little while to -- to grind through it all and it spits out an answer for them --

MS. BEHLING: I see.

MR. ALLEN: -- based on the tables in the TBD. It's going through all the methodology and that external implementation guide. And you're right, it's -- it's very tedious if you had to calculate it by hand, but that's why they've put in their --

MS. BEHLING: They're starting --

MR. ALLEN: -- tool, to be able to do that. And like I said, you'll be seeing those tomorrow.

MS. BEHLING: Okay.

MR. ALLEN: Tomorrow --

MS. BEHLING: Tomorrow --

MR. HINNEFELD: Starts tomorrow afternoon.

MS. BEHLING: Tomorrow afternoon. Yeah. Because

-- and not to trivialize the on-site ambient dose either, because I know in one of the Fernald cases that I did, Fernald in the early years, they've developed a spreadsheet that I, you know, picked up and could easily determine what they were doing. And I calculated for that particular case 9 rem of on-site ambient dose. So like I said, I think they are developing these workbooks and spreadsheets in order to -- to help the dose reconstructors.

DR. BEHLING: Yeah. And -- and -- and I don't want to minimize on-site ambient. You look at Hanford site in the late '40s. They released, in some instances for early years, something in the order of one million curies of iodine-131, meaning that you would get both a whopping immersion dose external, and certainly a whopping thyroid dose from those. So I don't want to minimize the impact of on-site ambient. But in those instances where you fully understand that -- you know, John Till's word that the exposures were very, very low, perhaps a time-saving thing would be to develop -- as they have in other facilities, saying where's the maximum dose for the 2000 hours or the 2600 hours a year and put

the guy there, which will be claimant-favorable and it usually doesn't amount that much to a dose. But it's claimant-favorable and certainly saves an awful lot of time.

MR. HINNEFELD: Right. Okay.

DR. BEHLING: Occupational medical exposures, again, I looked at that. And I looked at the TBD for numbers, and I came up with values that are somewhat different. Again, extremely trivial in differences, but nevertheless they -- they differ to some extent. We're talking, you know, millirem quantities here. But again, it's just simply a number that I couldn't reproduce.

MR. ALLEN: Some of these minor differences you're saying might be just the timing on when the --

DR. BEHLING: Yes.

MR. ALLEN: -- dose reconstruction was done and the revisions of the TBD?

DR. BEHLING: Yes. I mean the -- the occupational medical, you're talking very trivial, talking a few millirem.

(Whereupon, Dr. Roessler returns to the discussion.)

MS. BEHLING: Although I will tell you, we do

look at when -- we try to look at when that dose reconstruction was done, and go back into the archives to get the right Rev. of the TBD -- if I could only do that.

DR. BEHLING: I'll tell you what, in some cases the dose reconstructor doesn't make the proper reference. He will, for instance, use a -- a reference -- for instance, what is it, the ORAU-PROC triple --

MS. BEHLING: No, it's -- it's either PROC 6 or it's --

DR. BEHLING: -- 6, and they have attachments and the attachments came out subsequently. And he will give you the original issue date, and yet he will reference Attachment E.

MS. BEHLING: Right.

DR. BEHLING: And you realize you can't even go by that because Attachment E didn't exist back in the early version of the TBD.

MR. HINNEFELD: Right.

MS. BEHLING: We talked about that during --

DR. BEHLING: Or -- or the procedure, so again, you know, when you -- when you see all -- this is in compliance with Attachment E and you look at the reference and the issue date, and you use the

wrong date so --

MS. BEHLING: And we talked about that for the first 20 cases, and it had to do with, as you say, and I think that Attachment E and F of the ORAU-PROC procedure that was Hanford-specific guidance --

MR. HINNEFELD: Yeah.

MS. BEHLING: -- and they gave the wrong reference. But quite honestly, we now -- because -- as we've also belabored on the first set of 20, because the dose reconstruction reports are not always very clear and they're not thorough enough, I do look at that initial date and don't always just base it on what the reference might be so that we're sure that we're using the documentation that he -- that he or she was using.

DR. BEHLING: Yeah. It's -- it's clear obviously when you see a date completed, that if it pre-dates the -- an amendment, that he couldn't have used it. So I will go back and actually use the ones that he would have had access to, because I'm not -- I'm not going to hold somebody accountable for a procedure that changed subsequently, you know --

MR. HINNEFELD: Right.
DR. BEHLING: -- that's -- I just think it would not be fair to the dose reconstructor.
MR. HINNEFELD: And I think we've changed the referencing practices since those first 20. Now they won't probably be reflected in any of the dose reconstructions that have been selected for review, but I think we have told -- you know, pointed out to them that when you're referencing something that has page changes, you've got to -- you've got to indicate that you're referencing the one with the page changes by date or by PC number or something.
DR. BEHLING: Yeah, and as --
MR. HINNEFELD: We've told them that.
DR. BEHLING: As it indicates in our recommendation, sometimes the dose reconstructor will say "and in accordance with TBD" and they list the whole TBD and, you know, I mean this is like 200-some odd pages.
MR. HINNEFELD: Two hundred pages, right.
DR. BEHLING: Wouldn't it be nice to tell me which -- which table you used?
MR. GRIFFON: Zero in a little bit?
MR. HINNEFELD: Could be a tactic.

DR. BEHLING: Especially for the neutron dose reconstruction at the Savannah River Site. It would be nice to tell me which table came -- you used for this thing. But, you know, they make you work for your living.

Anyway, the last -- the next one's on page 16, but these are again issues that we've talked about before and now were brought up by Joyce Lipsztein when she first identified the issue of the organic tritium exposures, which we know is not likely to be significant based on the likelihood that at best a small portion of tritium exposures. And again, these are hypothetical on top of it. We're talking about tritium exposures that were not recorded based on 5 microcuries per liter. But we deferred to -- to the review of the Savannah River TBD on this one, the issue involving the -- the potential exposures for organified tritium, which would give a -- perhaps up to a 2.3-fold higher dose based on a longer residence time in the body, et cetera and --

MR. GRIFFON: Can I --

DR. BEHLING: -- and the other issue --

MR. GRIFFON: -- ask for clarification on that?

That's not listed in the matrix.

DR. BEHLING: No.

MR. GRIFFON: Those ones? And why is that?

MS. BEHLING: I should have done that. I'm sorry.

MR. GRIFFON: I know we've covered it in the past.

MS. BEHLING: Yes, we have.

MR. GRIFFON: But it's still kind of an outstanding --

MS. BEHLING: Yes, we have.

DR. BEHLING: It's an outstanding issue of the TBD.

MS. BEHLING: I'm sorry. Yes.

MR. GRIFFON: Yeah.

DR. BEHLING: I mean if -- if we can all concur that organified tritium is such an insignificant fraction of total tritium, then that issue should be something that we can ignore. And the other issue was the ICRP 30 versus 68 issue.

MR. GRIFFON: Right, right, those two --

DR. BEHLING: And, you know, in extreme conditions, as Joyce pointed out, that those can be higher. But in many other instances it's actually more favorable to apply the ICRP 30

data.

MR. HINNEFELD: Right.

DR. BEHLING: And so again, this is an issue that needs to be hacked out and resolved at a level that involves Task 3 as opposed to Task 4.

MR. HINNEFELD: Yeah.

MS. BEHLING: But they should be included in the matrix. I apologize.

DR. BEHLING: Okay.

MR. HINNEFELD: Okay.

MR. GRIFFON: Can I -- for case 27 I have one other thing. I was going to raise those two but you covered them. Going back to the same theme here but with the Savannah River, I'm looking at this individual -- and it applies to the next case, too. They -- the monitoring for this person is very sporadic and I guess the assumption is that if they were monitored, they should have been monitored. If there was no data, they worked in an area where they weren't required to be monitored or -- am I to conclude that all these blanks are -- are they -- they didn't require monitoring? I mean I see cycle and then a -- cycle 7, sometimes cycle 2, 6, and 9. I'm assuming that --

MR. HINNEFELD: Well, there's a time period at Savannah River when --

MR. GRIFFON: I'm trying to understand what these records mean.

MR. HINNEFELD: I don't remember the timing off the top of my head, or what years it was, but there was a period of time when this record didn't reflect zeroes, so those could be -- those could be like 00 readings. Like in this case, you know, you've got a 30 shallow so there -- it'll show a zero but --

MR. GRIFFON: Right.

MR. HINNEFELD: -- you won't see any 00 readings in these. There was a period of time when that's not evidence of not monitoring. That would -- that would be evidence actually of either not monitored or a 00 reading on that. And I don't remember the year --

MR. GRIFFON: Oh, okay.

MR. HINNEFELD: -- the exact year that Savannah River went (unintelligible). But it wouldn't be uncommon in this case to consider them as 00's for the dose reconstruction.

MR. ALLEN: Right, and that's what they did in this particular guy.

MR. GRIFFON: Yeah, and they used missed, right?

MR. HINNEFELD: Yeah, they would have used a missed.

MR. GRIFFON: Okay.

MR. ALLEN: They assigned a zero every month except for June for 1981.

MR. GRIFFON: June of 1981 -- 6/1981 would have been a 10.

MR. ALLEN: Yeah. For the deep.

MR. GRIFFON: Yeah. Yeah, for the deep.

MR. ALLEN: So they assigned him 11 zeroes and one 10 -- I think, yeah -- for recorded dose.

MR. HINNEFELD: Okay.

MR. GRIFFON: So -- so it could have been a case where that he was wearing a badge all the time, but how do you know the difference, I guess is what I'm trying to get at, when you're -- when you're reviewing an individual case? How do you know?

DR. BEHLING: That's a good point. That's a problem.

MR. HINNEFELD: Well, I don't know that you know positively for sure --

MR. GRIFFON: Okay.

MR. HINNEFELD: -- the difference. I don't know that you know positively for sure on this record.
MR. GRIFFON: For instance, whether a person --
MR. ALLEN: That's part of digging into sites and the site records and what they mean in different years and different records, and I think this one for Savannah River changed from one period to the next. At one point they recorded --
MR. HINNEFELD: Yeah. There -- there is another -- certain periods of time when you look at this record, that are 00's in this record. I forget what the timing is.
DR. BEHLING: It's 1970 through '88 I believe.
MR. HINNEFELD: '70 through '88 is when they don't list the 00's.
MR. GRIFFON: Okay.
MR. HINNEFELD: So --
MR. GRIFFON: Later, I think you're right. I think it was 00's.
MR. HINNEFELD: I think we would probably -- our approach on these would probably be that he was -- he had a 00 reading on his badge. And if he didn't, if he was unmonitored during that period, given the Savannah River badging practices, we figure he was probably less exposed than somebody

who was monitored and had a zero. And so we'd be bounding his -- his exposure by figuring he was monitored and had zero.

MR. GRIFFON: Okay. But that -- that presumes that the program is working a hundred percent accurately.

MR. HINNEFELD: It presumes it works, yeah. Well, yeah. There's a certain presumption that they badged the people that needed to be badged at a particular time and in a particular population, 'cause for a construction worker, we wouldn't necessarily make that --

MR. GRIFFON: Right.

MR. HINNEFELD: -- draw that conclusion.

MR. GRIFFON: I understand it better. I -- I still -- I guess -- I know it's site-specific and I -- is it to some extent covered in the site profile document? Some of them seem to have --

MR. HINNEFELD: Some of them -- I won't say they will all do a great job.

MR. GRIFFON: Right.

MR. HINNEFELD: Some of them do and some of them don't.

MR. GRIFFON: 'Cause it can be confus-- the reason I raised it is it can be confusing. And

also, you know, if -- if an individu-- you know, if an individual says that they -- especially if in the CATI interview they raise questions on, you know, concerns about their badges being accurate. I think then, you know, it raises that to a higher level where you owe it to them to investigate it further maybe, or something like that.

MS. BEHLING: I think in this particular issue, because of using these workbooks, it was difficult for us to pull out missed from recorded.

DR. BEHLING: Because they mixed them.

MS. BEHLING: Yeah, they mixed them.

MR. ALLEN: The final answer is all mixed together.

MS. BEHLING: Exactly, and so we couldn't determine --

DR. BEHLING: Yeah. I can -- I can look at, for instance, the -- the input to the IREP, you know, in Appendix A and the assigned recorded/missed doses start with entry number 201 and go all the way to 268. And you can look at these and realize obviously a computer program was used because you see a -- alternation between

lognormal, normal, lognormal distribution, and then you look at the -- the geometric standard deviation which oscillates about 1.52 and you realize that we're talking mostly missed dose here in most of these cases here and -- and this is how they arrived at their numbers. But it was very difficult for me to follow because of the fact that they blended these two. And you have to go through there and sort of say okay, what were the change-out cycles for that period of time and, on the assumption that it was purely missed dose, what should have been the value, et cetera, et cetera. And I did as much as I could without the benefit of the spreadsheet or workbook to -- to track this, and they looked okay. And I looked at the dosimetry record.

MR. GRIFFON: And I know what -- I know what you're saying too, that you're looking for things that don't look normal for certain time periods for certain sites, and yeah, if you've got some protocols in mind when you're going through these. I guess it would help us to see those in the site profile to some extent. I don't --

DR. BEHLING: Well, there are a whole host of Savannah River Site procedures which are outside

of the site profile --

MR. GRIFFON: Right.

DR. BEHLING: -- that are among the procedures we reviewed that -- strictly dedicated to Savannah River, including this period of time that I guess spans from around 1970 to 1988 where doses were not recorded because zeroes were not simply recorded, or -- or modest doses. Whatever they did, they did not record those dose values --

MR. GRIFFON: Right.

DR. BEHLING: -- that period of time.

MR. GRIFFON: Yeah. There's got to be some set of records at the site that show those zeroes somewhere, though. Right? I mean...

MR. HINNEFELD: I don't know what to tell you about Savannah River.

MR. GRIFFON: I guess -- I guess part of what I'm looking at is the validation, and it probably doesn't have to be done on each case, but if you had data that you can -- that says -- that says to the public that this final database from Savannah River is accurate; We checked it, we did some -- we did some --

MR. ALLEN: Validation of data --

MR. GRIFFON: I'm not -- I'm not talk -- I know

Jim Neton --

MR. ALLEN: I really don't know.

MR. GRIFFON: -- sometimes accuses me of --

MR. ALLEN: I understand what you're saying.

MR. GRIFFON: I'm not talking a hundred percent. I'm saying do some random sampling and take a case back and say okay, for this individual it says cycle 12, 15 millirem, but actually we -- we went back and found (unintelligible) --

MR. HINNEFELD: Try to look at all those other cycles.

MR. GRIFFON: -- records, and he had zeroes for all the other cycles.

MR. ALLEN: (Unintelligible) the records are in there.

MR. HINNEFELD: Yeah. Well, I don't --

MR. GRIFFON: I think those are. I don't know. I didn't -- this is the first I'm scanning this case so, you know, but...

MR. ALLEN: I can't recall every site because they're all so different but --

MR. HINNEFELD: Yeah, I know.

MR. ALLEN: That looks like a summary for that guy he's underlined there.

MR. GRIFFON: Yeah. Yeah.

MR. ALLEN: I think that's -- Okay. That's for the year, nothing for the quarter there. Yeah, so that might be --

MR. GRIFFON: That sort of does show the zero there. You're right. Yeah.

MR. ALLEN: Yeah.

MR. GRIFFON: Okay.

MR. HINNEFELD: There's some things that -- I don't know what every site retained in terms of individual dosimeter results. It could be that --

MR. ALLEN: Some are obviously better than others.

MR. GRIFFON: Right, right, right.

MR. HINNEFELD: They accumulated them in the quarterly reports and may not --

MR. GRIFFON: I guess something -- something to say, you know, this was the protocol for certain time periods at Savannah River and we validated that was in fact practiced --

MR. HINNEFELD: By looking at original record --

MR. GRIFFON: Exactly.

MR. HINNEFELD: -- like film badge --

MR. GRIFFON: A sampling. A sampling of original records, you know.

MR. HINNEFELD: I don't -- I don't know.
MR. GRIFFON: Yeah.
MR. HINNEFELD: I don't -- I don't know that every site would have a --
MR. GRIFFON: No, I know.
MR. HINNEFELD: -- a record --
MR. GRIFFON: You're not going to always be able to do it. Right.
MR. HINNEFELD: -- you can go back to the original record and do that.
MR. GRIFFON: I'm saying to the extent possible, I think that -- you know, again, that charge of -- or the concern of the public of well, you're just using DOE's records again.
MR. HINNEFELD: Yeah, and they were lying through their teeth the whole time.
MR. GRIFFON: Well, they're all DOE's records, but if we can go back beyond the database, maybe that -- that gives a -- you know, you -- you made attempts to validate.
MR. HINNEFELD: Yeah. Yeah. Yeah, I --
MR. GRIFFON: That's --
MR. HINNEFELD: I don't know what's -- I guess I'm not -- I don't know what's been done or --
MR. GRIFFON: Yeah. And the only other comment -

- this is a general comment again, not necessarily in this particular case because I think the POC was pretty -- pretty low. But the -- the question of whether you cross-walked -- sort of cross-walked the work history with those records to say okay, he, you know, he -- he was taken on and off of monitoring. I mean here they could have been zeroes, but say a person was taken on and off of monitoring --

MR. HINNEFELD: Uh-huh.

MR. GRIFFON: -- does it make sense, given his work history --

MR. HINNEFELD: Well, that -- that -- actually at Savannah River there is an opportunity to do some of that --

MR. GRIFFON: Right. Right.

MR. HINNEFELD: -- because if they've got a bioassay record, you've got an indication of where they were when they left the bioassay sample on the bioassay card.

MR. GRIFFON: Right.

MR. HINNEFELD: And there are certain level locations, like in the heavy water facility which is in the 400 area --

MR. GRIFFON: Yeah.

MR. HINNEFELD: -- at Savannah River, they didn't require monitoring --

MR. GRIFFON: And it was --

MR. HINNEFELD: -- for the longest time.

MR. GRIFFON: So then you could say, you know, we assigned missed dose. Even though there was no record, we assigned missed dose and this seems consistent with the person's work history, that they probably weren't in those areas requiring monitoring --

MR. HINNEFELD: Yeah.

MR. GRIFFON: -- or something to that --

MR. HINNEFELD: Right.

MR. GRIFFON: Yeah.

DR. BEHLING: The next one is tab 28. It's claim number 6257 for the Savannah River Site. And this individual worked at the Savannah River Site from August '78 to October 1995. The individual was diagnosed with skin cancers, basal cell carcinomas, on four separate occasions in -- basically in sets of two. The first two skin cancers were found on the right side of the neck, and they were diagnosed in '95. And the second skin cancer in the upper right back was diagnosed a few days later on March 17th, '95. So you have

two sets of skin cancers, in essence a few days apart. And then two additional cancers were identified in June of 2001 on the middle of the back and the final, fourth skin cancer is on the left side of the neck. So you had a total of four cancers. The first two coincided in time and the second two coincided in time, so you can basically view them as two -- two types of cancers.

He worked as a pipe fitter, and again NIOSH states that this dose reconstruction was performed using best estimates. For skin dose exposures NIOSH divides it again for the first two and the second two. So what you have -- well, I'll get to that in a second. But for the assigned dose of -- what do we have here, about 11 -- between 11.6 and 11.9 rem to the skin, a POC value of 43.87 percent. So we're -- we're at the threshold of compensation, at least according to the POC.

If you look at the Table 1 on page 5 of the report you see that appendix --you have two appendices, Appendix A-1, and Appendix A-2, and they each correspond to the first two sets of skin cancer and the second two skin cancers as

appendix A-2. So you have two different sets. Now, obviously the two will share the kind of exposure up until the time of the first diagnosis, and of course, the second two skin cancer will have additional exposure beyond the diagnosis of the first two, and that's why they're different. And you can look down the list here and see where did the doses come from. Obviously there was a -- again, a combination of photon dose for photon energies, 30-250, greater than 250 plus electron dose and missed dose, and they were all thrown into a single bucket. And so again it made the audit of this whole dose reconstruction quite complicated. But you see that for photon/electron recorded and missed dose, you have about a total of 6 rem assigned. And then you have some additional occupational medical and some environmental dose, and you have internal assigned doses from tritium and other radionuclides that collectively contribute to the dose of about 11 to 12 rem for -- for different cancers.

When you go to Table 2 on page 7, again you see what we already discussed in a previous case, a lot of checkmarks with an asterisk that

identifies the issue of the workbooks which we already said may resolve itself in the next day or so. Again, based on our inability to really follow each of the numbers based on the fact that we had a very complex dose reconstruction procedure that was broken up by photon energies plus electrons and recorded dose with missed dose, we had a very difficult time in really understanding how each of the various numbers came to be. Nevertheless, we -- we had some comments.

As you can see, on page 9 where we describe the recorded photon/electron doses, how it was defined in the DR. They segregated it on the basis of 30 to 250 keV photons and greater than 250, plus the greater than (unintelligible) keV electrons. And I guess one of the things that -- I hoped to touch on this earlier with Dr. Roessler on the issue of is it really that critical to segregate for IREP these different energies. Does it really have a purpose. Can -- can this even be justified based on relative effectiveness factor that is defined by different photon energies versus electron. I don't really have the answer. I know that David Coker had

presented something to the Board some time ago where he obviously showed some scientific basis for making that, but I haven't seen it so I've have to say this really complicates dose reconstruction when you have to go through each of these segregations, especially for skin cancers where you have to deal with a low energy photon and electron dose, et cetera, et cetera. And if you track a guy like this over a period of years for our facility, you can get yourself bogged down very quickly into a complex dose reconstruction protocol, to say the least. And of course, then comes the issue of the anterior, the DR further reports -- I'm reading on page 9 -- the DR report further states that for external exposure 100 percent anterior-posterior. And again, I'm looking at that and saying well, if you have a skin cancer on the back -- side and back of your neck, is it really even reasonable to assume an electron dose can be half of an anterior-posterior geometry? Now I know it's claimant-favorable because the DCF tells you it's claimant-favorable, but it sure doesn't make much sense from a scientific point of view to talk about an electron dose when the

exposure geometries assume anterior-posterior. And we're talking about a skin cancer on a guy's back, and -- and simple first principles tell you that photon energies less than 30 keV invaders will never get there.

So anyway, I make a couple comments here that, you know, it's just me talking as a scientist as opposed to saying what is more claimant-favorable in our assumptions. But really, you know, there are some issues here that I just discussed here that may or may not be resolved based on the fact of claimant-favorability and simplicity we'll say you have to make a decision about exposure geometry. In this case AP geometry was selected. But I do also want to make a comment about that because the appendix B is wrong in some of the DCF values because, especially for skin, they will give you skin values that assume that the dosimeter was not on the -- on the chest. I mean ultimately we always have to convert, especially for recorded dose, what the dosimeter recorded. And when it's worn on the chest you can make an assumption about the DCF, make an assumption that the dosimeter was in fact on the back side, which is frequently the case for -- and I made that

comment in my Task 3 report. The DCF values for PA geometry exposures are wrong, and so are those for -- for rotational isotropy because they're based on assumptions that do not hold.

Operational health physics tells you when you hand a guy a TLD, he wears it right here and -- and therefore the DCFs, as they are defined in appendix B as well as in -- in procedure number 6, are wrong.

Again, I -- I made some attempts to calculate it, and on page 12 and 13 I -- I talk about what I would have calculated. And again, my calculations suggest that I would have arrived at a dose of 4.045 rem and the dose that were recorded here were 3.583, and in the paragraph that follows, about 3.5, 3.6 rem versus 4, we're talking about 500 millirem as a difference.

Again, it's something that the workbooks probably would account for, but I couldn't when I did it manually on a spot check basis. I guess the -- the findings on page 13 are obviously issues that I already touched upon, the assumption of a skin dose and AP geometry that simply doesn't make much sense when you talk about the different locations for the four skin cancers. You could

spend a good number of hours on this one.

MR. ALLEN: It looks that way.

MS. BEHLING: Is the issue of why --

DR. BEHLING: Yeah. On -- on page 14 I found an inconsistency here that -- under statement two for external doses that include recorded missed dose, I take it that right there for the cancer that was diagnosed in 1995, this included an external photon dose of 3.231 rem and external electron dose of 4 -- and so for -- and then I compare that to the year 2001 and you realize that's impossible where you can have a larger dose of let's say the 4.285 versus the 4.262 for the year 2000, realizing there were an additional six years of exposure from internal that would have obviously had more dose. So it's a theoretical impossibility. I don't know how that came to be.

MR. ALLEN: I don't think those doses you're quoting include the internal, do they?

DR. BEHLING: Yeah, I think they do. Yeah, yeah. Yeah, the internal dose here is 4. -- in fact, those two numbers are highlighted, the 4.285 and -- and the 4.091, so forth -- and I -- yeah, the doses -- it's -- you know, again, it's trivial

when you talk about a few millirems, but it's just something that doesn't seem to make scientific sense where you have a higher dose for a shorter exposure period for the first two as opposed to the second two with the identical assumptions.

MS. BEHLING: Again, I think that's computer-generated --

DR. BEHLING: Yeah, it's probably --

MS. BEHLING: -- numbers that --

DR. BEHLING: This may be a statistical error when you cycle through the -- the Monte Carlo, that may be, you know, the reason. I don't know. But it's quite trivial.

MR. ALLEN: I haven't had a chance to dig into deep yet, but there -- it could be a random number.

DR. BEHLING: Yeah. It could be a random number since we were doing, you know, you're doing a Monte Carlo.

MR. ALLEN: It could also be an entry error.

DR. BEHLING: Yeah. One of the things that I've always felt when we have -- when you use the -- the -- I'm on page 15. I'm talking about the -- the ORAU-PROC 6 as well as the appendix B in the

implementation guide. When you have a DCF for skin, they give it to you for an HP-10 dose and your kerma dose or air exposure dose and so forth, but when you have an HP-10 dose, you should really not have to deal with a skin dose because invariably you also have a shallow dose, and shouldn't that be your -- your dose and ignore the whole concept of a DCF. I -- I can't -- I can't really grasp the concept of an HP-10 dose with a DCF to give you a skin dose when in fact you should have really a 7 millirem dose that defines the dose to the skin.

MR. ALLEN: I'm trying to think of a situation.

MR. HINNEFELD: Certainly at the time when the site was recording HP-10 they were also recording HP-07.

DR. BEHLING: Yeah.

MR. HINNEFELD: So at that point you wouldn't need them to have a DCF on an HP-10 number. There are cases when we've made adjustments in the recorded values at a site to say that if you make this adjustment, you can treat the doses as HP-10. That's about 1.19 at Savannah River and these are other periods that -- at Hanford when we made that kind of an adjustment on the

recorded dose and (unintelligible) recorded dose as HP-10, the deep dose as HP-10, when they may not have been recording an HP-07, they may have recorded in some other fashion.

DR. BEHLING: Yeah.

MR. HINNEFELD: So it's -- it's really --

DR. BEHLING: I don't have the (unintelligible) facts of it --

MR. HINNEFELD: Yeah.

DR. BEHLING: Because of the weight factor, I didn't bring mine. But if you have the appendix B on the skin, I don't know if the DCF for -- let's say greater than 250 or 30 to 250, what the DCF values are for skin for HP-10. Is it greater than -- is it 1?

MR. HINNEFELD: It's usually less than 1.

MS. BEHLING: It's less than 1.

DR. BEHLING: Yeah. And this is what -- what conflicts here. Obviously there's no theoretical way that a deep dose at a -- at a 10 millimeter depth should be anything less than -- than would -- that the skin dose should be less than what it is at 10 millimeters. So I'm -- I'm sort of looking at these numbers, whether it's the AP or PA geometry and I'm looking at a organ -- a skin

dose, HP-10, for -- for 30 to 250 keV of 0.677 for the AP geometry and 0.674 for the PA geometry and so forth -- and to me it doesn't make any sense. I mean you have as a minimum, depending -- I mean not depending. Obviously you will have some attenuation in your first centimeter of tissue that records this as a dose. Wouldn't you expect by a default a -- a 7 millirem dose would be greater and therefore the DCF should be at least 1 or possibly slightly greater than 1. I can't think of why a DCF that is recorded on my badge, and let's say my badge records exactly and I'm at the AP geometry, I'm facing the source, and it records 1 rem, HP-10. What should be my skin dose? My skin dose should be greater than -- than 1 rem.

MR. HINNEFELD: The basis would be that if the attenuation from the skin to 1 centimeter is small, is very small, that it would be the energy deposition rate from -- from -- as you go from the air into the skin, and you have to build up in the energy deposition as you go into the skin. So --

DR. BEHLING: I would say --

MR. HINNEFELD: -- that would be the basis.

DR. BEHLING: Yeah. What we're talking about here is -- is electron equilibrium.

MR. HINNEFELD: Uh-huh.

DR. BEHLING: Okay. Electron equilibrium, and it's -- rapidly rises and it's based on the mean free path of an electron that you generate. And for 30 to 250 keV, you're talking about an electron mean free path length that is microns. It's very short. And so you would have a rapid build-up, which at the point of 7 millirem probably has reached electron equilibrium.

MR. HINNEFELD: If that's the case, then there is none. I think this came out of the standard reference --

DR. BEHLING: Yeah.

MR. HINNEFELD: -- and I have to go find --

DR. BEHLING: I suspect all these DCFs are in error. For one, you know, I have a difficult in understanding why AP and PA are identical. In fact, you can see the same thing happened -- if you look at an eye dose -- one could certainly argue the point in saying well, maybe these take an average value since obviously skin is on the anterior side and the posterior side and everywhere in between. On the other hand, if you

look at for instance the eye dose or thyroid dose and -- and you look at the DCF value depending on AP and PA geometry, you know, realizing that the eyes are the exit side for photons that are coming from the posterior and the same thing with the thyroid, and so you have to look at those numbers and say these things don't make sense.

MR. HINNEFELD: Okay.

DR. BEHLING: And -- and for some reason or another ICRP must have assumed that you're wearing dosimeters front and back.

MR. HINNEFELD: Okay. Let -- let -- we'll have to look into the whole appendix B --

DR. BEHLING: Yeah.

MR. HINNEFELD: -- thing then. I mean that's kind of a procedure of your task, sort of -- finding. I mean rather than being specific to this dose reconstruction, it would be kind of part of your task -- which task is that?

MS. BEHLING: Three.

MR. HINNEFELD: Three.

DR. BEHLING: Yeah. I mean I can clearly look at the less than 30 keV and say the DCF -- it doesn't matter whether it's AP or PA -- is 1.8 versus -- you know, they're essentially the same.

And there has to be something wrong here with --

MR. HINNEFELD: Yeah. That has to presume that the dosimeter is facing the beams.

DR. BEHLING: Yes. I think they make some generic assumptions in ICRP that invalidates the fact that people monitored always wore their TLD up front.

MR. HINNEFELD: Yeah.

DR. BEHLING: Okay. And that is the dose of record, and you're trying to convert that HP-10 dose into a deep dose. And so for instance, I would say this. How could you have anything less than unity if for instance you're measuring let's say a dose to the lung and it's a PA geometry. What you're measuring is an exit dose. This TLD -- this is my TLD and the source is behind me. You're measuring an exit dose which means that the tissue that precedes this, my lungs or anything else, is getting more than what the exit dose is that my TLD is receiving.

MR. HINNEFELD: Right.

DR. BEHLING: So by -- by simple first principles, you can conclude that these DCFs are wrong. They should always be higher than unity, especially for PA geometry.

MR. HINNEFELD: For PA geometry.

DR. BEHLING: Yeah. And -- and don't forget, these TLDs and films, they actually even had not -- it's not even an exit dose. They had 1000 millirem filter on the back side.

MR. HINNEFELD: Yeah, back side too. Yeah.

DR. BEHLING: So -- so you can look at these and conclude that the DCFs are based on something that is -- doesn't apply to the world of individual personal monitoring and what the dose of record really would suggest.

MR. HINNEFELD: Okay. Well, certainly something we need to carry into our --

DR. BEHLING: And I pointed that out under Task 3.

MR. HINNEFELD: It's in Task 3, yeah.

DR. BEHLING: I've looked at the DCFs and said there's something wrong here with the assumptions. The DCFs do not -- do not comply with what you understand based on -- on the dosimeter position and the monitoring practices.

MR. HINNEFELD: All right. Well, let's break real quick since lunch is here.

DR. ROESSLER: Can I ask a question on this case before we -- two questions actually, and they're

kind of general, not so much specific to the conversation today. But Hans and Kathy, on this particular case -- it seems like one of the more complicated ones.

DR. BEHLING: Yes.

DR. ROESSLER: And I'm wondering what input you got when you did the conference call. You had Henry Anderson and Bob Presley involved.

DR. BEHLING: Yes.

DR. ROESSLER: Now Henry, being a physician, I would think would have maybe some input on the basal cell cancer situation. Did you get much feedback --

DR. BEHLING: No.

DR. ROESSLER: -- from them?

DR. BEHLING: No, not really. And I fully understand he's a physician but this is really a dosimetry issue.

DR. ROESSLER: What you're bringing up is dosimetry. What I want to bring up is more of a clinical thing, and this I'll mention to Stu. Every time I look at one of these basal cell cancers, I keep thinking of suntanning, fishing and stuff. When -- and in the lung cancers, there's a provision for taking into consideration

smoking.

MR. HINNEFELD: Uh-huh.

DR. ROESSLER: That's not true, I would say, on the basal cell cancers.

MR. HINNEFELD: Right.

DR. ROESSLER: There's nothing.

MR. HINNEFELD: There is no other lifestyle --

DR. ROESSLER: You just assume --

MR. HINNEFELD: -- adjustment made in IREP.

DR. BEHLING: And clearly, I mean I come from -- our current location is North Carolina and we have farmers. And whenever I go to my barber shop I deal with the locals sitting in the barber shop and listening to conversations. I'm awaiting my -- my hair -- my turn for a haircut, and the subject invariably turns to old people and their health problems. And I can't tell you how many people complain about oh, he was diagnosed with melanoma. He died from melanoma. And these farmers, they all get cancer because they spend their whole lifetime outside in -- in the environment.

DR. ROESSLER: Or people who fish a lot.

DR. BEHLING: And of course, you know, the POC has to obviously be driven by baseline cancers as

a competing variable. In other words what is it. Is it more likely to be radiation as opposed to all other factors, including sunlight. And so --

DR. ROESSLER: Uh-huh, but that's not taken into consideration.

DR. BEHLING: And so it's not likely to be taken into consideration.

DR. ROESSLER: Okay. Those are my questions.

DR. BEHLING: I mean skin cancers are so prevalent in the South.

(Whereupon, a recess was taken from 12:35 p.m. to 1:15 p.m.)

(Whereupon, Dr. Makhijani was unavailable for the remainder of the day.)

DR. BEHLING: We're back to the -- with tab 28, and I'm just briefly going over it. As I said, there's so -- this is so complex and we can't really deal with all of the issues. But with regard to missed external electron and photon doses, I just did a couple calculations, and they are on page 19 where you see, for instance, my estimates there. And I calculated the doses for two years, for 1979 and for 1990, and I came up with for -- for 1979, a dose of 90 millirem and for 1990, 30 millirem. And when you compare that

to those in the table below, you realize I'm considerably lower than what the assigned dose is. So again, the errors here, if there are any -- and I'm not saying there are because of the workbooks -- they would probably, at least based on my preliminary investigation, be on -- on the side of the claimant, being higher than I would have calculated them manually.

And as I said, I think what we can do is, if you show us a workbook maybe we'll run one of these two cases just to see what we come up. And if in the process we realize what he did is in compliance with the workbook and the workbooks are compliant, then these -- these two cases in particular, the Savannah River cases, will all be modified to reflect our new understanding of what the workbooks really have you do and how these doses are calculated.

I think with regard to on-site ambient dose, which starts on page 20, again, we end up with a similar situation that we talked about in the previous case where there are so many options for you to choose from and -- and TBD 3, which is the Savannah River TBD, I have option 1, 2, 3, and 4, and I followed their procedure and then compared

it with NIOSH dose reconstruction. Again, that's on -- in Table 3 on page 22. And you see they're all very close, depending on which option. I have 65 millirem, 52, another one is 52, and 45 and so forth. And of course, the NIOSH report was 43. But none of them match exactly, but they're all obviously very close and I still question whether or not all these different options that are available are really worth the time to pursue based on these trivial differences.

Going on to occupational medical exposure, nothing on this exactly match those numbers. On page 23 we talk about audit of internal doses, and again we talk about here the two issues that are really task 1 issues, and that's the issue of organified tritium versus ICRP 30 and 68. And we've already discussed those issues and stated that they -- they really belong under task 1.

So there were quite a few things that -- that we could have spent probably hours on discussing that I would just as soon defer to looking at a workbook and -- and maybe we can clear these two -- two dose reconstructions up once (unintelligible) --

MR. HINNEFELD: We could conceivably get an opportunity on Friday after you've gone -- you know, to chat one last time and see how we feel like we're standing on these, or we could do it on the phone after this week, as well, so...

DR. BEHLING: Yeah. As I said, most of the things -- as you see, they're not just one finding, two findings. There are a whole bunch and it's all because they're locked into each other.

MR. HINNEFELD: Right.

DR. BEHLING: And once we solve one, this domino effect falls by the wayside.

MR. HINNEFELD: Right.

MS. BEHLING: But just as a -- as a technical and as a side issue, I think the way we're going to handle the reports from here on in -- and Mark, you can correct me if I'm wrong -- but when we do have a finding, because this is now going to be a trackable issue and something that we're going to -- we're tracking through our checklist and tracking through the matrix, when we go back to revise the -- our write-up, we'll put there in an issue, this was resolved. It won't -- it's not like the finding will go away. It will just be -

-

MR. GRIFFON: Don't just delete it. Yeah.

MS. BEHLING: -- a resolved issue. Exactly. So we can follow the -- the sequence of events.

MR. GRIFFON: We worked with NIOSH on workbook analysis and --

MS. BEHLING: Exactly.

MR. GRIFFON: -- this issue is resolved.

MS. BEHLING: Exactly.

DR. BEHLING: Okay. The next case is case 10,732 which is also a Savannah River Site case. For quick review, this individual worked from September 1984 to May of '93, so a period of about ten years. But it was not continuous employment; in fact right below on page 4, you see the periods of employment. So there were a total of six discrete employment periods over that ten-year time frame. In fact when you add those time frames up, instead of ten years they only correspond to about 21 months in total of employment.

This individual was an iron worker and he died of lung cancer in -- no, he was diagnosed with lung cancer in 2002. I'm not sure if he's a survivor. I should look at the CATI report to see if he was

the one giving the interview. This person was monitored on a monthly basis for external exposure. There were in his file a number of bioassays, in vitro bioassays, urinalysis for tritium, strontium, fission products, plutonium, as well as he had some whole-body counts. Based on the assigned dose of 16 rem, this individual was given a POC of just under 19 percent for his lung cancer.

Page 5 of the report is Table 1, which gives you a quick summary. Again, recorded photon dose was very nominal. He had around -- a recorded dose of 282 millirem as a recorded photon dose. He had occupational medical exposure that was very comparable, 279 millirem, and assignment of external environmental dose of 545. But the single largest exposure to the 16 rem whole-body dose -- or organ dose assigned to him comes from hypothetical exposures from tritium, alpha, and electron, as you see in the bottom. So if you add those up, it's about 14.7 rem for -- for assigned internal dose, which is the overwhelming component of the total assigned dose of 16. So he had very little external, and most of his assigned dose was really internal.

Table 2 on page 7 has some of the things that we identified as findings. In total there were five findings. Again, they're all very low impact and affect the doses only in a very marginal sense. And let me just briefly go over those.

The first finding is on page 9, which is finding number 29.1-C.4.1, failed to include recorded photon dose uncertainty. We've already discussed that this morning, and again, it's a decision on the part of the dose reconstructor saying I don't know how to this probably, or it's not worth the time. And again, like I said, it would have probably been a very trivial amount given the fact that the recorded photon dose was less than 300 millirem. So any uncertainty associated with that, would have been trivial. And again, in context of the overall assigned dose of 16, which would have probably contributed very little to that since most of that 16 rem dose was due to hypothetical internalized exposures assigned to them.

The next finding is on page 10. It's finding 29.2-C.2.3, incorrect occupational medical dose. Again, the doses here are very marginal. I was not able to produce the assigned medical dose,

but these values are just slightly different from the ones that were assigned. In other words, this -- this time around we would have added 157 millirem to his dose had he assigned the doses that I think he should have, based on the lung dose and values identified in TIB-6.

MR. HINNEFELD: Were there other numbers in the Savannah River Technical Basis Document, different numbers? Or did you -- do you recall --

DR. BEHLING: I -- I -- he references TIB-6.

MR. HINNEFELD: TIB-6.

DR. BEHLING: And -- and so I used that. I can't tell you, Stu, whether or not if the, you know, the section on the TBD for Savannah River would have given -- I'm not sure whether they used group 1, 2, 3 categories in the --

MR. HINNEFELD: Savannah, I think they have the option to do that. I'm not sure.

DR. BEHLING: Yeah. I -- I can't tell you, but if I recall the dose reconstruction --

MR. HINNEFELD: But he referenced TIB-6.

DR. BEHLING: Referenced TIB-6. So, you know, they always reference Table 4.0-1 and then you have the option of tracking the time periods in

question and you take the organ dose. Based on that, I would have assigned 157 millirem in addition to the ones he did assign.

MR. HINNEFELD: Okay.

DR. BEHLING: Oh, I -- I believe -- yeah, he used a gender factor, as I did in the next one, error in converting occupational medical dose to organ dose. It appears that the error involves the use of a lung dose for a specific gender when in fact the claimant is of the opposite gender. I try not to use -- unless of course it's prostate cancer, I try not to identify the person's gender. But, you know, when you have breast cancer or prostate cancer you usually have to obviously acknowledge the fact that we know what the gender is (unintelligible) --

DR. ROESSLER: I have a comment on that one.

DR. BEHLING: Yes.

DR. ROESSLER: And without specifying the gender, it seems like this particular -- this is an example that fits in that same case of when you use the efficiency process and trying to be claimant-friendly that there's some things that you should really use the realistic situation, like the 12 radionuclides instead of 28 is one.

Here's another one. If the gender is a certain gender, and you use the opposite gender because it's more claimant-friendly, that doesn't make sense. This is kind of a trivial one but I think it fits in that same category of -- of, you know, in the future it should be claimant-friendly but not beyond the bounds of being ridiculous.

MS. BEHLING: Yeah.

DR. ROESSLER: And this -- this is one -- one case of it I think.

MS. BEHLING: Good scientific -- yeah, scientifically sound.

DR. ROESSLER: Use the reality --

MS. BEHLING: Yes.

DR. ROESSLER: -- when it -- when it's there.

DR. BEHLING: There were a number of findings involving environmental external dose. Again, if you look at the actual tables that are defined in the TBD for the H-Area, that's Table C-13, they end up with a number that I couldn't match. Yeah, in this case they failed to include the on-site ambient dose uncertainty which is contained in that table -- and the issue of argon 41 as a potential contributor. But like I said, these are likely to have added very few -- few amounts

of additional exposure, either the uncertainty or the inclusion of argon 41. And again, based on the fact that the internal exposures were fairly high and probably well in excess of what he -- what the individual really experienced, in -- all in all it would not have made a significant difference to dose to have included uncertainty and the contribution of argon 41 as part of on-site ambient.

Again, very trivial issues here, the missed dose from tritium here for entry number 40. I have to tell you, I have to re-read some of it myself because I can't commit everything to memory.

MR. GRIFFON: I don't see anything about missed dose from tritium in your --

DR. ROESSLER: Page 14.

MR. GRIFFON: -- matrix, on your matrix. I'm looking on the matrix.

MS. BEHLING: Yeah. I'm looking at that myself.

MR. GRIFFON: I'm trying to make -- oh, no. This -- this -- I don't know if you have this, Gen.

DR. ROESSLER: Oh, no. I don't have that. I have just this one.

MS. BEHLING: I e-mailed it.

MR. GRIFFON: Oh, it's -- you got it on e-mail, but you don't -- yeah.
DR. BEHLING: We're talking here 3 millirem.
MR. ALLEN: Yeah, that missed dose anyway was -- the assumption in this one was 71 -- 92, probably 7 millirem per year. That's right about the cutoff point. It was either 71 or --
DR. BEHLING: It's five -- five -- yeah, may have been.
MR. ALLEN: Basically the assumption of missed dose ends up giving you a higher -- I believe a higher urinalysis than what this guy had, so it's why it was ignored.
MS. BEHLING: And I guess the reason I didn't include it in the matrix is because we made a statement here that this dose is trivial and can be ignored and so I didn't make a finding out of it.
MR. GRIFFON: So it's more of an observation.
MS. BEHLING: Yes.
DR. BEHLING: Yeah. I just make a statement. We state here, however, this dose is trivial and may be ignored. I mean I don't think I would trip over 3 millirem if someone chose to ignore it.
MR. ALLEN: Yeah. I was trying to say instead of

being missed, it was just overestimated.

DR. BEHLING: And I think both the -- yeah. There were no findings for issues involving the CATI; radiological incidents, none. Okay. So I -- as I said on page 6, most of the findings had very little impact on dose and I would say, given some of the differences being either in favor -- more in favor than not, there was no significant impact on -- on changing dose or probability of causation.

MS. BEHLING: One more here, Hanford.

DR. BEHLING: One more here.

MS. BEHLING: Take them through.

DR. BEHLING: Okay. The next one is tab 30, and this involves a claim from Hanford. The number -- claim number is 1157. And this individual worked at the Hanford facility from 1967 to the present. The cancer was embryonal carcinoma of the right testis diagnosed in 1977, so obviously this individual was a male. He was employed at three different periods of time, and he -- his dose reconstruction was fragmented through three different areas. He was a chemical technologist for most of that time frame, engineer/chemical technologist. He stated that he was involved in

a number of radiological incidents that involved spills and other things. Individual was monitored monthly and -- for a period of time, but in portions of his employment he was monitored quarterly. So again, he has a fairly complex dose reconstruction based on the different jobs, locations, and monitoring periods.

If you look at Table 1 on page 5, again you get an overview of what his exposures were based on the type of exposure. He had about 8.8 rem of photon dosimeter dose. He also had nearly 1.4 rem of neutron dose and he again was given the largest contribution of dose from an internal dose based on hypothetical radionuclide intake. So in total his exposure was 35.46 rem to the testes.

Table 2, which is our case review checklist identifies a total of 11 findings which we'll try to briefly go through.

MS. BEHLING: (Unintelligible)

DR. BEHLING: Yeah. I'm trying to remember exactly what -- what he had done here. He -- he fractionated the photon exposures by 25 percent being less than 30 keV, 75 percent between 30 and

250, and then we had to go through an awful lot to find out what -- those conversion factors were also energy dependent, as you see in Table 3 on page 9. And they varied. As I said, the fractions varied over time period. So you see in the first period, '67 through '71, in 1975 he used zero per fraction for 30, 50 percent, 30 to 250, and 50 percent greater than 250. And for subsequent time periods, that changed from -- to -- to some contribution from lower energy photons between '72 and '74, and so forth. So it was one of those things where you had to really look hard to figure out which years and which energies and which DCFs were being used.

MS. BEHLING: That all came from the Technical Basis Document --

DR. BEHLING: Yes.

MS. BEHLING: -- from the Hanford Technical Basis Document. But in any case he didn't use them appropriately.

DR. BEHLING: Yeah. I'm trying to remember what he -- yeah, I couldn't figure out on what the -- the -- what was the basis for selecting these photon energy distributions, the 25 and 50 and 75 (unintelligible). I did not verify the -- the

basis for it, at least according to the Hanford Technical Basis Document. I could not verify where those fractions came from, and I explain that on page 10.

MS. BEHLING: We were able to reproduce what he did, but it does not match what the TBD recommends you -- that he does for those fractions, energy distributions.

DR. BEHLING: Yeah, and again I don't -- I'm not convinced that all of the effort is really something that complies with efficiency, balancing efficiency with precision. Seems like we're splitting hair here in some of these instances and we do often question whether or not the assigned fractions are even representative of the facility to begin with. But it seems like we spend an awful lot of time here going through these various time-consuming and laborious approaches for assigning IREP. And as I said, I would like still to determine whether or not IREP's assessment of relative effectiveness factors that are driven by these different photon energies are in fact something that has any level of credibility that would warrant this level of effort. After all, a dose is a dose until you

know that a dose is not a dose based on a relative effectiveness factor. And I realized in looking at some of these, they spend an awful lot of time going through these (unintelligible) because then it not only applies to recorded photon dose, but it also applies to missed photon dose. And you go through all these different iterations just to accommodate IREP.

MS. BEHLING: Well, the other thing --

MR. GRIFFON: Well, when it's in a workbook, it's a little faster.

DR. BEHLING: Yeah, if it's in a workbook --

MS. BEHLING: Although in this particular case, he did not use a workbook and this, I believe, he --

MR. GRIFFON: Oh, he didn't?

MS. BEHLING: No, he is a best estimate because he was at a little over 40 percent POC with this dose reconstruction. So the reconstructor spent, you know, a fair amount of time -- we always say sharpening his pencil -- on this one, because it was -- the POC was over 40 percent.

MR. GRIFFON: Well, it wasn't a best estimate though, was it? Because the internal dose is still a hypothetical.

DR. BEHLING: Yes. Well, now this is what I said. Sometimes they go through all these very definitive things for -- for making precise estimates of recorded or even missed, and then they just say well, we'll give you 20 radionuclides on the first day and all of that attempt to be precise is lost and somewhat inconsistent.

MR. HINNEFELD: Well, probably what happens is the dose reconstructor tries it as an overestimating approach because it's testicular cancer. It's not particularly radiogenic. And so he does several overestimating steps and he came out over 45 percent or around 50 percent or something and says, okay, well, I can't turn in an overestimate in this range. So now, what can I do to fine tune this.

MS. BEHLING: Exactly.

MR. HINNEFELD: It's easier to fine tune the external stuff than for -- for -- depending on who the dose reconstructor is, it's easier to fine tune the external stuff than it is to fit an IMBA curve to bioassay data. And so they start -- you know, they start doing more and more definitive things on the external and then leave

the internal at the overestimating. I suspect that's how it got to be where we were.

DR. BEHLING: Yeah, as I said I think --

MR. ALLEN: I think (unintelligible) did use a workbook on this one.

MR. HINNEFELD: They do have a workbook. They just did it under Monte Carlo where it goes back and forth between normal and lognormal, or what?

MR. ALLEN: I think they -- they probably used a workbook and clicked off a couple of maximizing and then tweaked on that.

MR. GRIFFON: I saw the workbook in the files.

MS. BEHLING: Oh, is that right?

MR. GRIFFON: Yeah, yeah.

MS. BEHLING: So they did work use a workbook on this?

MR. GRIFFON: Yeah. I don't know if they Monte Carlo'd it but --

MR. HINNEFELD: Not Monte Carlo --

MR. GRIFFON: They used the workbook, right.

DR. ROESSLER: Is that really Table -- in the middle of that first paragraph, it says Table 6E -2. That's a very strange table number. This is on page --

MR. GRIFFON: 6E-2.

MS. BEHLING: Yeah, it's --
DR. BEHLING: It's part of the attachment E.
DR. ROESSLER: It is? It sounds like a number with a superscript or something. That is a real number?
MR. HINNEFELD: You've got to get a microscope out to read it though. That one's really hard to read.
MR. GRIFFON: Table 20 is --
DR. BEHLING: No, it's in reference to Attachment E.
MS. BEHLING: That's right. They force you to read lots and lots of pages in that site profile and then at the attachment at the end they give you all --
MR. HINNEFELD: Here's what you do --
DR. ROESSLER: I tried looking at one of these backup disks that they send you, the Privacy Act stuff -- which you can't let anybody else see and all that -- before our teleconference call. And then looking at the case and looking at the disk, I said thank God we have a contractor because those of us who are on the Board have jobs. There's no way that we could put in the detailed time that these people are doing. I mean this is

an absolute necessity. Not only the time, but the knowledge, too.

DR. BEHLING: As I said, I couldn't convince myself that what was done was really claimant-favorable/unclaimant-favorable but, you know, and -- and I state there on page 10 where I talk about what they did. And in the end I sort of conclude that, given the varying locations and energy distribution, it may have been more efficient to assume a hundred percent of 30 to 250 keV and a dose conversion factor of 1.011 for all recorded -- I mean to me, I would have like to have actually had the time to run all the variables. And so I say what is the final difference. Are we talking about a few millirem here? All that effort with all the energies and fractions and so forth, again, I don't want to beat a dead horse, but efficiency has to be viewed as part of the equation for saying is this really worth our time, especially when we then turn around and assign the biggest dose to a hypothetical situation that we can't verify one way or the other in terms of its authenticity or how accurate. It really doesn't represent the true internal dose. And so it's just, you know,

my feeling that perhaps for -- for efficiency's sake, let's default to a value that is -- is easy to deal with, understandable to the claimant who may have to review his report, and in the end take some of the hours of work out of the equation.

The next issue is the missed photon dose, and I guess what I state here is that we --

MS. BEHLING: Uncertainty.

DR. BEHLING: Yeah, we again missed the uncertainty here. He -- he talks in one place -- and maybe this is something that -- Kathy has made mention of this before. I think the report oftentimes reflects a boilerplate wording that is taken out and it does not represent ultimately what the actual IREP input statement would have you believe. For instance, on page 10 I state that for missed photon dose, the DR report identified total 15 missed dosimeter readings using LOD values cited in Table 6E-6, and then states the following: A maximum potential missed dose of 0.463 rem from photons was used as the 95th percentile of a lognormal distribution for the purpose of calculating probability of causation. Well, if you look at the actual

values, they use not the LOD but they use LOD over 2 and a geometric standard deviation. So what you have -- and then that's okay, too, but you shouldn't state one thing in the text of the report and then do something totally different in the IREP input. And it appears that boilerplate wording is taken out -- and again, I understand why you want to standardize the format of the report, make it as -- as simple as possible, but as a minimum he could have done either LOD or LOD over 2, but they should be consistent. You shouldn't state that you're going to say -- you give them the 95th percentile value, but then actually when you look at the IREP input values that they are in fact LOD over 2 with a geometric standard deviation.

MR. HINNEFELD: Well, it was the -- I mean the 463 is the 95th percentile of that -- of that lognormal distribution that's used in the IREP.

DR. BEHLING: Yes.

MR. HINNEFELD: It used 230 and a GSD of 1.52, that means 463 is the 95th percentile. So the explanation -- the dose reconstruction explanation is not intuitively obvious, or it's not obvious --

MS. BEHLING: That's right.
MR. HINNEFELD: -- to the reader why that says 463 and the IREP line says 230. That's true.
MR. GRIFFON: Have you gone past the missed dose yet, Hans?
DR. BEHLING: Pardon?
MR. GRIFFON: Missed photon dose, are you done with that one?
DR. BEHLING: Yeah, missed photon dose. Those are multiple findings here. Failed to account for all missed photon doses -- (unintelligible) -- yeah, in some instances zero doses are not the only time when you should use missed dose, because obviously if you're going to maximize a -- an exposure, then it is LOD. Any value recorded dose that's less than LOD should be considered as a surrogate for a missed dose because obviously -- let's assume the LOD value for a dosimeter is 40 millirem and the recorded dose is 25. You would -- if you want to maximum his missed dose, you would assign 40 millirem as opposed to -- to the 25 that is really the recorded dose. So missed dose has to be viewed, not just for zero recorded doses, but any value that's either LOD, if you're maximizing, or LOD

over 2. And I think that everyone understands that equation.

MR. HINNEFELD: Yeah, yeah. I was just going to say, certainly if you have a recorded value that's less than LOD over 2 --

DR. BEHLING: Yes.

MR. HINNEFELD: -- we would say that should be a zero.

DR. BEHLING: Yes, yes.

MR. HINNEFELD: That would be treated as a zero.

DR. BEHLING: And I think in the last 20 cases I identified cases where the recorded dose was 1 or 2 millirem.

MR. HINNEFELD: Right.

DR. BEHLING: And -- and of course the guy would have been better off if we would have had zero because he would have -- as a minimum have gotten LOD over 2 as opposed to one or two recorded doses. So that's that issue.

MS. BEHLING: And I believe during the previous cases we addressed this, and this was something that you were going to be making changes to. Is that correct?

MR. HINNEFELD: Yeah. We've already -- we've told the contractor that if they have a recorded

dose that's less than LOD over 2, then that's treated as a zero.

DR. BEHLING: Yeah. I think, as I state here, count 16 zero readings along with 12 positive readings below LOD. And so again, if -- if you want to be claimant-favorable you would assign a missed dose even though there was a positive but it was below LOD.

MR. HINNEFELD: Well, I guess LOD -- or LOD depends on how the LOD is valid.

DR. BEHLING: Yeah.

MR. HINNEFELD: How do you know -- what do you know because LOD -- if it's a Currie MDA, meaning that you're confident you're going to see that value -- and the halfway too, that would be what Currie calls the critical line, and then we would use the critical (unintelligible) LOD because that's really where you say you can't tell if you're different from zero is LOD over 2. So if you can't tell that you're different than zero, recorded count is a zero, including the missed dose calculation. That's -- that's our approach.

DR. BEHLING: The next one, recorded neutron doses, and there were a couple findings here that I identified on page 12. He -- he said he gave

neutron doses on the basis of energy between 100 keV and 2 MeV and between 2 and 20 MeV, and what it turns out, that he did not -- he states that these were the fractions, but when you -- when you actually calculate it, it appears that what he's done is to use 100 percent for each. The doses for the 100 keV to 2 MeV would have been 10 percent too high based on the 90 percent and 10 percent, and of course the 2 to 20 MeV would have been ten times too high because they should have only been 10 percent fraction. So in essence he overestimated by -- he -- by stating in the text that he was going to do it but then failing to apply those fractions in this calculation. Missed neutron doses. Okay. I identified several deficiencies -- three deficiencies for missed photon doses. Let's see here. The first one is failure to properly account for missed neutron dose. SC&A was not able to duplicate the 42 zero readings reported by NIOSH but did count 90 zeroes neutron dosimeter readings and 21 neutron readings below LOD over a 10-year period.

MS. BEHLING: In going into the records, we -- we found almost double of the --

DR. BEHLING: Yeah. He --

MS. BEHLING: -- of the zero --
DR. BEHLING: -- understated the number of missed neutron doses. Incorrect energy percentages -- yeah, again, the same mistake here. He said he would give it a 10 percent and 90 percent fraction for the two ranges, but he ended up doing the same mistake as he did for actual recorded neutron doses.
MS. BEHLING: Excuse me one second. Can this be an item? This is an item that NIOSH can look into, the dose --
MR. HINNEFELD: Well, I certainly want -- I want to certainly look into the number of missed doses and the number of zeroes, the number of zeroes in the missed dose calculation. This table that he -- that's here in section 2.3 on page 12, is this out of the dose reconstruction report?
MS. BEHLING: Yes. Yes, it is.
DR. BEHLING: Yes.
MR. HINNEFELD: Hasn't he combined the 90 percent and 10 percent with the ICRP 60 factor in that table? Is that how he got these numbers? Because the number I'm familiar with, I mean .1 to 2 -- the ICRP conversion is 1.91, right?
MS. BEHLING: Yes.

MR. HINNEFELD: Isn't that the energy range you use --

DR. BEHLING: You may be correct --

MR. HINNEFELD: If you take 90 percent of that --

DR. BEHLING: ICRP 60 may have taken that into consideration.

MS. BEHLING: Maybe that's what they did then.

MR. HINNEFELD: I think they took the 90 percent and the 10 percent in those ICRP factors, because an ICRP factor of .13 just looks too low to me on 2 to 20. And so I think that must incorporate that 10 percent fraction that goes in that energy range. I think those factors that they call ICRP factor are actually a combination of the apportioning --

DR. BEHLING: I have to look at that, but 10 percent wouldn't give you .13. It would give you .19.

MR. HINNEFELD: But those -- but the ICRP factor is different on different energy ranges. You see 1.91 most often because .1 to 2 is used most often because of the REF and it's most favorable. So you see 1.91 most often, but the different energy bands for neutrons have different ICRP factors.

DR. BEHLING: I'd have to look at that.
MS. BEHLING: Let's all look at that.
DR. BEHLING: You may be right.
MS. BEHLING: Because I thought we assumed that's what he did, also. I don't know.
DR. BEHLING: I have to look at that to see if that -- if that actually addresses that as (unintelligible).
MR. HINNEFELD: I think that's what's going on in that table.
MS. BEHLING: Possibly.
MR. HINNEFELD: And I really hated that table when I saw it in the dose reconstruction --
DR. BEHLING: Yeah, if you have --
MR. HINNEFELD: -- and I told them for --
DR. BEHLING: Yeah, let's -- let's make an issue of that.
MR. HINNEFELD: -- explain to me what you're doing here, you know --
MS. BEHLING: Yes.
MR. HINNEFELD: -- instead of mixing stuff up like that.
MS. BEHLING: Yeah.
DR. BEHLING: Table 6E-3 is the table that we need to look at.

MS. BEHLING: We'll look at that again, but I can assure you when -- when we can't reproduce something, before we will say we can't do that, we go through hoops --

MR. HINNEFELD: A lot of different tries --

MS. BEHLING: So we tried --

MR. HINNEFELD: You have convinced me of that. Trust me, you have convinced me of that.

MS. BEHLING: Because we don't want to erroneously, you know, keep it. But -- but you may be right on this one. I'll look. But with regard to the missed neutron dose --

MR. HINNEFELD: And the number of zeroes, that's important.

MS. BEHLING: -- and the number of zeroes, I think that -- that's --

MR. HINNEFELD: Yeah, that's the note I made.

MS. BEHLING: -- I think a more significant issue.

DR. BEHLING: Who's got a calculator? Does anybody have a calculator where they can --

MR. HINNEFELD: I've got an Excel spreadsheet.

DR. BEHLING: Multiply 1.91 times .9. What does that tell you?

MS. BEHLING: 1.719.

MR. GRIFFON: 1.72, yeah. 1.719.
DR. BEHLING: Well, that would appear, because that's what's in that table. So it may very well end up being that he accounted for that 10 percent and 90 percent fraction by using the ICRP 60 factor as --
MR. HINNEFELD: I think that's what he's done just based on seeing that -- that value.
MS. BEHLING: Okay. Yeah.
DR. BEHLING: Okay. In that case we will --
MR. HINNEFELD: I think that might be what he did.
MS. BEHLING: Okay. We will look --
MR. HINNEFELD: Like I said, I hated that table. I saw a number of dose reconstructions that had tables like that where they combined two factors without really explaining --
MR. GRIFFON: Without really putting how they did it.
MR. HINNEFELD: -- that they had combined two factors and it'd drive you nuts when you haven't seen one like that, trying to figure out what in heck they're doing.
DR. BEHLING: Okay.
MS. BEHLING: Okay.

DR. BEHLING: Okay. So we'll -- we'll take a look at those. Let me just make a note here. Okay. Then the same thing then applies for the missed --

MR. HINNEFELD: The missed.

DR. BEHLING: Yes.

MR. HINNEFELD: It's the same table on this.

DR. BEHLING: Yes.

MR. ALLEN: Yeah, looks like they've got it broke down by area there. That's the two factors for these areas.

MR. GRIFFON: The 25 and 75 and 50/50, yeah, it's broken down by work areas. Right?

MR. ALLEN: Yeah.

MR. HINNEFELD: Uh-huh.

MR. ALLEN: Can't tell the basis for it on this spreadsheet here, but it looks like that's what it is. Some areas it's 1.91 all for the one range --

MR. HINNEFELD: Yeah, 1.91 in one range and zero in the other, and some ranges it's -- yeah.

MR. ALLEN: It's split up differently in other areas.

MR. HINNEFELD: Yeah.

DR. BEHLING: Okay. Shallow -- recorded shallow

electron dose. I think in this case the individual may have double-dipped and actually overstated. Shallow dose he assigned to -- you have an option of assigning shallow dose to less than 30 keV photon energy or to -- to electrons.

MR. HINNEFELD: Uh-huh.

DR. BEHLING: And I think he did both.

MR. HINNEFELD: Oh, okay.

MS. BEHLING: Is that this one?

DR. BEHLING: Yes.

MS. BEHLING: Because it was also the Hanford case where the recorded -- the dosimetry data initially appeared as if there was a shallow -- no. How did that work? That there was a shallow dose -- maybe it's under the missed shallow dose. We're going to get to that.

DR. BEHLING: In -- in this case they assigned a shallow dose to both 30 keV -- less than 30 keV photons and to betas. And in essence that's doubling the -- the shallow dose.

MR. HINNEFELD: Yeah.

DR. BEHLING: You should either use one or the other, but not both. Let's see. What do we have here. Missed shallow doses. For shallow dose, obviously the PROC -- procedure 6, addendum to

external dose reconstructor provides some means of calculating shallow dose for complex-wide situations, and that's formerly a number of zero dosimeter readings LOD, and then you multiply it by 2 and that's -- that multiplier is not really one for maximizing, but it accounts for the deficiency of the dosimeter. And so when you divide that by 2, you're not doing what some of the other people have done wrong in the past, but that's a correction factor for the deficiency in -- in monitoring shallow dose. And so when you divide by 2, you're still then subject to a -- an uncertainty. And the LOD for that was 15 millirem, and let me see here. I think he used a professional judgment case here of 200 millirem as a profession judgment.

MS. BEHLING: Yeah, he did. He used an LOD of 200.

DR. BEHLING: And then again --

MS. BEHLING: But again, it does say professional judgment.

DR. BEHLING: I have no idea where that number comes from.

MS. BEHLING: (Unintelligible)

DR. BEHLING: Yeah, one of the things -- yeah,

the statements made on page 15, reviewer's comment, improperly estimated shallow doses, and I have an exhibit here on page 16. I fully understand why some of these errors are made, but for instance, on page 16 you have the exposures for this individual for the year 1974 and if you look at Code 59, Code 59 is an external dosimeter for the whole body. And what you see on the far right-hand side -- not far right-hand, there's -- but the second to last and the one before that, you have NP, which stands for non-penetrating radiation, and then you have penetrating radiation. And you'll see for instance, the first entry -- which corresponds to month of January, there are 12 entries which has a Code 59 -- and then you see obviously the five elements for the TLD and -- and I guess the algorithm then spits out that for -- for the first month, in January, the non-penetrating dose is recorded zero and the penetrating dose is recorded as 40. And one would conclude that the dose really then to the skin is zero, when in fact it's 40. Just turns out to be that the penetrating/non-penetrating dose were the same. And so when you record it as non-penetrating, you subtract

penetrating from it and end up with a zero dose which is in essence an artifact. There -- this is not a missed -- this is not a missed dose then, and therefore -- you tend to overestimate the missed dose when your penetrating dose is equal to the non-penetrating, and when you subtract it you end up with a zero dose. The truth is there was no non-penetrating -- there wasn't a penetrating. It's not a missed dose, it's just that --

MR. HINNEFELD: Penetrating dose to the skin as well.

DR. BEHLING: And as I mentioned to you, from my experience in the utilities, if you have high energy photons as the ambient dose, your 7 millirem, your 300 millirem, your 1000 millirem dose will always be the same, generally speaking.

MR. HINNEFELD: Right.

DR. BEHLING: And so when you subtract one from the other to -- to determine what is your non-penetrating, you end up with a zero dose when in fact that's an artifact. The skin dose really is 40 in this case. And so I just wanted to point that out. Again, it's claimant-favorable in this case when you assume a zero dose and assign a

missed dose, when in fact it just turns out there was no -- a dose that should have been assigned as a missed dose --

MR. HINNEFELD: Right.

DR. BEHLING: -- in this case.

MR. HINNEFELD: Right, right. You're right.

MS. BEHLING: And again, it reflects on the facility reporting requirements and the reporting -- the way they report their (unintelligible due to electrical interference in microphones).

MR. HINNEFELD: Right.

MR. GRIFFON: Going back to this question of the algorithm now and -- I mean I noted in 1968 -- I think it's -- and I didn't bring that file, but on page -- I think it's on page 41 in the DOE data for this person -- they -- I mean they have an annual penetrating dose of 1910 for that year. And I -- I would -- I'd love it if somebody could describe to me how they came up with that number.

MR. HINNEFELD: You're in 1968?

MR. GRIFFON: Yeah, 1968. There's -- there's -- in this case I think they --

MR. HINNEFELD: Oh, you've got the -- oh, we don't have the -- we don't have those here.

MR. GRIFFON: Oh, you don't have that.

MR. ALLEN: I could go grab it.
MR. HINNEFELD: We can go look them up.
MR. GRIFFON: Yeah, it -- it just -- it was confusing to me to walk through that one. There were a bunch of negative values in that column, and I think they can be explained by the algorithm that was used, but it wasn't clear how. And I can see when I add all the -- I can make the numbers work and come up with 1910, but I'm not sure why a certain value is -- are in that column. So I guess just to crosswalk, that was difficult for me. And maybe it makes sense for someone who is more --
MR. HINNEFELD: We'll look that up.
MR. GRIFFON: -- understands this data more. Yeah.
MR. HINNEFELD: We'll look that up when we get done with our discussion and we'll have something for this week.
MR. GRIFFON: That's fine.
MR. HINNEFELD: If we can figure anything out.
MR. GRIFFON: I'm sure -- I'm sure you'll be able to.
DR. BEHLING: Yeah, for that particular exhibit here, if you look at it, I think the -- the

penetrating dose for that year, for the 12 cycles, was 590. I think if you actually look at the numbers and the annual doses where they collate them, they correctly identify the skin dose at 680 or something like -- 670. I explain that on page 15. If you look at the actual annual doses which collates the shallow dose as penetrating and non-penetrating, you realize that you don't really have a zero dose.

MR. HINNEFELD: Right, right.

MR. GRIFFON: Right.

MR. HINNEFELD: Okay.

DR. BEHLING: So again, you have to be familiar. If you -- if you only look at this, you may not come to that conclusion, but in this case, again, it benefits the claimant in the sense where you assign a missed dose when in fact these are really artifacts here. They're not zero doses at all. And then --

MR. GRIFFON: I guess my only question on that, Hans -- I don't disagree with you on this -- this example for this year, but I think it varies from year to year on how --

DR. BEHLING: Yes.

MS. BEHLING: Yes, that's what I --

DR. BEHLING: And that's one of the statements I made is that, you know, when you look at the instructions, you realize -- and -- do I have it here? In one of them I included tables that they give you and saying okay, for this year skin dose is shallow dose -- is penetrating plus non-penetrating, but it varies over time and you have to be really careful.

MR. HINNEFELD: Right.

MS. BEHLING: Like Hanford.

DR. BEHLING: And at what point does a shallow dose equal a skin dose, et cetera.

MR. GRIFFON: That's why I wanted just to clarify for my own sake.

MR. ALLEN: Didn't we have one earlier where we added the neutron in on one year's sheet --

DR. BEHLING: Yes.

MR. ALLEN: -- and not the other?

DR. BEHLING: Yes.

MR. HINNEFELD: Yeah.

MS. BEHLING: Yeah.

DR. BEHLING: And it gets very, very complex.

MR. ALLEN: Somebody had already added the tritium dose.

MR. HINNEFELD: For a while.

MR. ALLEN: Yes, for a while.
MS. BEHLING: Yes.
MR. HINNEFELD: For some years, the tritium dose is included. It's listed there and it's also added over here. And other years it's listed here and it's not added in.
MS. BEHLING: (Unintelligible)
MR. GRIFFON: Real archaeological dig (unintelligible).
MR. HINNEFELD: (Unintelligible) thought this was a good idea.
MR. GRIFFON: Can I -- can I touch on a couple things?
MR. HINNEFELD: Uh-huh.
MR. GRIFFON: The -- the missed photon dose on -- in this instance, again going back to my topic, my main topic I've hit on today, missed versus unmonitored. I guess I look at the summary and you see 231 millirem assigned for I think what they're saying are 15 missing dose periods. I think I came up with 17, but again, I'll agree with it for the sake of argument. If I look at this individual's photon dosimeter dose, he's got about 8 1/2 rem, close to 9 rem, recorded for photon dosimeter dose. That gives like an

average of 65 millirem per month.

MR. HINNEFELD: Okay.

MR. GRIFFON: If you're -- is it claimant-favorable to assign that LOD over 2 in this instance for those missing periods? They all seem to fall within -- unless you have good -- a good basis for saying that he was out of a -- out of a work area, but they all seem to me to fall within the '68 to '72 time period when he was doing -- when he was getting most of his higher external doses. And, you know, I guess the question is, you've got a few gaps in his data, you're assigning LOD over 2 and saying it's claimant-favorable. I'm saying on average for those years, he was getting about 65 millirem a month. Why not -- I -- I'm -- I guess I'm questioning, is that the most claimant-favorable approach, or -- or a best estimate? I think in this case you were trying to maybe hone in on it a little closer.

MR. HINNEFELD: Yeah, they tried to -- they tried to narrow in on this one, at least on the external side. Let me think a minute.

MR. GRIFFON: It seems to me -- it didn't seem logical to me, unless you have work history

justification, to say that he was jumping in and out of hot areas.

MR. HINNEFELD: Does the record indicate -- I mean is the record void for those years? Or does it look like he had a zero reading? Or can we tell for those months?

MR. GRIFFON: That's -- that's a good question. I mean your report says 15.

MR. HINNEFELD: Zero readings, or 15 periods when he wasn't -- 15 cycles when he wasn't monitored?

MR. GRIFFON: Fifteen where you assigned -- where you assigned missed doses, missed photon doses.

MR. HINNEFELD: Okay. But I mean before that, before we assigned 15 missed doses -- or were they zero readings --

MR. GRIFFON: Yeah --

MR. HINNEFELD: -- 15 badge zero readings, or were they --

MR. GRIFFON: I don't know. I don't have --

MR. HINNEFELD: -- were they 15 --

MR. GRIFFON: -- the record here.

MS. BEHLING: Unmonitored.

MR. HINNEFELD: -- months when we don't have a result because --

MR. GRIFFON: I know. I know what you're saying.

Yeah.

MR. HINNEFELD: Okay. That would -- that would certainly influence how we would approach the problem.

MR. GRIFFON: See, I have in my notes here -- and again, don't take these for granted, but I had -- I had like 17. I -- I'm using the word fields were blank, which for me would say not zeroes, but blank, no entries. Now, I don't know Hanford's practices with this regard, you know --

MR. HINNEFELD: Right.

MR. GRIFFON: -- were they -- were they zeroes that they just noted as blanks in the record. I don't know.

MR. HINNEFELD: Let us do some checking on that because I don't know sitting here.

MR. ALLEN: I'm just digging through the spreadsheet. It's looking like a lot of zeroes are pretty sporadic like a hundred -- you know, low dose -- in one month it's a zero and then a low dose the next month. I'm thinking it's just less than sensitivity.

MR. GRIFFON: It could be.

MR. ALLEN: But I don't have the dose record in front of me. I just have what they recorded

here.

MR. GRIFFON: Do you have zeroes in there, or blanks? I don't --

MR. ALLEN: This is just the spreadsheet.

MR. GRIFFON: Yeah, yeah.

MR. HINNEFELD: It's not the record. It's what they do for --

MR. GRIFFON: I thought there were blanks in the actual data.

MR. HINNEFELD: I guess from -- you know, an average of 65 millirem a month to me looks like it probably varies quite a bit on either side of that and you'll have some months quite a bit more and some considerably less. If you go to half that, or slightly less than half that, you're below the LOD and it would look like a zero on the badge.

MR. GRIFFON: Yeah.

MR. HINNEFELD: So what you've described so far doesn't give me a lot of concern that this was a situation where this guy should have had a result there and didn't. Sounds like he probably had a zero result there based on that kind of, you know, monthly exposure experience. If he were getting 500 a month and then there were months

missing or something like that, that would probably cause me to worry more than 65 millirem a month because it's just not that far from the threshold of badge. You know, the average is not that far from the threshold for the badge and I expect to have quite a bit of variation around the average, and I expect sometimes --

MR. GRIFFON: Well --

MR. HINNEFELD: -- vary below the threshold of the badge.

MR. GRIFFON: I think 60 -- well, I don't know. I -- I think it -- I mean in this case I think you're honing in on that a little more, and I think it probably -- this is my back of the envelope here, almost literally. But that 65 per month is also average from 1967 through '75, so --

MR. HINNEFELD: Oh, I see what you're saying. So it wasn't just in an early period --

MR. GRIFFON: -- and the blanks were in '68 through '72 when he got more of -- it looked like he got more of --

MR. HINNEFELD: Okay.

MR. GRIFFON: You know, so -- these aren't whopping exposures, but you are honing in on --

on something that's closer to your 50 percent cutoff, too.

MR. HINNEFELD: Okay. Let's see if we can draw any conclusions from it later on this week.

MR. GRIFFON: I wish I had the hard --

MR. HINNEFELD: It's available to us. I just -- we just didn't bring it down here. I mean we couldn't bring them all, so -- I guess we could have, but we didn't.

MR. GRIFFON: Yeah.

MR. ALLEN: I could stick it on a stake real quick, but...

MR. HINNEFELD: Well, let's -- let's try to get through them.

MR. GRIFFON: Yeah, let's get through them.

MR. HINNEFELD: Mark's going to be here all week.

MR. GRIFFON: Yeah, that's fine. No, I'm not going to be, but that's fine.

MR. HINNEFELD: Okay. Let's go ahead and get through this report and then we'll --

MR. GRIFFON: We can hold that. It's fine.

DR. BEHLING: Last finding is on page 19. It involves the internal dose assigned for a hypothetical exposure. As we always do, we try to run the Excel workbook in identifying what the

exposures were for photons, electrons, alpha particles, and for some reason or another we were able verify everything, but we were unable to reproduce the dose assigned to the alpha reading radiation. And we can't figure that one out since obviously this is a computer-generated set of data.

MS. BEHLING: And I was -- excuse me, Hans.

DR. BEHLING: Go ahead.

MS. BEHLING: I -- I was going to say, I believe on this one I used version 3.03 and I went back to an old -- the only older version that I have, which was 3.02.12, and tried to see if maybe they used an older version, and I -- I still was not able to reproduce that alpha dose.

MR. ALLEN: I think the difference is, but I've got to check this out for us. I think the difference was that they actually used testes on this one but they didn't use high uranium. High uraniums were basically a year-end process at Fernald or something.

MS. BEHLING: Okay.

MR. ALLEN: So they used a lower uranium value for a reactor facility, and they used testes.

MS. BEHLING: Okay. That may be it.

MR. ALLEN: Basically, they did this one right. That -- that threw you. But he said he was able to reproduce the numbers. I never verified it myself.

MS. BEHLING: Okay. I'm going to check that.

MR. HINNEFELD: Okay. So it would it be non-U -- non-U and then reactor?

MS. BEHLING: That's right.

MR. ALLEN: Yes.

MR. HINNEFELD: Non-U, reactor, and then testes and see what you get.

MS. BEHLING: Okay.

MR. HINNEFELD: See if that matches.

MS. BEHLING: Okay. Okay. Is that it for that one? I have --

DR. BEHLING: Let me just be sure.

MR. GRIFFON: I've got a couple --

DR. BEHLING: Let's see here, CATI reports -- yeah, obviously this guy had a series of events here involving everything from contamination of his hand when he borrowed a pen from a coworker. And of course the action cited was that they surveyed it, they decon'd the skin. They did a nasal smear which turned out negative and did -- did a whole-body count. Everything turned out

negative, et cetera. And then also that same year, 1970, he had a glove contamination event. Again they used a survey to assess the contamination, nasal smear, and it sounds like they -- they did everything that they probably should have done in assessing any potential contamination that involved these events from the pen to the cutting his finger, as he did on -- in April of 1971 here.

I guess in summary perhaps what they could have done is to perhaps follow up with some urinalysis that may have potentially found some internal exposure. But given the high dose assigned to him from the hypothetical, it's -- it's just my intuition that more than likely any doses he would have received and was not necessarily monitored by whatever method they took would have been captured by the assigned dose. So I didn't make any issue or make any finding on this case. Yeah, I think that's it. Do I get a break from talking for a while?

MR. GRIFFON: Can I just ask two -- two things on this. One, I think the uncertainty on the recorded photon dose, you guys -- you raised this as a finding. Right?

DR. BEHLING: Uh-huh.
MR. GRIFFON: But I think in this kind of case it -- it could play a pretty critical -- I mean I think what would happen actually is that if you added in uncertainty on that 8.78 rem recorded -- obviously annually, but if you added that in, even if the numbers got closer I think what would end up happening is you'd have to go back and tweak the internal dose a little --
MR. HINNEFELD: Could be.
MR. GRIFFON: -- more realistically.
MR. HINNEFELD: Could be.
MR. GRIFFON: You know, so it may not make a -- a difference in the outcome, but some of these things could push it over, the way it stands right now. You know what I'm saying?
DR. BEHLING: If everything (unintelligible) --
MR. GRIFFON: Given the hypothetical internal rate.
DR. BEHLING: -- dose.
MR. GRIFFON: So I think -- I think that's something that, you know -- you know, is a pretty important thing to resolve, and procedurally or whatever, they're not using what's on the procedures now and they're just assigning a

constant. I think that should be resolved, especially when you get to closer cases. It's going to -- could play a role I suppose.

MS. BEHLING: I think the implementation guide -- implementation guide, one, and using the normal distribution.

MR. HINNEFELD: Yeah. Yeah, it was a -- this is a testicular? What was the cancer in this one? I'm getting them confused now.

DR. BEHLING: Yeah, this one was a testicular cancer.

MR. HINNEFELD: I'll have to find out about that, because that is an awfully high DCF.

MS. BEHLING: (Unintelligible)

DR. BEHLING: Let me ask Dave on -- on the issue -- do you have -- let's just hypothetically go through a mental exercise that you can visualize. Let's assume you have a recorded dose for an individual of 10 rem and you assign that as a constant with no uncertainty. And then you say well, you know, there is an uncertainty, a sigma value that we should assign to that dose, and let's just for -- for simplicity assume that it's 30 percent.

(Whereupon, Dr. Neton enters the

proceedings.)

DR. BEHLING: So you could, in essence, have a 10 rem plus a sigma value of 3 rem assigned to that individual. Now you subject that to a Monte Carlo analysis that incorporates all the other variables and then you essentially select a 99th percentile value of that Monte Carlo analysis. What would that dose that is now defined of -- as 10 rem as a constant versus 10 rem with a sigma value of 3 result in an effective dose? If you were to say the same -- you -- you -- for the first case, you develop a POC and let's assume for the 10 rem constant with no uncertainty you get a POC of let's say 25 percent. And then you run the same calculation but you say 10 rem plus a sigma value of 3 rem, and you get a new POC. What I would like to know is what would be the single dose, a deterministic dose that would give you the same value with everything else being constant? What would you have to put in as a dose instead of 10 rem plus 3 rem sigma as a single dose in order to get the same POC calculation? Do you know what that -- just a ballpark estimate?

DR. NETON: Its varies depending on the cancer

and --

MR. GRIFFON: Cancer model.

MR. HINNEFELD: Cancer model. That should in the cancer model.

DR. NETON: There are some where --

DR. BEHLING: But let's assume you keep everything a constant --

MR. HINNEFELD: Hans, it's going to vary depending on the number of years, and you name it.

DR. NETON: I could tell you, Hans, you get the same number oftentimes if you put 10 as a constant or for a distribution value, it makes no difference because the uncertainty of the dose model -- the dosimetry calculation is extremely small compared to the overall uncertainty and all the other hundreds of --

MR. HINNEFELD: Use the risk model that IREP applies to get the --

DR. BEHLING: Yeah, I'm trying to gauge the significance --

MR. HINNEFELD: -- overwhelms the rest of the -- if they got 30 there, that overwhelms the uncertainty of the dose.

DR. BEHLING: Yeah. Well, when you even ask for

your (unintelligible) --

MR. GRIFFON: It does depend on the cancer model.

DR. BEHLING: -- in so many cases the sigma value has been deleted because we know it's a very complex thing to calculate and people have simply ignored it. And I guess Mark is raising the question, what would happen if -- you know, what -- how does that sigma value really impact the POC.

DR. NETON: The sigma value, if it'd been deleted or not put in there, it's my understanding the way you do this is that that value -- the constant should be an upper limit of the dose.

MR. HINNEFELD: That's what it -- that's what it's supposed to be. That means that the number is supposed to have (unintelligible) because of -- because of one of a number of things. One would be if there's a DCF for this organ that's -- the entire range would be kept at less than 1. So -- but rather than use that DCF, we're going to use a DCF of 1. So we apply that one rather than this lower DCF --

MR. GRIFFON: So that's your maximizing assumption.

MR. HINNEFELD: -- we actually are -- we're

actually maximizing the actual dose number rather than applying the uncertainty amount. That's even --

MR. GRIFFON: Well, that --

MR. HINNEFELD: You know, that's one application. That's one position that's been made that we have yet to validate. That's from the first 20. We have yet to validate that that's the fact, but that's kind of what we -- what the position was. Other -- I've seen it stated, I don't know that this was everything (unintelligible) abide by, but if we maximize things like geometry and -- and maximize the effectiveness of the energy band -- like we know the photons are spread over several -- over a couple energy bands, but we're going to put them all in the most energy effective range, the 30 to 250 -- then that's overestimating. And so rather than -- so we're not really recording the true dose. We're recording the overestimate of the dose, so we're not going to -- we're going to treat that as a constant because it's a high estimate.

MR. GRIFFON: See, here you didn't do that, though. This case you didn't do it.

MR. HINNEFELD: I have to check out why it would

be okay on this one.

MR. GRIFFON: Right.

MR. HINNEFELD: I would have to check why it would be okay on this one not to include the uncertainty on the measured dose because I -- just sitting here today, I can't figure it out.

MR. GRIFFON: That's what I -- I was asking specifically for this case.

MR. HINNEFELD: Yeah.

DR. NETON: But that is something we (unintelligible) -- I do remember from the first 20 that they had taken some liberties and put them in as constants and saying that it was claimant-favorable because you didn't include any other correction factors would tend to lower the dose. But I think we agreed that we need to demonstrate that that was the case.

MR. HINNEFELD: Yes, yes.

DR. NETON: It's -- it's a real -- it's all over the map as to how much that uncertainty really --

DR. BEHLING: Yeah, just curious.

DR. NETON: I tell you, if it's plus or minus 30 percent, my prediction is it will make almost zero difference in POC value. A 30 percent swing on a dose input value with models that span a

large, you know, range, I mean even -- and if you have alpha dose on top of it because the alpha (unintelligible) effectiveness factors goes anywhere from like 5 to 100 times that dose. So there's all kinds of other parameters in there that drive those uncertainties hugely. But we haven't -- we haven't done a detailed analysis of...

MR. GRIFFON: Yeah. I'm just -- I'm pointing out when you get to these cases that sort of start to approach your 45 percentile, I think we need to at least --

DR. NETON: Yeah, I agree.

MR. GRIFFON: -- (unintelligible).

MR. HINNEFELD: We've got several things to check on this one I think.

MR. GRIFFON: The last --

DR. NETON: If it's in the 45 percentile, I suspect there's a lot more going on that's claimant-favorable for a (unintelligible).

MR. HINNEFELD: There are.

MR. GRIFFON: Yeah, the internal is very claimant-favorable. Right, right.

MR. HINNEFELD: Now, Mark wanted to talk a little bit about the plan for tomorrow and --

DR. NETON: Yeah, my copy indicated you wanted to --

MR. HINNEFELD: -- so we may want to just chat about that for a minute. If anybody who's not going to be involved in that conversation wants to take a break, I guess they can do that right now. We can sort out what's going to happen then.

DR. NETON: Well, I guess the first question is how many people here are going to attend and participate? The problem is -- is -- I don't know how you're running. Are you going to meet tomorrow morning to finish up these 18?

MR. HINNEFELD: I don't think so.

MR. GRIFFON: No, we're going to get through.

MR. HINNEFELD: I don't think we're going to need it.

DR. ROESSLER: No, we'll get through.

MS. BEHLING: (Unintelligible) zip right along.

DR. NETON: I've been trying to get -- see, tomorrow morning the idea was that it would sort of be -- we have no court recorder scheduled for tomorrow because there was -- you know, there was a possibility that you guys were -- tomorrow morning.

MR. HINNEFELD: So Ray was scheduled to -- we have had actually this room scheduled for this conversation tomorrow morning.

DR. NETON: Right. And I was going to meet upstairs in 124.

MR. HINNEFELD: Right, uh-huh.

DR. NETON: And that's why I came down here. I was going to get set up and try to get some jury-rigged NOCTS access, which turns out is not as easy as I thought. If we can convene here tomorrow morning with no court recorder required and that on the agenda is going over case files. I think (unintelligible) is just heading out from what I saw at --

MR. HINNEFELD: Yeah, he wanted to get on NOCTS, so...

DR. NETON: I mean so he may get bored, but I was going to go through -- I selected the 66 -- I have a listing of 66 cases we've done so far for Mallinckrodt that are compensable, the 6 that aren't. And I was going to go over some examples and pick whatever anybody else wants and go through as to what approaches were used. And then I have three new cases that I just received from ORAU that are done sort of proof of

principle using the profile, although, you know, you can't get all possibly flavors, but just to get an idea of how those will done against the profile. That was going to be sort of show and tell and no substantive discussion of issues because we can't get into that if the court recorder is not available. Now, if Ray is available and we go quickly through the demo files, then maybe we could get into some discussions.

MR. GRIFFON: Well, and -- and then the plan generally was in the afternoon we were going to get into the SC&A question resolution?

DR. NETON: Yes. Well, discuss the questions and stuff. That was the plan in the afternoon, talk about -- there's some internal dosimetry questions, external, and some combined questions. Cindy Bloom is coming in today. She'll be here for tomorrow all day and Thursday. She is more knowledgeable about the specifics of Mallinckrodt than I am. And Janet Westbrook is going to be available by telephone for any real nuts and bolts issues that go to data. So that's the plan. I'm encouraged to hear we can meet here tomorrow. It sounds like you guys are going to -

-

MR. HINNEFELD: We'll just make a point of staying till we're done.

DR. NETON: Well, I don't want to, you know, tax anybody.

MS. BEHLING: No, we'll get there.

DR. NETON: If you can do that, then great. Then tomorrow morning we'll meet here, say 8:30-ish. Is that when you started today or --

MR. HINNEFELD: It's when we tried to start today.

MS. BEHLING: Depends on when our cab gets here.

DR. BEHLING: Taxi cab drivers --

MR. HINNEFELD: Depends on how good of directions we give them.

DR. NETON: Well, we have two full days for Mallinckrodt, so I feel we've got plenty of time. I mean if we want to start at 9:00 to make sure people can get here and get some coffee, that's fine by me. I'll make sure I'm ready to set up with the projector and everything.

MR. GRIFFON: Well, I was hoping to head out tomorrow night, so --

DR. NETON: Okay, 8:30 then. We'll start at 8:30 tomorrow.

MR. GRIFFON: I mean I can --
DR. NETON: Yeah, we'll go through the questions, and Thursday was really sort of an open agenda item. It had just general more discussion, and I don't know if we're going to solve all of the Mallinckrodt issues tomorrow. This is a little ahead of where I -- it needs a little further advance than I may want to hold it, but it's fine. I mean if we can get these issues on the table. I will -- I need to talk to Leroy, though, because he was not planning on having the NOCTS available here until tomorrow afternoon.
MR. HINNEFELD: Okay.
DR. NETON: So I'll make -- I'll try to see if I can get that hooked up. There may have to be some people mucking around in here while you're deliberating. Okay. So how many people are planning on attending then tomorrow? Gen's going to be here. Okay. So pretty much Hans and Kathy -- this will be right up your alley, and then we're going to be going over some case files, which is, you know, how we've approached the Mallinckrodt cases thus far and how we intend to do the remaining. Turns out there's really only 90 -- 127 cases of Mallinckrodt that are not in

the SEC, people who started work after 1948 and worked at the Destrehan Street facility. So of those 127, you know, we're going to -- I'm going to try to -- I'm going to show you three that have been done according to profile. And turns out we probably have done about 30 of them already using the -- some similar techniques to what you've seen already, the 20 radionuclides mix and that kind of stuff.

MS. BEHLING: (Unintelligible) we don't have more board members here.

DR. NETON: I will leave this stuff here.

DR. ROESSLER: You're going to be here.

MS. BEHLING: Can we take a break?

MR. HINNEFELD: Yeah, we can take a break for a couple minutes.

MR. GRIFFON: There's one more point on this last case. It doesn't make sense to --

MR. HINNEFELD: Yeah, go ahead.

MR. GRIFFON: The question I had was, the Hanford worker, was he doing any glovebox work? I think we talked about this sometime.

DR. BEHLING: Yeah.

MS. BEHLING: Yeah.

DR. BEHLING: I mean he tore -- he tore --

MR. GRIFFON: Question I had.
DR. BEHLING: -- one of the gloves and, you know, so --
MR. GRIFFON: I don't know the extent of his glovebox work over time, but I guess the question I had was -- especially -- I saw that recent TIB released on the applicability of -- or corrections to be used for certain organ doses, and this is a testicular cancer. You got I imagine lapel monitoring. Was that taken into account, the glovebox -- potential glovebox exposures? I mean there was a lot of corrections given to -- to the various, you know, doses here for energy levels for other -- you know, did anyone take into account the glovebox question?
DR. NETON: Up until now the glovebox corrections that we've been using were only for cases that were either clearly non -- or probably clearly non-compensable. We didn't have a refinement. We knew it couldn't be higher than, like I said, a factor of 10. So we just, you know, jack it up by a factor of 10 and say that we will -- we're in the processing of refining that TIB right now.
MR. GRIFFON: Yeah. I'm not saying it wasn't even in -- it clearly wasn't available at the

time this --

DR. NETON: Right. That's what I'm wondering --

MR. GRIFFON: Right.

DR. NETON: It might have not.

DR. BEHLING: From the description, I'm not sure he was a -- a typical glovebox worker.

MR. GRIFFON: Right. I'm not clear on that, either. Appears, I should say.

DR. BEHLING: He worked as an engineer, generally in the B Plant as a chemical technologist in the PUREX lab --

MR. GRIFFON: So it might have involved very minimal --

MR. HINNEFELD: Here's kind of a description, some of the CATI quotation, and -- let's see.

MR. GRIFFON: Chemical technologist.

MS. BEHLING: (Unintelligible)

MR. HINNEFELD: Yeah. Receiving process samples, breaking samples down, radiochemical analysis, decontamination activities, lab hoods, and spills. Sounds like he worked in the laboratory more than a glovebox --

MR. GRIFFON: Rather than a glovebox setting, yeah.

DR. BEHLING: Yeah, I don't think this is a

typical glovebox worker.

MR. GRIFFON: Okay, I wasn't clear on that. I know I saw that one incident with a glove -- related to a glovebox and I didn't know if he was -- did that for a period of time or whatever.

MR. HINNEFELD: Right.

MR. GRIFFON: That was it. Okay. Take a break.

MS. BEHLING: Can we go --

MR. HINNEFELD: Okay. Break for a few minutes. Ten minutes?

(Whereupon, a recess was taken from 2:35 p.m. to 2:55 p.m.)

(Whereupon, Dr. Neton was unavailable for the remainder of the day.)

MS. BEHLING: All right. I guess I'm going to start now with tab 31, and the rest of these really will go quite quickly, I -- I believe, just because when I scanned through these I didn't see any new issues that we really haven't discussed before. But we'll still go through each of the tabs, and if anybody has any questions, you know, just stop -- stop us along the way. Again, tab 34 (sic), and this is case number 010556 and this was our second Hanford case of these 18. This case, the employee had

several jobs, job titles -- pipefitter, maintenance engineer, operations specialist. He was employed from September of 1980 I guess up until present and was diagnosed with prostate cancer in July of 2002.

The dose reconstructor indicated that this was -- they -- they proceeded with this dose -- reconstructing this dose in an overestimation using overestimating techniques for calculating the dose, and their dose was 27.7 rem and that resulted in a probability of causation of 16.6 percent.

And if you look down Table 1, as you can see, the -- the biggest contributor of the dose was the missed neutron dose, which was over 10 rem. And I believe in this case there were two findings, and I do have to make two corrections here. We sort of went back into these cases after we were done and Mark and I had been working on the matrix and the checklist, and some cases I didn't identify all the findings appropriately in the text. And in this particular case, in Table 2, I --

MR. ALLEN: What page?

MS. BEHLING: -- on page 7, I erroneously marked

that we had a finding at C.2.1 and actually the finding should be the missed photon dose, which is C.2.2. It's the same number of findings, but I just checkmarked the wrong box there. The second issue I see that I didn't do here is on page 9 under the photon recorded dose, under our reviewer's comments, that's where I should have inserted finding 31.1-C.4.1. And the issue here was failed to account for photon dose uncertainty, and this is the same issue where the dose reconstructor had a recorded dose. He entered it as a constant with no uncertainty, which is not what is recommended by OCAS-IG001, and I believe we've touched on that many times now.

The second issue, again Hans got the brunt of -- of all of the findings and he discussed this in his Hanford case, and this is an issue where when we -- we did -- it was an inappropriately accounted for maximum potential missed dose. And when you go into the IREP code, the actual dose is correct. They entered a median dose with geometric standard deviation of 1.52, and we could reproduce that dose. However, it's the wording that appears in the dose reconstruction

report that we're questioning because, again, the dose reconstructor indicated that the maximum potential missed dose of 4.56 rem from photons -- that was the value that was calculated and that this was entered as a 95th percentile of the lognormal distribution. And it's just confusing when you actually go into IREP and you tally up the total number that are the maximum dose. You won't come up with this 4.56; you come up with one-half that value, but that is correct as far as the dose that's been entered into IREP. It was a correct dose entered into IREP along with the standard -- the standard deviation of 1.52. However, it's -- we're just questioning the wording that's put into this boilerplate dose reconstruction report.

MR. ALLEN: We struggled with that ourselves so...

MR. HINNEFELD: Yeah.

MS. BEHLING: Yeah. That's -- those are the only two findings in this particular case. The only thing I will point out, because it's something that we did talk about earlier and I just marked this more as an observation. As I mentioned, a lot of times when we do the -- when we're going

through the dose reconstruction reports, when we go through our reference list, we will find references that aren't necessarily appropriate. In this case, this is the ORAU-PROC 6 reference that should have been -- and they're referencing that -- that Attachment E, but they're using an older version and they did not use the PC-1 version which was dated November 7th, 2003. So to be technical, they -- they -- technically they used the wrong -- the wrong reference in that dose reconstruction report. I -- I just marked that as an observation.

DR. ROESSLER: I have a question on this case, and it probably elapsed this morning. I think we talked about it. This is dose to the prostate using the bladder as the surrogate organ and in case 23 the testes was used.

MS. BEHLING: Yes.

DR. ROESSLER: What was the difference on that, Kathy?

MS. BEHLING: Okay. Initially, the -- the implementation guide states that you should use the testes as the surrogate organ for the prostate. However, TIB --

MR. HINNEFELD: 5.

MS. BEHLING: -- 5.
MR. HINNEFELD: OTIB-5.
MS. BEHLING: -- OTIB-5 states that you should use the bladder as the surrogate organ for the prostate.
DR. BEHLING: For external.
MS. BEHLING: For external dose. And so there's an inconsistency in the procedures and I believe Dave said that possibly back when they did this dose reconstruction -- or did that dose reconstruction, both the TIB and the implementation guide specified the testes. Is that correct?
MR. ALLEN: Everything originally specified testes, and that was a question we raised ourselves and decided bladder was a much better surrogate and changed OTIB-5 several months ago, but this is past tense here.
DR. ROESSLER: So you're saying scientifically, the bladder is the more appropriate surrogate, and which would be more claimant-friendly?
MR. ALLEN: Testes.
DR. BEHLING: Testes. Yeah, especially if it's an AP geometry exposure.
DR. ROESSLER: I'm trying to think of the anatomy

here.

DR. BEHLING: Well, the prostate sits right at the neck of the bladder and so it would be more subject to -- to photon attenuation as would be the testes. So testes would clearly be more claimant-favorable for AP geometry using external exposure -- for -- for (unintelligible) exposure, there's no question.

DR. ROESSLER: Okay.

MS. BEHLING: Okay. So those are the only two issues with tab 31, with the Hanford.

Okay. We'll go on to tab 32, and this is Nevada Test Site, and it's case number 006704 and --

MR. GRIFFON: Just for the record, I'll have to recuse myself from this Nevada Test Site case.

MR. HINNEFELD: Oh, okay.

MS. BEHLING: Okay.

MR. HINNEFELD: Okay.

MS. BEHLING: In this particular case, it was a female employee who was diagnosed with breast cancer in 2001 and actually worked for only a several -- a few months in 1970 and then again in 1979. NIOSH derived a dose of 17.3 rem which resulted in a probability of causation of 28 percent. Here again the majority of the dose was

associated with the internal dose by using the hypothetical internal dose model. Let me see here -- again, the first issue -- the first finding we have on page 9 is finding 32.1-4 -- C-4-2 -- .2, I'm sorry, inappropriate missed photon dose uncertainty. And here again it is what we have seen throughout. If you're going to maximize the dose, you use LOD times 10, enter that as a constant into IREP with no uncertainty, or you can use a best estimate where you take LOD divided by 2 times N and enter that as a geometric mean with a standard -- geometric standard deviation of 1.52. And in this case they inappropriately entered it as a median value of a lognormal distribution when they should have actually entered it as a constant. And that's, again, associated with that ORAU-TIB-10.

MR. HINNEFELD: TIB-10.

MS. BEHLING: TIB-10.

MR. HINNEFELD: Right.

DR. ROESSLER: Are there any claimants ever male with breast cancer?

MR. HINNEFELD: Beg your pardon?

DR. ROESSLER: Are there -- have you ever had any --

MR. HINNEFELD: Yeah. Male claimants with -- yes.

DR. ROESSLER: Okay.

MR. ALLEN: We have some now. I don't know if we've completed them or not, but we've had -- I know there's some in there.

MS. BEHLING: I -- I know. I thought about that when I said about the breast cancer. Yeah, you can certainly have --

DR. BEHLING: Well, we also have records of -- of the actual dosimetry, and in this case we were -- based on the name -- aware of the fact that this was a female.

MS. BEHLING: Yeah.

MR. HINNEFELD: Well, but -- but the gender of the claimant is part of the claimant -- claim.

DR. ROESSLER: Yeah, part of the record.

MR. HINNEFELD: Part of the record.

DR. ROESSLER: So you don't have to go by name. That could be dangerous, too.

MR. HINNEFELD: No.

MR. ALLEN: No. No, we don't.

MR. HINNEFELD: There's a gender-specific --

MR. GRIFFON: Yeah.

MR. HINNEFELD: -- the IREP model.

DR. ROESSLER: Yeah, I remember looking one of these up on that. I think it might -- might have been this one.

MS. BEHLING: Okay. And then we can skip to page 12 under the audit of the internal doses and here again, I -- I identified two findings and they both have to do with the hypothetical internal dose model, the fact that this was obviously a breast cancer and they used the colon as the --

DR. BEHLING: Surrogate.

MS. BEHLING: -- the surrogate organ, where they could have used the breast itself because that's the organ of interest or tissue of interest in this particular case, which obviously results in an overestimating or conservative dose, internal dose. And also in this particular case, I believe --

DR. BEHLING: 28.

MS. BEHLING: Let's see. Is this a 28 also? No, I didn't identify this one as a -- as -- they did use the 28 radionuclides and I should have actually incorporated that also into our findings for consistency, which I didn't in this particular case. But with this being Nevada Test Site, they should have actually also used the 12

radionuclide model for this, for the internal dose calculation.

MR. HINNEFELD: I think we make allowance for Nevada Test Site --

MS. BEHLING: Okay.

MR. HINNEFELD: -- for using the 28 radionuclide. I think that -- I have to figure out where we wrote that because of --

MS. BEHLING: Okay.

MR. HINNEFELD: -- Because of fission products.

DR. BEHLING: Fission products, right.

MS. BEHLING: Yes.

MR. ALLEN: Right. I mean that's the whole --

MR. HINNEFELD: That's why.

DR. BEHLING: Fission products is what drives the 28 versus 12, the reactor being a source term for fission products.

MS. BEHLING: Yeah.

DR. BEHLING: So that's probably something we don't want to --

MR. HINNEFELD: The 28 is probably okay.

MS. BEHLING: Okay. I didn't cite it in this one.

MR. HINNEFELD: It's not written here.

MS. BEHLING: The reason I have two findings is

because I indicated there you selected the wrong model and also obviously then you didn't account -- or you improperly accounted for the hypothetical internal dose.

MR. HINNEFELD: Yeah, the dose is different because of the model selection.

MS. BEHLING: So it's just dose.

MR. HINNEFELD: Yeah.

MS. BEHLING: Yes.

MR. HINNEFELD: And I looked at -- this is one of the cases that I -- I was -- that I looked at getting ready for the meeting and we kind of (unintelligible) --

MS. BEHLING: Sure.

MR. HINNEFELD: And the work -- the spreadsheet that has the dose to the breast is right there in DR development --

MS. BEHLING: Yes.

MR. HINNEFELD: -- so -- but they didn't use it, they used colon, which is the highest non-metabolic or the routine choice, which was the original approach of TIB-2 was highest non-metabolic.

MS. BEHLING: So there was -- there was a reason why we didn't cite the 12 and 28 radionuclides in

this particular case.

DR. BEHLING: I'm not even sure -- I won't give myself credit for saying the fission products would have been there that would warrant the 28, but maybe it was just a gratuitous oversight on our part that we did.

MS. BEHLING: No, come on. Okay. Unless there's any other questions on this particular case, we'll move on to tab 33. And tab 33 is case number 5206, which is a Fernald case. And again, there is very few findings in this particular case but I'll give you an overview.

This employee worked from 1955 until July of 1994. He worked as a laborer and was diagnosed with four basal cell skin carcinomas in 1993 and 1998. Two of the skin cancers were on the eyelid and two were in -- on the back, in the back -- on the back region. And actually when NIOSH calculated the dose in this particular case, the dose actually -- entering that dose into IREP actually exceeded the 50 percent POC value, and so this case was compensated. The only reason that I identified, let's see, some findings in this particular case was something that Hans discussed in detail earlier, and that was the

fact that SC&A is questioning the DCF values for the skin in the implementation guide, the external implementation guide. And he went into great detail about our issues and concerns about these DCF values, and so that was one of the findings in this particular case.

Let's see what the second one is.

DR. BEHLING: The second one is (unintelligible).

MS. BEHLING: Oh, yes. Yeah, in this particular case it just so happened -- the assumptions that were used by NIOSH in calculating the dose -- one of the assumptions was to use a dose reduction factor of .6, which was applied to -- because of attenuation from clothing. And when we actually went into the Technical Basis Document they also give a more modest dose reduction factor of .8. And one of the other issues was that the dose reconstructor -- he -- he used *The Health Physics Manual of Good Practices for Uranium Facilities* as his basis for the dose reduction factor of .6, and I don't believe he actually referenced that in his records, unless he may have made mention of it in the dose reconstruction report. But the other issue is, he -- he could have, more appropriately in our minds, used the Technical

Basis Document for Fernald to come up with a dose reduction factor of .8.

DR. BEHLING: I mean he was overly underestimating the dose --

MS. BEHLING: Yes.

DR. BEHLING: -- which is something that is commonly used when you -- really trying to push this to the test and saying will we have to compensate, by either doing a partial or using parameters that are not necessarily claimant-favorable or claimant deliberately unfavorable.

MR. HINNEFELD: Right.

DR. BEHLING: But, you know, the -- the reduction factor of .8 versus .6, the TBD offers that as --

MR. HINNEFELD: Right.

DR. BEHLING: -- one option and I said well, why did he have to go to another (unintelligible) to come up with this value when the TBD has a value here that he could have referenced that would have been more appropriate. But, you know, it's a nitpicking issue.

DR. ROESSLER: So what you're saying is instead of using .8, he used .6 --

DR. BEHLING: .6.

DR. ROESSLER: -- and still came up over --

DR. BEHLING: Yes, uh-huh.
DR. ROESSLER: So -- I got it.
MR. HINNEFELD: And all these -- and really only considered two of the four cancers.
DR. ROESSLER: Yes.
MR. HINNEFELD: He had four basal cells --
DR. ROESSLER: That's right.
MR. HINNEFELD: -- but only two of them were considered in the dose reconstruction.
DR. ROESSLER: In the other basal cell cancer, did they use this dose --
DR. BEHLING: No, no. It's only for clothing. The eyelids are --
MR. HINNEFELD: Eyelids wouldn't --
DR. ROESSLER: Yeah, I don't mean this --
DR. BEHLING: Unless the guy wore glasses or something --
DR. ROESSLER: A different case, there was a guy with a back cancer, an earlier one.
MR. HINNEFELD: Yeah. There wasn't any -- I don't think there was any beta dose on that. Wasn't it all photon dose on that?
DR. BEHLING: Yeah, I think so.
DR. ROESSLER: Okay.
MS. BEHLING: Okay. I believe that's it for this

case. I got the easy ones.

DR. ROESSLER: Maybe you're just more efficient.

MR. HINNEFELD: The meeting goes much quicker when you run things, Kathy.

DR. ROESSLER: Kathy, there's only two. There's two of our gender here.

MS. BEHLING: Okay. We're going to go on to tab 34, but this I must have been doing late at night. I made -- I got a little overzealous on the checkmarks that I put in my checklist. I think I -- in the version that you got that was originally sent out I think I have eight findings and there's actually only six. And I don't think they're the same findings as what I ultimately came to when I changed some wording. So here's five pages of an errata sheet that I sent to some people. I actually sent to --

MR. HINNEFELD: Me and Dr. Ziemer.

DR. ROESSLER: I think -- yes, I've got copies of that.

MS. BEHLING: I may have sent this out before the meeting also, but I do apologize.

MR. ALLEN: I got it.

MS. BEHLING: Okay. It makes it a little bit easier when we go through this case if you have

those. Okay.

MR. HINNEFELD: Maybe I'll just mention that I'll insert these errata sheets in the hard copy that I'm going to provide to Ray so that Ray's version will have the corrected sheets.

MS. BEHLING: Okay.

MR. HINNEFELD: Okay.

MS. BEHLING: Yes. And after this meeting and we come to some resolution on these issues, and we'll be submitting a revised version. And in fact, there was several typographical errors that we found throughout. But this particular case, it makes it so much more difficult to go over this case if you don't have these errata sheets in your hand here.

Okay. As I said, this is tab 34. It's case number 014898, and it is again a Fernald site. The individual worked at Fernald from 1954, early time frame, until 1968 and was diagnosed with prostate cancer in 1990. Again, this was considered an overestimation of the dose by NIOSH, and they derived a 35.6 rem dose to prostate, which resulted in a probability of causation of 37.95 percent. The largest contribution of dose was the calculation or the

estimate of missed photon dose, which was over 16 rem, and then there was also a hypothetical internal dose calculated.

Okay. As I said, there were actually six findings as opposed to the eight original findings, and let's see here. Okay. We -- we discussed this several times before, again, and that's the issue of using either the testes or the bladder as the surrogate for the prostate, and I make mention of that on page 9. I don't know that I actually identified that as a finding, but I did make mention that there's an inconsistency between the two guidance documents. So the first finding, 34.1-C.2.2 on page 10 of the errata sheet -- let's see here, inappropriate assignment of missed photon dose. Okay. In this particular case this individual, as I recall, had records, and -- yes, older records seem to be available. And I just felt as I went through this, again, it's this issue of if you have an unknown, then be maximally claimant-favorable and you can overestimate the dose. However, in this particular case the records did exist and I was able to go into those records and actually calculate the number of missed dose cycles which,

rather than NIOSH's number of 328 missed dosimetry cycles, I calculated or counted 197. And the difference in missed dose then from the 16.3 rem that was calculated by NIOSH would have been 9.8 using the same -- using the same LOD and DCF values as NIOSH used -- for the 197 dosimetry exchange cycles. And again, it's just an issue of -- as the regulations state, when you -- when you know the information, there is no reason to be overly claimant-favorable in this case.

DR. BEHLING: And let me just interject, sometimes -- we probably would not have even made that an issue if the dose reconstruction -- right now, I'm making an assumption here that he did not, but sometimes they will say a missed dose was assigned for all years during which the person was monitored based on the exchange frequency, independent of whether or not a person had a recorded dose. And so they tell you that, for instance, if six cycles out of this year, a person had a recorded dose, they would still give you 12. And if they state that, then you know up front that that is an intended overestimation of missed dose because they state so. And I'm not sure in this case whether that was done or not.

But 320 versus 197, sort of -- I don't know where they came up with that number.

MR. GIBSON: (Unintelligible)

MS. BEHLING: Yeah, okay, we discussed this already. Thanks.

(Whereupon, Mr. Gibson excused himself from the meeting.)

MS. BEHLING: Okay. Yeah, and I'm not sure --

DR. BEHLING: Again, it's claimant-favorable.

MS. BEHLING: It's claimant-favorable, but --

DR. BEHLING: The question is, is this an issue that you want to necessarily deal with by correcting something. For efficiency purposes, it's sometimes easier -- rather than to go through each of the data sheets of dosimetry and saying oh, for this year there were -- there was three recorded doses that were positive, therefore missed dose is only 9. And perhaps for efficiency one could argue let's just assume all years and all cycles were basically missed and therefore -- knowing very well that you're going to overestimate and in the process save yourself an hour or two worth of going through the individual records, I can understand the efficiency factor here.

MR. HINNEFELD: That's probably what was done in this case.

MS. BEHLING: The second finding has to do with the use of the limit of detection for -- in this particular case, the dose reconstructor used ORAU-TIB-10, which is a complex-wide procedure and assumed a 40 millirem per cycle limit of detection where they -- they should have gone to the site-specific procedure or Technical Basis Document, the Fernald Technical Basis Document, which actually identifies 30 millirem as your -- to be used for your LOD for your missed dosimetry cycles. So again, this was an overestimation of the dose, but we just felt it was more technically correct to use the information from the Technical Basis Document.

And then finding three, which is finding 34.3-C.4.2, again goes back to this reoccurring issue that we obviously have seen in almost every case, and that's inappropriately assigning uncertainty for the missed photon dose.

DR. BEHLING: When LOD is used.

MS. BEHLING: Right, when LOD is used. Exactly. I think we've gone through that enough times now. Okay. And here again, the -- we're going to move

on to the on-site ambient dose, and I identify two findings on page 12, that the dose reconstructor failed to account for on-site ambient dose and that they didn't use appropriate procedure for considering the use of on-site ambient dose. Again, I just feel -- looking at the regulations and looking at what's most defensible, the dose reconstructor in this case actually made the statement in the dose reconstruction report that because they used claimant-favorable correction factors for measured and missed photon dose, they decided not to use -- not to calculate an assigned dose -- an on-site ambient dose. And I feel that it would be -- it would have been better -- in fact I cited up-front findings that it --the dose reconstructor could have almost -- just as easily looked at the records, they were clear to me how many missed doses there were, and actually count the correct number of missed doses and then gone into the Fernald -- Fernald does have -- it's one of those facilities that in the early years -- since this dose reconstructor (sic) started his employment in 1954, Fernald has a workbook or a spreadsheet I believe that you can go in and very

easily put in the years of employment and calculate the on-site ambient dose, which in this particular case I did and it came up to 9.17 rem. And so I just felt it's more defensible and scientifically sound to actually calculate the doses that apply to this particular dose reconstruction in the most appropriate manner. And like I said, although in early cases I said it was a lot of overestimation of dose, in this particular case I feel they should have calculated this on-site ambient dose.

Okay. The last --

MR. GRIFFON: To me, that 9.17 rem -- or 9.71, I forget what you said. Is that for the entire -- how long was that individual there?

MS. BEHLING: '54 through '68, I believe.

MR. GRIFFON: Is that for that 14-year period?

MS. BEHLING: Yes. Yes.

DR. BEHLING: Was it based on a maximum (unintelligible) -- you're placing the person always at the highest location?

MS. BEHLING: I don't know yet, because we didn't get training.

MR. HINNEFELD: Workbook training. That's pretty high.

MR. GRIFFON: That's out of the workbook? Yeah, that's 600 --
MS. BEHLING: Yes.
MR. GRIFFON: -- millirem a year.
MR. HINNEFELD: That's 600 or 700 millirem a year. That's pretty high for a uranium plant.
MR. GRIFFON: That seems surprising to me to have that high of an ambient dose.
MS. BEHLING: Yes.
DR. ROESSLER: So are you saying they really underestimated in this case, that we should add 9 to --
DR. BEHLING: Yes, yes. Yeah, that's the deficiency.
DR. ROESSLER: -- and with a POC of 38, that --
MS. BEHLING: However --
MR. HINNEFELD: It was already about 8 that she took out.
MS. BEHLING: Yes. What I was going to say is, if you go back to Table 1, the majority of the dose in Table 1 is identified under photon missed dose, which was 16 rem. And I'm suggesting that -- the dose reconstructor really overestimated that dose because --
MR. HINNEFELD: It should be 7 lower?

DR. ROESSLER: Oh -- oh, yeah. I see it here.
MS. BEHLING: Yes. It should have been around -- I think I calculated -- what did I say, 9.
MR. HINNEFELD: I think you said --
MS. BEHLING: Yeah, about 9 rem.
DR. ROESSLER: Okay.
MS. BEHLING: So in one case, I'm -- I'm saying add -- you know, add the 9 rem for the on-site ambient, but to me it's just still something that's more defensible --
MR. GRIFFON: I guess my question was --
MS. BEHLING: -- in both cases.
MR. GRIFFON: -- is that ambient worksheet -- I mean that seems high to me.
MR. HINNEFELD: Yeah. I wondered where that is, too.
MS. BEHLING: Yeah. In fact --
MR. HINNEFELD: Maybe I'll go over that one when I'm over there.
MS. BEHLING: In fact, I found it interesting also, because initially I -- I wasn't going to delve this far into that on-site ambient, but when I started to look at those worksheets and the site-specific Fernald, there is a Word version write-up up front that talks about how

significant the Fernald dose was in the early years. So that's what made me look a little bit deeper and actually calculate what that dose was. Yeah. But it's something hopefully we'll discuss over the next few days of the training.

MR. HINNEFELD: K65. It had to be close to K65 to get anything --

MR. GRIFFON: Yeah.

MR. HINNEFELD: -- anywhere close to that, and then it would be --

MR. GRIFFON: Maybe they assume --

MR. HINNEFELD: -- badge storage and subsequent subtraction of that, you know, from control. I don't know. I don't know what they did in the '50s. In the early '80s the control badges were kept in the lab. So I don't know what they did in the '50s. There was two in 1954.

MS. BEHLING: Okay. And if we move on to the internal dose, here again, in this particular case they used the hypothetical internal dose. They did assume 12 radionuclides. They used the colon, even though I guess you can now use -- I think you can use prostate now in -- in the model. But what I wasn't able to do was to reproduce the electron dose with, again, energies

less than 15 keV based on the assumptions that were provided in the dose reconstruction report. And again, I used the workbook version 3.03, and I believe I may have gone back to an older version of the workbook that I had, which didn't change anything.

MR. ALLEN: Oh, I recognize the number. There was an error in an earlier workbook.

MS. BEHLING: Okay.

MR. ALLEN: The electron greater than 15 keV, you said?

MS. BEHLING: Yes.

MR. HINNEFELD: It's got a (unintelligible) greater than 15.

MR. ALLEN: There -- there was an error on that 12 isotope that added one of those isotopes into the 12, exactly 13 isotopes, one of which did not belong there.

MS. BEHLING: Okay.

MR. ALLEN: That's why you can't reproduce it. It was corrected later.

MS. BEHLING: Okay. In fact, that makes sense because -- well -- yeah, that does make sense because initially the difference between my calculation and their calculation for the

electron dose energies greater than 15, NIOSH derived 1.265 rem and my -- my dose came up to .886 rem.

MR. ALLEN: Sounds about right.

MS. BEHLING: So that's -- I think that probably accounts for it. So I was using a version where this was corrected.

MR. ALLEN: Right.

MR. HINNEFELD: Yeah.

MS. BEHLING: Okay. That explains it. Okay. Let me just mark this.

Okay, and I believe that's all the findings for this case unless anyone has some questions.

MR. GRIFFON: I just have a question but it's more of on the Fernald site -- I mean the monitoring practices. I'm looking at this person's record, and from '58 to '59 it seems like he went from having like all zeroes in his deep dose to having measurable quantities. Was there --

MR. HINNEFELD: What was his job?

MS. BEHLING: I was just going to say --

MR. GRIFFON: Yeah, I wondered if it was a matter of the work or a matter of the monitoring changing from '58 to '59.

MR. ALLEN: It's probably the monitoring change. I think it went from like weekly to bi-weekly, or bi-weekly to monthly --

MR. GRIFFON: So they'd have more --

MR. ALLEN: -- in that time frame 'cause I think you're right.

MR. GRIFFON: -- detectable sensor --

MS. BEHLING: Okay. Yes.

MR. GRIFFON: Thank you. 'Cause it's 12 periods, yeah. Yeah, you're right.

MS. BEHLING: Okay. We'll move on to tab 35, which is the Lawrence Livermore National Laboratory site, and it's case number 014627. In this case the energy employee worked from 1975 through 2001 and was diagnosed with breast cancer in 2001. She was a member of the administrative staff and NIOSH calculated the dose to the breast of 48.140 rem, and that resulted in a probability of causation of 42 percent.

And here again, if you look at Table 1, the biggest contribution of dose came from the estimation of missed photon dose and they also calculated missed electron dose and also there was a hypothetical internal dose calculated.

Okay. We identified three findings. The first

finding is on page 10, and once again it's that reoccurring theme of an inappropriate method used for estimating missed photon dose where they used that standard correction factor of 2 and then they correct that error by dividing by 2, and then they enter the dose as a lognormal -- or as a median with a lognormal distribution of 1.52. So it's the same -- as you can see, those procedures are troublesome to the dose reconstructors.

Okay. Where's finding two here. Okay. We've covered two findings there.

The third finding -- again, something we've already talked about -- the hypothetical internal -- the hypothetical intake model. They used the colon to maximize the dose where they could have used the breast as the tissue of interest, which would have reduced the internal dose. And also in this case they selected the 28 radionuclides as opposed to the 12 radionuclides, which I thought would have been more appropriate for the Lawrence Livermore site. And that also would have reduced the dose to, I think -- let's see, it would reduce the dose down to 7.2 rem and -- as opposed to 13.7 rem as calculated by NIOSH.

Let's see. And I believe that's it for tab 37 -- 35.

MR. GRIFFON: You're getting ahead of it.

MS. BEHLING: Wishful thinking.

MR. HINNEFELD: Yeah, wishful thinking.

MS. BEHLING: That's my next -- Hans's turn.

DR. BEHLING: Okay. Here comes slowpoke again.

DR. ROESSLER: Don't get defensive.

DR. BEHLING: Well, I've been insulted (unintelligible) --

DR. ROESSLER: I can see I'm not riding back with him.

DR. BEHLING: All right. Next case, tab 36 is case number -- claim number 10920. The individual worked at Pacific Northwest National Laboratory, and the person was there between January of 1977 through February of the year 2000. So he was there for 23 years or thereabouts. The Energy employee was an engineer type and he was a senior designer. He was diagnosed with melanoma skin cancer on the right cheek on October 17, 2001 shortly after he terminated his employment. There was an assigned skin dose of 33.5 rem to the -- to the -- cancer, skin cancer, and the POC for that assigned dose

was 35.1 percent.

Table 1 identifies the general distribution of assigned doses. For photon recorded dose, he only had 100 millirem. The largest dose assigned to him was from missed photon dose, less than 30 keV, with 15 rem and also an assigned missed photon dose of an additional 2.6 rem for photon doses in the energy range of 30 to 250 keV. He was given a fairly significant high occupational medical dose, as well as an on-site ambient dose, and also a total hypothetical internal dose of -- if you add alpha, photon, electron -- 13.5. So you see that most of the doses assigned to this individual are from the calculated doses that are far in excess of the potential real doses based upon missed dose as well as internal hypothetical dose.

For this audit we identified a bunch of noes in our audit response, that if you look at Table 2, there was -- right up front under review of data collection as well as issues involving the CATI report there were a bunch of noes and also cited as potential significant for under review, and we'll explain why that turned out to be the case. In addition to those, there were several other

deficiencies which we identified for -- for recorded model photon doses, and those involved electron doses. In total we had nine deficiencies or issues that we wanted to bring up.

One of the things that we -- I wanted to just briefly point out -- and again, it's relatively minor -- and that was the issue of how shallow doses are -- are identified. And on page 9 I go through the actual document itself. In the middle of the page we have dose data reported by the DOE, and -- for all the years he worked there was only -- there were only two years in which he received a recorded dose. All others were either zero or non-recorded doses. And so for 1980 you see two values, a shallow dose and a deep dose. And for 1981, again, a -- and for the first year was 30 and 30. For 1981 it's 40 and 10. And I looked at those and then I tried to identify how the entries in the IREP input code for entries one through three were derived, and I had a tough time really understanding it, so I looked towards the bottom. You see at the bottom of page 9 I stated -- based on this explanation NIOSH assigned the following skin doses which are

defined in the entries as one, two, and three, and they were also defined as constants. And so you see doses defined in behalf of 30 to 250 keV and less than 30 keV, and these are the reflected doses assigned in the IREP input for the two years, '80 and '81. And I cannot really come up with how these numbers were derived. And again, I sort of go to the Table 3, which I identify on page 11 as the instructions that were offered, historical Hanford recorded dose practices. And -- and you look at those and you sort of say how did they come up with the numbers that they assigned based on the definition for non-penetrating and penetrating doses. And as I said, they're trivial differences, but I really can't quite understand how these numbers that you identify in the IREP code were -- were derived from these values.

Also I might want to add that when you look at the Table 3 values and then also go to the -- on page 25 there is a table which came -- which is taken directly out of the DOE assigned doses as an instruction -- you find that they're not -- not -- they don't coincide in time when you look at the Table 2 on page 25 and compare that to

Table 3 on page 11. They do not match each other in terms of how these dosimeters are to be interpreted with regard to -- to skin dose as opposed to whole body dose over function of time. And then I think sometimes you run into these -- these problems where you sort of say well, which procedure should I -- which instruction should I follow. And as you can see, the time frames don't match necessarily. And as I said beforehand, the actual doses are trivial, but it's just a matter of trying to get an understanding of how these doses were actually derived.

In addition, we talk about a skin DCF, and I have to say, when -- in this case it didn't matter because they used a dose conversation factor of 1, but the fact is when you add penetrating and non-penetrating as defined in those two tables, either Table 3 on page 11 or the other table on page 25, the skin dose is defined as open window plus shielded, let's say, for '44 through '47, do you really need a DCF value? In this case, as I said, it didn't matter because they used -- elected to use a DCF of 1. But the truth is, a skin dose is a skin dose, and the concept of a

DCF falls by the wayside. The fact that, again, these values were entered as constants as opposed to a -- an arithmetic mean with an uncertainty, again was an issue we've raised in a number of previous cases and, again, these doses were modest so that any uncertainty assigned dose wouldn't have really significantly made any difference. But again, it's just a technical error. I'm on page 12 and these are the findings, 36.3 and 36.4.

Under other observations I do point out the issue of something that we've already discussed, and that is what I find is -- is -- are DCF values that I can't reconcile based on the actual numbers. And we won't go into it but, you know, I don't -- I can't understand how the HP-10 dose that's given and the DCF values for AP versus PA are essentially identical. That cannot be, so something is wrong about this whole table in which DCFs were derived based on ICRP data.

One of the things that we could not really do for this particular case, and that was explained by DOE, that because of the low doses that he received they only provided an annual summary table, not -- rather than individual monitoring.

So it's -- it was essentially impossible for me to determine what the frequency of the monitoring period was, whether it was monthly, quarterly, or whatever. But NIOSH assumed 300 zero dosimeter readings on the assumption that they were -- this individual was monitored on a monthly basis for the full 25 years in question. And then they divided by two photon energies, 30 to 250 and less than 30 keV. Given that, I will give the benefit by saying that okay, in the absence of data, 12 cycles per year does appear to be claimant-favorable and -- and so it certainly would tend to overestimate, if anything else. But I didn't make that as a finding, it's just that the -- the dosimetry DOE data did not allow me to verify whether or not the individual was monitored monthly because they stated in the dosimetry records that for very low doses they simply do not give cycle by cycle readouts. So I can only conclude that this must be a claimant-favorable assumption of 300 cycles of monitoring. On-site ambient, again, I think this is something that we've talked about. It's likely to be trivial, but on-site ambient doses are usually defined by a deep dose, which is very appropriate

then when you assign an on-site ambient dose for a person who has a solid cancer. Or you take the HP-10 if you want to do -- take the HP-10 at face value, or you take a DCF value in using maybe perhaps an isotropic geometry. In this case, the cancer in question is skin dose, and therefore the ambient doses, as we see them or as they are recorded, might just underestimate the actual dose to the skin because the on-site ambient doses are deep doses. I assume they're always recorded as deep doses, which means that a skin dose or a skin cancer may be underestimated in circumstances where on-site ambient dose is also in addition to photon exposures includes the beta component or very low energy photon component that wouldn't be captured in the environmental dosimeter that is recorded only by -- by the deep dose. It's not like it's going to be a significant change but, you know, it's just something that I've raised in other instances involving skin cancers since ambient doses are never defined for a -- a 7 millirem dose.

MR. ALLEN: Shouldn't be a lot of low energy ambient dose --

DR. BEHLING: Yeah.

MR. ALLEN: I mean if you're close enough to get that kind of dose, then it's not ambient anymore.
DR. BEHLING: Well, if it's a plume emersion and it involves certain noble gases that might contain, you know, a beta component, the HP-10 dose that is normally recorded as a deep dose for -- for environmental purposes is -- is something that would modestly underestimate the real dose. Audit of internal doses on page 15, let's see here. He assigned internal dose of 13.4 and it corresponds to the colon, which was used as the surrogate for non-metabolic tissue. When we did the calculation for skin, the dose in question turned out to be 8.46 rem, so again the skin is one of those tissues that can be calculated directly without having to rely on a surrogate tissue. Again, the dose is lower, so the assigned dose is clearly claimant-favorable and was also assigned for 28 radionuclides. Let me see here. Does PNNL have reactors that would justify the 28 radionuclides?
MR. HINNEFELD: We would assume a PNNL person maybe (unintelligible) around reactor --
MR. ALLEN: Pretty intermingled, so --
MR. HINNEFELD: Yeah.

DR. BEHLING: Yeah, I didn't make an issue out of it but I was just asking for -- for own -- my own clarification.

MR. HINNEFELD: We kind of -- it's a little tough to separate PNNL --

DR. BEHLING: Yeah, yeah.

MR. HINNEFELD: -- from Hanford sometimes, so...

DR. BEHLING: As I said, I wasn't sure and so I didn't make that as a -- an issue at all. But here we have a -- we're on page 16 and the CATI report and radiological incidents. Now here's the situation -- and I think we can talk about this -- where the person in this report claimed that he was injured at one point in time in the middle '90s while he was working on a pipe that ruptured and sprayed him. And apparently he claimed he was -- the injury required first aid treatment, and there is no record of any radiological incidents reported among the DOE records that were filed. And one would normally dismiss it, but according to the claimant it is the exact location where he was subsequently diagnosed with a melanoma. Now on that level of coincidence, one would certainly want to look at this and sort of say was this a radiological

incidence that should have been looked at? If it was not a radiological incident, could we at least dismiss it on the basis of information that should have been filed for on-the-job injuries which are well-documented even when they're not radiological in nature. The question is, given the coincidence of an injury that the claimant claims to have sustained and that also being the exact location of a skin cancer warrants somewhat of a closer look that says there is every reason to believe that this happened because of first aid. Perhaps some documentation in the first aid facility where he was apparently treated or, as a minimum, collaborate with -- with coworkers who may have seen this or been witness to this or something. So in essence what I wanted to do here is to say can we in some form or fashion eliminate the likelihood that that melanoma that he had was potentially linked to an injury that happened or didn't happen. Right now I don't see any documentation that would allow you to say categorically one way or the other.

DR. ROESSLER: What's the latent period for melanoma?

MR. HINNEFELD: I was just going to say, this

one, it would have to get up there pretty high to make a huge difference.

DR. BEHLING: Yes. There was a relatively few years in between the diagnosis and the --

DR. ROESSLER: Just six years, and I'm wondering if that's a -- I don't know what it is.

MR. HINNEFELD: I don't know. I was thinking melanoma acts a lot like a solid tumor, doesn't it?

MR. ALLEN: Yeah.

DR. ROESSLER: Be more like 10 to 20 years then?

MR. HINNEFELD: Well, the -- the risk factor, you know, doesn't just start in all these things. It kind of creeps up.

DR. ROESSLER: Yeah, yeah.

MR. HINNEFELD: So it wouldn't necessarily be zero at six years --

MR. ALLEN: Right.

MR. HINNEFELD: -- but it would be far below where it would eventually be.

DR. ROESSLER: Is that entered into the POC?

MR. HINNEFELD: It's part of IREP, yeah.

MR. ALLEN: Yeah. Yeah, it's in IREP. Yeah.

DR. BEHLING: And I assume that the shortened latency period --

DR. ROESSLER: This wasn't in there.
DR. BEHLING: -- is considered in IREP in terms of POC.
MR. HINNEFELD: Yes. Yes, it'd be independent of any dosing we do --
DR. BEHLING: Yes.
DR. ROESSLER: Yeah.
MR. HINNEFELD: -- because that gets sorted out in the IREP application.
MR. ALLEN: So we could go through a lot of trouble determining a dose that's been multiplied by zero.
MR. HINNEFELD: Or close to zero.
DR. ROESSLER: Very close to zero.
DR. BEHLING: I mean I would just like to see something that says we either confirm or we discredit this claim. You know, I mean I don't want to call anyone a liar, but, you know, after the Wendy's incidence and chili and the finger, you sort of say is this something that you necessarily want to at least look at? You don't want to -- you don't want to call anybody a liar, but if -- if the claim is there, certainly an employee injured on the job is usually well-documented.

MR. HINNEFELD: You have -- if you got first aid, a lot of places will have it.
DR. BEHLING: Yes.
MR. ALLEN: Yeah.
MR. HINNEFELD: I mean you get their medical record --
DR. BEHLING: Oh, yes.
MS. BEHLING: Right.
MR. HINNEFELD: -- it has every visit --
DR. BEHLING: And this was '95. This did not happen, you know, in the '60s when here's a band aid, son, get out of here. This clearly would have been documented and -- and I think we should, as a minimum, look at injury reports and -- and if nothing else, if that doesn't exist, say who were the coworkers that supposedly were with you and potentially will have to go on record as saying yes, I concur with --
MR. HINNEFELD: The outcome of this might be that regardless of what the scrape did to his cheek --
DR. BEHLING: Yes.
MR. HINNEFELD: -- the latency period is such that it's just not credible to have an impact. You know, he -- he -- absolutely factual in telling us what happened --

MR. GRIFFON: Yeah, yeah.
DR. ROESSLER: Uh-huh.
MR. HINNEFELD: -- and it just doesn't matter --
MR. GRIFFON: Right.
MR. HINNEFELD: -- because not enough time passed. I mean that could be (unintelligible) --
DR. BEHLING: But, you know, one would still -- the probability which -- I mean the short latency period doesn't exclude it. It's just I think with the exceptions of -- I think IREP considers almost every latency period as something contributed to the cancer. I don't know where it stops. Clearly obviously, leukemia have a known short latency period. I don't know about skin cancer, but one could say with horrendous exposures if it was an alpha emitter and locally --
MR. HINNEFELD: Sure.
DR. BEHLING: -- and, you know, I wouldn't say no. But I would like to at least say we've gone the distance. We've identified, you know, or we contacted the first aid people. Are there any -- any injury reports, are there any people that you recall that supposedly worked with you who will at least stand by your side and say that yes,

they remember him being injured and -- and even perhaps identify a location and perhaps a potential source term in terms of the radionuclides. I would just like to see some resolution. Anyway, having -- having that claim made by the claimant, we elected to cite a number of things that ultimately resulted in an uncertainty because we don't know what those could have been possibly without necessarily jumping to conclusions at this point.

MS. BEHLING: So we marked it as under review.

DR. BEHLING: Under review.

MR. HINNEFELD: Yeah, I know what the -- well, the dose -- I know what the dose reconstructor's view was that, you know, we gave him this huge intake --

DR. BEHLING: Yes.

MR. HINNEFELD: -- and so on and so forth, and the issue here that is sort of dramatic is the location of the scrape and the location of the melanoma, and so -- yeah. I guess I'd hate to speak for OCAS in terms of will we go do this, but it seems like that might be something we might want to look into.

MR. ALLEN: As a manner of --

MR. HINNEFELD: At the very least --
MR. ALLEN: -- follow-up telephone calls.
MR. HINNEFELD: -- PNNL can obtain medical records from '95, which many sites can. I would suspect Battelle can. While they may not normally routinely provide them -- each site provides different stuff in response to our routine requests, based upon how they keep it.
MR. GRIFFON: But as a special request --
MR. HINNEFELD: As a special request, they might be able to pull it out and send it to us.
DR. BEHLING: And it was so recent. I know that most employers today would keep very good records on injuries, and they don't have to be serious injuries, but if it required first aid treatment on location it's likely that they do have records that would say no, there is nothing here on our file. Which would certainly, again, put some distance between the claimant's statement and the --
DR. ROESSLER: I'd like to see what the multiplier is six years after.
MR. HINNEFELD: Where can I find that, Dave? Do you know?
MR. ALLEN: Without asking Russ, we can --

MR. GRIFFON: Yeah, Russ.
MR. ALLEN: -- input --
MR. HINNEFELD: We could stick it in IREP and just see what kind of POC you get for rem.
DR. ROESSLER: Yeah.
MR. ALLEN: Yeah.
DR. BEHLING: Vary the time frame, you know, do it at 10-year, 15-year, 6-year --
MR. HINNEFELD: Give him a rem or a rem a year.
DR. BEHLING: Let's see what it was, the POC was --
MR. HINNEFELD: Three years before or six years before.
DR. BEHLING: -- to see how rapidly it falls off.
MR. ALLEN: We know '94 is --
DR. BEHLING: '94, '95 time frame.
MR. ALLEN: 2001 we've got cancer, so -- we can get his age and stick it all in IREP and see what kind of a dose --
DR. ROESSLER: They'd have to -- have to bring it up there.
MR. HINNEFELD: We could do something like that.
DR. BEHLING: And if it shows that you essentially go -- let's say you put in 20 rads to the skin, 15 years or 20 years ahead and then at

6 years it drops off to nothing, then it's an academic question --

MR. GRIFFON: Right. Doesn't matter.

DR. BEHLING: -- to even follow through.

MR. ALLEN: And this guy is not even sure what the exact location was.

DR. BEHLING: Yes.

MR. ALLEN: He doesn't even know if it was even a contaminated area.

DR. BEHLING: You know, there are many unanswered questions. Did the injury even occur? If it did occur, was it an injury that was -- that involved a radiological issue? You know, we don't know any of the answers here, but just the coincidence of the cheek and the -- and the injury sort of raises questions that be resolved.

MS. BEHLING: Is that it?

DR. BEHLING: Yeah, I think that's it for this case.

MS. BEHLING: Okay. I'm going to take the last one, and -- and this is the last one, tab 37, because there were no findings on tab 38. That was a Bethlehem Steel case, and it was a compensable case and so there were no findings there.

DR. BEHLING: For Bethlehem Steel.

MS. BEHLING: For Bethlehem Steel on case 38. So we're going to -- tab 37 is the last one. And that's Paducah, and it's case number 010753. And in this particular case the employee worked from 1951 through 1953 and was diagnosed with prostate cancer in 1968. He was an instrument specialist and the dose -- NIOSH derived a dose of 18.8 rem, and it resulted in a probability of causation of 17 percent.

MR. GRIFFON: Can you tell me -- as you give the background for this, can you tell me when they started processing in Paducah? I thought it was mid-'53, which would mean he was there prior to any rad contamination.

MS. BEHLING: It was, because in fact when we -- Okay. When we go on to my first line, then we'll --

MR. GRIFFON: I'm sorry.

MS. BEHLING: Yeah, that's okay. We'll discuss it because this particular case -- this is interesting because on page 9 they calculated an unmonitored dose for the years '52 and '53, and I put a note in here that no dose was assigned for 1951 because Paducah was not yet operational.

Okay. But they did calculate for '52 and '53. And the process that they went about -- and this was something we were talking about earlier, how do we go about calculating these unmonitored doses for the various facilities. And in this case, again, they went into the Paducah Technical Basis Document and there was data showing that there were 223 workers monitored with an average exposure of 140 rem associated with those workers, and a maximum exposure --

DR. BEHLING: 140 millirem.

MS. BEHLING: I'm sorry, 140 millirem. I'm sorry.

DR. BEHLING: I smell (unintelligible) here.

MS. BEHLING: Getting tired, huh? -- with a maximum exposure of 820 millirem. What NIOSH did to assess this or to calculate this unmonitored dose for these two years was to use that maximum exposure of 820 millilrem, and then they used maximizing parameters as specified in TIB-10. And those maximizing parameters were they multiplied that dose by a factor of 2, they assumed that the photon energy was 100 percent 30 to 250 keV, that it was an acute exposure, and they used an organ dose -- a DCF factor of 1.244

which corresponds to the bladder as a surrogate organ for the prostate.

DR. BEHLING: And that's for the ranking to -- to organ dose conversion.

MS. BEHLING: Yes. The -- the only issue that we wanted to point out here is the fact that they did use maximizing parameters associated with TIB-10. And I know this sounds like it's nitpicking, but it's a technical issue that TIB-10 is for --

DR. BEHLING: Post --

MS. BEHLING: Yeah, it's post-1970 data. TIB-10 is written for the late film badge era of 1970 and after. And we're just recommending that this -- this -- this is more of a technical flaw that maybe NIOSH can either delete this restriction or provide separate guidance for pre-1970 film badge data.

DR. BEHLING: Yeah, if -- if you look at the procedures as use this only for late era film badge dosimetry --

MR. HINNEFELD: Yeah.

DR. BEHLING: -- and -- and this, of course, occurred in the '50s and so --

MR. HINNEFELD: Of course it --

DR. BEHLING: It's not a --
MS. BEHLING: It's not unreasonable --
MR. HINNEFELD: It's also for application to a measured dose and this guy didn't have any measured doses.
DR. BEHLING: Yes.
MS. BEHLING: Exactly. And it's not that they're unreasonable assumptions, it's --
DR. BEHLING: No, they're not. It's just that, again, it's a technical limitation that the procedure specifies and says don't use this unless it's for post-'70 dosimetry data involving film. And of course, this is obviously well before 1970, so it's just a technical issue.
MS. BEHLING: Okay. The second finding is on page 10 and this finding is associated with the occupational medical dose. And this -- this was just an interpretation by us. The finding is inappropriate assignment of occupational medical dose uncertainty, and the reason we felt that way is because when you go into the Technical Basis Document for Paducah they talk about the organ dose equivalents for the lumbar spine examination that are described as, quote, rough first approximations for lumbar spine dose

reconstruction in the absence of other information. So we assumed that, based on that information, the values that were provided should be used as a best estimate as opposed to an upper bound estimate and that they should have been entered -- they should have been entered --

DR. BEHLING: With the 30 percent.

MS. BEHLING: Right, as a -- as a -- with an uncertainty.

DR. BEHLING: And standard is the 30 percent.

MS. BEHLING: Thirty percent uncertainty, which they weren't in this particular case, no. Right. Yeah, entry number 60 of Appendix A shows a lumbar spine dose of 2.9 rem, and it should have been entered with an estimate of uncertainty.

DR. BEHLING: Again, when you look at that and compare it to the other lumbar spine, which was somewhere around 270 millirem or thereabouts, you realize this is a factor of 10 higher. So this is a very high dose.

MS. BEHLING: Yes.

MR. HINNEFELD: Yeah. I don't know where this 2.9 came from. I think it has to do with the number of years.

MS. BEHLING: Okay. And you may be touching on

the next issue, which is finding three. It just so happens that we were looking at both the Iowa Technical Basis Document and this Paducah Technical Basis Document. And when you look at the issue of the doses assigned for the lumbar spine based on the guidance provided in those two Technical Basis Documents, the doses are very different. The Technical Basis Document for Iowa recommends a dose of 330 millirem for the lumbar spine associated with colon -- the colon/rectum and it -- for the Paducah, obviously it was -- it was the 2.9 rem and we couldn't -- couldn't --

DR. BEHLING: Couldn't reconcile.

MS. BEHLING: Yeah, reconcile why there was such a difference.

DR. ROESSLER: Does it have anything to do with the date when they would have given it, the technology that's involved?

DR. BEHLING: No, they were about the same time frame.

DR. ROESSLER: About the same time.

MR. ALLEN: Which would have been probably in the '50s, as well, I think.

MR. HINNEFELD: Our reviewer says there was a difference in the number of years. Iowa's

(unintelligible) --

DR. BEHLING: Yes. I think one was two and the other one was five.

MR. HINNEFELD: -- Paducah's five, that doesn't account for the total difference, so -- unless you -- I don't know. I'll have to do some more research on, you know, where these things come from. But 2.19 seems pretty high for --

DR. BEHLING: Yeah, it does.

MR. HINNEFELD: -- a lumbar spine exam, colon dose for the lumbar spine. Even -- even with five years that sounds kind of high.

DR. ROESSLER: This says the blood changes at that -- I'm just kidding.

MS. BEHLING: Okay. And then the final finding on this case is on page 11 and it has to do, again, with the internal dose. And once again, the -- NIOSH selected the colon as -- in calculating their hypothetical internal dose, which resulted in 11.6 rem where -- whereas they could have used the prostate as the organ of interest for calculating the hypothetical internal, which would have reduced that dose to I believe about 10 rem. And again, the issue of they selected the 28 radionuclides for Paducah,

which I thought the 12 radionuclides would have been more appropriate because this facility does not have a reactor.

MR. HINNEFELD: Yeah, the 12 certainly should have been used. What's the -- what worksheet -- what's the worksheet use as the target when it comes out for prostate?

MR. ALLEN: Highest non-metabolic, a lot of times it's --

MR. HINNEFELD: Heart wall or something?

MR. ALLEN: Heart wall would be typical.

MR. HINNEFELD: Because with colon, you get some GI tract contribution. Is that why colon is usually higher? If you're really talking non-metabolic and from the circulating bloods-- you wouldn't use colon because colon is going to overestimate the dose just circulating in the bloodstream.

MR. ALLEN: And in reality, heart wall is not the greatest because it's a hollow organ. It's got the blood going through it, but it's -- it's only slightly higher than the rest.

MR. HINNEFELD: Than the rest. Okay.

MS. BEHLING: I believe that's it.

DR. ROESSLER: I have a question about the

medical X-rays, and I probably just haven't been listening. But the -- when -- when someone has a chest X-ray, then the -- there is a dose assumed to the prostate and the bladder and the knees or whatever. I mean it's a pretty -- does that change over time as the --

DR. BEHLING: Yes, yes. Collimation and the --

MR. HINNEFELD: Technology.

DR. BEHLING: -- filtration, and other factors.

DR. ROESSLER: Everything, yeah.

DR. BEHLING: What starts out as a very small dose, ends up as an insignificant dose as a function of time.

DR. ROESSLER: Okay.

DR. BEHLING: So for certain cancers such as colon and rectal and prostate and testicular, because they're basically out of the field and with proper collimation and filtration --

DR. ROESSLER: At about what year does that -- or is it a kind of a gradual?

DR. BEHLING: Over in --

MR. HINNEFELD: Different sites have different times. There was a significant change at Rocky Flats in 1970. I happen to know that because that was one of the cases I looked at, that it --

and for -- this is probably a bladder. It kind of disappears after 1970. It was like 25 millirem in 1970 and then like 1 after that. So any kind of change -- different sites did change at different times, apparently. I've got those tables from the Rocky Flats TBD here I can show you what happened there -- over time there.

MS. BEHLING: Okay.

MR. HINNEFELD: Is that it?

MS. BEHLING: That's it.

MR. HINNEFELD: Eighteen in one day. We're getting better at this.

MS. BEHLING: We are. Seventeen.

MR. HINNEFELD: Oh, I'm sorry. Seventeen.

MR. GRIFFON: I guess I have one follow-up question going back to --

DR. BEHLING: Sixteen.

MS. BEHLING: Sixteen.

MR. HINNEFELD: We're still getting better.

MR. GRIFFON: -- that Hanford case 1157, case number 30.

DR. ROESSLER: We don't know for sure yet, because Mark speaks.

MR. GRIFFON: No, this is the last little point. I just wanted to see if -- since we said we'd

look at some of these issues on this case, anyway. I had a note on this -- on the dosimetry records, too, of -- like in 1972, Hans mentioned these codes, code 58 or 59 I think he said was whole-body. In 1972, as an example, I saw that they noted that code 59, not defined for this year. And it says it in the -- on the sheet itself, not defined for this year. But there -- it shows 11 times in that year and they -- and they sum up those doses for that year. So I was unclear if the code is not defined for that year, but then they're going ahead and summing up the doses, what -- what does that tell me.

MS. BEHLING: What are they assigning that dose to.

MR. GRIFFON: Yeah. So -- and '72 as an example I have, I saw that in some of the records, though, where they -- it said code -- it would say code so-and-so, and then the next column over would be a comment saying this code is not defined for this year.

DR. BEHLING: Yeah. They change codes though, every year.

MR. GRIFFON: And then they went ahead -- it looked like to me they went ahead and used it.

Now I -- you know, it is a -- I'm looking at some of the other calculations over time change for the dosimetry, so I'm not that familiar with it, but I'm just laying it out there as a question. If these codes weren't defined --

MR. HINNEFELD: This is case --

MR. GRIFFON: -- wouldn't that have -- wouldn't that have flagged it when you were going through this data.

MR. HINNEFELD: Case 1157, is that the case?

MR. GRIFFON: Yeah, 1157. Number 30.

MR. HINNEFELD: Yeah.

MR. GRIFFON: And that's something we --

MR. ALLEN: I've got the 1972 here. I can tell you what doses they used.

MR. GRIFFON: Yeah. Do you see the column I'm talking about? Oh, you've got the --

MR. HINNEFELD: He's got the -- he's got the worksheet.

MR. GRIFFON: Spreadsheet, yeah.

DR. BEHLING: You know, they --

MR. GRIFFON: I'm talking about the DOE record, maybe we can all get -- take a look at that tonight if you have a chance.

MR. HINNEFELD: Yeah, I can pull it out.

MR. ALLEN: Let me go grab that.
MR. HINNEFELD: Yeah, why don't you go grab it. Print -- print a bunch of them, 1157.
MR. GRIFFON: I don't know if he wants to print a bunch of them. The DOE records themselves --
MR. HINNEFELD: Well, he can print the page. Yeah, sometimes we get hundreds of pages of responses.
MR. GRIFFON: That was it. I just -- that's it.
MR. HINNEFELD: It strikes me that there was a -- ORAU team has provided some training to various people, dose reconstructors, on the records from certain sites. And I think they probably provided something on Hanford where they -- you know, they have gone back to say these are -- this is what the records looked like from Hanford, and they change over time. And they -- and these are the columns, and these are what the various codes mean and things like that. Now to the extent that, you know, some of the site profiles might explain those things relatively well and some might not, so there seems to be knowledge available that's not necessarily captured in the site profile about what -- how to interpret those records. So I don't know exactly

where those training materials are or things like that.

MS. BEHLING: Yeah.

MR. GRIFFON: I guess -- I guess, what, you know, what I keep falling back to is, you know, it's pretty easy to follow what -- what you do with the data, albeit we haven't walked through the worksheets that well. I've tried on my own sometimes and I've stumbled a -- you know, there's some -- there's a learning curve there, but it's pretty easy to follow those categorizations. But -- but one thing I think we have to reflect back on constantly is we're starting with a -- we're starting with the assumption that all these numbers are correct. And based on -- I mean -- and I think from my standpoint I just want to know how they arrived at some of these numbers in these nicely-formed columns of years of deep dose exposures. I mean if -- if -- I think -- and I'm sure someone on your team has gone through all this, but I think we need to be able to look at that and make sure we -- and Hans probably knows better than I. But I'm just trying to get a level of -- level of comfort with that.

DR. BEHLING: For instance --

MR. GRIFFON: Did they handle these and, you know, --

DR. BEHLING: Well, once you started with the five element multi-purpose dosimeters and they developed an algorithm -- now, an algorithm is really site-specific or the -- the radiologic condition-specific because what applies to one location in terms of an algorithm will not apply to another. I mean that is very, very, very specific to a condition. And I mentioned to you I believe when we were at Three Mile Island we had different algorithms defined for defining the radiation doses for Unit -- the damaged Unit 2 reactor versus 1. And because of the high beta component that was there due to contamination and -- and external contamination that was not confined to tanks and pipes and so forth. So an algorithm is not a single algorithm, but one that you've got to define for a radiological environment. And of course when you go from one site to -- or a DOE site where in one location you may have a photon dose that is dominated by a very low energy photon like americium 241, you can't use that algorithm and compare that to a

production reactor, you know, that's clear. So --

MR. GRIFFON: Well, that's what I'm saying. We spend a lot of time assessing what went on with a number after --

DR. BEHLING: Yeah.

MR. GRIFFON: -- it was taken as --

DR. BEHLING: Is the number correct though?

MR. GRIFFON: What were the dose conversion factors, or were they, you know, organ dose conversions. But all that, what went into making that number is what I want to look at or closer understand that. I'm sure you guys have done that, but --

DR. BEHLING: I mean it was simple during the times when you had a film dosimeter, you had an open window and you had a shielded, and you realized that a -- a film only responds to low energy based on the high z material of silver halide, silver bromide. But when you get to the multi-element TLDs in later years, those algorithms had to be defined for a radiation field to know --

MR. ALLEN: I grabbed the whole dose record here.

DR. BEHLING: -- what it is, and it is not the

same for a very wide range of photon fields.

MR. GRIFFON: You got the whole DR record. I forgot to bring that case 'cause I had reviewed that one. That's the one I've got on a disk at home.

MR. ALLEN: The -- I've got all the DOE records that we had.

MR. GRIFFON: Yeah, that's the file I want.

MR. ALLEN: I printed off some of the summary stuff. Is this --

MR. HINNEFELD: Does the sheet you're looking at look like any of these?

MR. GRIFFON: No, no.

MR. HINNEFELD: Okay. I guess --

MR. GRIFFON: The page is --

DR. BEHLING: Those are the summary sheets for (unintelligible).

MS. BEHLING: I believe he's looking for these, okay?

MR. HINNEFELD: Oh, okay.

MS. BEHLING: Mark?

MR. GRIFFON: Yeah, yeah. Yes.

DR. BEHLING: Because here they give you --

MR. GRIFFON: For different years they look a little different.

DR. BEHLING: This is obviously is 1974 when the multi-purpose dosimeter was used and you have your five elements and then you have your --

MS. BEHLING: What year?

MR. GRIFFON: I know page 41 in that document, if you're -- has this 1968 issue that I was talking about, and then not too far after that is 1972 stuff, so --

DR. BEHLING: Page 41.

MR. GRIFFON: -- 41 should start it.

MR. ALLEN: That's 1968. Looks like those go in a different file, probably.

MR. GRIFFON: Right. Go -- maybe go down like on the next page -- yeah, here. That's it. That's it. Those are some of the ones I was wondering about when you had -- you have negative values. When you add up every -- they cancel each other out, so I know there's something going on.

MR. ALLEN: Well, we had a hard code of 3, I suspect that's -- it looks like they're -- it's the same date for four readings in a row.

DR. BEHLING: Well, some will be finger rings.

MR. ALLEN: This guy did have extremity --

MR. GRIFFON: Right.

MR. ALLEN: Let's see, 1968.

MR. GRIFFON: I don't -- I don't know that we even need this transcribed if you want to close out and we can look at this. I mean I --

MR. HINNEFELD: Okay. Then we'll wrap up the --

MR. GRIFFON: Do we need it, Jim? I don't think. Yeah, we're just --

MR. HINNEFELD: -- the transcribed portion of the meeting then, and then we'll go ahead and have an off-line discussion on --

MR. GRIFFON: Yeah, that's fine.

MR. HINNEFELD: -- this record's interpretation thing, if that's okay with you guys.

(Whereupon, the recorded portion of the discussion concluded a

C E R T I F I C A T E OF COURT REPORTER

STATE OF GEORGIA

COUNTY OF FULTON

I, Steven Ray Green, Certified Merit Court Reporter, do hereby certify that I reported the above and foregoing on the day of May 31, 2005; and it is a true and accurate transcript of the testimony captioned herein.

I further certify that I am neither kin nor counsel to any of the parties herein, nor have any interest in the cause named herein.

WITNESS my hand and official seal this the 20th day of July, 2005.

_____

STEVEN RAY GREEN, CCR

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