UNITED STATES OF AMERICA
DEPARTMENT OF HEALTH AND HUMAN SERVICES
CENTERS FOR DISEASE CONTROL AND PREVENTION

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NATIONAL INSTITUTE FOR OCCUPATIONAL
SAFETY AND HEALTH
ADVISORY BOARD ON RADIATION AND WORKER HEALTH

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WORK GROUP ON THE IDAHO NATIONAL LABORATORY

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WEDNESDAY, JUNE 10, 2009

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The meeting came to order at 9:30 a.m. in the Zurich Room of the Cincinnati Airport Marriott Hotel, Hebron, Kentucky, Phillip Schofield, Chairman, presiding.

PRESENT:

PHILLIP SCHOFIELD, Chairman
JOSIE BEACH, Member
JAMES M. MELIUS, Member
WANDA I. MUNN, Member

THEODORE M. KATZ, Acting Designated Federal Official

IDENTIFIED PARTICIPANTS:

NANCY ADAMS, NIOSH Contractor*
HANS BEHLING, SC&A*
GRADY CALHOUN, NIOSH
PETER DARNELL, NIOSH
BRIAN GLECKLER, Dade Moeller & Associates
EMILY HOWELL, HHS*
JODI JENKINS, Dade Moeller & Associates
JOHN MAURO, SC&A
STEVE OSTROW, SC&A
MICHAEL RAFKY, HHS*
JOE ZLOTNICKI, SC&A*

*Participating via telephone

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

9:33 a.m.

MR. KATZ: Good morning. This is the Advisory Board on Radiation and Worker Health. It's the INL Working Group, and we are just convening at this point, and we will start as is usual with roll call, and if people would address conflict of interest at the same time, and we'll begin in the room with the Board Members with the Chair.

CHAIRMAN SCHOFIELD: Phillip Schofield, Chair, working group.

MR. KATZ: And conflict?

CHAIRMAN SCHOFIELD: No conflict.

MEMBER BEACH: Josie Beach, Board Member, no conflict.

MEMBER MELIUS: Jim Melius, Board Member, no conflict.

MEMBER MUNN: Wanda Munn, Board Member, no conflicts.

MR. KATZ: Okay, and for the record, Gen Roessler, I believe, cannot make it. Gen,

you're not on the telephone, are you? Are any other Board Members on the phone? Okay, and then going around the room, NIOSH ORAU team?

MR. DARNELL: Pete Darnell, health physicist, NIOSH, no conflict or bias.

MR. CALHOUN: Grady Calhoun, team leader at OCAS, no conflict at this site.

MS. JENKINS: Jodi Meyer Jenkins, Dade Moeller & Associates, no conflict by INL or ANL.

MR. GLECKLER: Brian Gleckler, Dade Moeller & Associates, supporting NIOSH, no conflict or bias.

MR. KATZ: How about on the telephone? NIOSH ORAU team? Okay. You're not expecting any folks, NIOSH ORAU? Okay. Okay, and then SC&A in the room?

DR. MAURO: John Mauro, SC&A, no conflict.

MR. OSTROW: Steve Ostrow, SC&A, no conflict.

MR. KATZ: And SC&A on the

telephone?

DR. BEHLING: Hans Behling, no conflict.

MR. KATZ: Welcome, Hans.

MR. ZLOTNICKI: Joe Zlotnicki, no conflict.

MR. KATZ: Can you say your name again?

MR. ZLOTNICKI: Joe Zlotnicki.

MR. KATZ: Zlotnicki. Okay, thanks. Okay, and then we don't have any members of the public in the room. Are there any members of the public or staff of congressional offices on the line, on the phone? Okay, and then federal officials, NIOSH, HHS, DOE, DOL on the telephone?

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

MR. RAFKY: Michael Rafky, HHS, no conflict.

MS. ADAMS: Nancy Adams, NIOSH contractor, no conflict.

MR. KATZ: Welcome all. All right, then. I'm going to just remind everyone on the telephone to please mute your phones except when you're addressing the group here, and if you don't have a mute button, use *6, and then to come off of mute just hit *6 again. Thanks very much, and, Phil, it's all yours.

CHAIRMAN SCHOFIELD: Rather than follow the matrix as laid out, the first issue I really want to kind of address is what all went on and how it's laid out, because my feeling is on the technical basis document and that map, you really don't get a good feel of everything that went on there.

Correct me if I'm wrong, someone, but there was 52 reactors plus the SL-1 on the facility. They have different -- they have different facilities for fuel pin storage, processing of those fuel pins, so it has, you know, a very extensive history of working with about every known radioactive isotope there

is.

They've had numerous releases, accidents, but I found the technical basis document as far as the layout in how the facilities were -- what facility was where to be pretty much lacking. If anybody else has a different observation on that, please feel free to speak to it.

MR. CALHOUN: I wasn't there. I can't comment.

MR. MAURO: I'd like to add one thing. You know, each of the sites and their history almost like their own world, not unlike an individual facility having its own site profile, and, in fact, that's why I recommended the other day how about we include Argonne National Laboratory West, because that's one of the more important facilities with its 11 reactors on site, and there's a lot of overlap with regard to the kinds of things we're going to be talking about at INL, and you'll have direct applicability to

Argonne West.

So, in a way, I mean, you know, Argonne West is a good example of if you wanted to develop each location and operation, in theory you probably could. So, yes, this is one of the more complicated sites in terms of kinds of things that were going on historically.

So, yes, I agree, but I would also like to add that I think that the way in which the report is written tries to, as best it could, cover the landscape where there is a commonality on how they came at external dosimetry, internal dosimetry, and environmental. So you can talk in generalities, and I think that's good, but at some point we probably want to go vertical on individual facilities.

CHAIRMAN SCHOFIELD: Now, correct me if I'm wrong, but DOE was actually the ones who managed some of the dosimetry and the reading of some of the film badges for both

Argonne and INL?

DR. MAURO: I don't know. I don't know if anyone online knows who ran the programs.

MR. KATZ: I believe so, up until fairly recently, I think, is when that transition occurred. I'm not exactly sure on the dates, but when I was talking to the DOE folks that provided us the dosimetry records, they indicated that that was -- because they have a lot of the records for the early years, actually going up to at least the -- probably early 1990s for INL West, as well, but it's sometime around that time frame that there is a transition where it changed over to where ANL-West is independent.

MR. DARNELL: INL actually houses the entire Department of Energy's dosimetry. That's where the DOE regulations for the entire complex are promulgated, where they're developed, where they do research for the systems. That's why they have most of the

dosimetry run through DOE.

CHAIRMAN SCHOFIELD: Also, in 2005 I think it was, basically they combined Argonne National Labs and West, INL and -- I'd have to look it up. I don't remember the name -- into one facility I believe is what's stated in the technical basis document, so they are no longer considered separate entities but as one. That was in 2005 in the document.

MR. GLECKLER: I remember seeing something on that. They changed their name, as well.

CHAIRMAN SCHOFIELD: Yes, they changed the name. They combined them all into one facility, so this is -- where we're going with this discussion is Pete and John Mauro and I were on the phone on another matter with Senator Nelson's office, and we were discussing this, and there is so much of the facility. People interacted with one another.

Releases and stuff, you know, they don't care about a barbed wire fence or

anything else. You know, they obviously would affect everybody onsite or potentially affect others, and there was a lot of just interactions between the different contractors, and this is the reason why we discussed the possibility of combining the Argonne National Labs West and INL into one basic package.

It would also save time, save money. This is kind of another aim we were coming from. Peter, John, either one of you got anything to add to that?

DR. MAURO: I just, when I was preparing for this meeting, I read both our reviews of both INL, and I noticed that what we have here is the INL site profile in our review is more overarching, and then when you go into Argonne West, you can actually see how the Argonne West information is a subset of it and plugs in nicely, but it goes to a higher level of granularity, and it's a good example of, you know, what you would realize if you

decided to dive vertically into a facility.

I think perhaps the best one where you would want to go vertical would be Argonne West, given the 11 reactors and the different kinds of activity besides reactors, the other activities that took place.

So I think it's a good marriage, because we get a good picture of the overarching site profile and some of the issues and then how some of the issues might actually require a more in-depth evaluation when you start to dive into Argonne West.

MR. DARNELL: Argonne in Idaho technical base documents at one time were one document.

MR. GLECKLER: Yes, originally it came out of INL and then got split, but we're kind of looking at combining them again, as well, because there's just so much of an overlap.

DR. MAURO: There's a lot of overlap.

MR. GLECKLER: A lot to where it's like the -- when they created the Argonne West one, they didn't take the Argonne West stuff out of the INL TBD, and they've been updated and revised at different periods. So there's some stuff that's out of synch, and the way to just keep it all synchronized and that is just to recombine them and just take what's in the Argonne, the additional information in the Argonne West one, and combine it or add it into the INL TBD.

MR. DARNELL: You just have to realize that if we do combine them, you're already worried about the complexity of the TBD and the picture that it paints of the site. It'll actually get worse, because we're going to add more to this.

I think John's suggestion about looking at it basically as a stovepipe, you know, TRN, TRA, ANL-West just specifically by themselves is a lot better way than trying to understand the entire site's complexity across

the board.

CHAIRMAN SCHOFIELD: Particularly when we get into like the environmental dose and some of that, I don't see how we can separate the two facilities at all. I mean, that's just my personal opinion, you know.

DR. MAURO: Yes, that's the one place where the environmental program as implemented is, I would say, overarching, that is actually designed where the way in which it's laid out captures the whole site and the impacts of individual sites.

So I do think that's one place where we can talk in generalities about how the design of the environmental surveillance program, which includes the modeling for effluents and the places where their TLDs are, where their samplings are, can be looked at in a macro scale.

Then eventually, of course, we do want to dive in and say, "How good a job does it do to allow you to reconstruct doses to

workers that might have been up close and personal?" to one of the specific facilities. That's going to be a subject, I guess, very much a subject of our environmental section. So there's -- I think it's -- I think it's very workable to marry it to --

DR. BEHLING: John?

DR. MAURO: Yes?

DR. BEHLING: John, this is Hans Behling. Let me just add to that in support of what just was stated by John and that is the fact that the commonality exists because of one thing. The whole environmental assessment of exposure was based on the Idaho National Engineering Laboratory Historical Dose Evaluation Report, and so that served as the basis for both the INL as well as the ANL-W exposure for environmental as a technical source, so there is commonality here, and it's the identical report that was used for both facilities.

DR. MAURO: And then the subsequent

RAC report. John Till wrote a report on the offsite impacts, associated airborne effluents, where he basically stood on the shoulders of the Header report. This is the DOE work that they did site-wise.

In the beginning, the interest with all of that environmental work was more what were the emissions from the entire complex and what the potential impacts were on the public outside the fence line of the whole facility, so from that perspective it was treated as a single large complicated site and looking at the source terms, airborne, and that information becomes the starting point for the environmental part of INL and ANL-West.

CHAIRMAN SCHOFIELD: The other thing that I couldn't find an answer to -- this is something else -- is a lot of the crafts, I mean, I don't know if they actually had boundaries of which buildings they were allowed to work in. Even though they were employed by one facility, did they go in other

facilities?

I mean, like, you know, some of the crafts from INL who were under contract then, did they actually do some of the work for Argonne National Labs, West Lab? I didn't find an answer to that.

MR. GLECKLER: Typically -- I'm trying to remember if there is much interaction with Argonne-West. I don't think there is much, but a lot of the crafts were stationed at the central facilities area, and they went out.

Especially like maintenance workers, you see on their -- they've got dosimeters for every facility on site quite often. It's like they'll have multiple dosimeters for the same periods for all the different areas that they might have worked at, and we have to account for those zeroes in a special way per the TBD instructions, and some of them will go over to NRF at times, as well, but those historically haven't been

counted. I guess that might be changing.

MR. DARNELL: Which is another good reason for looking at it as a stovepipe. If you have Worker A who came out of almost like a union shop, he'd work at one facility one day. The next day, he could be someplace completely different.

Dosimetry was separate for each one, so they didn't wear dosimetry when they were in the central place. They wore that particular facility's dosimetry each different time.

CHAIRMAN SCHOFIELD: The same would be for the security people, whatever particular contract was in place at that time. I didn't find anything that would tell me they would limit it to one area, but rather they would be -- and probably the same thing with the fire department. They would be all over the facility, even though they're employed by one contractor.

DR. MAURO: As an overarching

effect, I would like to pose this question also to Joe Zlotnicki, and Joe emphasized the external aspects of the overall program, and Hans emphasized the internal, and when I read through it, the sense I got was that there was a single overarching program where everyone was issued film badges, and so, therefore, no matter where they went, you know -- now, of course, the setting to which they were exposed is going to be a little different. Some may have neutrons. Some may not, et cetera, but there was sort of like an overarching program where everyone had issued a film badge.

Also, everyone was on some type of bioassay program, but it sounded as if, and correct me if I'm wrong, that it was basically they pulled a urine sample periodically and did gross beta/gamma.

And the question is how do you convert the gross beta/gamma reading that you're getting off the urine sample and convert that into a meaningful dose intake for

the particular activity, because it would be different at different sites with the mix of radionuclides, and I have to say that --

Well, one of -- we'll get into this, of course, so I think that's what I mean. You can talk about it in generalities. Okay, how well would a universal film badge program and universal urine sampling program serve you if you're trying to get now a little more granular and say, "Well, wait a minute. How do things change from site to site, and do you take that into consideration in doing a dose reconstruction for a real worker that may have spent some time here and then some time here?" and I think that we're going to get into that a little bit.

DR. BEHLING: John, this is Hans. I hope we do get into that, because that, I believe, is the single most important concern that I have. As Phil already mentioned, we have a very, very complex site. We have mixed fission products. We have mixed activation

products. We have transuranics.

We have all these different areas, the ICPP that released huge quantities of halogens of noble gases, et cetera, et cetera, and yet when we talk about the ability to assess doses, when we go back to the historical dose evaluation report, the methodology there was based on public exposures, and there the criteria was the use of selecting of the many, many radionuclides.

In some instances they had as many as 56 radionuclides that they were considering as contributing to offsite doses, but to expedite the issue, in many instances they selected for periodic or episodic or operational releases either at nine radionuclides or seven radionuclides, and those radionuclides were selected on the basis of their total contribution to the committed effective dose equivalent for 60 years.

And I went through this for my ANL review, and when you look at those

radionuclides, you realize how they may affect the potential for estimating organ doses as defined under the OICA, and you realize. I gave one example where the radionuclides, yes, they do contribute to committed effective dose equipment, but the selection would handicap many, many dose reconstruction for select tissues.

In one case, I gave an example of the use of those radionuclides for, let's say, a gone surface cancer or even a leukemia and/or liver dose, and when you look at the mix of 50-some-odd radionuclides and the selection from that that is defined by CEDE for offsite dose assessment, you realize the grievous potential error you're going to make when you try to do dose reconstruction based on the radionuclide mixes as proposed currently by the INL site profile.

I have to say I'm looking at many of the different facilities where they say even the seven or eight radionuclides such as

in Table 5-18 are too many, and so will even further reduce that, and that to me is the single biggest problem here.

We have such a heterogenous facility, and the radionuclide mixtures are so variable between one facility and the next, and to assume that one radionuclide mix that has been identified in table, either the default table in 5-26 or 5-18 or even some subsets of that, that they will suffice for specific organ dose reconstruction as defined for the 22 compensable cancers, to me it's impossible. We cannot do this.

MR. DARNELL: Are you applying those radionuclides site-wide or to the individual facilities? Table 5-18 is for INTEC.

DR. BEHLING: Yes, I know, but as you go to all the other sites, you will find that they will even reference, say, "Oh, that 5-18 is also applicable here," or even a subset of that, and the truth is, when you realize what the variability is among the

different cancers and how they're affected by different radionuclide mixtures, the assumption of one-size-fits-all or nearly all is one that's going to create a tremendous amount of uncertainty in establishing specific organ doses.

And, as I said, when we get into this, I will give you an example, as I already pointed out in my review of the ANL-W facility, where I selected radionuclides that were identified as 95 percent contributing to EDE values, and realized that the exclusion of many of the others, for instance, the radioactive lanthanum, would be a critical radionuclide for liver cancer, and if you look at the table that I supplied, it is basically the only one that contributes significant, but it's not included among the seven or nine radionuclides for episodic or operational releases.

DR. MAURO: This is going to be an important issue, because I think that what we

have here is -- there was an attempt made, and this is especially applicable to the work done by the Risk Assessment Corporation, John Till.

His mandate, his mission, was to reconstruct offsite doses, and the metric that was used is the committed effective whole body dose. So he really is concerned about what is the sort of overall burden on the collective public, and the metric, and appropriately so, would be the committed effective dose equivalent.

Now, in order to make it a manageable problem, rather than work with an enormous number of radionuclides, it's convenient and appropriate for his purposes, John Till's purposes, to narrow it down to some more manageable number of radionuclides, I think nine or whatever the number was.

Now, one of -- now, this is -- one of the general overarching observations that we made, as well, taking -- now, if you work with that set of nine, that may be fine for

doing offsite collective burden on the public, but now we're trying to apply that same source term, which has been culled down, to the reconstructing the doses to individual organs where --

And I think Hans has made an example that may turn out that some particular radionuclides which you have screened out because it really doesn't contribute very much to the effective whole body dose may very well be an important contributor to the dose to the liver, and that's what's of interest here if the person has liver cancer.

So there might be some problem is introduced by that simplification process, and I think we need to discuss that. It may turn out it's not a big problem. It may turn out it's a manageable problem where it could be fixed. I'm not sure, but I think that this is one of the overarching observations that -- universal across the whole complex.

MR. DARNELL: It sounds like an

appropriate comment to make, but the one thing that you need to give us for us to be able to even start looking at this type of comment is the calculations and the other examples so that we can look at it.

I was just looking through the TBD. I mean, there are a lot of nuclides for ANL-West that are listed. The same thing goes -- is true for INL at the different many facilities that they had.

DR. MAURO: Well, I think that's why I say it's very useful to have the ANL-West as part of this, because we go vertical there, and it's at ANL-West where Hans' report -- Hans authored, I think, the vast majority of the ANL-West piece -- gives specific examples of, "Here are the radionuclides that have been screened out."

But perhaps when it comes to a person with liver cancer, you should not have screened this radionuclide out, because it could be an important contributor to the liver

dose, certainly maybe not an important contributor to the committed effective whole body dose, but you may miss that, and that could be --

Now, that doesn't mean it's not a manageable problem, you know. There may be a way that you can go back and say, "Wait a minute. We better go back and look at that," but I think, you know --

MR. DARNELL: We're trying to entertain it, but we need the calculations to these.

DR. MAURO: They're in here. They're in the ANL-West site profile report for that particular --

MR. DARNELL: Where?

DR. MAURO: Hans, can you -- I remember I read it Friday, Hans. I'm not --

MR. DARNELL: It's not in the matrix or in the --

DR. MAURO: Not in the -- it's not in the -- oh, no, the -- see, one of the -- I

mean, the matrix helps us try to keep track and keep accounting, but you've got to -- I've got the two -- I mean, there are two big reports. Unfortunately, you've got to go through it.

MEMBER MELIUS: Before we get into specific issues, is NIOSH or its contractors doing any work, more work in terms of updating the site profiles or other technical documents?

MR. DARNELL: Since the initial technical basis documents came out, there's been two revisions. I don't know -- I don't know if you have any idea?

MR. GLECKLER: ANL, I think, is the one that needs to be updated, because the INL ones got updated on some things that should affect the ANL-West TBD, but the internal TBD is one that I started working on revising, but it's kind of put on hold for some other stuff, so I'll get back to doing that.

MR. CALHOUN: So the answer is yes,

we're in the process of it but not actively.

MR. GLECKLER: We recognize a few areas where we need to do some updates and everything, but --

MR. KATZ: Only for ANL. INL is up-to-date? Is that what you're saying?

MR. GLECKLER: INL internal needs to be updated. There are some changes for the x-rays.

MR. DARNELL: Is there ongoing --

MEMBER MELIUS: Well, what specifically? I mean, it makes some difference in terms of how this review gets organized.

MR. OSTROW: On the -- I didn't look at the ANL part, but I worked on the INL one, and this is where we were a little bit behind the curve for a while, because originally TBDs came out in 2004. We did our review in 2005, and we did a Rev 1 in early 2006.

The NIOSH issued the revised TBDs in 2007, and some of these are Rev 1. Some

are Rev 2. Some are Rev 3. It depends on which TBD it is, and in December of 2008 we did a quick look. That's when you started your work group again.

So we did a quick look at the revised TBDs. That's when we came out with our sort of supplemental report, but we -- and that's with the matrix we produced. We added a couple of issues and changed a few things, but we never did a really deep look at the latest set of INL TBDs.

But from what I just heard about the ANL-West that Hans did, we encountered the same issue like with the internal doses with the idea of using the Till report, and for offsite dose it was fine to exclude five percent of the radio -- five percent of the dose and reduce the set of radionuclides from the large number down to seven to nine, which was manageable.

We didn't do the calculations that Hans did, but we also noted that this is an

issue, too, for specific cancers and specific radionuclides that you might have thrown out, so it's sort of a common issue for both things, which makes sense. It's the same physical facility. You know, you're calling it, you know, two different names.

DR. MAURO: To add to this, it was my understanding that there is a periodic process where you update your site profiles. Like a two-year review you refer to it as. I would imagine it is what it is, right?

So what happened here is that there was an original 2004/2005 site profile. Then when the -- you recall when the Board authorized this work group, one of the things I suggested, "Listen, we are aware that the site profile had gone through one of its revisions in 2007," and the Board authorized us to do what I would call a mini-review.

I called it a refresher, because so much time had passed, and we did, and we issued a report December 30, 2008, which is

basically our attempt to sort of catch up and get up to date so that we could initiate this work group meeting in a way that is as close as possible to the latest thinking regarding INL.

Now, what I'm hearing, though, there may be even another -- in other words, the 2007 version is about to perhaps enter into a 2009. In other words, are you -- is there another revision coming out?

And the question -- because, in light of that, that there might be another revision being issued, the question is, you know, would it be -- is it beneficial for us to go through our findings that reflect our findings on the 2007 version of the TBD, and would that add value to the process you're about -- you are into or about to enter into your next revision?

And that's really where we are, or is there so many changes going on that it would be premature for -- it would be -- well,

maybe it's less than efficient, because, you know --

MR. CALHOUN: Brian is like --

DR. MAURO: What do you want to do?

MR. CALHOUN: Brian gets to tap dance on that one.

DR. MAURO: What do you want to do?

MR. DARNELL: Before Brian starts, just to let you know, the latest revision to the matrix that you sent me I compared with the 2006 version of the matrix, and there was no significant change.

DR. MAURO: In fact, the matrix shows where things have changed, and I don't know if you folks -- has any -- this is important. Does everyone have the -- we have a deliverable that's dated December 30, 2008. Does everybody --

Now, if you go to the back of it, you'll see an Attachment 1 and a matrix, and the matrix -- in that matrix, Steve -- thank you -- identifies where we have new issues

that have emerged from the updated.

MR. DARNELL: I think there's only one.

DR. MAURO: And there's maybe only one and which are basically -- and which ones are basically unchanged.

MR. ZLOTNICKI: John, this is Joe Zlotnicki. Can I jump in there for a second?

DR. MAURO: Sure. Please.

MR. ZLOTNICKI: I did that review, and I think what was remarkable to me is that not one of the original SC&A observations and findings was rendered moot by the subsequent update that was issued by NIOSH. Every single finding and observation stood, so although there had been a change in I think it was 2007, which probably occurred while the SC&A original site profile review was undergoing review and, you know, approval, so they may not have had access to it, but nonetheless the update --

DR. MAURO: I'm sorry, Joe --

MR. ZLOTNICKI: Not one of all those 30-odd findings and observations changed. So I'm only saying that because, you know, the reality is as of today, as I understand it, all of those findings and observations are still, you know, valid, and the subsequent changes to the site profile documents have so far not addressed any of them.

MEMBER BEACH: And then you added three, so, actually --

MR. ZLOTNICKI: Another few were added, yes, because, you know, I looked through it, and a fresh set of eyes normally would, you know, find a few things, which I did. I mean, none of them were too dramatic, but, yes, that is -- that did occur.

MR. GLECKLER: I thought when we went through that, didn't we identify a few original comments that were moot because of the changes to the TBD?

MR. DARNELL: Yes, we think there are a couple. When we start going through the

issues we'll point those out.

MR. ZLOTNICKI: Just one other thing, John. We were talking on a high level about the combination of INL and ANL-West and whether or not they should be combined in some way. Let me just make two quick points from an external dosimetry point of view.

The first one is that I did not review the ANL-West, and I don't have access to whatever stage the SC&A review is at, so I can't comment on that too much except to say that in the ANL-West site profile it clearly states that the dosimetry system was the same for both, so I would concur with the comments on internal does that it may make a lot of sense to combine them.

DR. MAURO: Yes, Hans performed the review of ANL-West, so, yes, we do have the marriage. I think we have all the people sitting at the table at SC&A that can speak to both ANL-West and the INL versions.

DR. BEHLING: Yes, with regard to --

this is Hans. With regard to the external radiation issues that I had critiqued for the ANL-West, I think I may have some additional comments that you may want to look at, and I am addressing this to Mr. Zlotnicki, so I may want to send you my version of it and see what additional things that I've identified that you may want to look at and either comment on or incorporate into your comments section.

MR. ZLOTNICKI: Okay. Thank you, Hans.

DR. MAURO: Jim, you asked a simple question and got quite an answer.

MEMBER MELIUS: Yes.

CHAIRMAN SCHOFIELD: I'd just kind of like a little input from the other Board Member, because if they're comfortable with this, this is what we're going to propose at the next Board meeting, that these two be combined, you know, on the basis of commonality and kill two birds with one stone, effectively.

MEMBER BEACH: I think it's a great idea.

MEMBER MELIUS: You're talking about the two reviews, not the two documents.

CHAIRMAN SCHOFIELD: Right. There's really -- the two reviews for all purposes are going to become one because of some of the, like I say, internal and external exposure data was managed according to the TBD by Department of Energy itself.

Then we have the environmental dose, which, you know, depending on where you are in the facility. The site, obviously, has application across the board. There may be some areas, like John says, we may have to --

We'll have to obviously break this down in smaller slices to look at these different areas for potentials for mis-dose or other problems that we have, but overall they seem to mesh to me real well, but that's my own personal opinion.

MR. DARNELL: Actually, in the

future, I don't know if this is scheduled or not, but if we combine the two documents again, I don't think that there would be a significant impact on any of the comments. They'd just be rolled together.

DR. MAURO: I think that is -- combining makes it a more efficient product, so there is no redundancy, because there is redundancy between the comments that are made because there is so much similarity. So, yes, so when you read both of these, oh, no, and, in effect, it's interesting. It sort of reenforces each other.

That is, the same comments that are made regarding ANL-West are also in the INL review, so I don't think we're going to lose anything by right now having these two separate documents, and in the process, we do have the people all here that are familiar with both documents, so we could have a seamless discussion even though the products themselves are separated.

MR. GLECKLER: From ORAU's standpoint, like the internal TBD revision that I was in the process of doing a few months back, it's like I had gotten approval to combine them, and so I was going to combine the two internal TBDs at that point, and then as we update the others we were going to invite you, because from a dose reconstructor's standpoint it was causing too much headache for us to go back and forth, because TBDs were getting updated at different times.

It's like where -- and the sites are so interrelated to where we have so many claims to where you've got INL and ANL-West employment both in different periods, and we're using the same tool, spreadsheet tool, to work those claims.

It's like -- and things were -- you know, there's subtle -- one of the best examples of a subtle difference between the two, they're virtually identical TBDs and that

except the environmental external. The early years where they didn't have any dosimetry data, they based it off of some of the later years.

It's like where the approach used for the INL TBD was slightly different than the approach used for the ANL-West TBD, and I think it was just how they averaged it or the period of time that they averaged over to get that assumed value.

It's just like an ever so slightly different value, but it really makes it a pain in the butt when you've got a TBD, the INL TBD that still has ANL-West numbers in it and an ANL-West TBD that has slightly different numbers for those years.

You've got to watch what reference you use when you work those claims that have both ANL-West and INL , so it just -- it does make things easier for us to combine them from a dose reconstructor's standpoint.

DR. MAURO: I would argue

notwithstanding whether the documents, both the TBDs or the SC&A, are combined or not, it's the issues that are at the heart of it, and I think the issues that we raise are essential, and perhaps this is the perfect time to discuss them, before you engage in putting an issue in a new --

I mean, we can make a lot of progress in going through the issues, and then you could make a judgment, and certainly the work group could make a judgment which of the issues really is something that may be something you may not be looking at right now, and it's an opportunity to air them out.

And if we could agree in principle that, "Yes, I think you made a good point here. I think we're going to adopt that when we come out with the next version," or, "No, we don't agree with this. We have the problem well in hand, and we've come to agreement" --

So I think that I'm either -- I guess I'm asking myself the question is it

worth getting together and discussing this, and I would say yes. I think the timing is right, especially if you have not yet issued your next version of the various TBDs.

MR. GLECKLER: There's a lot of work to be done yet.

DR. MAURO: Right, so I think the fact that these are going on in parallel is a benefit and not a detriment.

MR. DARNELL: I think it's a very good idea to go through the issues. Part of NIOSH's response that we do have ready for you is how some of the issues -- how you're conveying some of the issues. For example, you use in some of your comments the Tiger Team report --

DR. MAURO: Yes.

MR. DARNELL: -- and there are comments based off the Code of Federal Regulations that have no applicability to the site, and so we need more information on how you're viewing those types of comments --

DR. MAURO: I agree.

MR. DARNELL: -- as being applicable to NIOSH.

DR. MAURO: I completely agree with that, because when I read through it, there are certain Tiger Team commentaries that are offered by the Tiger Team as a compliance issue. That is, did you do all these good things? And you didn't do them.

And it's important to make a distinction between comments that are made for that purpose and the degree to which that comment has teeth as it applies to dose reconstruction, and sometimes it does, and sometimes it doesn't, and I think that's a very good point.

MR. OSTROW: Yes, some of the comments may be sort of administrative. Administratively they didn't comply with DOE regulations, but it may not have had an actual effect on the dosimetry.

MR. DARNELL: The Tiger Team report

-- well, for the first comment, the Tiger Team report refers to 40 CFR Part 50 and Part 58, which are EPA regulations for ambient air. It has no bearing whatsoever for how we are using the data that was collected, yet the comment is saying -- it is basically saying because the site didn't meet EPA regulations, we can't pick up the program, which is not correct.

DR. MAURO: But I'm going to -- in defense of our report, on the other hand, there were many Tiger Team commentaries that had to do with deficiencies in the health physics program, whether it's internal dosimetry, external dosimetry.

MR. DARNELL: Sure.

DR. MAURO: Now, you say to yourself, "Well, how is that relevant?" Well, when I read all this material, it became clear that a lot of trust was given to the soundness and completeness, reliability of the health physics program and that the bioacid program was implemented in a very, I guess,

conscientious way, the film badge program.

But we are finding that -- well, the Tiger Team found, well, no, there were some problems with those programs, and that does bear back on the completeness, reliability, and adequacy of the data. There were certain deficiencies in the program that will affect, so I would say it's both.

MR. DARNELL: In some cases, that's absolutely true, but I would say for the majority of the cases you need either more technical basis behind the comment or some definite examples so that we can move forward with trying to answer the comments, and I think that's going to be the biggest benefit to this meeting is to be able to hash through that type of comment.

I don't think we're going to get a lot of comments where we will either agree or disagree or have an answer. I think what we're going to have to do is come to a meshing of the minds to be able to move forward. I

think that's going to be the biggest benefit.

MEMBER MUNN: Phil, I'm sorry Dr. Melius isn't in the room, but in answer partially to your inquiry and to his, we haven't heard anything up to now that would cause anyone to believe there is not a good reason to combine these two.

They occupy the same geography. Individuals who work there have the same shared potential for exposure, whether it's actual exposure or not.

It's clear that for the individual dose reconstructor where these individual worked would have a difference in their approach, but for purposes of what we're speaking of doing here, there does not appear to be any reason why we should not recommend to the Board that these be combined.

Now, in terms of how we approach it, it would seem logical that because both of these separate entities have already been reviewed and some matrix of issues has been

set forth, it would appear to be logical to take a look at those matrices so that we can see whether there is unreasonable duplication in them or whether solutions of any of these items that are before us have already essentially been resolved or at least make it easy, much easier for NIOSH to complete their next review of the documentation that's there. As long as the issues have been agreed to from the matrix, then there is a much better basis for NIOSH to proceed with this new document.

CHAIRMAN SCHOFIELD: Have you got anything to say, address that to, Ted?

MR. KATZ: Excuse me?

CHAIRMAN SCHOFIELD: I'm going to put you on the hot seat here. Do you have any comment?

MR. KATZ: No, I think it makes perfect sense to me for the working group to get charged with addressing these together. I have absolutely no uncertainty about that at

all. That makes perfect sense to me.

Also, on the question of when to dip in this moving stream, I'm going to have you dip in when you're ready, which is now, so the fact that NIOSH has some work still underway to make changes, NIOSH may always have some stuff underway to make changes, but it seems perfectly right that the Board get engaged on these now. We've waited a long time for the Board to be engaged on these sites.

MR. DARNELL: Just to point out, again, these are living documents. There is always going to be work on them.

MR. KATZ: Right.

MEMBER MELIUS: I just don't want us to spend two hours discussing something and the end of it you say, "Oh, well, we've changed that, anyway," and so that's -- and, frankly, that's happened before, and that was the reason for the question.

We understand that there's always

changes going on, but we don't want to waste time arguing and reviewing something that's sort of a moot point because you've already come up with a new approach.

MR. DARNELL: On our initial vetting, we looked for that. Right now I think we're actually beating a dead horse by forcefully agreeing that we're going to combine them, so, you know, I agree with you wholeheartedly. I don't want to have a two-hour discussion on something that's --

CHAIRMAN SCHOFIELD: I'd kind of like to see a roadmap. I mean, I hate to use that term, but you've done this for other facilities and sites, just so we have a better feel of what went on where and what are the players in that particular area.

I'll be honest with you. I haven't been all through the Argonne National Labs West TBD documents yet. This idea kind of just got germane to us this last week, so personally don't feel I have a good grasp on

what all went on where, what the potential hazards were. If that is something possible -- maybe you already have something like that, a little better breakdown.

DR. MAURO: The beginning of the site -- one of our feelings about the strengths of your site profile was you did a nice overview of all the different activities, so they're all there, I mean, not all, but there's a lot there. I think you probably could do a lot with more. There's always more.

This thing goes off the -- it's a complicated site, but I have to say I felt that by reading their site description, it set the stage for me to get an appreciation of the complexity, the different nuclides, the external issues, the airborne emission issues and how different they were, the different -- the TAN facility, the Aircraft Nuclear Propulsion, the different reactors, EBR-1, EBR-2. There was all --

MR. DARNELL: Even the storage cans.

DR. MAURO: Yes, you're right, so, I mean, it's tedious, but I did read it, so I said, "Okay, I think I've got a feel," and that's all I can say I got out of it of the incredible complexity. I don't think there's any place more complex than this.

MEMBER BEACH: John, that was the site description for Idaho or for the lab?

DR. MAURO: Idaho. Right.

MEMBER BEACH: Okay. I just didn't -- okay.

DR. MAURO: The overall one, yes.

MEMBER BEACH: I just downloaded that.

DR. MAURO: And I believe -- I'm not sure. Somehow I believe that one of our sections even repeats excerpts from beginning--

MEMBER BEACH: It does.

DR. MAURO: I'm trying to see where it is. It's someplace in here.

MR. GLECKLER: ANL-West TBD is almost identical to the INL. There's just a little bit of added background information, and there's a few differences regarding x-rays and those environmental TLDs.

MR. DARNELL: The site description is much smaller for ANL, which makes sense.

MR. GLECKLER: Other than that, they're almost word-for-word.

MR. OSTROW: You know what's -- the history -- I just sort of remembered now when we did our site profile review of INL, one of the documents we read sort of a background, it's not a reference list.

There's an actual book that was published that was actually quite good that gives like the whole history of the lab from it's early days before it became a nuclear lab. It's well written, and it's a great place if someone wants to get into it, just an overview of everything that went on.

MR. KATZ: What's the name of the

book?

MR. OSTROW: Do you remember?

MR. DARNELL: Jodi has it.

MS. JENKINS: Yes, *Proving the Principle* by --

MEMBER MUNN: It's referenced above the document.

DR. MAURO: We referenced it, yes.

MS. JENKINS: The author is Stacy, I believe.

MEMBER MUNN: Yes, it's referenced both in the text and in the references.

CHAIRMAN SCHOFIELD: Would that really be more of a change just to combine those two in there, the site profile issues?

MR. CALHOUN: We're not talking about -- oh, the issue. I think we're talking about you guys combining the issues. We're not talking about committing to combining the site profiles. Now, we may do that if it becomes more efficient for us, but we're not going to say we're going to do that now. We

may be doing some of it.

MR. GLECKLER: Depending on if we get back to the revision on the TBD.

MR. CALHOUN: But we don't want to run back and say we're going to combine them, though. We've got five million other things to do.

MR. DARNELL: Things like the site description probably wouldn't be combined, because it makes more sense to keep them separate. The introduction to the site probably would be separate, because we need to take the time to put them together.

DR. MAURO: I would offer that if we go through the issues on the overall INL document, what will happen is we'll come to some resolution and pass forward on those issues, and then when we then -- if we then after that say, "Okay, now let's take a look at the Argonne West," we're going to find, well, Issue 1, Issue 2, well, we've already discussed that, but then there's going to be

one or two issues in the ANL-West that are very specific to ANL-West and give you greater granularity, and then we'll hit those.

So I think that in terms of the process, it makes -- I was thinking about this when I was reading it. I said, you know, it'll work. It'll work.

MEMBER MUNN: It'll work.

MR. OSTROW: This is Steve. I was looking at our site profile review while everyone else was talking, and the book I was referring to before was Stacy, *Proving the Principle: A History of the Idaho National Engineering and Environmental Laboratory, 1949-1999*. It's year 2000, and it's a DOE book, and it's sort of a popular book. It's not really deeply scientific but is a great overall reference work.

MEMBER MUNN: And an easy read.

MR. DARNELL: Is it?

MEMBER MUNN: It really is. I'm not a really technical person.

MR. GLECKLER: It's got pictures from various facilities and stuff. It's kind of neat to see.

MR. DARNELL: All it's missing is pop-ups for guys like me.

MEMBER MUNN: No commercials.

CHAIRMAN SCHOFIELD: Okay. Well, I think in principle we've all pretty much agreed we'll go forward with that, and we'll make a formal proposal at the Board meeting, but otherwise I don't expect there will be any problem with that. Do you see a problem, Jim?

MEMBER MELIUS: No. No.

CHAIRMAN SCHOFIELD: Okay.

MEMBER MELIUS: And I would just add I don't see any need to combine the two documents or do anything. Maybe for other reasons keep them separate and so forth.

DR. MAURO: In fact, one of the things that could come out of this meeting is you may want to go vertical on some other locations. The Aircraft Nuclear Propulsion

program, we have a real problem with that section, by the way.

We'll get into that, and we think that the RAC missed the boat when they did their source terms, and that's -- I mean, there may be other facilities and activities that took place where we think going vertical might be very helpful.

CHAIRMAN SCHOFIELD: Just a quick observation before we get into the matrix that SC&A released, and that's the propulsion program there. I think that gets into the environmental dose where I just don't see how you can state not putting these two together and looking at them as one unit.

MR. OSTROW: Especially since the environmental dose is basically derived from the offsite dose, which is basically for the whole facility.

DR. MAURO: The 30-second sound bite is the computer program, the MESODIF type, not only the source terms, which were selected for

concern over doses that could have occurred 20 miles away and not 100 meters away plus the atmosphere and dispersion models that were used, and this is --

This is boiled down to with the environmental dose, if you want the 30-second sound bite, is that you don't have the right mix of radionuclides, and you used the wrong atmospheric dispersion model. You didn't, the HEDA report and then following that the RAC report, and to take that and then apply it to dose reconstruction onsite.

Now, I'll preface that. Those doses probably are not all that large compared to the internal and external doses from occupational exposure. Nevertheless, they're there, and you say, "What is our simple concern?"

You don't use this kind of atmospheric transport code and this mix of radionuclides if you're concerned about a guy who is 100 feet downwind from the source term.

You use it when the guy is 20 miles away but not when he's right next to it, and that's what, when you say, you know, from the environmental part, there it is. We could get into some fine structure.

MEMBER MUNN: I've been looking forward to the discussion about meso as opposed to macro and micro.

MEMBER MELIUS: We'll only use robust statistics.

MR. OSTROW: John and I were discussing this two days ago, and we just made the observation we both worked a long time ago in the World Trade Center. A high floor, 91st floor, whatever, 89, and you could see there were such local wind and weather effects for the local environment where it would be clear outside and clear all around New Jersey. It would be raining around the World Trade Center, and the raindrops would actually be going up the side of the building just because of the wind pattern.

So when we're dealing with environmental, and say on the site here you have these high stacks all over the place. All the buildings had fairly high stacks, which had structures around them.

Someone standing on the ground in one particular spot, depending on how the wind patterns are going, vortex effects that you have from the stacks, vortex shedding and things like that, you really can't look at offsite or site boundary environmental exposures and use that to predict the local environment exposures. A lot of local effects have to be taken into account.

CHAIRMAN SCHOFIELD: Well, should we go ahead and go on to the matrix here, starting with the difference between the thick and thalamines? That would be issue 25-3.1, on the matrix you issued, John.

MR. OSTROW: Where are we starting?

CHAIRMAN SCHOFIELD: The discrepancies between the thick and

thalamines. I assume that's going to apply to both Argonne and -- it's issue 25-3.1, page 11.

MEMBER MUNN: So we're going to start with Argonne-West?

DR. MAURO: I would suggest we start with INL.

CHAIRMAN SCHOFIELD: This is INL.

DR. MAURO: That is INL. Okay. Let's start with Issue 25 rather than issue 1.

CHAIRMAN SCHOFIELD: Well, you guys laid it out this way, so I thought, well, there must be a logical reason for it.

DR. MAURO: No, this is what happened when we laid it out. I've got it now. We reproduced in the back Attachment 1, the entire bunch of issues, you know, like starting with Issue 1 and going up to Issue -- what have we got now, 38 of them?

What we did -- where we -- we added the -- we took this out of the original site profile review we did in 2006, and we added

two columns. The second to the last column indicates whether this is the original comments are unchanged from the original review, whether we changed the comment or we added a new one.

So, for example, Issue Number 1, which was airborne release, is unchanged from the original, but we never really discussed it. You know, after we issued our original report, that was it. There was no more discussion ever on this stuff.

Where I think -- where we added new issues or changed some of the issues, that's where we had the text up front that you were just referring to.

MEMBER MUNN: So a question. If I'm on page 18 of your December document, that's the matrix that I was looking at.

MR. OSTROW: That's the matrix.

MEMBER MUNN: Are we working from some other matrix?

DR. MAURO: That was my

understanding.

MR. OSTROW: That's is their matrix, but I think --

MR. DARNELL: How do you think is best to go?

MR. OSTROW: I think just start with Issue Number 1 and work our way through.

CHAIRMAN SCHOFIELD: I just thought maybe there was some special logic to the way it was started out that way --

MR. OSTROW: Well, there was some logic.

CHAIRMAN SCHOFIELD: -- to go into the next thing or something.

MR. OSTROW: There's some logic. The up-front text that we had just elaborated on the comments that were changed from our original site profile review, so we should probably just start off on Issue 1.

CHAIRMAN SCHOFIELD: I just thought it may start on health physics or something, which, you know, I'm not real strong on.

Maybe that was --

MR. OSTROW: Nothing like that.

CHAIRMAN SCHOFIELD: -- a logical thing, that you saw that as a logical way to progress, so I thought, okay, well, I'll go with you guys.

MR. OSTROW: Nothing that complicated.

MEMBER MELIUS: That was John Mauro's lottery ticket.

CHAIRMAN SCHOFIELD: Too late. That little rancher got it.

MR. OSTROW: Okay. I guess we'll have to point out that also in this matrix, for example, we have an Issue 1, and then we have in parenthesis after that 5.1.1.1. The 5.1.1.1 refers to the section in our site profile review that we did in 2006 where it's elaborated.

These issues in the matrix, like all the matrices for all the different sites, are basically sound bites. These are just a

little reference which sort of jogs your memory about it so you can talk about it, but the full discussion is actually in the site profile review. It can go on for pages for some of these things.

I'll just, as a way to start out here, just say first three issues, 1, 2, and 3, all on the first page, have to do with environmental, and they're sort of interrelated.

I think a good way to approach this is to sort of do it by types of exposure, so we should discuss issues 1, 2, and 3 sort of together. Then, after that, we get into the internal, which a lot of them can be discussed together, and then the external is a separate group.

So, going -- okay, that's a long-winded explanation here. Issues -- so the environmental issues, 1, 2, and 3, the short story is on here, but the long story is what we were just talking about, what John,

basically, and I were talking about, that the used offsite exposure data in the RAC report in the monitoring basically to try to extrapolate to get the onsite doses to workers from the environmental, and we think that's basically a flawed process, and that's what these three capture.

So the Issue 1 is stated a little bit generally here, that the data NIOSH used does not take into account the deficiencies in environmental monitoring equipment in the locations, and NIOSH doesn't assess the uncertainties associated with the meteorological dispersion model used for the INL site. So that's what John was talking about, this meso model.

DR. MAURO: You know, would you mind if I go up to the blackboard?

MEMBER MUNN: Please. You need to draw this.

DR. MAURO: Hans, certainly jump in, because you have a higher, a more detailed

understanding, but, I mean, when I went over this originally, originally wrote it, and I helped out a bit with the environmental piece, and then we reviewed it again, it becomes -- but I'm just going to say, okay, you know --

DR. BEHLING: Shaped like a potato.

DR. MAURO: Shaped like a potato. I don't know. I don't know, Hans, but what I'm getting at is this. Okay, you've got -- the idea, you've got all these little locations, okay, and they've got fences around them, I guess. I'm giving you the model I have in my head, okay, and what happens is this. Every one of these locations, a lot of them, okay, have information on what was released to the atmosphere.

So you have chronic episodic releases, okay, so every one of these locations by year, year one, year two, year three, year four, has an estimate of a list of radionuclides in curies per year, and there may be 52 of these radionuclides that are at

play, different mixes from different locations, different times, and what happened was there was a big movement about ten years go to reconstruct offsite doses around the weapons complex, and DOE reconstructed all --

And the way you do that is you figure out what were the radionuclides released and curies per year, complete list. Then you apply some -- say, okay, given that those radionuclides were released into the atmosphere, then you apply some atmospheric transport code, so you could figure out what the doses were at Atomic City.

There were all these population centers around, and you want to figure out what kind of health burden you may have put these people to, and on that basis, if the doses, the collective burden, was theoretically large, they would follow up with epidemiological studies.

That was the whole idea behind the whole offsite dose reconstruction, which went

on for years, and DOE first started to do it, and then it was transferred over because of potential conflict issues to -- and a lot of the work was done by private contractors. The number one private contractor in the country to do this work was John Till and Risk Assessment Corporation. Great.

So you have this vast amount of material, a tremendous volume upon volume of work where you've got for each facility the curies per year by radionuclide, and then they applied what I consider to be a great model. It's called a meso.

Think of it like this. You're interested in the big picture. You know, we're talking I don't know how many miles across this. It's 50 miles, whatever it is, and so you're thinking in terms of transport of these puffs coming out, plumes, and they're moving in a wind field on a meso-scale. That's what we did.

It's, you know, a fairly large

scale. Medium. There are bigger scales, and it's the right selection for the kinds of distances you're interested in.

And so what John Till did and what the -- they said, "Listen, we've got to make this thing simpler." I've got this movie in my head, and my criticism comes from that, and it's great if you're doing offsite doses.

Now, where did things go wrong? Where does this thing break down, because they -- basically what happened, my understanding is we took that good work and said, "Now we're going to apply it to calculate the doses to people in the area," okay, when, in fact, this thing you just did was for people over here.

And what happened is they used the same atmospheric dispersion models, and they took the 52, and they said, "That's too many radionuclides. We don't need all that."

So what Till did is said, "We're going to screen out all the radionuclides that really don't contribute very much to the dose

and get rid of that, because if we capture 95 percent of the dose by straining down to, say, nine radionuclides, we didn't lose anything. We're dropping five percent of the collective whole body dose." Remember, the metric is the whole body dose, and that sort of made its way.

Now what we're doing is we're calculating the doses to these people of those radionuclides using a meso-scale atmospheric dispersion model, and that's for the purpose of both chronic and episodic releases.

So, right off the bat, our criticism comes down to -- and this is like a collective way of looking at it, because we do break it down, and there's a lot of more fine structure, which you can get by looking at the report, but we're saying they can't do that, because, first of all, as we mentioned earlier, if you're talking about --

You know, this is fine if you're doing the committed effective dose equivalent,

but what we're doing here is an organ dose. That's what we really want, and there are radionuclides that might have been screened out that are important contributors to particular organ doses, maybe not important to the committed effective dose, so that's concern number one.

Now, that doesn't mean you got wrong. You've got to demonstrate that you didn't miss anything, but Hans in his review of Argonne-West, where we got vertical, said, "Yes. I can show you several radionuclides that are not in your list that should have been there, because it would completely change your liver dose, and if a guy happens to have liver cancer, we missed it," okay, so that's like one of the findings, so right off the bat we're saying --

MR. CALHOUN: And is that -- that's in the details of the report?

DR. MAURO: That's in the -- that's in the Argonne-West report.

MR. CALHOUN: Okay.

MR. DARNELL: That's in the Argonne-West?

DR. MAURO: Yes. But, you see, it's also -- see, we went vertical, because we could. Now, we didn't go that vertical, but in theory that concept, that idea, applies everywhere, and I think the onus is on NIOSH to demonstrate it was okay to do this for all radionuclides, and we were able to demonstrate, no, it wasn't, at least not at Argonne-West. Now, maybe you were okay at the other locations, but certainly not at Argonne-West.

DR. BEHLING: John, let me just jump in.

DR. MAURO: Sure, please. Please.

DR. BEHLING: One of the key concerns for doing the offsite public exposures was really the concern from the release, massive releases of radio-iodines that were part of the ANP program in the ICPP,

and so heavy emphasis was obviously focused on the iodine exposures, and that obviously, therefore, required the inclusion of iodine-131 and the other short-lived iodines, which may or may not necessarily, obviously, impact those exposures where the concern for cancer does not involve the thyroid.

So it's clear that the objectives that were part of the historical dose evaluation report are very different from the ones that we are addressing here in trying to reconstruct specific organ doses involving cancerous tissues.

MEMBER MUNN: How are you going to have it both ways, though? On the one hand, we hear people say over and over again all these people have the same potential, because nobody stayed home. Everybody wandered all over the site or at least had the potential to wander all over the site all the time, and therefore they could have picked up anything anywhere.

Your concern, as I understand it, is, but, at discrete locations for specific individuals, the doses could be much higher or be inclusive of radionuclides that were sorted out of the Till report.

DR. MAURO: You just went to the next tier. The first tier, I guess, has to do with radionuclides. By using just a limited number of the 52 radionuclides, is it possible you could have missed some important doses to particular organs, notwithstanding where the person was?

Okay, so that's like the first level. There needs to be some level of assurance that the -- I'll call it a shortcut. In other words, to make things more efficient, we don't have to -- we don't want to have to process 52 radionuclides, but there is no guarantee that by eliminating a whole bunch of radionuclides from explicit consideration you may not have -- you may have eliminated some radionuclides that could have

been important contributors to certain organs at certain doses.

One example give, I believe, is the liver for I forget which isotope that was eliminated at Argonne-West that probably should not have been. We're not saying this is universal at every one of the facilities, but at least in that case we show that it was an important --

MEMBER MUNN: Well, of course, that's the only one for which we have a discrete report.

DR. MAURO: No, we know the 52 radionuclides.

MEMBER MUNN: Yes.

DR. MAURO: So we could go back to them and say, "Wait a minute. You know, what are the releases for each radionuclides, as opposed to just looking at the nine, and are any of those important?" And this is a tractable problem.

You know, you could say, "Okay, if

we were to redo some of these doses for particular organs with the full suite of radionuclides, all 52. Do you find a holy mackerel? Yes, this guy's liver dose could have been pretty high, and we would have missed it, because we screened out this radionuclides when we originally started the process."

So we just have to be assured that we did not miss any important radionuclides when all of a sudden your interest is not the whole body dose. Your interest is some particular dose to a particular organ, and that evokes the other question.

Now you tier down and say, "But, hold on. We're modeling over here." All of a sudden, you know, predicting what the concentrations are -- now, this is for Argonne. This is still environmental, by the way. We haven't gone into -- we're just talking, you know, you run an atmospheric dispersion model and you come up with --

What happens is this. It'll be fine. As far as I'm concerned, the MESODIF program is fine. You know their source. Let's say you finally get to the point where we're happy with the source term, the curies per year by radionuclide, and you know what they are from here, from here, from here, from here, and if you were interested in calculating the dose from those places to here, you're fine. You're far away, and that's the MESODIF scale, because these are miles. You know, very often these are miles way.

MEMBER MUNN: They are miles.

DR. MAURO: But I'm more worried about the releases from here, and you didn't do that. You didn't break them down. Here's the releases from this facility, from this facility, and the isotopes that were released from each facility and what were the concentrations and the exposures that workers who were working onsite next to this, whatever

that was.

I am concerned that that is never captured. Now, I'm not saying that's a big dose. Remember my preface. When you're talking environmental, you're always talking about small doses, so it may turn out this is a lot of concern about something that might not be that important, but, you know, our job is to point out places where we think there may be certain flaws in your approach.

How important it is needs to be demonstrated. I don't know how important it is. I suspect it's not that important, because we're talking about millirems per year, maybe hundreds of millirems per year. Well, when you get inside the building and we're doing occupational dose inside of building, we're talking about rems per year, so the scale changes.

So I'd be the first to admit, but, nevertheless, listen, you know, one of the chapters is environmental, and the first three

comments, in effect, that's the concern I have. You can't -- how are you going to do that guy's dose from this source term?

MR. CALHOUN: And certainly it would be much more of a concern with people who did not have bioassays --

DR. MAURO: Yes, and --

MR. CALHOUN: -- because if somebody's been full body counted or urinalysis, the dose that we end up assigning is -- we oftentimes will pick the highest dose or the one that will result in the highest POC, organ-specific.

DR. MAURO: And if you can demonstrate that, you're great, but, of course, remember, you're assuming there's only these radionuclides. Now, imagine if --

MR. CALHOUN: Yes, if they weren't monitored and we were assigning environmental.

DR. MAURO: Your answer may very well be, "No, we're okay, because everyone that worked onsite had monthly bioassay

samples, gross beta/gamma, and we know the mix of radionuclides that were released from that facility, and on that basis we could pro-rate the gross beta/gamma according to that mix and reconstruct their dosing. You're done.

DR. BEHLING: Can I jump in?

DR. MAURO: Yes, sure, Hans. Yes.

DR. BEHLING: First of all, looking at the numbers I'm not convinced that the bioassays, routine bioassays, were more than once a year or perhaps up to twice a year. Secondly, when you deal with gross beta, which in the early days was the principal or dominant method, you're really only dealing with a count that you can't really assign to a specific radionuclide.

So you're faced with the same problem. What do we assign this radionuclide mix to? And that will be highly variable depending on where that individual worked, which may or may not even be decipherable prior to 1989, because you may not have an

understanding of where that individual worked.

So the dilemma will be to take gross beta counts or gross gamma counts and assign a radionuclide mix that represents truly what that individual was exposed to. And I think you're back in the same situation, especially since in the early years, fifties, sixties, even up into the 1970s, before whole body counting became the more routine bioassay protocol, you're kind of up for grabs in terms of interpreting how that information will be assigned to specific radionuclides, especially when you have only one or two -- one or two bioassays in a given year where you're obviously not going to catch a lot of these radionuclides but a short list.

MR. DARNELL: Depending on the specific claim that is being looked at, I'm not actually sure that getting the specific radionuclides for that specific person based on a specific job location is actually something for the vast majority of the claims

that we need to do.

In just trying to be expedient about getting the dose reconstruction done, most of the time for most of the workers you throw a large number intake at them, see if it goes close to 50 percent. If it doesn't, you're done.

You're not going to be looking for specifics, and for the vast majority of the claims, that's the true case. You're not looking for the specifics that you're talking about.

When you get to a claim that's closer to 50 percent, where you have to become more accurate with the dose calculation, then we'd be looking for those specifics. Really, the things that you guys are talking about with trying to find whether methenam was done or a specific radionuclide is done, for the vast majority of the claims, it will never matter.

DR. MAURO: I would --

MEMBER MELIUS: So you're saying you just throw out those other claims then? What's your argument?

MR. DARNELL: No, no. You're not throwing them out, but for the vast majority of the claims you don't need to go to the level of detail that SC&A is talking about.

MEMBER MELIUS: So what's your point? I don't understand your point, because if you have to do it for some, it's a valid criticism.

MR. CALHOUN: If you have to use it, it is. I agree. However, one of the things that we do, and I have to get -- I haven't been into an ANL-West case for a while, but one of the things that we do, and I don't know if Brian knows, is that if we just have -- let's just say we have a gross urinalysis and it's 50 picocuries. I'm just throwing numbers out, okay?

We'll look at what -- and it's gross beta. We'll look at the cadre of

isotopes that are available to us, and based on the limit of detectinon of that isotope and the probability of causation and the dose, which can be kind of different depending on what nuclide it is, we assign the most claimant-favorable nuclide. So we don't eliminate any activity.

DR. MAURO: But that's not what's in your --

MR. CALHOUN: I don't know. I don't --

DR. MAURO: Your report doesn't say it. I mean, I hear what you're saying.

MR. CALHOUN: For whole body counts, we know cerium-144 is going to give you the highest lung dose of any of them, because it's a very low MDA on a whole body count, and so we will routinely assign that as the only radionuclide, because the dose is huge. So I don't know the details of how it works.

MR. GLECKLER: But the whole body counts the TBD has uses cesium as the default

unless like there is like a positive, you know, for a misdose calculation or there's a negative where there's -- all the results are below the MDA, but if there's a positive for a specific nuclide, we'll use that specific result in that nuclide that's been identified, but for the misdose calc we'll assume that all --

We'll use the MDA or half of the MDA for cesium, calculate a misdose for that, and then use or calculate intake rate for that and use that intake rate with some ratios to calculate the other nuclides, which do include cerium.

DR. MAURO: You're -- right now around the table we're inventing a solution, and I think you're fine. That's great, but right now that report doesn't say all this. I've got a couple of solutions that I was thinking about. I mean, I know I'm not supposed to --

MR. DARNELL: But what we're

describing is how the dose reconstruction process works.

DR. MAURO: But it's in the report.

MS. JENKINS: But the reports aren't necessarily meant to describe the minutia of how dose reconstructors do their work. They give technical information on the site. We have other documents and procedures and protocols that tell us how to do a dose reconstruction.

MEMBER MUNN: So the response to these comments, actually, is to codify that by having a written NIOSH response as to how these specific items are addressed when you address them and where they are addressed.

MR. CALHOUN: Right, and especially since there is an example that they've given, a real detailed example, to make it easier for us to give a response.

DR. MAURO: Two cautions. The sources of data that you didn't take advantage of in your report -- and Hans pointed this out

-- is you've got data characterizing the radionuclide isotopic mix in here I think as a result of Superfund kind of work.

You relied heavily on the atmospheric releases and dispersion modeling. You've got some real measurements in here that could help tell you what the mix of radionuclides is. Now, those would be the long-lived radionuclides.

MEMBER MUNN: John?

DR. MAURO: Yes.

MEMBER MUNN: Our transcriptionist says he can hear you well, but your soft voice is not carrying very well to the --

DR. MAURO: Oh, I'm sorry. I'm saying that -- I was thinking about two things that came to mind when you were describing your strategy for dealing with this. Two things came to mind. One, there are already nuclide concentrations in the soil that I think have been characterized, not unlike Nevada Test Site, where they have that kind of

information where now they're starting to use that.

MEMBER MUNN: Right.

DR. MAURO: There might be some value there. Also, I am concerned about a point that Hans made is that, if you are taking annual bioassay samples where you've got gross beta/gamma, and some of these emissions, the mixes, these radionuclides mixes, there are some very short-lived radionuclides that could be large quantities that you missed, and they're not there.

Now, that could have occurred as a result of the episodic release and then, okay, let's say a year later you go pull a urine sample. What happens to all of those short-lived radionuclides that may have gone away in the interim that could possibly -- I'm not saying that it is. Don't get me wrong, but I'm saying that there's -- you know, you've got to put these issues to bed.

Demonstrate that the approach

you're using, where are the vulnerabilities, where, if we did that, we could be wrong, and I think that one of the places is if you're basing it on a gross beta/gamma that's collected once a year, is it possible that there were some lists of radionuclides that that person could have been exposed to outdoors, now, still outdoors, that were missing?

Short-lived iodines. Iodine-132, I think, was screened out. Now, I think iodine-132 has a relatively short half-life. You're going to miss it in any kind of bioassay or a thyroid scan a year later.

MEMBER MUNN: But how significant is it going to be in this particular case?

DR. MAURO: I'm not saying you can't put this to bed. All I'm saying is if I -- seriously, if I was doing this, I always look for how can I be wrong. You know, what is it that could trick me here where I'm going to miss something important? And I think that

there are a lot of these little -- this is a tough one. There are a lot of places where if you're not careful you could fool yourself in thinking you've got it when you don't.

MR. GLECKLER: See, one of the things that we take credit for with doing the INL dose reconstruction is there is a strong indication that they used a lot of workplace indicators for their bioassay program. So if there was like a camel arm or someone got contaminated or something, it's like that's where you suddenly see bioassay procedures, and they'll usually check that it was a special bioassay.

So they're using other indicators, and the thing that we're relying heavily on is that the people most likely exposed or that receive the highest exposures were the most likely monitored, and so, thus, it's like any of the other people at the facility that were farther away or weren't directly involved with an occurrence, it's like, you know, they

typically didn't get bioassayed, especially when these bioassay results quite often come back negative, which --

MR. DARNELL: You have to remember that for a lot of those co-located workers within the facility, we use a coworker dose approach to where the same types of doses that the monitored workforce are getting are being used to determine the doses for a coworker that may not have the same --

MEMBER MUNN: Pete, your voice is as soft as his is, and when you turn your back to me, I can't hear what you're saying.

MR. DARNELL: I have a hearing problem, too, so I don't know how loud to talk.

MEMBER MUNN: No, no, I don't believe I have a hearing problem. I think it's acoustics.

DR. MAURO: I agree. I mean, there are ways of making this a tractable problem. It's not in your report. It's not --

MR. DARNELL: By report you're talking about the technical --

DR. MAURO: -- in your site profile. In other words, what you're doing is there is some very troublesome complexities about this site that, you know, need some, I guess, need some very careful consideration on how can I be fooled? You know, how can I miss it?

MR. DARNELL: Sure.

DR. MAURO: You're bringing up some good points. There are other ways you can get a hook that allows a dose reconstructor, you know, if he has the wherewithal, to sort of navigate his way across all these challenges, but none of that is explored or discussed.

MR. GLECKLER: Do you want me to give like a quick overview of how most INL dose reconstructions get worked?

CHAIRMAN SCHOFIELD: Please do.

MR. GLECKLER: That might help. For the external dose, it's usually pretty simple. It's like basically when they go inside the -

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MR. DARNELL: Why don't we just limit to the environmental until --

DR. MAURO: We're on environmental right now.

MR. GLECKLER: Okay.

DR. MAURO: In other words, we're trying to find, listen to a strategy, and Hans, you're more familiar with this than I am.

MR. GLECKLER: Well, when we're crossing into like bioassay and that, it's like it's kind of opening up the door to --

DR. MAURO: Your answer to my -- see, I didn't think you were using the bioassay for outdoor workers. I thought the indoor workers got it, but if the outdoor workers were bioassayed as well as, you know --

MR. DARNELL: We have bioassay records for both sets of workers, but not everybody on the outside has bioassay records,

so their would be a coworker sharing of that dose.

MR. OSTROW: I have a little bit of a philosophical problem with that in a couple of places. It's this matter of trust we talked about before. It's like, you know, the document is sort of saying and INL was saying that, if they didn't think that somebody was going to be routinely exposed, then they weren't monitored, but then you don't know if they -- but we don't really have a way of showing that they actually weren't exposed. You know, it's assuming ahead of time that they weren't exposing him.

MR. DARNELL: We can't prove a negative.

MR. OSTROW: Well, the Tiger TCS we've seen -- the Tiger Team said there's a problem here, and so what I'm getting at is --

MR. DARNELL: Yes, but the Tiger Team, especially for this particular issue with the environmental, was basing their

comments off of requirements and Code of Federal Regulation that had nothing to do with what we're using this data for, had nothing to do with actually what the site was collecting data for. They were looking at ambient air standards for different chemicals, different types of equipment, and that part of this comment has no technical basis.

DR. MAURO: I disagree. The Tiger Team said the stack monitor is -- I know you're familiar with what isokinetic sampling is. They're saying you weren't doing isokinetic sampling. Therefore, these curies per year numbers you can't trust. I mean, it's such a layered problem.

Now, you have to somehow demonstrate that, notwithstanding the limitations there were and the criticism of the isokinetic samples from the Tiger Team report, you're still going to be okay. Right now, I'm not convinced of that.

I mean, you know, the Tiger Team

says no, you didn't really -- how wrong could you be? Maybe not too wrong. In other words, the clean air standards, 40 CFR 196 --

MR. DARNELL: Fifty, fifty-eight.

DR. MAURO: Okay. Require very, very prescriptive requirements on how you pull your air samples, isokinetic sampling, the test, and you're right. The auditors on those rarely take out their magnifying glass. Did you do it or not? But the question becomes -- it's an issue that was raised by Tiger Team, and I would argue you have an obligation to say, notwithstanding that, we still think we could place a --

MR. DARNELL: Show us where in isokinetic sampling they weren't meeting the needs for what we're doing with the data, not --

DR. MAURO: You've got to show that.

MR. DARNELL: You're casting an aspersion saying we didn't do uncertainties on equipment, which could mean fence line

equipment. It could mean the local equipment. It could be the cans. You know, there's a lot to looking at 40 CFR Part 50 if you start looking at individual pieces of equipment, which is something that you can't do and we don't need to do for how we're using the data that was collected.

DR. MAURO: I would argue that when the Tiger Team comes in, they say, listen, we've got a problem with your isokinetic sampling. We think that you're not doing it the way you're supposed to it. Therefore -- and the reason they raise the question, it means that there is some question about how much trust we could put into your source terms, okay.

Now, my argument is this. Okay, I believe you that notwithstanding that criticism -- and they're very specific about what it is. There's some very, very fine structure here. You could argue that notwithstanding that, we still think we could

place a plausible upper bound on the curies per year, notwithstanding that certain -- that criticism, because --

MR. DARNELL: You have to remember we're balancing the stack emissions against what was actually measured out in the field with the field equipment.

DR. MAURO: Far away. Far away, and by the time it -- all the short-lived radionuclides have decayed away, deposited out, and what you see offsite at the site boundary and what's going on right over there, two different things.

MR. DARNELL: And, like I said, we cover right over there a different way.

DR. MAURO: No, you don't.

MR. GLECKLER: They didn't have any onsite environmental monitoring?

DR. MAURO: You didn't use it. The only monitoring that I saw was --

MR. GLECKLER: They say that correlated to monitoring results in the TBD,

but they don't really identify where those monitors were.

DR. MAURO: I'm sorry. I get --

MR. DARNELL: I think on this particular issue we both need to be a bit more specific.

DR. MAURO: Well, I mean, our report is very specific. I'm being general right now because there's so much stuff there, but the whole intent of all of this monitoring was to make sure there wasn't lots of curies leaving the site and exposing Atomic City, and there were a couple of other cities outside the site boundary, and that was the mission.

And then the whole RAC thing was what kind of burden, the collective burden that was placed on the general public outside the site boundary.

When you read that stuff, there was no intention ever to say, wait a minute. Let's try to figure out what kind of doses the workers might have gotten that were working in

here, and I think that that marriage has to be -- you have to build a bridge between the two. That bridge was not built.

DR. BEHLING: John, can I jump in here for a second?

MR. OSTROW: Go ahead, Hans.

DR. BEHLING: Yes, I think it's probably a good time to also mention something else. In the TBD offsite profile for INL, the reference is made to the historical dose evaluation report and, of course, the John Till RAC report.

What is blatantly missing is an investigation of source terms that was done by S. Cohen & Associates, and I happen to be the principal author of a dose assessment, or, actually, not dose assessment but source term reassessment for the ANP program.

And we were asked by the CDC to look into this, and this was part of a review that the CDC was doing both for the ANP program and the CPT program, and we provided a

very comprehensive reevaluation of the -- in my report, I provided a very comprehensive review of the ANP program.

That report was issued in July of 2003. It was presented to the Idaho National Engineering and Environmental Laboratory Health Effect Subcommittee at two locations in two times, one of which was at the -- this was in July. The other one was in August.

In that report, which I evaluated, three IETs, which were the dominant initial engine tests -- it was engine test 3, 4, and 10, and I presented that information, and there were people there including Mr. Wentzel. Let's see. The other one, Henry Peterson, who happens to be also the principal or site expert for the environmental TBD here for INL.

They were all part of that discussion, and they presented their side. I presented mine, and I think it was universally accepted that they had missed a lot of exposures and releases as a result of

underestimating releases for IET 3, 4, and 10, which were the dominant ones, and I'll just give you the summation of it.

For IET 3, our initial engine test Number 3, the total radionuclide releases that were estimated by the historical dose evaluation report were underestimated by a factor of three. For IET 4, the noble gases that were released were estimated by a factor of 16, and solids were up to a factor of two. For IET 10, the total radionuclide releases were underestimated by a factor of about seven.

So notwithstanding the issues that we're discussing here about radionuclides mixtures that travel offsite, a big concern is also one of were the source terms correct, and in my review of the ANP program, the three major IETs that I looked at were considerably underestimated. And I think it needs to be looked at, and, of course, the TBD is totally silent on that particular report that was

under contract to the CDC, and I think it would be nice to at least acknowledge what the content of that report is showing.

DR. MAURO: And Hans, I'd like to answer one thing. However, that very same investigation we found that the releases, episodic and chronic, from the chem plant, ICPP, were good. In other words, we came down saying that those were numbers you could hang your hat on, but the --

And, by the way, these two locations, these two were picked for investigation by CDC, the radiation studies branch -- I don't know if you know those folks -- because this was where the big releases occurred. In other words, from the point of view of the impact on the general public, if we got those wrong, we missed the boat on the doses to the general public, and so we were asked almost like a third tier.

First, DOE did it. Then RAC did it, and then we were brought in to say, wait a

minute. Let's take a closer look at these two, the ICPP emissions, in fact, over a particular time period, because that's when they were doing the Green -- no, it was the RaLa runs, the RaLa runs, and the Aircraft Nuclear Propulsion Program, where they were literally melting down the fuel.

MR. DARNELL: What's the point?

DR. MAURO: So those source terms are fine for ICPP, which is a positive outcome, which means we think that source term is probably pretty good, but the ones for the Aircraft Nuclear Propulsion Program, which are the second largest releases from the facility, are probably underestimated several-fold, and, by the way, Wentzel and Peterson sat in on those meetings, and after a lot of haggling they go, you may be right. So from the source term point of view, you know, I think that has to be looked at, because they were the big contributors.

MR. CALHOUN: Now, does your report

say that -- and, I'm sorry, I haven't read it, but does it say that they are underestimated, and here's the calculations that show why?

DR. MAURO: Yes. Yes.

MR. CALHOUN: Okay, because I don't want to really get into, they may be. Go look.

DR. MAURO: No, no. We're saying they are.

MR. CALHOUN: Okay. That's going to take too much time.

DR. MAURO: I think we concluded that, of course, standing behind that statement in the brief summary that's in the report that we gave out.

MR. CALHOUN: Okay, so we can look at the actual specifics and see if we --

DR. MAURO: The numbers.

MR. CALHOUN: That's perfect.

MR. OSTROW: Well, it's actually two places to look. For the INL review that we did, it's on page 56 of our review. It's

our Issue Number 2 that we have down here.

That's what we just referenced, Hans's report that he was just talking about, so the INL report just has a short reference to that. The original calculations that you're asking for are in the 2003 report that we did that's referenced.

MR. CALHOUN: Okay. I just want to make sure we have something specific to look at.

DR. BEHLING: Yes, and I think I would recommend that the people from NIOSH and their contractors may want to talk to, not only Henry Peterson and Doug Wentzel but also Richard Dixon. I assume he's still with INL.

MEMBER MUNN: So it appears from what we've heard that the actual calculations that are currently taking place may be done properly and accurately but that there is nothing in the TBD that would cause a close observer to feel any comfort that it was being done correctly.

The answers to some of the issues may simply be a discussion from NIOSH -- a description from NIOSH as to how these issues are addressed when you encounter them during dose reconstruction. In other cases, if --

I've just pulled up the references, and since Hans says there is no reference to the work that they had done earlier with respect to these emissions, it might be wise for NIOSH in its response to take that earlier work into consideration and include it in the reference material that they're producing for the next go-round.

CHAIRMAN SCHOFIELD: I've got a quick question on this very issue with the exposures. You have a laborer that, by all accounts, probably isn't badged. He's probably not under bioassay, because he's never expected to go inside any of these buildings, but he's over on the chem plant mowing weeds on a tractor one day.

Then, maybe a few days later, he's

farther out near the perimeter fence doing a similar thing. How are you going to address that issue of what he may or may not have been exposed to?

MR. GLECKLER: I can explain that. Like with the INL, which is a little bit different than a lot of facilities, these other operating facilities onsite, it's like they basically had a perimeter fence line for, I think, security reasons mostly, but they have typically a central badging area.

In order to get inside that fence line, you had to have your dosimeter badge, and that is like -- and that's why you'll see, like, people have multiple dosimeter badges, especially like maintenance workers that go from area to area, and each time they go into that area, they'll get their dosimeter badge upon entry.

So, basically, if they're unmonitored, they were not inside the radiological areas onsite, but anyone that was

in there, any sort of maintenance or like a yard worker, you know, mowing or even bus drivers, when some of the bus drivers went in, it was like they would have a dosimeter on that occasion.

CHAIRMAN SCHOFIELD: Was that true for the majority of the employees anywhere on the facility?

MR. GLECKLER: As I understand it, that's the case for the entire site. They're basically like islands that have control points where the radiological area was controlled at a central point to where they took -- their badges were centrally located. In order to get into that area, they had to have a dosimeter badge assigned to them if they didn't already have one.

MEMBER BEACH: That's just to go into the facilities, though.

MR. GLECKLER: That's to get in the fence line.

MEMBER BEACH: Well, I was over

there about two months ago, and the badges were on the inside of the guard shack, but I think he's talking about outside, working just directly out at the fence line, aren't you, Phil?

CHAIRMAN SCHOFIELD: Yes, I'm talking about like, you know, you gave the illustration here. This guy's mowing, say, here, and then maybe a few days later he's mowing down along here, along this outer fence line, and the fact that realistically they're not going to expect this person to get, say, more than 100 millirem external exposure a year, so they don't badge him. He probably is, since he's not badged, probably isn't on the bioassay program or whole body count.

MEMBER BEACH: Well, he's got a badge to get into the gate --

CHAIRMAN SCHOFIELD: He's got a badge to get into this gate.

MEMBER BEACH: -- and work around all the facilities.

MR. GLECKLER: Like to give a specific example for a specific facility, you've got the ICPP, and it's like it'll have a fence line around it for those facilities, and there's a number of buildings other than just the ICPP associated with that facility to where, in order for them to get inside the radiologically controlled area, which is including those ancillary buildings and everything, they have to go through a central checkpoint, from what I understand, and get a badge.

I've never actually been out there to see that first-hand, but that's my understanding, and so, upon entering that fence line or to get into those other buildings and like to mow the grass around them, it's like they would have a dosimeter badge assigned to them, but if they were mowing the grass outside that facility boundary, no, they would not have a dosimeter assigned to them.

CHAIRMAN SCHOFIELD: Okay. That's what I'm getting at is they're not actually going in there. Maybe they're the ones who basically, you know, mows along major roads in the facility or along the perimeter fences, keeps things down on the site or even these different locations within the site, and, like I said, I mean, realistically they probably aren't going to get, you know, more than probably 150 millirem external exposure.

MR. GLECKLER: That's where the perimeter dosimeter data would be claimant-favorable for those individuals that were outside those fences, because that's the closest point that they could get to the facility without having their own dosimeters.

MEMBER MUNN: And those people would almost by definition be included in the mesoscale exposures, which are pretty well thinned out.

DR. MAURO: I'm not concerned about outside that fence line, the big fence line.

I'm concerned inside and how they -- by the way, this is not unlike NTS. Nevada Test Site has a very similar problem.

It's broken up into area, Areas 12, 13, 14, 15, and there is some question about -- and there are people that work out in the flats, which is the opened areas, as opposed to people that went into controlled areas where they had a fence inside the fence, and there was access controls and egress controls.

The question became, and this was only resolved recently -- the solution is we're going to find the worst location onsite where people could have been working. We don't know who was there, when they were there, and how long they were there, but the worst thing you could assume is that these people worked 2,000 hours per year over here, and they assigned that dose.

Now, it turns out it's not that big of a dose, so they have the luxury to do that,

and since they don't know any better, we don't know whether there was a person, who was there and when they were there and how long they were there without making some heroic efforts, and even then there's some uncertainty.

So they're taking the approach that we're just going to assign the highest plausible dose that a person might have experienced working in the flats, where, you know, they were not under the direct health physics control as they would be when they entered the restricted areas, okay, the fence inside the fence.

So that strategy is what was found acceptable during the NTS work group. Whether you want to have something similar to that here, you know, certainly.

CHAIRMAN SCHOFIELD: I think that's actually what we're --

MR. GLECKLER: There is a bit of a difference between those two sites to where like NTS, to get on to the main body of the

site, you know, which would be equivalent to the main body of the INL site, it's like they had to go through mercury, and I think that's where their central badging or the majority of their central badging was. They had to have a badge issued to them just to get on the site, period.

It's like -- but, because of that, it's like they don't have any detailed information typically where those individuals went. Every once in a while, we would get more detailed information for that site, but it's really hard to figure out exactly -- pinpoint where those workers were, whereas the way they handle it at INL, you have these islands out there with fences around them, and it's like -- and central badging points for those specific islands to where they've got dosimeter codes where almost 100 percent of the dosimeters we can tell exactly where that worker -- what facility that worker was at during that time frame.

CHAIRMAN SCHOFIELD: What about the internal, I mean, because, you know, here we've got a problem with --

MR. GLECKLER: Internal is a little different.

CHAIRMAN SCHOFIELD: We know there is some of this resuspension going on, because we've been told there's telephone poles out there that have had the tops cut off, because they got contaminated by resuspension. This goes on to this day, so that means there is airborne resuspension, and if these people aren't on a regular bioassay program, how are the potential for intakes going to be addressed?

MR. CALHOUN: Environmental ambient is the sum.

CHAIRMAN SCHOFIELD: That's what I was assuming.

MR. CALHOUN: And until we determine that that's not claimant-favorable, you know, that's part of our whole discussion that we're

having here.

MR. GLECKLER: I mean, the one thing that the environment TBD does indicate that it did correlate it with the environmental monitoring reports, which, based on my Hanford experience, that included what they call near-field monitoring at the Hanford site, which is the onsite environmental monitoring. So I'm assuming they had a similar program, because it was all driven by the same DOE order, so that could be an incorrect assumption for that site.

CHAIRMAN SCHOFIELD: Maybe Josie can help me on this. Not being really familiar, having been on the ground and actually seeing how this facility is all laid out entirely, there are some areas, obviously, that are going to be more prone to this resuspension issue with the potential of internal intakes than other areas.

You're talking about this monitoring again. Were those areas

specifically monitored for this problem, or just in general terms, they were looking at the external possible exposure and basically not looking for the possibility of internal exposures?

MR. GLECKLER: I have no idea exactly what their onsite environmental monitoring program entailed. I've never seen any information, but just in general, if they had an environmental air sampling station inside one of those facilities or at the perimeter boundary, which they almost certainly had to have some just based on my familiarity with the DOE orders and what we had to do with the Hanford site, to where that would -- those air sampling stations would account for what's being resuspended.

CHAIRMAN SCHOFIELD: So on that basis, they could use that to give a bounding dose?

MR. GLECKLER: Yes, or validate the models that they used, and that's kind of what

the TBD indicates how they validated, you know, the use of those models and the atmospheric, you know, basically the gaseous effluent emissions, which all go out in the stacks, typically, is all they used, and it's like for those models, but then the TBD indicates that it's been correlated to the data in those environmental monitoring reports.

I assume -- I am purely assuming that those environmental monitoring reports contain similar things as what the Hanford did, Hanford site has, and that's a bunch of near-field or onsite environmental monitoring samples or air sampling stations, so we could pick up stuff like that.

MR. DARNELL: We'd have to go back to the source and have a look at it. This is part of the reason.

CHAIRMAN SCHOFIELD: Okay, so this is -- I think we need to look at a little more is the environmental monitoring, you know,

exactly how it was done, just because of this issue of resuspension.

Particular -- you know, I don't have a problem with, you know, them having instrumentations around saying, well, external dose we can pretty well figure there was this much at this point, in this area, you know, but the internal dose potential would have to be based upon that monitoring.

MR. DARNELL: This particular topic that you're discussing is part of why I get heartburn relying so much on the Tiger Team report, because the original data that we used to develop what's in the TBD looked at the releases only to the monitoring station, to the data that was there that we have available.

So going back and saying, well, the instrumentation was wrong, doesn't really matter, because you've got instrumentation at the boundaries. You've got instrumentation near-field, far field, whatever you want to

call it, that you correlate the data to. If you weren't doing isokinetic monitoring inside the stack, it doesn't really matter.

DR. MAURO: So you're protected. You're saying the environmental measurements are there as a backup to supplement your source terms.

MR. DARNELL: Sure.

DR. MAURO: I remember the emphasis was placed on air sampling and film badges, but I think you might have had them over here, too. In other words, the idea being -- I think the philosophy was we want to make sure what's leaving the perimeter of each of these areas -- this might be one, two, or ten. I'm not sure which, and also we're very interested in what's going on over here.

So the question becomes, okay, let's say we've got film badges, TLDs, at these locations, and let's say we have air sampling stations that are pulling particular air samples. Let's say that's there. Right

now, I think that might --

MR. DARNELL: I believe the Tiger Team report talked specifically about those air sampling stations, because it casts aspersions on the type of equipment that was used in the field versus talking about flow rate, even tent sizes.

DR. MAURO: Yes, it talked about high volume versus low volume air, and, now, I'm not -- I don't know if they're doing those.

MR. DARNELL: Yes.

DR. MAURO: But now I say to myself, okay, let's say under the best circumstances you've got, I'm not sure, but I think -- these are the ones that I know about. These I don't really care about so much. This is 20 miles away. This might be -- I don't know what kind of businesses they're talking about. Here's a stack or some ground-level source.

MR. GLECKLER: And those may not have been limited to the facility boundaries,

either. It's like with the Hanford site, I know they had them inside and right at the perimeter around the site, so they --

DR. MAURO: Well, and this might -- this might be a couple of miles.

MR. GLECKLER: I don't know if they did the same thing there.

DR. MAURO: This could be a couple of miles. Now, 100 meters away, and you wouldn't do it.

MR. DARNELL: I think what we need to do is go back and take a detailed look at the data we did use to develop it, and I think that's actually the only way we can move forward with these three items is we have to be a little bit more sure of how we use what data we have, and then we can come back and talk about the issue some more, probably between this, between now and the next Board meeting.

I don't see us getting any further with these issues, because we need to have a

little bit more data about our -- more knowledge about our own data that was used, and please recognize I'm not trying to pass anything off. Both Jodi and Brian are the second people, second or third generation people that have been working on INL, so this was done prior to them. That's why we don't have it all at our fingertips.

MR. GLECKLER: Neither of us has been involved with the site profile until just recently.

DR. MAURO: One of the recurring themes doing this now for five years is, and this goes across the board, is it seems that you grab the data you have, okay, and you say, "Okay, how do we use the data we have to reconstruct doses?" and you do the best you can with what you've got, as opposed to saying, "How is the right way to do this, and what data do we really need to do this right?" and there we would --

In other words, I would come at it

as vulnerability. In other words, I think that given that the whole design was intended to protect offsite environment and the data you have is oriented that way, I would ask myself the question, "Where in that -- where does that create vulnerabilities, and how are we going to deal with it?"

MR. DARNELL: This monitoring has nothing to do with protection. It's a monitoring problem. It's not protection

DR. MAURO: No, no, when I say protection, we want to know what kind of -- what kind of exposures the general public got offsite, and that's the overarching story. It's really for the --

You know, outdoor environmental exposures, I did not get the sense that the design was primarily there to see what kind of exposures workers who were working onsite outdoors next to these facilities, what exposures they would have, no.

The data that was collected was

there mainly to be able to write an environmental report to satisfy EPA that we understood what the emissions were and what the impacts were to people offsite, and I think that somehow a bridge has to be brought.

If you're going to use that data, you have to show why that very same data, together with anything else you might have --

MR. DARNELL: I think that where we're at now, we probably should table any more discussion on these three issues and find out what our data was, how we used it, and then we'll get back together and have a conversation in between the meetings. Otherwise --

CHAIRMAN SCHOFIELD: Would people like to take a break now or go to lunch? What time? I didn't realize it was this late.

MR. DARNELL: Sounds like lunch to me.

MEMBER BEACH: It's too early for lunch.

CHAIRMAN SCHOFIELD: Too early for lunch?

MEMBER BEACH: I think it's too early for lunch.

DR. BEHLING: Phil, this is Hans. Can I just quickly ask questions? Have we touched on anything that relates to fence line external dosimetry and how it impacts the assessment of external exposure to workers? This was actually comment Number 3 or finding Number 7 on the first page. Have we discussed that at all or at least in a level where we understand what some of the concerns are?

DR. MAURO: Hans, I'll answer that. No, we haven't. I think it's important that you bring it up before we close this aspect of our discussion.

DR. BEHLING: Yes, I would like to, because I think there are certain aspects to that that have not been even introduced in our review comments, but I did address them in my comments section for the ANL-W.

MR. GLECKLER: Didn't I kind of touch on that?

MR. CALHOUN: Yes, I thought you addressed that completely.

DR. MAURO: The film badges?

MR. CALHOUN: The issue was fence line TLD measurements are not adequate for reconstructing direct gamma doses to personnel working outdoors, and the explanation was that everybody working indoors in that fence was badged.

The TLDs were on the outside of the fence, so people working on the outside of the fence would get a higher dose that would be a claimant-favorable approach. That was -- is that what you said?

MS. JENKINS: In addition to the fact that we applied a correction accounting for overtime. We give them -- we account for working overtime more hours than the union standard and apply current 2.13 also, and that is in conjunction with our procedures.

MEMBER MUNN: So that all now needs to be said in written response to the comment so that it's of record.

DR. BEHLING: Can I ask then a very stupid question? What is the purpose of Table 4-13 if we're saying that anyone who was onsite wasn't, in fact, monitored?

MR. DARNELL: Which document?

DR. BEHLING: Therefore, that table has no purpose.

MR. GLECKLER: No, not anyone onsite, anyone in a radiological facility in that site. The INL site as a whole has basically a bunch of island facilities throughout that whole site.

All those radiological areas for the most part are surrounded by fence lines to where they've got like a single badging area that they have to go through and get a dosimeter badge to get inside that operating area.

So like the example that I gave

earlier where it was like the ICPP, well, you've got a bunch of ancillary buildings with that facility, but you've got a perimeter fence around it and a central badging location, so to get inside that fence line they have to have a dosimeter badge, and if they didn't have a dosimeter badge, that means they were outside that fence line.

Thus, the perimeter dosimeters for that facility are either representative or claimant-favorable of any workers' doses that worked outside that fence line, depending on how close they were to the fence.

DR. BEHLING: Well, I think we need to discuss, because I do have some questions about that whole Table 4-13, and if we can do -- set aside a few minutes after lunch, I would appreciate it.

MR. DARNELL: Are talking about Table 4-13 in INL or ANL?

DR. BEHLING: INL.

MR. DARNELL: Okay.

DR. BEHLING: And they are both -- those tables are common to both site profiles.

DR. MAURO: Do you want to do that now or after lunch?

CHAIRMAN SCHOFIELD: We'll do it after we address it, since we haven't had a break this morning.

MEMBER BEACH: Breaking or lunch?

CHAIRMAN SCHOFIELD: I guess it's majority. If people are hungry, we'll just go to lunch. Otherwise, we'll take a 15-minute break.

MR. CALHOUN: If we're going to take a break, are we going to go eat lunch at noon?

MR. DARNELL: Yes, why don't we just work until we're going to go to lunch and call it done.

CHAIRMAN SCHOFIELD: Okay. That's fine. We're sitting down for 30 minutes.

MR. DARNELL: Go to lunch at noon? Sounds good. So what don't you understand, Hans, about Table 4-13?

DR. BEHLING: Well, as I get -- I am not still sure for whom is the table intended.

DR. MAURO: Could you describe the table? I don't think we all have it in front of us. Could you say the kind of information that's in it? I don't have it in front of me.

MR. DARNELL: It's the INL Facility Fence Direct Gamma Values, TLD minus background.

DR. BEHLING: Yes, I understand what it says, but are there people that --

MR. DARNELL: It's for people that don't have --

DR. BEHLING: -- would be exposed to radiation onsite who were not badged? And if the answer is yes, there were people onsite within the site itself but not necessarily within a restricted area within that site. If they were there, they may have been exposed to external radiation, obviously from internal exposure from plume emersion or resuspension and/or from external radiation that emanates

from outside the body.

MR. GLECKLER: Table 4-13, the most common use for, you know, the type of person that's on the INL site proper that doesn't go into the facilities that I can think of is like a bus driver.

Also, those individuals do not go into the facilities and thus never were badged. On occasion, they'll have one or two dosimeters, and they'll even indicate in their caddy on some occasions that they had to go into the facility on one or two occasions or whatever.

Other than that, the majority of the use of that table is because of the inappropriate subtraction of elevated background or controlled dosimeter results. For the INL site, even monitored individuals get assigned these onsite ambient doses, which are also representative of the location where the control dosimeters were at, which was at the control points where the badge racks were

located.

So, in addition to their dosimeter results, all INL personnel get these ambient doses assigned on top of that, because those control dosimeter results have been subtracted out of their reported doses already.

DR. BEHLING: Okay. Well, that's one issue, but I have a couple of other issues. One is the assigned doses for 52 through 72 for which you have no data, and the assumption is that they will take -- among the six-month values for each of the sites there, they will take the higher of the two, multiply it times two, and then end up with that particular value, and I believe that's what we're looking at for that column 52 through 72.

Now, the scientific basis for that assumption, that is, we'll take starting from 1973. We have two measurements for each of those locations that were six-month measurements.

We'll take the higher of the two measurements, multiply it by two to make it up for a 12-month exposure period, and then assign it. That was the -- that was the basis, and I believe that it was justified by the following statement, and I will read it from Section 4.3.

It says, "In general, beta gamma radiation from the facility increases with time, because the general contamination of the area increases. In addition, as the facility ages, radioactive sources tend to accumulate at the facility, which causes the general background to increase with time."

That's possibly true but not necessarily true, and I say that because I was looking at -- in my particular ANL-W write-up, I have Exhibit 3.4-8A, which is taken from the historical dosing evaluation report of 1991, and it shows the annual releases of radioactivity prior to 1972, and they peaked during the `60, `61, `62 areas.

I mean, they skyrocketed, and most of those releases were obviously short-lived, so I don't believe that statement and justification of assuming that we can take `73 data, take the higher of the two biannual measurements multiply by two, and then assume that that applies to all years prior to `72 as a legitimate way of saying we have basically capped the potential exposure for the 20 years for which we have no data.

And I'm sure you don't have access to that particular exhibit that I have, but I have two exhibits, a graph exhibit that shows the actual curie levels that were released and also the actual --

MR. DARNELL: Hans, I don't mean to interrupt, but further discussion about this is moot until you give us those exhibits. We can't --

DR. MAURO: Well, you have them. It's in our report. They're all in our ANL-W report.

MR. DARNELL: I'm looking for it. I don't see what he's talking about in the ANL-W report, the exhibits, and he --

DR. MAURO: Do you have a page number?

DR. BEHLING: No, they're in the historical dose evaluation report of 1991.

DR. MAURO: Oh, they're -- oh, they're in the header report. You didn't list them? I thought you listed them and put them in your report. I remember seeing them.

MR. DARNELL: It's not here, nothing I'm finding.

DR. MAURO: It doesn't -- okay.

MEMBER MUNN: In the ANL report.

MR. DARNELL: The ANL report.

DR. BEHLING: No, it's not in the ANL report. I wrote it in my review of the ANL-W report, and I included information that I had taken from the historical dose evaluation report that the DOE wrote in 1991, but don't look at the ANL-W report itself.

You won't find it.

DR. MAURO: Your report. Okay, I have a simple question. Does your review of the ANL-W report contain that graphic?

DR. BEHLING: Yes.

DR. MAURO: Okay.

DR. BEHLING: My review contains those two exhibits.

DR. MAURO: Okay. Do you have the page number?

DR. BEHLING: Yes, I have it on page 50.

DR. MAURO: Page 50. Okay. Now we're getting somewhere.

MS. JENKINS: The doses, the background doses used in the dose reconstruction are also increased by 20 percent, and, like I said before, it's assumed 1,400 hours work per year, as opposed to -- it's 50 hours per -- it's assuming 50 hours per week.

MR. GLECKLER: It gets adjusted from

this differently. I think these are 2,000-hour doses.

MS. JENKINS: Right, but then we take those doses and adjust them.

MR. GLECKLER: We adjust them to 2,600-hour doses for overestimates and 2,500 for best estimates.

MS. JENKINS: So those are the wrong numbers that then get adjusted in a claimant-favorable fashion.

DR. MAURO: I'm sorry. I mean, I'm just looking at the figure. I understand Hans's point.

MR. DARNELL: I understand it now, too.

DR. MAURO: In other words, yes, let me show you. Hans, not everyone has the figure, and I'm sort of walking around the table showing it. On page 50, the measurements, I think your measurements started in the seventies.

MR. GLECKLER: Yes, `73.

DR. MAURO: `73, so basically what you're saying is you've got a TLD sitting on the perimeter there in `73, and you're saying, "Okay, here's my reading," and that's going to give you a pretty good idea of the annual exposure, but we know that the releases that occurred were much, much higher in `60, so the extrapolation -- by multiplying by 1.3 doesn't really cover the kinds of differences we're talking about.

Now, whether or not the TLD measurement is driven by the direct gamma from the facility versus the airborne emissions, that's another question, but this is --

MR. GLECKLER: That's probably an indicator that there might be --

DR. MAURO: There might be a problem, yes.

MR. CALHOUN: It's worth looking.

DR. MAURO: Yes. Thank you.

DR. BEHLING: Are we through with that issue?

MEMBER MUNN: We think so.

DR. BEHLING: Okay. Next question, if you look at Table 4-13, and you look at -- and I'm going to -- and there will be two things. I want to look at Figure 4-7 and then also Table 4-13.

DR. MAURO: In which report, Hans?

DR. BEHLING: In the INL, our report.

DR. MAURO: Our report, ANL-West report, page number --

DR. BEHLING: No, no, no. INL.

DR. MAURO: Oh, the INL. Okay.

MR. GLECKLER: The environment TBD.

DR. MAURO: Okay, I'm getting there. Okay. And you have a page number?

DR. BEHLING: Let's see here.

MR. KATZ: 38 and 39.

DR. MAURO: Thank you.

DR. BEHLING: Yes, 39, and there is also the figure the page before that, Figure 4-7, but let's go to Figure 4-13, and I will

give you an example. Look at TRA. That's in the center at the top.

You'll see among the sites looked at is TRA, and then below that you have TLDs used, and you will see for assessing the annual exposure based on TLD reads, the TLDs 1, 7, 12, and 13 were used. That's on Table 4-13. Does everybody see that?

MR. GLECKLER: Yes.

DR. BEHLING: Okay. Then let's go to Figure 4-7 and then look at that, and you will see at the very bottom the facility TRA, and there you see a total of 13 TLDs that were available for readouts, and you realize that TLD 1, 7, 12, and 13 are among the lowest.

For instance, TLD Number 7 for the year -- no, TLD Number 5 for the year -- for the first half of `75 read 2,434 millirems, so that multiplied times two, you would be talking about 5,000 millirem.

I guess the question is why were these TLDs selected for Table 4-13 when you

had potentially all these other TLDs that would have given you a much higher dose? What's the basis?

MR. GLECKLER: My guess is that they were not perimeter TLDs. They were probably in closer to the facility somewhere.

DR. BEHLING: Would somebody have been exposed to those levels that was not necessarily monitored?

MR. GLECKLER: Only monitored workers would have been in that area, so they would have had their own dosimeter results.

DR. BEHLING: Those are hefty dose rates there for many of these TLDs that involve the TRA facility, and I guess not having a very, very definitive understanding as to where they were located, the question is were there people who could have been exposed to such high dose rates who were possibly not monitored but whose exposure will now be assigned on the basis of Table 4-13?

MR. GLECKLER: You know, without

looking at the source document to see what locations those dosimeter numbers were associated with, it's really hard to tell for sure, but I'd be willing to bet money that those are inside the perimeter fence line for that facility or that area, and all the individuals in that area would have been monitored.

So it's hard to say why they were monitoring that location. I'm not -- I mean, it's probably a combination of what you would call like an area dosimeter versus an environmental dosimeter, but it's kind of strange that it shows up in this sort of a report. We'd have to look at the source document to verify that.

MR. DARNELL: Check the source document for what specific --

MR. CALHOUN: You can get back on that one.

MR. GLECKLER: For Figure 4-7.

MR. CALHOUN: Let's keep rolling

here.

MR. GLECKLER: The locations for the TRA, Test Reactor Area.

MR. DARNELL: Well, right now I don't know. Are you done, Hans?

DR. BEHLING: Yes, I mean, that was -- I had three questions. You answered the first one regarding the high background that was subtracted, and, of course, I had the other two that related to pre-1972 extrapolation from a single year backwards in time, and, as I said, I looked at the actual releases in the fifties, sixties, and I sort of came to the conclusion that maybe that's not the good way to do it.

MR. DARNELL: Okay. So, to recap then, just for these first three issues, I have three things written down. We need to look at the -- capture the data for the environmental exposures that we calculated at SC&A, and NIOSH will discuss that before the next Board meeting.

Review environmental ambient versus Exhibit 3.4-8A and see how that affects the doses that we're using, and we're looking, checking the source document for Figure 4-7. Those are the three things that we need to get done for these three issues.

DR. BEHLING: Also perhaps look at our ANP report that we did on the contract with the CDC for the changes and perhaps source term for the aircraft nuclear propulsion test.

MR. CALHOUN: Is that brought up specifically in the matrix as an issue so we know how to target that?

DR. BEHLING: Well, it was -- I think it was both in the --

MR. OSTROW: It's Issue Number 2.

DR. BEHLING: -- writeup for INL as well as for ANL-W.

MR. DARNELL: Could you say that again so I could write it down? Hans, restate that so I could write it down, please.

DR. BEHLING: Yes, the report in question, I'll give you the title, and the title of the report is "A Critical Review of Source Terms" --

MR. DARNELL: Okay.

DR. BEHLING: -- "For Select Initial Engine Tests Associated with the Aircraft Nuclear Propulsion Program at INL."

DR. MAURO: Is that on the CDC website? They published that.

DR. BEHLING: It's possible that it's on the website, but I'll give you the date. We submitted it on July -- in July of 2003.

DR. MAURO: How about we just send them a copy?

DR. BEHLING: I can do that.

MR. DARNELL: That would be better.

MS. JENKINS: Action item.

DR. MAURO: We have an action item.

MR. CALHOUN: A CD would be better than a hard copy.

DR. MAURO: CDs, you got it.

MEMBER BEACH: I have a question. You keep saying you're going to report this before the next Board meeting. Is this actually going to be in a white paper, or is it going to be in a memo? Will it just come to the work group?

MR. DARNELL: What we'll do is have a discussion between the technical folks so that we have something to report either for resolution or for a pat forward on this.

MEMBER BEACH: So are you suggesting a technical call?

DR. MAURO: The next meeting is like mid-July, right?

MR. DARNELL: I'm sorry?

MEMBER BEACH: Are you suggesting like a technical call, or is that --

MR. DARNELL: Yes.

MEMBER BEACH: I'm just trying to figure out what's going on.

MR. DARNELL: Yes, a technical call.

MEMBER BEACH: Okay.

MR. DARNELL: Phil will know when it's going forward.

MR. CALHOUN: What's the normal mechanism?

MR. KATZ: The normal procedure is for us to get written responses to the matrix, all the matrix issues, so that's, I mean, I think that's an easy way. Let's capture it on paper, and then when that -- then that'll trigger us to have another work group meeting.

MEMBER BEACH: Regardless if you have a technical call, it still needs to be captured on paper.

MR. KATZ: The technical calls are -- you have them -- generally, you have them because you need clarification about an issue, and it's complex, and it doesn't make sense to work it out with the whole working group, and then the working group members are invited to listen in on the technical call, but that's usually why we want to use technical calls.

MR. DARNELL: Yes, and I think this issue is complicated enough that --

MR. OSTROW: Well, because I remember we did this on Linde work group, where we had like one specific thorny issue, and we had technical calls on just one issue back and forth, you know, not on a bunch of issues, but then we wrote it down, you know, as a conclusion.

DR. MAURO: I think that, as Ted pointed out, normally there would be a list or action items that come out of this meeting where SC&A would have certain things to do, and you folks would look into certain things to almost try to keep a running account of it, and hopefully it keys back to the matrix.

Then the next step would be, if you have some brief response, if you fill in the matrix under the NIOSH column, if it turns out it's an analysis, it's a white paper, and that's filed.

Now, prior to doing that, putting

that paper into the system, if it turns out a conference call helps because you're not quite sure what our concerns were and what the issues are, whatever it is, then we have a conference call. So as you work your way through --

MR. DARNELL: With some of this, we need to know if there is actually a concern there or not. I mean, we don't -- we don't have off the top of our heads right now enough knowledge about the data that was used to develop the environmental model, so we can't even begin to come to that common ground until we come to the common ground on what the data was. We'll need to talk with you about it.

DR. MAURO: Yes, we are in an unusual circumstance on this environmental work, because you've sort of rested your work on the RAC work and the HEDA work, which is really not your work.

MR. DARNELL: Right.

DR. MAURO: You've sort of accepted

it, because it was peer reviewed. It was published, and so, yes, and we were -- we benefitted from the fact that we were asked to -- we spent a lot -- we spent a year studying that data.

MR. DARNELL: And we're going to have to go back and check some of it, check what we used it for, how we used it, and then come to the common ground before we can move ahead with answering these things, answering these issues.

MEMBER BEACH: Is somebody keeping track of the action items?

MR. CALHOUN: I think Pete just took those three.

MEMBER BEACH: Pete took them?

DR. MAURO: I have to say that I've been in the situation where things are this complex on Fernald, and what I ended up doing was going back to the transcript and spending a lot of time working my way through it and writing it up in a way that -- and

communicating it to everyone. "This is my understanding of where things are." That was very helpful to me. I know you folks have been putting out the transcripts pretty quickly, about a month?

MR. KATZ: About a month. Well, yes, by the time it hits the website, it's probably 40 days or so.

DR. MAURO: Okay.

MEMBER MUNN: If there are simple questions like, "Where do I find a document? What document was your basis for this?" then there is no reason why that can't be communicated by email, any method.

MR. KATZ: Right. Absolutely.

MEMBER MUNN: That's fine, but if there is an extended discussion about technical issues, once you identify what the technical issues really are, once you've identified that --

MR. KATZ: Definitely.

MEMBER MUNN: -- then it's helpful

for us to -- for anyone who is on the Board and wants to be involved in the technical call to sit in, but that invitation is usually --

DR. MAURO: Let me say something in our defense. Everything we're talking about is written up in agonizing detail in our detailed review of INL and ANL-West, so the first place is that when you see the brief summary that's in the matrix, and you may want to go back.

Let me take a look at the chapter, because Hans wrote the very detail, the tables, the excerpts, where they came from. I think it's all there, but certainly if there is any ambiguity or uncertainty or you need something, certainly we'll provide you whatever you need.

MR. DARNELL: Yes, definitely. I find it much easier to work with rather than against, so that's why I said once we get some more of our own data together, let's talk about it a little further and try to answer

it.

MR. OSTROW: Yes, it shouldn't be a guessing game like what our comments mean, exactly.

MR. DARNELL: And I still think, and no offense, John, but I think we're rather far apart about the applicability of the Tiger Team report until we see --

DR. MAURO: Well, I don't -- I don't -- I agree with what you're saying, but I think that, well, it's all -- there are places where I would say right now when I read this over I said, "You know, we probably should not have included this," and I agree with that, but there are other places where I felt the Tiger Team comments were, in fact, valid, and we can talk about that.

That's something that's very much worth a conference call, because that's not in our writeup. Right now we have this whole list of all this Tiger Team stuff, some of which I would agree with you we probably

should not have put in.

MR. OSTROW: But I think to resolve that both sides have to go back and actually read the Tiger Team reports and see, you know, what is actually --

MR. DARNELL: I will admit I didn't have a chance to do that, but I'm ex-DOE. I worked for them, and I know what the Tiger Team reports were all about.

MR. CALHOUN: Don't admit that.

MR. DARNELL: I have to. I do know what the Tiger Team reports were all about, and it wasn't always to be helpful to the site. So I've got four items then, looking for the source document for Figure 4-7 with the third one, and then taking a look at Hans's report, the critical review of source terms and so on, so I think we're okay with the first three issues then.

MR. OSTROW: I think, you know, just echoing what John was saying just a couple of minutes ago, keep track of these things. If

you're keeping track of what you think you should be doing with these four issues, I would suggest sending an email, you know, when you get back or whatever, when this is over, "This is my understanding. These are the things that we're supposed to do."

MR. DARNELL: Actually, I was recapping for the benefit of our transcriptionist so that it would be in the report.

MR. OSTROW: Yes, but that takes -- that takes, you know, a month before it hits the street, but if you do like an email when this is finished, you know, to the group or whatever, "This is my understanding."

MR. DARNELL: Okay, I'll do that.

MR. OSTROW: This way we can look and add or subtract things so we have a set of items. Otherwise, it's difficult to track.

MR. CALHOUN: Ultimately, our response is going to be a written response to what's in here now. If there's any updates to

that, those will be provided by you guys.

MEMBER MUNN: That'll come back. If there is an issue after you've responded, then you'll get another comment back from SC&A.

MR. CALHOUN: So we're not taking on additional tasks for the matrix based on these. These are in support of responses.

DR. MAURO: Yes. Correct. Absolutely.

MR. GLECKLER: Absolutely.

MEMBER MUNN: Right, these are there for response to the matrix items.

MR. DARNELL: Yes, and it may come down, if we look at the data and say, "Oh, they're right," you'll get an email that says, "We don't need a conference call." We'll get an answer.

DR. MAURO: And places where you think the Tiger Team findings are really not applicable, please say so.

MR. OSTROW: We may just say, "Yes, you're right," you know, too, so that's why

you reduce the number of items.

MR. DARNELL: Right now, as far as NIOSH is concerned with these issues, we don't have a prepared response for any of them right now. We do have some talking points but not a prepared response.

DR. MAURO: By way of process, in the past we didn't hold these meetings until NIOSH had a chance to fill in the column called "NIOSH Response." I guess that hasn't happened, but that's okay. I mean, I think this is complicated enough. We needed to talk about this stuff.

MR. DARNELL: Well, that was kind of our point of view, too.

MEMBER MELIUS: So that's the reason nothing's happened for two and a half years on this? This is from 2006, the original review. I'm trying to understand.

MR. DARNELL: I got an email out of the blue a couple of months ago that this was going to happen. Otherwise, all I knew was my

name was assigned to the site, had no idea anything had gone on prior to this.

MEMBER MELIUS: And how long have you been assigned to the site?

MR. DARNELL: I don't know. When did that happen?

MR. CALHOUN: I don't know, probably within probably two years, but if we don't know that a working group or something is imminent, we're not going to go respond to everything, because we've got too many other things to do, and, as you know, there are so many things going on with us responding to Board issues that we've got to pick and choose and prioritize when we've got upcoming meetings. Then we'll do the -- then we'll respond as we need to.

DR. MAURO: I'm going to step out on a limb a little bit, but we've got about 33 site profile reviews, only half of which have engaged in the site profile process. Nevertheless, they're sitting on the shelf.

If you folks are about to engage in an update, a two-year update on one of your site profiles -- X-10 would be an example -- take a look at it. Read it.

MR. DARNELL: Good suggestion.

MEMBER MUNN: But, of course, this work group has not been active, either, so having a work group active often is an initializing event.

MR. CALHOUN: Pushes things to the top of the list.

MEMBER MUNN: Such things as this.

MR. CALHOUN: And, to tell you the truth, Jim, we didn't even actually get the most updated matrix that we're talking about until Friday before this meeting.

DR. MAURO: Not true.

MR. DARNELL: Pardon?

DR. MAURO: The matrix was part of the product. Every -- the two reports we're talking about, the original, the revised, and the ANL, all had an attachment which had a

matrix.

MR. DARNELL: The most updated one you sent me Friday said this --

DR. MAURO: It was there when we originally distributed it. It's sitting on your shelf. You have a hard copy. In the back there's the matrix.

MR. DARNELL: I got an email.

MR. OSTROW: The original matrix -- we just added -- in our December 2008 we added to the matrix, but the original one was January 2006 on the report.

MR. DARNELL: Yes, that's the one I have is January 2006.

MR. OSTROW: Okay, and the latest one, which was the -- we updated it somewhat, supplemented, we call it. That came out in December of last year, 2008.

MR. DARNELL: Yes, I didn't have that until John emailed it to me Friday.

MR. KATZ: Just to clarify for my understanding, because, you know, I haven't

been at this that long, but I thought that the resolution process with the matrix really doesn't begin until you have a working group and a -- because the resolution process is a Board process of managing resolution and identifying issues that can't be resolved, et cetera. So not having had an INL working group until now, in effect, I mean --

MEMBER BEACH: When did we establish it?

MR. KATZ: We established it -- we established it last year in September, I believe.

MEMBER BEACH: And requested NIOSH to do the review.

MEMBER MELIUS: So it's been eight months.

MR. KATZ: So it's been eight months, absolutely.

MEMBER BEACH: We requested SC&A to issue a new --

MR. OSTROW: If I remember, I

thought we sent that.

MR. KATZ: And we tasked --

MR. OSTROW: We sent that around September. You guys reconstituted your -- what we -- you created the work group. You asked us to do a supplemental review, and then we produced in December our supplemental review. That's what got the process moving.

MR. KATZ: So really the refresher, your supplemental refresher or whatever you want to call it, is what kicked off then, you know, the scheduling of the working group meeting.

MEMBER MUNN: And now it's lunch time.

MR. DARNELL: Yes, I second that note.

MEMBER MUNN: And I don't know what's going to --

MR. DARNELL: Is this room secure for us?

MR. KATZ: No, we can lock it. If

no one's staying in here, we'll lock it. So it's noon. Phil, are you ready to close the meeting until after lunch?

CHAIRMAN SCHOFIELD: Yes.

MR. KATZ: Okay. So it's noon, so 1:00, is that good for you?

CHAIRMAN SCHOFIELD: That's fine.

MR. KATZ: 1:00. For everyone on the phone, thanks for participating. We'll cut the line now and start back up around 1:00.

(Whereupon, the above-entitled matter went off the record at 12:01 p.m. and resumed at 1:07 p.m.)

MR. KATZ: Good afternoon, everyone on the phone. This is the INL working group of the Advisory Board on Radiation and Worker Health, and we are just reconvening after a lunch break. I don't think I need to check on anyone on the phone. I can tell that there are folks there. It's all yours, Phil.

CHAIRMAN SCHOFIELD: Okay. I guess

we're going to move on to Issue 4. We have the four items from this morning that I think we've got those settled as to what needs to be done, so Issue 4 is about the completeness and quality of INL internal dosimetry programs. Do you want to take that one first, Pete?

MR. KATZ: Do you want SC&A to present?

MR. DARNELL: Yes.

MR. KATZ: SC&A, present the issues.

MR. OSTROW: Well, this is what we were talking about this morning. This has to deal with -- this deals with missed internal doses for workers and the assumption of confidence, you know, that procedures, but were they actually followed correctly?

This is where we reference the DOE Tiger Team reports, and the Defense Nuclear Facility Safety Board, DNFSB, also did a series of audit reports where they had a whole, you know, litany, laundry list of criticisms of the actual practices at the

site.

They said they were going to do one thing but didn't really do it, and your comment from this morning, I guess, still stands that a lot of these comments weren't really applicable to what we're doing with dose reconstruction. So, I mean, that's not the general problem, that's your response, I suppose, also.

MR. DARNELL: Yes, I would like to add to that. Other than feeling that way about the audit reports that you guys are referencing, we're more based on taking the numbers that the site generated and then correcting them to current standards and basically using as many claimant-favorable ratios in other assessments -- excuse me -- other assumptions to bring those numbers up to what they should have been.

So NIOSH in its approach is basically taking steps to -- I can't say improve the data, but correct the data I think

would be a better way of stating it. Again, we use -- we take the monitoring results, bring it up to current ICRP standards, recalculate the doses, apply correction factors, use ratios where appropriate, and bring the data up.

And, again, as we were discussing offline between the meeting, it's a set of procedures that we use that does that more so than what's completed in the technical basis document. The technical basis document, especially for this stuff, is more of the background information. It doesn't tell you exactly how the dose reconstruction was done.

MR. OSTROW: Well, in addition to the Tiger Team and the -- I was also looking at our actual site profile reviews. As we said, what we have in this matrix is just a little sound bite that sort of points you to the issues, and we have a couple of pages of this where we go into a little bit more detail.

In addition to the official reports, we also had site interviews, and we quoted some of them. We have some attached where past and present workers were saying, you know, pointed out some of the deficiencies of the programs, and we have some particular examples that we give in our report.

So in addition to just saying that, you know, that the Tiger Team and the DNFSB didn't pertain exactly to the program and you guys improved their measurements or their calculations or whatever, we have some specific examples here, too.

MR. DARNELL: I'm looking at one now where it talks about the internal dosimetry program was found to be deficient because compliance with DOE Order 5480.11 couldn't be demonstrated. It's at the bottom of 74, top of page 75 of the report, and they're talking about --

MR. CALHOUN: I only have 29 pages.

MR. OSTROW: Well, this is the

original site profile, which is 249 pages.

DR. MAURO: You're talking about our review of the site profile.

MR. DARNELL: The 250-page report.

MR. OSTROW: Right, and you're at page 74?

MR. DARNELL: Bottom of 74, and basically what it's saying is that logs weren't kept to maintain the information for the purpose of the bioassay schedule, bioassay -- that one in particular has no effect at all on how we use the data, and there are examples, I would assume, on both sides where it could have an effect or wouldn't have an effect.

MR. CALHOUN: But we are going to look at the individual comments. We're not just blowing it off right now and saying that it didn't happen.

MR. OSTROW: Okay. You know, I understand what you're saying. I mean, that's basically it, you know. We pointed out where

we thought there was some deficiency, and you guys say, "Well, this is not a deficiency, because we didn't use this, anyway," or --

MR. CALHOUN: We'll give you a response.

MR. OSTROW: That's the --

MR. DARNELL: We're not using the data in the same manner that the site used the data.

MR. OSTROW: Okay.

MS. JENKINS: The thing about deficiencies in site experts, I mean, our site experts wrote the -- the initial documents were written by our site experts, and they obviously have a different opinion.

MR. OSTROW: Yes, that happens very often with these sites, but generally you can't dismiss, you know, like half the site experts because you use the other half. You still have to give them some credence.

MR. DARNELL: We're not trying to say that there's no credence in what you're

saying here. It's just what we're going to have to do is balance out what we used versus how those reports could affect us. My own personal thought is that that report will have very little bearing, but I also recognize we need to go ahead and do the research and get through that.

DR. MAURO: On a -- and I'm going to ask Hans this -- Hans, are you on the line? Is Hans here?

DR. BEHLING: Yes.

DR. MAURO: I just wanted to make sure. I want to make an opening statement, and then maybe you could elaborate on it.

DR. BEHLING: Okay.

DR. MAURO: My sense is that the data for internal dose, the data you're hanging your hat on primarily, are bioassay urine samples that were collected periodically from lots of workers and analyzed primarily for gross beta, gross gamma, and from there, that's hour hook into, okay, from there we

could reconstruct doses because we know the mix of radionuclides that the worker might have been exposed to, and on that basis we can figure out what the intake was of some mix of radionuclides. And in principle that's a reasonable thing to do, but I think during our review we had some concerns whereby, you know, if you take it once a year and the person is exposed to a mix of radionuclides, some of which might be short-lived.

In other words, that fundamental approach has the potential for some weaknesses, and that's the level of, I guess, granularity that I understood the concerns. Now, Hans, do you want to go into some of these as --

DR. BEHLING: Yes, let me just elaborate, and I think you hit it pretty much where I would have started out in my discussion, and that is you do have in many instances a very limited number of bioassays. I think in the TBD there is some reference to

the fact that multiple bioassays would have been given per year for a given individual, and support for that comes from the graphs that, one of the tables that shows that in one year or for a given year there were 11,000 total urinalyses, 8,000 and change for gross beta, 2,000 and change for gross gamma, and then there were some radionuclide-specific, and then there was also the comment that that same year there were 3,500 or so people badged with film or TLD dosimeters. I think it was film dosimeters for that year.

And then on that basis one would conclude that dividing 11,000 by 3,500 that the average individual would have had three bioassays, but I have a suspicion that's a number that's somewhat inflated because I believe --

MR. DARNELL: I wouldn't agree with that at all.

DR. BEHLING: -- that many of the people may have had both a gross beta and a

gross gamma. In addition, you would have probably had a baseline bioassay for people who just entered into employment, which really doesn't count. It's just basically we'd say, "This is what you came to us with, and we don't have any reason to assume that this was an exposure received here," and there were other factors, you know, termination urinalysis maybe.

So in total I would say perhaps using those numbers that a person may have had on average somewhere between one and two bioassays in a given year, and that may still have some reasonable value for doing dose reconstruction, except if we have to deal with the fact that they may not indicate exposure to radionuclides that either have short half-lives or short effective half-lives if you are having intervals of bioassays at six months or a year.

Now the question still in addition to that comes from the fact that I'm not sure

to what extent early bioassay data would identify the location of exposure because I'm looking at table in the INL TBD, Table 5-4 and 5-5. If you guys can look at that, I will point to something that I looked at and sort of came to conclude maybe that's going to be a problem. Those two tables appear on page 17 of TBD 5.

For those who may have already accessed those tables, one of the things that concerned me in Table 5-5 is that unlike Table 5-4, which contains employer and exposure location, that is not one of the fields that is likely to be had in bioassay data before 1989.

So as John started saying, we may have a whole wide range of exposure conditions depending on where an individual worked, and the radionuclide mix would certainly reflect that location of exposure. If, as suggested by Table 5-5, that potential bit of information may be lacking up to 1989, you

would be hard pressed to look at that potential bioassay and assess it for the kinds of radionuclides that that individual might have been exposed to.

MR. GLECKLER: We can pretty much tell where the workers worked at INL throughout their history, not because of their dosimeter codes, the location codes on their dosimeter badges. It's like the only time we have any real difficulty is in the very early years of operation. It's a different format of record, and because we've got black and white photocopies of those records, it was color-coded to where the different areas were represented by different colored cards.

And now we can't tell for those early years in the fifties, but after like, I think, starting like in 1957-58 time frame they used location codes, and so we can from that point on tell for sure where they worked. There's other ways that we find out for the early years where they were at, and they

didn't move around as much in those years, either.

DR. BEHLING: So what you're saying is that the use of film or TLD data would give you that information that may not be there on bioassay data sheets. Is that correct?

MR. GLECKLER: Correct, as far as the location stuff. It's like there's another type of record, not just their dosimeter results, that tells us that. They have like a summary of when they're assigned dosimeters, for what periods that they were assigned dosimeters for various areas. I forget what that record is called, actually.

The external TBD might have an example of it in there, but it'll tell you when they were at a certain facility between which and which dates and that they had a dosimeter for that facility if they were routinely monitored for that facility.

DR. BEHLING: Okay. I think that that really resolves the major concern that I

had is the ability to place a worker prior to `89 in a location where you could make use of the bioassay data in the most efficient way, and that is understand what nuclide mix he might have been exposed to for a given period of time.

MR. GLECKLER: Unlike a lot of sites, we can narrow that down at INL pretty easily and pretty consistently for nearly 100 percent of the claims.

MR. DARNELL: The other thing you need to remember, Hans, is that your assumption that you just take the total number of bioassay and divide it by the workers and come up with a number per worker really does not fit not only INL but none of the DOE sites. The radiation workers, in other words the ones who were to get the bioassays, are always a much smaller subset of the general workforce, so you can't assume that 11,000 people working at INL, that all 11,000 of them would have bioassay.

The number of people needing bioassay and requiring bioassay generally runs a third of that total at the DOE sites. I don't know what that exact ratio is for INL, but, you know, along those lines it's going to be a much smaller subset.

DR. BEHLING: Yes, I was basically using that because it is stated in the TBD using those values. I'm trying to find the exact location. The implication was that on the basis of 3,500 people who were given external dosimeters and the total of 11,000 or some-odd bioassays, that would provide a strong indication that people were assayed multiple times in any given year. I'm trying to find where that actual statement is.

MR. GLECKLER: Also, something to be aware of is that the INL, even though they didn't bioassay a lot of the individuals on a regular basis, it's like the ones that were routinely dealing with the radioactive materials or routinely had potential for

exposure were being monitored, and the ones that only had the potential for intermittent exposures that may not have received anything but an annual bioassay, odds are if they were doing any radiological work where that potential exposure was is more than likely, the routinely monitored folks in that area are working directly with them to where when they have an event there, they will --

It'll show up on their bioassay results, and then they kind of typically -- you'll see groups of individuals being bioassayed all together, especially if it's like a suspected iodine release and that. You'll see a whole series of urine samples collected in a very short period of time.

DR. BEHLING: Yes, and, as I said, I accept your explanation, but it is a statement I just found, and it's on page 22 of TBD-5, and it's in the middle of the page, the second paragraph, and I'll read it to you.

"The total number of urinalysis in

1959 was 11,066; 3,524 people had radiation badges, and 715 received external doses above 500 millirem," and then it concludes, "These numbers demonstrate that workers provided urine samples multiple times during the year." That's where I got my statements from.

MR. DARNELL: I think that you can assume that workers provide multiple samples, but you can't assume it's 11,000 divided by 3,524.

DR. BEHLING: No, and this is what -- this was my comment is that among all those are probably baseline assessments, termination, and, in some instances, if you have a very strong positive response in a bioassay, you would probably monitor that person multiple times in the days that follow all for the same exposure so that these numbers in themselves do not provide a technical basis for coming to that conclusion.

CHAIRMAN SCHOFIELD: I've got a question. The documentation you researched,

does it show who was assigned bioassays, say, quarterly, semi-annually, annually? Is there an actual -- are the records --

MR. DARNELL: There is a program document that covers that generally, but you just -- the records for each individual just has what's there. There's not necessarily a correlation between the two.

MR. GLECKLER: I don't think I remember seeing any records in an individual's dosimetry records saying that they were on a quarterly frequency or a biannual frequency. I don't think we get anything like that other than you get the results, and you can tell that, okay, they're on a quarterly basis based on all the dosimeter or the bioassay results that you have, and that's the only way that we can usually tell.

CHAIRMAN SCHOFIELD: Would they have a radiation work permit? Was that a standard practice for them to do bioassay after they finish a job or not? I mean, I don't know if

INL, that's why I'm asking.

MR. DARNELL: I haven't heard of that practice for INL. I know that Mound they used that practice, and some other sites have. I haven't heard that for INL. I don't know if the operations -- most of the general operations would require that level of detail in monitoring. Now some of the jobs, you know, maybe the aircraft ANP test, things like that. That probably could have required something like that, but I don't know off the top of my head.

MR. GLECKLER: One thing that you might want to be aware of is that the majority of the bioassay results at INL are negative results or below the MDAs, which implies that they are performing bioassay measurements more frequently than they need to, aside from individuals.

They're being fairly -- it's an indication of how cautious they are and how well they're using workplace indicators to

say, "Okay, yes, these individuals need to be bioassayed to make sure that they're not getting intakes."

If there was a significant number of them with positive bioassay results, not as a total population, it's like, you know, every time that they bioassay someone it tends to be a positive result, that would imply the opposite, that, A, there's a problem with this program.

The same is kind of true with, you know, the external dosimeter results, and it really comes down to where there's -- I don't want to say a handful. It's clear that a decent number of individuals that received -- you know, where their external dosimeter results are always positive and their bioassay results are always positive, but they are routinely monitored individuals, as well.

DR. MAURO: If you get -- let's say you're doing a dose reconstruction for a worker in 1956 who worked there for several

years. He's been, let's say, bioassayed once, twice a year, and they all come back less than the MDL.

It is my understanding that, okay, we assume the person was, in fact -- we're talking missed dose now, the missed dose procedure, your procedure, of course. You assume one-half of the MDL. That's what he was at.

I'm not quite sure which radionuclides you would pick. Would you go back to where he was working and say, "Okay, at this location at this time, this was the mix of radionuclides that were likely in the environment," or would you pick the worst? Because I know in some places you say it's -

MR. GLECKLER: The TBD, the internal TBD for INL, is actually pretty prescriptive on that compared to other sites. Let me get the table number.

DR. BEHLING: It's 5-24.

MR. GLECKLER: There it is. We can

pass it around.

DR. MAURO: And, Hans, is there a simple answer to that question I just posed?

DR. BEHLING: Yes. No, it's a one-size-fits-all. It's a generic protocol, especially in the early years prior to 1960. You'll see if you look at 5-24, Table 5-24, you'll see a generic prescription for assigning radionuclides and quantity.

MS. JENKINS: Would you do that, Brian, or would you --

MR. GLECKLER: They eventually break it out a little bit more. It's like it starts out -- the early years, it's one-size-fits all. Then you had like -- even for the early years they have special stuff for the test reactor areas because of the certain nuclides that were present, but then they start to break it out as the years progress, because they become, I'm assuming, a little bit different as time goes on.

DR. MAURO: Okay, so you drop a

worker in that box, and you're feeling pretty confident that those default assumptions will, in fact, place a plausible upper bound depending on the organ, I guess, or do you just assign no matter what organ it is?

MR. GLECKLER: Well, ideally the first step we would take if all those bioassay results are negative on that route, we'd skip the missed dose approach and use a more claimant -- an overestimating approach, which is typically --

DR. MAURO: The coworker model?

MR. GLECKLER: No, we'd use the OTIB-18 approach.

DR. MAURO: OTIB-18?

MR. GLECKLER: That is the --

MR. CALHOUN: Limiting air concentration.

MR. GLECKLER: Limiting air concentration.

MR. CALHOUN: So whatever limiting air concentration was --

DR. MAURO: But that's more -- only for denial.

MR. CALHOUN: Not like ten percent back.

DR. MAURO: That's only for denial.

MR. GLECKLER: Right.

MR. CALHOUN: That's correct.

DR. MAURO: Okay, no, that's fine. We're fine with that, for denial purposes operating near the NPCs, but for granting we know that you're not supposed to do that.

MR. CALHOUN: Right.

DR. MAURO: And you fall back to 033, then, which is infraction?

MR. GLECKLER: Well, that's how we use it in conjunction with OTIB-33.

DR. MAURO: I remember -

MR. GLECKLER: Because then if there's positive bioassay results, what we'll typically do is a set -- because typically with INL you don't see any indication of chronic intakes, and the vast majority are

like iodine intakes, where you see a big spike, and they'll take a whole bunch of bioassay samples, and it drops down in a real distinctive peak when you graph it. So we'll assess typically each of those intakes, assign -- figure out the dose for that and add it on top of the OTIB-18 dose, which is part of what you can do under 33.

DR. MAURO: See, that would have been episodic. In other words, you have records of when the episodics occurred, and the person was in the area when the episodic occurred.

MR. GLECKLER: Even if it's not one of the episodic releases, there's a number of intakes that occurred that aren't part of the document. The episodic releases in the TBD are the major incidents, where there's a bunch of release incidents that you'll see, and some are documented in the dosimetry records.

We've got -- you know, like some will have like 100 pages that affect a number

of individuals onsite to where it's like we -- like some of us have printed off those copies just so we don't have to keep looking through them, and we've highlighted the key parts of those reports. There's like a strontium incident that they investigated that involved a number of workers and that we actually processed claims for a good chunk of the workers that were involved with that incident.

It's like it keeps popping up, like, "Oh, yes, there's another one involved in that incident," stuff like that, and I don't think that incident is actually in one of the episodic releases because it's like I think they determined that they couldn't figure out the cause of it.

It was one worker that caused all that. Basically, one worker had a, if I remember right, had a positive bioassay, and it was a fairly significant bioassay for strontium, and they investigated everyone that was working with him to figure out where this

came from.

DR. MAURO: So the gross beta/gamma, one of the things I was going to ask is if gross beta/gamma was the currency at the time for determining the dose reconstruction, then it looks like you have a bunch of alpha emitters that you also assume, depending on the facility at the time, as being an assumed, so you wouldn't necessarily depend solely on your bioassay data. You also have a default set.

For example, if the person wasn't monitored or if you didn't see anything, you still have a default. If he was monitored, then you deal with the mix that applies to him, but let's say he was only monitored gross beta/gamma. You still might very well assign some alpha, even though he wasn't monitored.

MR. GLECKLER: We always assign some alpha.

DR. MAURO: You always assign it.

MR. GLECKLER: Yes.

DR. MAURO: The alpha comes off the table.

MR. GLECKLER: Yes, because they didn't routinely, especially in the early years. It wasn't until the later years where they did any monitoring for alpha-emitting nuclides, and in the early years, I guess the reason that they didn't do it is because they never separated out like the plutonium.

They separated out the uranium, and I can't -- I don't think we have any bioassay specifically for uranium. I'm not sure on that on the early years, but the later years they do, but because like plutonium being one of the key nuclides of concern for internal dose, it's like it was never separated from the irradiated reactor fuel or the spent reactor fuel.

So that source term works for the reactors, and then it also works for the ICPP and that, and the only other thing to look at for the ICPP is when they separated out the

uranium from the spent reactor fuel and that the plutonium all went with the fission products on that, so it's always associated with the fission products, which were much easier to detect. So from what it appears is they didn't bother with the Pu bioassays because they could detect more readily using like a gross beta.

Well, initially, in the early years they just did gross beta, and then they went to gross gamma, and then in that era they started doing strontium-90 analyses, and so if they didn't see anything on those indicator nuclides, then they didn't have any intake of the others.

CHAIRMAN SCHOFIELD: Is there any correlation in any of the data you found between positive urinalysis and whole body counting in the later years?

MR. GLECKLER: You usually don't get too much of the same type of data in the same era. It's like they basically have a very

distinct era where they transitioned from just doing gross beta and urine to gross gamma and urine, and the only overlap is there is some strontium-90 in urine that's usually in the gross gamma in the urine, and then once the gross -- it basically transitions. You know, once they start the whole body counting for an individual, you usually don't see any urine sample results. You only have the full body count results.

In the later years, some individuals will get like plutonium analyses and uranium analyses and a wider variety of stuff depending on what specifically -- what they're -- they're usually working on something special, though, like the SMC project where they have depleted uranium, for instance, and then you'll see some lung counts and stuff like that for specific individuals, but those are still relatively rare.

They mostly rely on whole body counts after, what is it, around 1961 and

later? There's like a couple of years that some of the individuals transitioned close to `61 and some after `61 time frame, but usually by 1963 or later it's almost all whole body count data, period, very little urine data.

DR. MAURO: So, Hans, what I'm hearing is that as long as you could place the person at a particular location at a particular time, and you had some gross beta/gamma urine samples, you're in pretty good shape in order to be able to reconstruct --

DR. BEHLING: I would say generally speaking, but I'm going to come back to the issue that we discussed earlier this morning, and that is the use of or the choice of selective radionuclides for doing that analysis, and I'll ask you to turn to, I guess, page 32 of TBD-5, which has the first set of radionuclides that are likely to be of concern for the ICPP in the area of highly enriched spent fuel storage. There we have or

the TBD in Table 5-18 identifies ten radionuclides, and, again, just above the table it says that these ten radionuclides can be assumed to account for over 95 percent of the dose and therefore will obviously be assigned to a person's exposure.

But, again, to what extent do they necessarily always end up being claimant-favorable to certain types of cancers with the radionuclide mix in question? Even though it will be one that will give you the highest CEDE value, at least for 95 percent of the dose, but for certain select cancers those radionuclides may or may not necessarily be claimant-favorable.

And the same thing applies when you go further to the next page where we talk about, again, spent fuel processing and the identification of -- intakes of most limiting radionuclides. Again, the numbers of radionuclides are even more restricted because on page 34, middle of the page or two-thirds

down the page, it says -- the paragraph starts with, "Table 5-18 contains too many radionuclides for efficient dose reconstruction. Rather than include all of the radionuclides in the default summary table from this dose, i.e., Table 5-24 later in this document, only strontium, cesium, cerium, and plutonium are included for aluminum zirconium fuels."

The question that I have is when those select radionuclides are used for dose reconstruction of specific organs, are we short-changing some people for certain types of cancer?

MR. CALHOUN: My question would be do you know that we are?

DR. BEHLING: Well, again, when we go to the next step on that same page where we have the green fuel in the RaLa runs, we know that, for instance, barium-140 and radioactive lanthanum-140 and 142, they're very short-lived, and they may not even show up in

bioassays depending on when they're taken, and to what extent they will contribute to certain doses such as, obviously, liver cancer would not be included in that select series of radionuclides.

MR. DARNELL: Actually, I think part of the answer is the process that we use to overestimate the dose for claims that are not compensable. They are well overestimated, as we've discovered with using OTIB-18 process in doing the dose calculations. I think the only time that your comment or question about the specific nuclides would be when we would have to do a very accurate assessment.

DR. MAURO: I agree.

MR. DARNELL: And I think that, you know, for that time -- for those times only would we ever need to even look at this, and I think that by the way that we do dose reconstructions they would be looked at. I don't know if that's in the procedure or not. Do you know, Brian, off the top of your head?

MR. GLECKLER: As far as for those, there's nothing really that would call out to identify those specific nuclides, but something to be aware of is in that time frame, if they were -- well, if they were involved with the RaLa process, RaLa process, whatever you want to call it, it's like they should have been -- they were probably routinely monitored during that time frame.

And just, if it's a more radio sensitive cancer, you know, it'll generate a higher POC such as, I believe, a liver cancer will generate a pretty high POC. Odds are it's going to go comp on missed dose alone just for the cerium and plutonium missed doses that would get assigned.

MR. DARNELL: That is the other thing that we do have to remember. When you start looking at workers where you have to get the very accurate dose reconstructions, they're not going to be the ones that aren't monitored.

These guys will -- these people have real dose. They'll have monitoring records because that's the nature of the work and that's the nature that's putting them close to the probability causation of 50 percent or greater.

DR. MAURO: Well, I think that we're talking about one -- we have a worker. We have some gross beta/gamma, and here is the mix of radionuclides, and Hans brings up a point. Well, there are certain exposure scenarios where that mix may not be limiting for that worker for a realistic dose best estimate.

Then we move out of that and go to the coworker model. Now the presumption that the person that was not bioassayed therefore did not have potential exposure, that is a longstanding debate that we've been having through folks, and that sometimes goes toward some of the findings from the Tiger Team.

To automatically make that

presumption I think is not claimant favorable. If you could -- if you take a position that the person wasn't bioassayed and therefore probably was not -- did not need to be bioassayed, I think the onus is on you folks to take it a step further and what his job category was, what he was doing, and why that judgment was valid, as opposed to just -- it's almost like a tautology.

MR. DARNELL: Well, my personal thought is that when we make the statement that there is no bioassay, so he didn't need it, I don't believe that's actually true in the older days of DOE. It's not a decision basis that we're using. We'll say that statement in a dose reconstruction and then say, "However, we applied OTIB-18," or we applied all this.

DR. MAURO: No, that's okay for denial. We're on -- we're fine with you folks on denial.

MR. DARNELL: Okay.

DR. MAURO: I'm more concerned that when you try to do a realistic best estimate dose reconstruction.

MR. DARNELL: You won't find that statement in a best estimate.

MS. JENKINS: In a best estimate case, we would have to justify why we were not assigning internal dose. We would have to have good justification for why we didn't assign any internal dose. We would have to have good justification why we decided to assign environmental internal dose, or we would have to have very good justification as to why we would assign coworker dose.

We can't just arbitrarily say in a best estimate case that, "Okay, he wasn't monitored. Therefore, he had no internal dose." We have to justify, and we do justify our conclusions.

MR. CALHOUN: And we've placed plenty of people that weren't monitored internally based on coworker dose.

DR. MAURO: Oh, no, that's why I asked the question.

MS. JENKINS: Yes, we just -- we don't just say no -- in a best estimate situation, we don't just say, "No bioassay, no internal dose." Now --

MR. GLECKLER: We need to be careful when we say coworker dose for INL because --

MR. CALHOUN: We don't have a coworker model.

MR. GLECKLER: Yes, we never compiled the coworker data.

DR. MAURO: But you do have a generic coworker -

MR. GLECKLER: We might have compiled it, but we never processed it.

DR. MAURO: Right now, you do have a generic model for coworkers, internal and external, and Jim and I have been discussing it because this emerged on many occasions, and this goes to -- it's complex-wide on philosophy, and I think that the philosophy

that I -- and Jim, of course, can confirm this or not, but the philosophy being here you have a worker that doesn't have any bioassay data. You look into his work history, and you feel that maybe he could have received some exposures, internal exposures, and we'd like to do a best estimate dose reconstruction for his cancer.

At that point in time, a judgment has to be made whether or not we're going to assume he probably didn't get any exposure, and we're going to assign environmental, or you can --

MS. JENKINS: We also -- well, we'd look at his external dosimetry results in conjunction with his internal. No external, no bioassay, that lends itself to being able to support the fact that maybe you give him environmental internal. If he's got positive external dose and no bioassay, then, well, he obviously was somewhere, so then you start looking at assigning him some type of dose.

DR. MAURO: And in comes the coworker model at that point.

MR. DARNELL: It could, yes.

MR. GLECKLER: The internal TBD specifically tells us to assign something above and beyond environmental internal if they've got positive external dose for a given year.

DR. MAURO: And, see, you're using external dose as an indicator of whether or not you want to assign a coworker dose.

MR. GLECKLER: That's essentially a claimant-favorable assumption.

DR. MAURO: Okay.

MR. DARNELL: But you're not going to get an exposure if you're not around the radioactive materials, which gives you the idea, lends credence to the idea that if you're getting an external exposure, you're around the materials, so therefore you maybe should have been -

MS. JENKINS: There could be an

internal.

DR. MAURO: All right, so at that point you're saying you have to make a judgment. Are we going to assign to this person the full distribution for the coworker model, whatever that distribution is, or some upper end value, 84th percentile?

Do you have that in your writeup right now, that is, this is the radionuclide distribution mix and intakes that are going to be used, either a distribution or a geometric mean, when we believe the guy might have been exposed because he has some positive external or we don't believe he's at the upper end on the distribution?

In other words, I'm really bringing you back to --

MR. DARNELL: There is a procedure that covers that in these notes?

DR. MAURO: Yes, there is, and how -- but that procedure does not give you explicit coworker model. It's a philosophy of

how you --

MR. DARNELL: It doesn't give us explicit coworker data, but what it does have in here or prescribes in here for us to do for -- let's say we have the situation where we've got a worker that doesn't have any bioassay data, but he's got -- a couple of weeks he's got positive external dose.

Per the internal TBD, we can't just assign him environmental internal for those years. However, for this site -- and I think it's probably the only site where we have it, where we can do what they call a default missed dose calculation -- basically we use hypothetical bioassays as if they were monitored and assign a missed dose based on that. And we'll use that Table 5-24 and get the nuclides list, or, depending on the later years, it's like they have -- they refer you back to Table 5-18, which is a more detailed list of nuclides.

DR. MAURO: And did that table give

you the mix or gives you the --

MR. GLECKLER: Well, basically, for instance, for like prior to 1960, you would assume that he only had a gross gamma or a urine sample analyzed for gross beta, and so then you would calculated it assuming that it was a strontium intake, and then you'd take like .4 times that.

MR. CALHOUN: And the intake would be based on LOD.

MR. GLECKLER: But then you get ratios to get the other nuclides like cesium, plutonium, 238, and cerium.

DR. MAURO: Okay, I'm with you. That's assuming he's got a measurement.

MR. CALHOUN: No.

MR. GLECKLER: No, we'd assume that there was a measurement, because he at least -- if he was monitored, no. Under the assumption that if he was monitored and all his bioassay results were zero --

DR. MAURO: I've got it.

MR. GLECKLER: -- he would get that much, at least --

DR. MAURO: Okay.

MR. GLECKLER: -- for a monitored worker and thus get -- so it's something that it's actually these early bioassay results, because the MDA values that we have are very claimant-favorable in this TBD right now, and it's like we might look at reducing those. These doses, these missed doses come close to TIB-18 doses.

DR. MAURO: I'm with you, so you have a urine sample below the limit of detection, and you have a default set of assumptions and still get less than the MDA.

MR. GLECKLER: Yes. Well, we assume he had a urine sample. We would assume that there was a --

DR. MAURO: Assume.

MR. GLECKLER: Yes, because this is an individual --

MR. CALHOUN: This is your guy that

you said got external dose, no internal dosimetry.

DR. MAURO: And that's why --

MR. CALHOUN: We assume they had -- he was monitored and got zeroes, and we assign him this dosimetry with that.

MR. GLECKLER: Yes, because ideally what we would do is just use the overestimating approach with OTIB-18 and overestimate it, but if it's closer than that, we could make the case compensable on missed dose based on a hypothetical bioassay result.

DR. MAURO: Hans, I just heard something that is a first for me. You do a lot of these. What I just heard is that I have a worker. I have no bioassay data, but I do have some positive external data, so therefore there is reason to believe he might have gotten some internal, some intake.

However, there is no -- we don't have any samples, and they're not going to -- they just -- they're going to assign the

missed dose as if there was a sample that came up with less than the MDL.

That is new to me, because it's my understanding it's at that point when you have no bioassay data where you have to have a coworker model, not operate on the assumption that he had a bioassay sample, and it was below the MDL. This is disturbing to me.

Hans, what's your -- you know more about this than I do.

DR. BEHLING: Well, I'm going back again to Table 5-22, and the first series of calculatable approaches that define the startup to 1960 do, in fact -- at least, this is my interpretation -- require that you do have a positive urine gross beta bioassay.

Am I correct? Because the first thing it says, "Based on urine gross beta," and then you calculate chronic sontium 90 intake that results in the urine activity that is equal to 0.4 times gross beta. If gross beta is below MDA, you don't have a value, but

I suppose you can take half of MDA and substitute that for an empirical value.

MR. DARNELL: And that's what's being done.

MR. CALHOUN: Let's just say, though -- let's change the terminology here a little bit. Let's not just -- let's not say -- we assume he was monitored. We don't have the results.

What we're doing is we're assigning a dose that is equivalent to a monitored worker who received less than MDL. Now, this is supported, because there are so many negative internal dosimetry results at the INL that, number one, we can assume that it's likely that he would have been monitored should he have had the potential to have been exposed, but since he wasn't, and he has had some external, we're going to give him internal dose, anyway.

It's kind of like a coworker model at the lower end. We're not assuming he was

monitored. We don't have results. We're assigning a dose that would be equal to someone who was monitored and received no positives.

MR. GLECKLER: But it really hinges on the fact that the majority of those bioassay results were typically negative, and if it was a site to where the majority of the results were positive just like for the monitored workers, then, yes, you really couldn't get away with that.

DR. MAURO: Well, what you're really saying is your coworker model is that if, in fact, you do take -- because so many people have less than the MDL that were monitored, a reasonable coworker model is that if this person were monitored, he would have --

Now, my experience is -- my experience is that you build a graph. You take all your bioassay data, and you construct a distribution from the bioassay data, which is usually logged normal, and you assign the -

- now, what you're saying is there are so many zeroes or less than the MDLs.

I've got to say I'm not sure what you do when your -- when you make your big table, here we have 10,000 bioassay samples, and 9,000 are zero, and 1,000 are above the MDL, not assay zero, below the MDL. I'm making that up. What do you do to build a coworker model when you have a circumstance like that? We --

MS. JENKINS: That's a totally different study. A team is commissioned to do a coworker study, and a coworker study has not been commissioned for INL.

DR. MAURO: Okay, so it sounds like that's something --

MR. GLECKLER: It would have been independent of the TBD.

MS. JENKINS: That's not a TBD thing. That's a coworker study.

MR. GLECKLER: Sometimes you'll see population data in the TBD's quota, but that's

kind of something we've gone away from, because it can't be used for dose reconstruction. They need to have coworker data, which accounts for missed doses.

DR. MAURO: I mean, you actually have a coworker model in all where over 90 percent of the workers have a bioassay sample, so it was deemed, even though only ten percent of the workers have no bioassay, we still felt we had to use a coworker model, and we have one, and it's a good one, and right now we're looking at it, and there are certain questions that are being posed to it, but I think it's looking pretty good.

What we have here is the same circumstance. You're saying lots and lots of people have had their bioassay samples, but there are a certain percentage that possibly had gotten some external exposure but were not sampled. It sounds to me you need a coworker model.

MR. CALHOUN: That's possible.

MS. JENKINS: That's a decision that we don't get to make.

MR. CALHOUN: It couldn't hurt.

DR. MAURO: Okay, but, I mean, that's --

MR. CALHOUN: Yes, there's other sites out there that, you know, I mean --

MS. JENKINS: Some sites have them. Some don't.

MR. CALHOUN: It's always best to have a coworker model, too, but it's probably on the list somewhere.

MR. GLECKLER: The INL ones have been taken off the list, because based on our input, you know, it's like basically we don't see a need for it, because the TBD covers it.

MR. CALHOUN: Yes, if there's really, really extensive bioassay and dosimetry, they won't do a coworker model.

MR. OSTROW: I just have a basic problem, sort of philosophical, maybe, with what I'm hearing is the approach, that if you

have a worker without a -- without the data, you assume that he didn't need to have the monitoring, because he had such a low exposure to it, and therefore you're assuming that you're assigning him half the MDL without really knowing what he really got.

MR. DARNELL: We are assuming that he could have had an exposure, because he had a positive external exposure, so because of the large number of zeroes and probably because it's done individually but most likely based on where that worker worked and the type of work he was doing, as well as the bioassay for that facility, they assign one-half of the MDL.

It's not just where you've got a guy with a positive TLD, and we're going to give him internal dose. It's not just that. There are other factors that go into that decision.

MR. GLECKLER: That's potentially claimant-favorable compared to other sites,

because a lot of the other sites don't have that if there's a -- you know, you have to have a fairly significant positive external dose before they really, you know, have you look at something other than environmental internal. Odds are the individual only got environmental internal, but giving them anything above that is likely going to be claimant favorable --

DR. MAURO: What you're saying is --

MR. GLECKLER: -- and this is a big -- this is a big plus.

DR. MAURO: What you're saying is true. However, I still have a problem with it, because that's like dealing with on the average, probably, and all that. It may not necessarily be claimant-favorable for a particular person.

MR. GLECKLER: But you have to have something that indicates that that person received an exposure out of the ordinary.

MR. CALHOUN: Right, and that's

going to be based on -- that's going to be based on the CATI. We're going to take that into account. We're going to take his employment records into account. We're going to take monitoring history into account.

DR. MAURO: You do all that, and you walk away, say, "Listen, I think we've got to assign this guy some internal."

MR. CALHOUN: Yes.

DR. MAURO: Okay. You walk away. Either you do, or you don't. Once you decide, "Yes, we do. We're going to give him something," there is some question about, "Well, what do we give him?" Do we give him an intake that corresponds to environmental? Do we give an intake that is the full distribution for the data that you do have?

MR. CALHOUN: Right.

DR. MAURO: Do you give him an intake which is assumed to be one-half of the MDL, or do you give him an intake that's at the upper 84^{th} percentile of the distribution?

MR. CALHOUN: Well, there's only two options, as far as I know, and correct me if I'm wrong here. You've got environmental, or you've got this dose that's equivalent to being monitored and not --

DR. MAURO: You're not seeing it.

MR. CALHOUN: Yes, and that includes the distribution of those radionuclides in that table.

DR. MAURO: I understand, but you're --

MR. GLECKLER: It's outside OTIB-18.

MS. JENKINS: It's best estimates based on --

MR. KATZ: One at a time, because the poor transcriber cannot transcribe both of the voices at the same time.

MR. DARNELL: What you're basically looking at, if you don't do -- if you try to do a coworker model, you've got thousands of samples down here at zero, and then you get a big shoot up, okay, so what is the correct

thing to give somebody? It's going to be zero.

MR. OSTROW: Is it? No.

MR. DARNELL: If you get -- the same thing happened at Pinellas. At the upper 95th percentile, it was less than 100 millirem for no matter who the worker was, so we gave them up to 100 millirem. You get enough bioassay at zero or below, you're going to get to the point where 95 percent of the people are at zero or a very, very low number, and that's what you would give them.

MR. CALHOUN: And by zero we mean --

DR. MAURO: Less than the MDL.

MR. DARNELL: Less than the MDL, okay, so you stack up the number of bioassay. You have less than the MDL, and then shoot up. What we're doing is basically giving them credit at that point for being less than the MDL when most of the workers are already less than the MDL.

DR. MAURO: I think the onus is on -

- we've seen this before. In other words, this is ringing a bell. We had our statistician, and we looked at -- what we're really saying is, you know, there is a distribution out there, and it's almost like a policy decision.

When we're in this circumstance, do we make the assumption you made or whatever we've done in the past? I think there is a consistency issue. We've seen this before on other sites where you've got just this circumstance, and I'm not quite sure how it was dealt with.

MR. KATZ: I may have recollected incorrectly, but I thought a couple weeks ago at our work group meeting -- and I was thinking it was Mound, Josie, but I could be confused about that.

I thought it was there where we had a coworker model. It was built on the data, but it comes up to lower than the MDL, and so they did -- but they built -- they actually

did the work, constructed the coworker model.

The results ended up at the MDL or whatever, so they were applying that, and you were asking questions about, "Well, is that right to be applying the MDL?" and Jim Neton's response in effect was, "Well, if that's what the data tell you is correct, it just happens to be that that's what it is. That's where you get to."

DR. MAURO: Okay.

MR. KATZ: But in that case, they did the work.

DR. MAURO: Yes, I would say that, you know, I mean, if it turns out that 95 percent of the numbers of the bioassay samples in the worker population were below the MDL when you did take the sample, I can understand the rationale, and this is the class we're going to assign to this guy.

MR. DARNELL: I just threw out the number 95 percent. I don't know what the actual percentage is.

DR. MAURO: Whatever number they get. I know we've been there before. It's probably important that whatever we do here, we do what we did before.

MR. GLECKLER: It shouldn't be over 50 percent based on what I've observed. So many of them are just zeroes on that.

MS. JENKINS: And based on faith in the dosimetry program, you know, the assumption is also made that the people who needed to be monitored were monitored appropriately.

MR. OSTROW: See, that's a little bit going back to taking, putting faith in the monitoring program, that it actually worked, not that it didn't, but there's been a lot of evidence in looking at all the different sites, especially in the early days. What was written down on paper, how they actually monitored --

MR. DARNELL: She's not saying that the program was right. She's saying that the

monitoring was done appropriately. In other words, if they needed samples, samples were taken. We're not talking about calculations, not talking about uncertainties, not talking about any of the other stuff. It's just that the right people should have been monitored.

MR. GLECKLER: Also what we need is evidence specific to the INL site. So what if it happened at other sites? We know that happened. Did it happen -- do we have evidence that indicates that this occurred at the INL site?

If it occurred as our -- if it only occurred for a specific period of time, you know, unless we know details of a specific, you know, scenario, it's like we really can't even investigate it or do anything. What do you do about it?

It's like, you know, it's something out there that's -- you know, unless we have some evidence that indicates that that actually happened, it doesn't do us any good

to debate it.

MEMBER MUNN: Well, INL was always unique in many respects, not the least of which is that it came online later than the other large complexes did, and its mission was different than the other large complexes.

It was more of a research and testing status than it was a production facility, which makes it very different in a number of ways and may give some legs to the concept of a monitoring program that had the advantage of some previous history in the complex to help it get started. I don't know that anyone needs to make that assertion, but it's a historical fact, I think.

MR. DARNELL: And the other part of this with the dose, especially with the internal dosimetry program, is you need to remember that this was the home of the entire DOE complex's internal dosimetry program.

They had more focus. They had more interest. They had more money to do that

stuff at INL than they did anyplace else. While you do have to take into account the negative factors like you guys are discussing with the Tiger Team report, you also have to take into account the positive factors.

CHAIRMAN SCHOFIELD: What year did the accreditation program start?

MR. CALHOUN: Eighties, wasn't it?

MR. DARNELL: Yes, early eighties.

MR. CALHOUN: Internal?

MR. DARNELL: Eighties or nineties. 58-480.11 came into effect in 1989. It was for the entire program, but the voluntary -- the DOE lab accreditation program predated that. I'm just not sure how long.

DR. MAURO: I would agree with that approach if population workers that you were going to pull -- see that graph? In my mind, that graph is different as a function of location and time. That is, if you were working at TAN, or you were working at ABR, wherever it is you were working, there is a

population of workers, and that graph might very well be different in different places, and so I think if you were going to do that, it would be a little bit more justifiable if you're building your coworker model, that, from the population in which that worker belongs.

MR. DARNELL: I think Table 5-24 pretty much does that, because it's four different nuclides, four different places.

MR. CALHOUN: And I'll bet we haven't crunched the numbers, but I would -- it's likely that the people on the high end of that, you're not going to find it's the case very often where they don't have internal monitoring. I don't know that.

DR. MAURO: No, I'm saying there might be a -- there might be a facility where the graph isn't like this. If the graph is like this, fine, but let's say the graph is like this. Like this.

Let's say this is one facility,

BORAX, but ABR is like this, okay, I don't know, where you don't get so many zeroes. You're getting a lot of positive hits. In other words, you don't have a large number. I guess this is number of workers. This is the peak occurrence per liter or something. I don't know.

MR. DARNELL: Sure, the dose consequence, or it can be whatever you --

DR. MAURO: I'm trying to justify to myself what makes sense to me, and I think that there's probably a lot of great variability depending on time and operation of the facility where the kind of graph that you would plot like this when you do have bioassay data and you apply a frequency distribution, how many zeroes do you have? How many zero to ones do you have? I mean, you know, less than the LDLs?

MR. GLECKLER: For example, in 1961, not just because of SL-1 but because of a number of other occurrences that happened to

happen that year, there are a much larger number of positive results for that year.

DR. MAURO: You have to deal with that, right, and to me it's almost like, if it was me, and I was having my dose reconstructed, what would make me feel confident and comfortable that you did the right thing by me? And let's say you use the universal data all the bioassays -- let's say there's 100,000 bioassay samples taken across the complex over 50 years, and they're all plotted. I wouldn't like that, because I am certain to be rolled into --

MR. DARNELL: Could you speak up?

DR. MAURO: What's that?

MR. DARNELL: We can't hear you.

DR. MAURO: Oh, I would be uncomfortable if you sort of rolled me into global bioassays, and I happened to work there during a three-year period in 1957 to 1960 at the BORAX facility. I would be a lot more comfortable if you assigned to me some, you

know, some value from this distribution -- 95th percentile.

I would be very -- I would be comfortable if you said, "We're going to assign to you the upper 95th percentile amongst all the workers that worked at BORAX in this decade or in this time period," and then I would say, yes, I think you did right by me and not just roll everything up. Do you see what I'm getting at?

Otherwise, you sort of homogenized the whole place, and I think that would be unfair to that particular worker. "Wait a minute. No, I worked over here in this time. That data doesn't represent the world I lived in. That represents the world the whole complex lived in for 50 years." Do you see what I'm saying?

CHAIRMAN SCHOFIELD: Yes.

MS. JENKINS: Yes, but in lots of situations it comes down to that based on information given to CATI. We do make

professional decisions like that.

CHAIRMAN SCHOFIELD: So you're going to have to look at a coworker model almost in some respects, depending on location, if during the CATI interview they said, you know, "I worked at the chem processing plant area"?

MR. CALHOUN: I think maybe the first step is to better define the proportion of non-positives to the overall population or something. I dump it into a coworker study right now. There's a reason we haven't done one, and I don't want to commit to doing that, but, you know, I don't know what else we can to do to make people feel more comfortable with this.

MR. GLECKLER: I think the urine data might be entered into a database. That's all the farther we've got.

MR. CALHOUN: I haven't dug down into the weeds that far.

MR. DARNELL: I don't know if they've got the data. The raw data's got --

the sheets have facility location tags, but I don't know if they capture that as part of it.

MR. CALHOUN: And how big of an issue is this? I don't know. I don't know how many people are involved.

MR. DARNELL: Again, we're talking about a subset of a subset of the radiological workers. You know, we're really down to the weeds point of how do you do a best estimate in discussing this. Otherwise -- otherwise, this is moot, and I'm not absolutely sure that for a TBD review this conversation is really germane.

You know, there are procedures that we have in place -- we discussed those earlier -- that tell the dose reconstructor how to do this stuff and how to come up with the best estimate doses. That's not part of the TBDs. I'm not saying we should kick this out, because I think it's a worthwhile discussion, but I just don't know how germane it is to what we're trying to do with the TBD.

MR. KATZ: Just a little context, Pete. I mean, I understand that this has come up, actually, recently in another meeting, too, this issue of, you know, all across the complex most of the dose reconstructions, you know, are worse, you know, are in effect overestimates or underestimates, but with the site profile reviews, as with all of the work that SC&A is doing, I mean, the point of it is not those cases, because generally there is agreement that, yes, these things are being done well.

The overestimates and the underestimates are doing the job they need to do, at least, but, I mean, all of, really, the real important grist is about the best estimate case, because you want to be certain that there is justice done to those cases, so it doesn't really matter.

That's what I think, why Jim got a little frustrated earlier with your response about, "Well, most of the cases this doesn't

apply to," but that's not -- that's not -- that's not the matter for which the Board's, you know, reviewing these, you know, putting most of its meat into these reviews.

It's really for these, and with all the site profiles it's germane, as well as petitions, to be certain that those best estimate cases are doing fairness to the claimants.

MR. DARNELL: Yes, I'm not trying to kick something out because it doesn't apply to most cases. I'm just trying to understand where we're all coming from.

DR. MAURO: As a matter of process, when we engage in this process and we bring up an issue and don't necessarily agree, okay, maybe there's something that needs to be thought about, and if it's, you know, your judgment, of course, at some point we are going to agree in principle, this seems to be a reasonable strategy for dealing with this concern. I know we didn't get to that point

yet, but at some point we'll get to that point whether, you know, it's a kind of agreement.

Then it becomes a matter of your call. You stated in your response in the matrix, and usually it's a commitment to do one of two things, write an OTIB that will provide additional guidance to the dose reconstructor on how to deal with this particular issue when it arises, or a commitment that the site profile will be amended at some point in the future, maybe at the next two-year round. I mean, this is your call, but --

MR. CALHOUN: Or that we stand by what's in there completely, and we're not going to do anything.

DR. MAURO: Yes, and that's fine, and that's your call, but that goes in the matrix, and then, when that hits the matrix, we meet, and we talk about it, and, you know, we knock heads and we see where we come out.

MR. DARNELL: I don't think we're

actually far off on agreeing on this issue. We just -- I think we need to provide a little more detail on the best case estimates, really.

DR. MAURO: That's what we're talking about. That's all there is to it.

MEMBER MUNN: That appears to be the case.

MR. CALHOUN: Next?

CHAIRMAN SCHOFIELD: Okay. We're still basically on the same subject, the high-risk jobs' internal exposure issue.

DR. BEHLING: Hello?

DR. MAURO: Yes, Hans?

MR. CALHOUN: Is he muted? Are we muted?

MR. KATZ: We are muted, and I don't know why, because it's not -- the mute button is not affecting it. Did someone kick the phone, perhaps?

MR. CALHOUN: Well, there's not one down here. There could be a plug over here,

but I'm going to blame it on John.

MR. KATZ: It just went mute. Let me --

MR. CALHOUN: Did you hit the -- oh, yes. Sorry.

MR. KATZ: I just moved my thing, and -- Hans?

MR. GLECKLER: I just moved it just now, yes.

MR. KATZ: Can you hear us now?

MR. GLECKLER: It was sitting right here.

MR. KATZ: Is Hans the only one on the line? Is anyone on the line right now?

MR. CALHOUN: Way to go, Brian.

MR. KATZ: Okay, well, we're still on the line.

MR. CALHOUN: I told you not to do that until 3:30.

MR. GLECKLER: This was sitting like off, and once we switched to the next thing, it's like I put it there, and it was right on

top.

DR. MAURO: I would say -- I think -- I hate to say this, but we talked about some very, very important concepts. We're coming to closure, and Hans was not part of this, and Hans is my go-to guy.

MR. KATZ: Yes, I think you just -- did you just mute it within the last --

MR. GLECKLER: Yes, because I just --

MR. KATZ: We're reconnected on the --

DR. BEHLING: I'm back. I got disconnected.

MR. KATZ: Hans, how long were you disconnected for?

DR. BEHLING: Oh, just a few minutes. Yes, as quick as I could redial, I was reconnected.

MR. KATZ: Okay. Thank goodness.

MR. DARNELL: So just in a quick recap, NIOSH needs to provide more detail on

how we do the best estimate for internals.

MR. CALHOUN: Where there is no monitoring data.

DR. MAURO: Where there is no monitoring data.

DR. BEHLING: And I would add to that when there is monitoring data, because one of the major concerns I keep expressing, both for environmental as well as internal, when there is data and especially if the data is confined to gross beta or gross gamma or some other generic bioassay that does not necessarily identify the radionuclides that may be very critical in that organ dose assessment.

And, as I said, I looked at all of the different facilities, and before we perhaps close the door to this whole issue, I looked at a couple other facilities including the Rad Waste Management Complex, including the transuranic storage area, and, again, in Table 5-20 the dose reconstructors provided a

table that gives the ratio of various radionuclides, transuranics, plutonium and uresium, and uranium and curium. There's very little information provided that would allow that person to say, "Okay, this is what I need to do here."

I would assume that that table is to be used in conjunction with a urine analysis that specifically identified one of the several radionuclides in question, either plutonium, uranium, or curium, and on that basis, once you have one of those radionuclides for which there is either below MDA or MDL or a positive measurement, you would then use this table to assign all of the other transuranics to that particular urinalysis. Is that correct?

MR. CALHOUN: Yes, that's my understanding.

DR. BEHLING: Yes, and the problem is that that kind of information isn't given when I look at it and I read it, and if I were

a dose reconstructor, I would say, "Oh, that's very cute. You have a waste facility here, and it tells me that there are 65,000 cubic meters of solid TRU waste," and then you give a breakdown and say, "Okay, 44 percent of that is plutonium-241."

There should be some additional information that says, "Okay, if a person was assigned to that facility, TSA facility, and there was, in fact, a bioassay for that individual which shows one of these radionuclides as a positive value, this is how you do it."

Right now, obviously, I would assume all of your dose reconstructors are smart enough to put those or connect those dots, but I'd like to see a few additional comments to that effect. In fact, most of the TBDs that we've had in the past, there's usually an appendix that says, "Okay, here you are, and here's what you need to do in order to make use of the data in Table 5-10."

This is lacking right now, and I would put -- I would say that the dose reconstructor at times will kind of be scratching his head and saying, "What do I do now, and how do I use the data as I see it?"

MR. GLECKLER: If I understand correctly, you're saying that we've got isotopic data versus just a generic gross beta/gross gamma type stuff?

DR. BEHLING: Well, there is, in fact, I believe, if you go back to at least one of the tables, Table 5-10 in the TBD, they do, in fact, show that there was a limited -- at least for the years `59, `60, and `61, there was a limited amount of alpha analysis for thorium, uranium, plutonium, and uresium, as you can see on --

What's the page here? It's on page -- it's on Table 5-10, and I would assume, if that's an example, you would expect to have -- this would be page 23 in the TBD. You would expect to have, perhaps, data all the way back

to the time of 1952, because that's when the Rad Waste facility started operation.

MR. DARNELL: I think one of the things that you're looking for, Hans, that you're not seeing is the actual procedures on how this information is used and how the dose reconstructor takes this data that's presented in the TBD and turns it into a dose reconstructor, and that is not in this TBD.

DR. BEHLING: Well, most times, in most TBDs, usually they are given specific instructions that make reference to various tables.

MR. DARNELL: You're absolutely correct. You're absolutely correct, but this particular TBD was one that was developed later in NIOSH's TBD cycle, for lack of a better word.

They were already going back to the first TBDs and developing the, I guess, the HP instructions or whatever you want to call it. In other words, how the HP was putting the

dose reconstruction together was being put together at the particular time that this TBD came out.

So I think what we're seeing here is that there is -- some of the information that you would normally have seen in a TBD is now actually included in the HP procedures and instructions, rather than all in the TBD. What you have, the TBD here is providing more of a generic -- more generic information than what you're used to being seen.

MR. GLECKLER: A lot of the specifics aren't covered by -- I think it's OTIB-60 is our internal, if I remember right on that. We've got a number of procedures for, you know, dealing with the medical and the onsite ambient doses, and that's all dealt at a higher level that's complex-wide, whereas, you know, part of the instructions that I've heard recently on the TBDs is like, yes, it's like if it's --

They don't want -- we don't want

the TBDs to be too prescriptive of how to do the dose reconstruction, because we have upper-level procedures and documents that dictate that, and what you run into by putting in too much prescriptive information on how to do that, you run into conflicts with those as all these documents get revised. So, ideally, it's like if there's anything real prescriptive in our generic procedure, we should yank it out of the profile.

MR. CALHOUN: On Table 5-24, doesn't it do that? I'm at a loss.

MR. GLECKLER: What's that?

MR. CALHOUN: It seems like Table 5-24 does what he's asking.

MR. GLECKLER: I keep thinking that, but --

MR. CALHOUN: Yes, I mean --

MR. GLECKLER: It gives the other --

MR. CALHOUN: I understand the argument that not all the radionuclides are included, but 5-24 is very prescriptive as far

as how do you assign the mix of dose. It's not even a whole lot of thought that goes into that.

It's, "Here's what you do," and one of your points that you've come to twice here, at least, is the point regarding another radionuclide and how it may affect a certain organ differently, but what I'd like to see, and maybe it's in your total writeup, is that if there is another radionuclide based on what its relative abundance would be, compared to the strontium or whatever the key radionuclide in this table is, you know, show me where that would have a significant impact on a certain organ, and maybe it will.

DR. BEHLING: Well, let me go back here, and with regard to 5-24 for the period of `52 through 1960, you know, obviously have prescription here that says, "Okay, you can take these protocols," and they list, obviously, the various radionuclides that basically start out with strontium-90 and

cesium-137, plutonium-238, cerium, and so forth.

But let's assume the guy worked at the transuranic storage area where the radionuclides in question are defined by Table 5-20. So now you have a complete reversal of assigned radionuclides that are not necessarily -- do not necessarily reflect what's on Table 5-24.

MR. DARNELL: So what's your point?

DR. BEHLING: The point is you're going to be calculating an organ dose based on a radionuclide mix that doesn't apply.

MEMBER MUNN: It would sound wise for NIOSH to respond to the specific issue that's been put before us in writing so that if it does not respond adequately to the concern that's being raised, then SC&A can in turn respond back, "No, we don't see it that way. This is the way we see it," so that this entire discussion will not just be on the transcript.

It will be in the written record of this group as to how the issue was resolved. Trying to solve it in this kind of setting may be productive here, but it has not been productive in other places, so perhaps the wisest course would be for us to consider looking at the written response from NIOSH.

MEMBER BEACH: Well, and that goes to all of them, not just this one.

MR. DARNELL: Oh, yes, we're going to respond.

DR. BEHLING: I think Phil in his opening statement this morning basically set the stage for everything that I meant to say or maybe already have said, too, and that is that this facility is a very, very complex facility, unlike so many others that are in a production mode of enriching uranium and other things.

This facility is a very complex one. It has 52 reactors. It has different processes, and each facility had its every

unique radionuclide mixture, and when you go to a certain default value, you obviously have to make a compromise, and as I see it here, that compromise could certainly affect select cancers for which we are doing dose reconstruction by virtue of the radionuclide mixture that may not necessarily be claimant favorable.

MR. DARNELL: Well, what I hear you saying is it may do this. It may do that. Do you have a calculation, say, for the liver?

DR. BEHLING: Of course, I haven't done that yet. I mean --

MR. DARNELL: Well --

DR. BEHLING: All I can say is that in all likelihood the assigned dose will change based on which radionuclide mixture you will assume or apply. That's a given.

MR. DARNELL: I think NIOSH's position is that the isotopes that we selected and the way that the dose reconstruction is done covers it. I mean, show us where we're

wrong. We'll be glad to look at it.

MR. CALHOUN: There's too many possible radionuclides -- I mean, you know that -- in fission products that were dissolved in fuel or whatever they were doing there. There would be way too many to try to prove every single radionuclide is going to be specific to every single organ.

DR. BEHLING: Well, as I said, if you use the criteria that you take the radionuclide mixture that represents 95 percent of the CEDE, that in itself will obviously tell you that it's not likely to be one that will always be favorable to the actual dose that a particular tissue may have received based on the type of radionuclide mixture to which that individual was exposed. That's something you can almost conclude without doing any calculation at all.

MR. OSTROW: You know, I'm being maybe simple-minded in this, because I don't actually do the dose reconstruction

calculations, but since you're doing this on computer, anyway, what's the practical problem just using all the radionuclides? You're not doing it by hand. What do you care about cutting it down to 12 nuclides and 9 --

MR. CALHOUN: It's huge.

MS. JENKINS: I mean, that involves multiple, multiple runs.

MR. OSTROW: You can't just input all the radionuclides?

MR. CALHOUN: No.

MS. JENKINS: No.

MR. OSTROW: I'm being simple-minded here.

MS. JENKINS: No, it's huge.

DR. MAURO: My experience is you put more than one radionuclide in -- like I try to put a mix of uranium sometime, different --

MR. CALHOUN: That's the only one that you can even mix. You can't put uranium and thorium together. You can't do it.

MR. DARNELL: You'll have a dose

reconstruction with a section for plutonium, a section for uranium, a section for thorium, and on and on and on.

MR. OSTROW: Okay.

MR. CALHOUN: Individual runs for each one.

MR. OSTROW: I didn't know that. Okay.

MS. JENKINS: I mean, it will significantly increase the time it takes to do a dose reconstruction.

MR. CALHOUN: Is there any uncertainty associated with the input of the data from Table 5-24?

MR. GLECKLER: What do you mean?

MR. CALHOUN: Is it put in as a constant? Is it put in as a normal distribution?

MR. GLECKLER: This dose is triangular, right?

MR. CALHOUN: Sometimes it is.

MR. DARNELL: Sometimes it is. I

don't remember what it is for INL. I've seen it both ways, I think.

MR. CALHOUN: I mean, that's something to look at, too, if we're saying it's 95 percent.

MR. GLECKLER: Yes, for INL it's kind of like being treated as a -- actually, if they don't have any bioassay data, it could be entered technically as a normal, because it's an unmonitored dose at that point.

DR. MAURO: I've got to say it's not -- you're putting something on SC&A and the Board and the work group, that really isn't yours to court. You've made a judgment that you can go with those nine radionuclides or those radionuclides because you feel that that's bounding based on the CDE argument, and we're saying, well, there are some flaws to that argument that really have to be explored, and we gave our rationale.

Now, if the work group wants us to research that, we certainly will do that, but

this -- I mean, time and again we're always -- it is explained to us this is not our job, and we'd be certainly more than happy to do it. You know, we'll do it, but, quite frankly, this is, in my opinion, this is something that if it's a reasonable inquiry that needs to be put to bed, this is something NIOSH usually does.

MR. CALHOUN: We just want to try to get away from, "There's something wrong with this. Prove us wrong," and we'd like to get into, "Then tell us exactly what's wrong, and we'll evaluate it," but with this one, we're really not getting there. Now, we may come back with, "We're not going to do that."

DR. MAURO: You know how I would do it? I wouldn't work them in, though. I would put a spreadsheet out, okay, and I would say -- I would put down the organ dose conversion factor for all the 52 radionuclides and then weight them and then say, you know -- and at the end you say it's obvious that these nine

will always be limiting.

MR. CALHOUN: My first step is going to be to go back and see why we picked those nine, and, you know, that very well may be there, you know.

DR. MAURO: Did this nine come out of the RAC work?

MR. CALHOUN: I couldn't tell you.

DR. BEHLING: Well, I think most of them will come out of an evaluation of what does this contribute to the committed effective dose equivalent, 50-year effective dose equivalent, which may not always reflect the benefit to a specific organ for the total radionuclide mixture.

You know, for instance, I'm looking at Table 5-22, where we have the gaseous radionuclide mixture for the advanced test reactor, and you will see the overwhelming contribution to that dose is iodine-131, and that's probably true for when you talk about contributing to a CEDE value, and if you

obviously have a case where a person has a thyroid cancer, that would be a very, very relevant mixture of radionuclides.

But what if the individual has another cancer, lung cancer or colon cancer or something? To what extent is this an improper radionuclide mixture, especially when -- and I did look at the basis for it. Obviously, we used codes, and we used certain release fractions based on serious damage to the fuel.

However, in one of the statements above on page 37, one of the things that caught my eye was the statement that goes as follows. "Several factors contribute to unusual amounts of fission products in the coolant system of the MTR and ETR during early operations."

And then it says, "With cladding technology in its infancy, the quality of the cladding was not the best, and fission products leaked through it. Another factor was trans fuel, which was contaminant on the

outside of the cladding."

So here we are with a situation where we have a potential fuel failure, given the fact that this was a technology that was not very well managed at that stage in our history of fuel development, but we also have probably fuel that was perhaps heavily contaminated with trans fuel, which does not require you to leak out, and the assumption was 100 percent of the noble gases were leaked out of the fuel, 50 percent of the halogens, and one percent of the particulates.

Well, that ratio, first of all, would not necessarily apply to trans fuel that is already basically on the exterior of the fuel matrix and therefore available for release right there into the coolant water.

I'm just looking at the radionuclide mixture for that particular situation and saying, "Would this mixture necessarily be favorable to a person who has certain types of cancers that are not going to

benefit from this selection of nuclides?"

MR. GLECKLER: The ratios in Table 5-24 are based on irradiated reactor fuel for the various types of cladding on that, so it's like it would account for any trans fuel, so I'm not sure what the issue is.

DR. BEHLING: Well, you would obviously see a lot more fission products that are available, including cesium.

MR. GLECKLER: Yes, it would be the more volatile type fission products, which are usually the lesser dose contributors like iodines and cesiums and that, and by assuming -- by using the ratios in Table 5-24, we would also assign PU-238 dose and cerium-144 dose, depending on -- some years, yttrium-91 and zirc-95, which would more than likely not be present there, so that's a claimant-favorable in that aspect, because in those situations they were probably only exposed to iodine and cesium and noble gases, which only contribute to the external dose.

DR. BEHLING: Well, I'm still somewhat confused about the use of Table 5-24. It's my -- am I wrong in assuming that that's only to be used for missed dose, people who don't have bioassay data, as opposed to those who have a positive bioassay data and --

MR. GLECKLER: No. It's used for people -- well, we use it for both the unmonitored workers where we need to assign a default missed dose based on hypothetical bioassay data, but it's also used for the monitored workers, as well.

DR. BEHLING: Well, let me go back and restate my question. What if a person you know for a fact based on external dosimeter data that he was in 1953 or `54 assigned to the advanced test reactor, and you have in Table 5-22 the various radionuclides mixes. Wouldn't you use that? Or, conversely, if the person was assigned to the transuranic storage area, wouldn't you assign those radionuclides?

MR. GLECKLER: Well, let's stick

with one facility. For the ATR, it's like as long as they don't have a thyroid cancer, it's like we'd use Table 5-24, because it's much more claimant-favorable for him.

Table 5-22 is dominated by your iodines, and it's like they just don't -- you can -- I've had monstrous iodine intakes for workers, and it's like unless they've got a thyroid cancer, they're not going to get any significant dose out of it.

DR. BEHLING: No, of course not, and that's exactly my point.

MR. GLECKLER: And so then we typically will default to 5-24. We just need to watch out for the thyroid cases, and they've got stuff for default iodine intakes in Table 5-24, but they're very claimant-favorable and will push a case comp, so we can't use them, because they are too claimant-favorable to use for a comp case.

MR. DARNELL: The questions that we keep going back to and circling around to over

and over again seem to apply specifically to procedures and how this documentation, how the data is being used.

Let's get to the procedures. Nobody here is prepared for that. We're going to need to do another discussion on procedures. Otherwise, we're just going to keep talking about this dead horse and beating it.

DR. MAURO: So we'll wait for your response. It's simple as that. I mean, you're going to answer these questions, and in so doing you'll probably make reference to the procedures that apply to these various circumstances, and then we'll take a look at it.

MEMBER MUNN: Hopefully, most of the questions that are being asked.

DR. MAURO: Yes, I agree with you.

MR. DARNELL: Jump ahead to Number 5?

MEMBER MUNN: Yes, let's do.

MR. DARNELL: Basically, if that's the tack we're going to take to talk about procedures and bring procedures up, the same issues in Number 5 and Number 6, Number 7, and Number 8.

DR. MAURO: No, no, no. We're going pretty quickly. I would agree with Issue 5, Issue 5, but Issue 6, now we're getting into, I guess, ultimately your lower limits of protection and calibration.

MR. DARNELL: It goes back to the Tiger Team report and the applicability, and we're going to have look at the procedures on it. I don't -- form NIOSH's point of view, I don't agree with your comments, and until we give you the procedures on how we're doing this, we're going to talk about Tiger Team comments saying we don't have proper equipment, proper uncertainties, and all that.

DR. MAURO: I mean, just to make it, you know, why this is an issue is if you determine that a particular -- you took a

bioassay sample. It was below the limits of detection, and, as a result, you're going to assign whatever you decide to assign, that mix, but whatever that lower limit of detection is that's specified is in question because of the Tiger Team comments saying, "Listen, we have a problem with what you did here," what was done then, what was your --

So whatever is reported in the literature as their lower limit of detection back then, 1956, `57, whatever the time period is, the Tiger Team is saying, "Well, listen, we've got a problem. We don't know if you really got a good handle on what your lower limit of detection is."

So that puts you in a difficult position. How are we going to -- what are we going to assign when we decide we want to assign one-half the LOD if you don't know what a good number is for the LOD?

MS. JENKINS: Well, that's basing it on the Tiger Team report.

DR. MAURO: Right.

MS. JENKINS: I looked around and found other audits that say the program was adequate.

DR. MAURO: Okay.

MS. JENKINS: There were not problems. There is information referenced in some of the reference documents in the TBD that talk about calibration procedures and what they were doing. They had a whole instrumentation group that worked on this.

DR. MAURO: So, basically, you have an answer. The answer is you don't agree with the Tiger Team findings. We do believe we have a good handle on the LOD.

MR. CALHOUN: Do we have the site's response to the Tiger Team findings?

MEMBER MUNN: I doubt it. There ought to be one other point that needs to be made as long as we're talking about Item Number 6.

We need to notice that Item Number

6 is an observation, rather than a finding, which means in terms of significance for this group, it's a secondary level. It's just an observation.

MR. OSTROW: It fits in with the other ones, but it's --

MEMBER MUNN: Yes. Yes.

MR. OSTROW: We don't feel it's as important.

MEMBER MUNN: The need to respond to it with the same kind of rigor as you do a finding is not there.

MR. OSTROW: Backing up one, though -- backing up, though, I think we went too fast over Issue 5, which is on a high-risk job. This also came out of the Tiger Team and DNF as the findings, but, anyway, the finding was basically -- I'll just read one sentence that we had in our site profile review.

"Instead of merely using inhalation dose defaults the worker missed doses from generic facility operational source terms,

NIOSH should develop a list of high-risk jobs for different categories of workers at each facility based on bioassay data and sampling data, air survey data, and RWD data."

It's basically that should have broken it -- we think you should have broken down the defaults to identify high-risk jobs, different facilities with certain high-risk jobs.

MR. DARNELL: Why?

MR. OSTROW: Because not everybody was living on the average. There were certainly particular facilities and certain occupations that were higher risk.

MR. DARNELL: Define a high-risk job.

MR. OSTROW: Well, you define the high-risk job. I mean, who had the potential of getting the highest exposure?

MR. DARNELL: We don't have to define a high-risk job to calculate a dose for a worker.

MS. JENKINS: It goes back to the CATI, too.

MR. DARNELL: It goes back to documentation the worker gives us. It goes back to documentation that exists from the Department of Energy and whether or not there was an incident reported.

The Department of Energy treated basically every job life or death. You know, if you had the possibility of getting 1,000 bpm of contamination on your skin, they wrapped you up in a bubble suit and piped your air from Australia.

MR. CALHOUN: At least in the nineties.

MR. DARNELL: I mean, that was the mind set in the later time frames, and it started by the late sixties, where they were wrapping these workers up like they needed to be in Saran Wrap. Why do you think that NIOSH needs to go and define what a high-risk job is and pretend that we know that this particular

worker was assigned to this particular pretend high-risk job?

MR. CALHOUN: Then you're not on a --

MR. DARNELL: This is what you're asking us to do.

MR. CALHOUN: You've got to assume that the high-risk people weren't monitored, because if they were monitored, it doesn't matter.

MR. DARNELL: Done.

MS. JENKINS: And if it was a high-risk --

MR. OSTROW: Well, if they were, yes, if they were monitored. If you have the data.

MR. CALHOUN: Well, so what you're assuming then, to make this a valid comment, is that people on high-risk jobs weren't monitored, and that's not very likely.

MR. GLECKLER: That's the only way it becomes relevant.

MR. CALHOUN: That's not very likely.

DR. MAURO: Right. That's the only way it becomes relevant. I agree with that. So here we have a worker that has no bioassay data. We know he worked over at this facility at this time period, and you're going to make a judgment what we're going to assign to this guy. We believe he probably got some internal exposure.

You're going to have to make some judgment of what you want to assign to this person, and I guess the idea being the nature of his job and where he was and when he was there indicates that he may have been in the circumstance where he could have got --

They didn't have bioassay samples, but you're saying that if there was a problem and he was, you know, working in the thing, he would have had bioassay data, and therefore by definition it makes sense to assign to him less than the MDL, and that's your answer, and

if that's your answer, that's your answer. I guess we'll worry about it when you write it up and send it back.

MR. GLECKLER: If he was -- if the worker was routinely exposed at INL, it's highly unlikely that they would not ever have been monitored. We're really only talking about potentially individuals that may have only had an intermittent exposure, you know, due to some circumstances, which would have been like an occurrence. So we rely heavily on their CATI information, their California interview information, as to whether they were involved.

MS. JENKINS: And if they tell us they were involved in an incident, then we evaluate that incident, and we evaluate what they say and figure out whether or not, you know, in our professional opinion, being claimant-favorable or as we depict claimant-favorable, it's going to be non-comp or as realistic as possible if we're going to be on

the edge. We evaluate what they say and figure out how to assign them some dose or whether we don't need to, and we justify that in the report.

DR. MAURO: Is OTIB-60 the one that deals with the Complex Y coworker internal dosimetry model? I'm going to -- I think that --

MR. CALHOUN: I think that TIB that you're talking about is how to make coworker models. I don't think it's -- it's not a complex --

MR. GLECKLER: OTIB-60, I believe, is our procedure on how to assess internal dose based on bioassay data.

MR. CALHOUN: I have not seen, lately, at least, an overall OTIB that covers assigning internal dose at all sites. Is there one?

MS. JENKINS: I don't see how we could do it.

MR. GLECKLER: It's just -- yes, not

for --

MR. CALHOUN: There is a guidance document that Jim put out about, I think, how to develop coworker models, but I don't think that there is a Complex Y coworker model. You know, there is for some of the AWEs in that, whatever it is, the 6000 document for uranium facilities, but I don't know. I may be wrong on that, John, but I'm not sure.

MR. DARNELL: I see this issue as very similar to hot particle issues that SC&A has brought up in the past. Unless there is something to document in that claim that something like a high-risk job that would require special consideration went on, there is no way we can do it, because you're asking us to guess about the job, guess if the worker did it, and then assign something, and that's less reasonable than the approaches that we've already laid out on how to do dose reconstruction.

MR. GLECKLER: If there's something

in the dosimetry records that indicates that that might have occurred, then we'll assess it carefully. If there's something, you know, or if there's something in the CATI or in the information provided by the claimant, then we'll look into it, but if there is absolutely no information and nothing indicating that anything out of the ordinary happened, we're not going to look into it or assume that we don't have a basis for assigning that dose.

MR. DARNELL: Let me put it to you this way. I'm a laboratory worker. Am I in a high-risk job? Am I not in --

MS. JENKINS: It depends on how good a lab worker you are.

MR. DARNELL: Exactly.

MS. JENKINS: How many -- how many incidents --

MR. DARNELL: I mean, I could walk through one of the test areas where rabbits bringing in samples that have just been irradiated from the reactor, and I could be in

an extremely high-risk job, or I could be just walking by, and I'm not in any high-risk job.

DR. MAURO: I like the question. Let's say we were reconstructing your dose, and you worked for five years at a particular site and no bioassay samples taken. This is a story that we hear time and again from the evening sessions at these -- and I'm sympathetic to these concerns.

"Listen, no one ever took my bioassay sample." That's very common at NTS. "I was working out in the Flats with my nose in the dirt, and no one ever gave me a bioassay sample." Now, you're about to reconstruct my dose, and what are you going to assume was my intake? I don't have any bioassay samples.

MR. DARNELL: You talk to the claimants from NTS.

DR. MAURO: What would you want them to do for you?

MR. DARNELL: I talk to claimants

from NTS and from INL. "They never took my bioassay." I'll open their file, and there's bioassay.

DR. MAURO: Okay, no. That's a different story. I'm saying you know for a fact that you never had a bioassay sample in five years while you were working at this location at this time period, never had a bioassay sample. All of a sudden, we're going to do a dose reconstruction for you.

What do you think would be the reasonable thing to do if you were working, and you never had a bioassay sample? We can create any scenario. You know, what would make you feel confident that you were treated right? That's really what we're asking.

MS. JENKINS: We can't answer that question. We're health physicists.

DR. MAURO: You can't answer it. You could answer that better than anybody.

MS. JENKINS: No.

MR. DARNELL: What I would say --

MS. JENKINS: Yes, I can answer it.

MR. CALHOUN: Then we'd say that 99 percent of all of our doses are overestimated.

DR. MAURO: Right, now, maybe your answer -- maybe your answer is that if you assigned the upper 95th percentile for all the workers that worked at my time period in that facility with that intake, I would be more than happy with that, and I would agree with that.

MR. DARNELL: That's good for you. Upper 95th percentile is not reasonable for all workers.

MR. GLECKLER: We'll have to remember that at tomorrow's meeting on Pinellas.

MR. DARNELL: But we have to remember these percentiles aren't reasonable for all workers, and we --

DR. MAURO: But we're not doing it. We're doing just you. We don't know where you fit in on that distribution. For all you

know, you've been working in a place at the upper end of that distribution, unless you feel confident.

MR. DARNELL: Your methods are really going to bomb, because I am a claimant who has been, all right.

Okay, in bringing it right to the table, I would want my dose to be as close as possible, and I get this from claimants all the time. I want it close as possible to what my dose is, and if you sit there and you tell me, "I overestimated it by ten or 20 times because it's never going to get close to POC," I don't care. It's never going to get close to the POC, and I'm done.

I may complain. I may say, "I got more dose. I did this, and there should be more dose," but I'm not going to complain, because you overestimated it, and from time and time again from workers, that's what I hear. "Oh, you overestimated? How much more dose do I need to get there?" And you start

explaining about orders of magnitude.

DR. MAURO: I didn't realize this. I asked a question that was very personal. I didn't realize.

MR. DARNELL: No, no. Please don't think I took offense. I didn't.

DR. MAURO: Every time I come into a situation like this, I always ask myself the question, "What would give me peace of mind that I feel that the government did the right thing by me?" and I keep coming back to the same place.

MR. DARNELL: But you need to answer it from the ignorance of the worker. You know a lot more than the worker does, and I'm not casting dispersions on the worker by saying ignorance of the worker. He does not know about the statistics. He does not know about the competence. He doesn't know --

DR. MAURO: That's why I posed the question, sir, because I do know.

MR. DARNELL: Right.

DR. MAURO: And I know -- and if it makes -- if I walk away saying, "I feel like I was treated right," then I believe the workers have been treated right. Do you understand what I'm saying? Right now I'm not hearing it.

MR. DARNELL: I see that you're projecting your thoughts onto the workers, okay, and I can't do that, because it's not fair to the worker. I look at it this way. You've got those guys at Y-12 that went through the criticality that got prostate cancer and have not been compensated, but they were in a criticality accident.

They were right on top of the criticality accident, got prostate cancer, and they're not getting compensated, but that 30,000 guys out at NTS who played golf in the desert, and they're getting compensated on skin cancer.

You know, where do you draw the line about fairness? Where do you draw the

line about reasonableness? And I think that the approaches that we have are reasonable.

MR. CALHOUN: I think we just need to respond to this question and move on.

MEMBER MUNN: Absolutely.

MR. DARNELL: I think that we could both be very good debaters.

DR. MAURO: That's what we're doing.

MS. JENKINS: I can honestly say that based on my monitoring history and what I used to do, if these methods were used to assign my dose, I would be very confident that it was overestimated.

DR. MAURO: You're getting a fair deal.

MS. JENKINS: Yes.

DR. MAURO: That's all it comes down to, isn't it?

MS. JENKINS: But I have a lot of knowledge that the average worker does not, and I understand lots of things because of my schooling and everything that someone who is

trained in something else just doesn't know.

MR. CALHOUN: And like we've talked about, if you're not getting paid, you're not going to be in. That's what it all comes down to.

DR. MAURO: That's absolutely true.

MR. DARNELL: But I think that for Number 5, and there are other issues listed that are very similar to this one about high-risk jobs, high-fired jobs, or what. We're going to -- it's going to have to be done on a case-by-case basis, and records are going to have to be there for us to be able to look at this type of approach at all, and it's just -- there is no reasonable way for us to do dose reconstruction for the entire population and include this stuff unless it's in that claim, that specific claim.

MR. CALHOUN: Is there an incident section in this TBD?

MEMBER BEACH: That was my next question, but I was waiting for a cut-in.

MR. DARNELL: Sorry.

MEMBER BEACH: Because I don't think all the incidents that I know about are listed, but I don't know for sure. I know there's eight of them.

MR. GLECKLER: All the major ones, I think they're probably listed, but it's like there's a lot of minor ones that are --

MS. JENKINS: How many major ones do you know that are listed offhand?

MR. GLECKLER: Oh, they're covered in two separate TBDs for the INL profile. The environmental one goes into it, and I'm trying to remember if it's the internal or the external. It's probably the internal that covers --

MS. JENKINS: I was just curious offhand.

MR. GLECKLER: -- some of that, but they're in a couple, but even the site description I think touches on some of them. I'd say it's definitely less than 20, if I

remember right. That's just a guess. I haven't really counted them.

MR. DARNELL: You get into a problem with a site like INL, long history, huge site, a lot of people. You start listing incidents. If you don't hit the ones you consider major and say, "This is just a partial list," you'd never get them all.

MR. CALHOUN: And we address them all as long as somebody brings them up in the TBD. You've got to say something about it.

MS. JENKINS: Or we find documentation.

DR. MAURO: You know what they're doing at Fernal?

MR. CALHOUN: Nothing at all. The place has been closed, John.

DR. MAURO: Okay. We have Building 1 and 2 up to 9. Here's the building numbers. This is 1952.

MR. CALHOUN: Don't forget the waste pits and the --

DR. MAURO: Yes, they're all there, okay, and what they're saying is, "We know how many bioassay samples. We've got 5,000 bioassay samples in that box, Building Number 1 in 1952."

MR. CALHOUN: Five thousand?

DR. MAURO: I'm making this number up.

MR. CALHOUN: Okay.

DR. MAURO: We looked at numbers. Okay, what they're saying is every single one of these boxes we could make a distribution, okay.

From that distribution, we know that in certain years a lot of people had their bioassays. The ones that don't have any bioassay data, they're saying, "Okay, we dropped the guy into the box."

Okay. Let's say we've got a guy who doesn't have a bioassay available. We know he worked in Building 2 in 1952. What are we going to assign as his concentration in

his urine?

MEMBER MUNN: Be loud and obnoxious, John.

DR. MAURO: Okay, yes. What are we going to assign? We've got to assign something. We've got to assign kind of a DPM, probably, okay, a concentration, average concentration in the course of that year.

All right, so you've got a distribution. They take a look at the guy and look at what his job history was, and they find out that -- and we know the job types in the buildings where there was a higher potential for exposure.

What they do is they're going to assign the high end of the distribution for that year for that guy, and other guys where they know, "We know what the job was. No, we're not going to assign that. We're going to assign the full distribution," and that's what's being done. You can't do better than that.

I think this site is a perfect example of where the same exact thing is being done, because now we're talking the same thing with the time, and we're talking the same thing across the top to EBR-1, EBR-2, TAN, whatever, BORAX, all these.

Same thing. Same thing, and if you could tell me right now I could make a table that says I know how many bioassays samples. I could make a plot like that for every single one of them, and my process is going to be using prudent judgments based on the CATI and everything else you know, I'm going to pick off someplace in that distribution for that year for that guy and what his mix of radionuclides are.

I don't see that in the writeup. I think that's -- and if I was -- and that's the way you come at every problem. Every one of these sites, you come at it this way, and I don't see it here.

MR. CALHOUN: INL is a lot different

than Fernald.

MR. GLECKLER: But is it -- so you're saying it's not appropriate to like group all the reactor sites versus like processing sites?

DR. MAURO: I'm not -- I'm not disagreeing. If it turns out there are certain -- I used this as an example, because there were enough differences in time and space at Fernald.

Now, you're telling me that whatever X, Y, and Z is, those X, Y, and Z weren't really an X, Y, and Z. They were all the same, so who -- I made your case. That's all I'm saying.

You're creating boxes, and from there you move forward. I think, time and again, if that approach could be adopted, you're standing on a rock. You can't be touched.

MR. GLECKLER: We can only hope.

MR. DARNELL: I think the only thing

-- we need to agree to disagree and give you an answer in writing and move on.

MR. CALHOUN: We don't know completely if we're disagreeing until we write it out.

MR. DARNELL: That's true.

MEMBER MUNN: And that's probably true of all 35, in 35 and this one, and I haven't even looked at

MR. DARNELL: Thirty-eight.

MEMBER MUNN: Oh, 38-B and --

MR. DARNELL: Eleven.

MEMBER MUNN: And 11 more.

MEMBER BEACH: Which we haven't taken on officially yet.

MEMBER MUNN: Yes, but, you know, if that's possible to pass forward, it would seem to be giving NIOSH an opportunity to respond to as many of these issues that are before us on the table today as they can, and you might be surprised. A significant number of them may simply go away by reason of your written

response.

MR. OSTROW: Well, I remember when we did Linde. Wanda, you were on Linde group, weren't you?

MEMBER MUNN: No.

MR. OSTROW: No?

MEMBER MUNN: I dodged that bullet.

MR. OSTROW: Too bad. What happened was that when we had -- we had findings like this, also, not as many but a bunch, and the way that -- we had some discussions, and the way that NIOSH responded, NIOSH wrote like a paper, white paper or whatever, and they grouped them.

You know, we had a lot of common type issues like the, for example, the Tiger Team business, you know. So say you'd have an actual section, which may be a page, half a page, maybe five pages on the Tiger Team, DNFSB findings, and you say in the title of it, you know, "Tiger Team Issues 5, 7, 13, and 37."

So you're cross-referencing it, so you're covering five or six or seven of our issues by one writeup that may be a couple of pages, and you put in what your basis is, what your understanding of our comment is, basically, and then how you're responding to that and why you think that what you're saying is correct.

You can put tables in or writing, whatever it is, and that covers like a bunch of our different issues, because from what I'm hearing so far is that at least you think that you can -- where you may have one that you say, "Okay, well, this may not be in the site profile, but it's answered by our procedures. This is how we actually do the dose reconstruction according to these procedures that we have."

So you may have a section on, let's say, procedures, and you say, "This answers our comments Number 1, 13, 42," whatever it is, and instead of having 38 separate

responses for the -- I think the number of issues we have here, you may only have five writeups. It may come out, and that covers everything.

That's what we did in Linde, and it came out a bunch of pages, and we were able to go through it, and we threw out probably -- well, we resolved probably three-quarters of the issues basically on that one write up where -- yes, one white page.

We responded to that. We said, "Yes, you're right on this," or whatever, and we got down to -- instead of having a whole bunch, we got down to just a handful of sort of key issues that we identified that were real, significant, and they were sort of scientific type issues rather than sort of philosophical issues, and we narrowed it down quickly that way to a few real issues.

We spent a good amount of time resolving a few issues, but they were like real issues. So that's -- I'm just suggesting

that might be a way to approach it.

MR. CALHOUN: Thirty-eight's nothing.

MR. OSTROW: Thirty-eight's nothing.

MR. DARNELL: Any way we want to do it, that's fine with me.

MR. OSTROW: I mean, that's up to you how you want to do it, but I'm suggesting this worked on one of the other sites, and it may work on this one.

DR. MAURO: To expedite matters, 4 through 14 are all the internal, so we would take them there, and I would say basically we covered all of them except for maybe one or two that maybe were just bringing it to the attention, and one is -- there is this high-fired plutonium issue that we raised. Is there a high-fired plutonium and uranium issue at the site, and, if so, I think we brought it up in the writeup in the audit.

MS. JENKINS: Super S is going to be addressed in the next TBD.

DR. MAURO: Okay, so this is an issue you're aware of and you plan to deal with. I know you have an OTIB-49 that deals with high-fired plutonium, anyway, and it sounds to me that you have that in hand.

MR. CALHOUN: And I think that we actually do raise this.

MR. DARNELL: I have one for uranium for this site.

MR. CALHOUN: High-fired uranium is a new animal.

DR. MAURO: It is a new animal.

MR. CALHOUN: So I'd need to see definitely -- because that changes everything, so I definitely need to see something that says that this is -- that we do have high-fired uranium, where it is, and how it behaves. It doesn't have to just be high-fired. I need to know that it's variant soluble, because Super-S plutonium changed everything.

MS. JENKINS: Yes, and that is going

to be addressed in the next --

MR. CALHOUN: And it probably only exists in one or two places in the world, really.

MR. OSTROW: Okay, so it really exists. That's an answer, also. Either you say it doesn't exist here, or you say, "Yes, it does exist. We're aware of it. We're going to deal with it."

MR. CALHOUN: No, I want you to tell me where you saw that it does exist --

MR. OSTROW: Oh, okay.

MR. CALHOUN: -- because that's your comment, not mine.

MR. OSTROW: Yes, I think it's in the writeup, but, I mean, if it's in there we probably point it out. We recognize certain operations where high-fired plutonium and high-fired uranium --

MR. CALHOUN: And that it is very, very more insoluble than type-S.

DR. MAURO: Well, that's why we

brought it up.

MR. CALHOUN: Because it doesn't matter if it's not.

DR. MAURO: Well, we know plutonium. Everybody's okay.

MR. CALHOUN: Right.

DR. MAURO: We realize that's real.

MR. CALHOUN: Plutonium's done, and I think we're actually -- I think we're doing some DRs, getting returns from Idaho and redoing it for super class S.

MR. DARNELL: The writeup that you guys provided for this one is two paragraphs long. One paragraph is completely about U-238. The other paragraph says some INL facilities, high-fired uranium or plutonium oxide to above 1,000 degrees, and there was no data.

MR. OSTROW: That's all we said? Okay. We probably based it on something. I hope we did.

MR. CALHOUN: Sure.

DR. MAURO: We owe you something there, okay.

MR. OSTROW: That would be fine too, you know.

MR. CALHOUN: Plutonium is spelled wrong in there.

MR. OSTROW: We spelled it wrong? We didn't mean to.

MR. CALHOUN: It might be something new. That could change everything, and it's 238, too, so, okay.

DR. MAURO: The other one, and then I'll stop, that we didn't talk about that's sort of different, and this is a generic issue just to alert you to it, is when it comes to skin and skin cancer, when it comes to skin cancer, the methods you use, OTIB-17, to do non-penetrating radiation exposures and how you do it.

One of the concerns we discussed at length is there are some sites where there is a very real potential for airborne

particulates positing on people's skin, okay, and the uranium enrichment facilities are an example. There are flakes of uranium that become airborne. You have six oxidizers, and there are other -- and that same thing happened with Nevada Test Site. You do have the suspension of particulates landing on skin.

There really is no provision, and I don't think we've ever come to -- and this may be a generic issue, but I want to alert you to it. We have a comment here regarding facial and skin contamination.

MR. DARNELL: Which one? Is that Number 8?

DR. MAURO: That is Number 9. It's the only one that's sort of different. These two -- I bring these up because I'm trying to get through that group of ten quickly, and there's only two out of -- we talked about everything except high-fired plutonium and uranium. Now we talked about it, and now the

other one that I think is special is the skin contamination.

Is it your experience that there were some of the operations that took place at INL had a very real potential for airborne particles that could have settled on skin and caused a localized beta dose that was not -- that was of some possible significance and therefore could have been the cause of a skin cancer? We are concerned that there are -- that that particular exposure scenario has not been engaged in this program.

MR. DARNELL: There's no way it could engage that. You're talking about a hypothetical situation where a hypothetical particle settled on a hypothetical worker's arm, and we've got to guess who got it.

MR. CALHOUN: And it wasn't monitored.

MR. DARNELL: It wasn't monitored.

MEMBER MUNN: No. No. No.

MR. CALHOUN: It could land on the

TLD.

MEMBER MUNN: No, the question he's asking is were there activities or incidents on this site which could have resulted in airborne particulate, radioactive airborne --

MR. CALHOUN: Sure. There are on every site.

DR. MAURO: What do you tell the person who's got skin cancer on his ear, his neck, on his face, his hands, and he says, "Wait a minute. I worked in the area" --

MR. CALHOUN: Well, what we do first is we assign the dose based on the badge, and if it's all over, it would have landed on the badge. Okay, if we're going to say that this is uniformly distributed, it would have fallen on the badge.

Secondly, if there's a documented skin contamination incident, we take that into account, and we calculate dose; if there's not a documented skin contamination incident, we do not, for skin contamination contributing to

that site. We can't.

That's just a hypothetical, and we can't really go there. We can't, because then everybody is going to say, "Well, I got contaminated and didn't get --," you know. So because if we're saying that this is a, you know, ubiquitous particulate that fell around --

And I think the hot particle goes the same way. If it wasn't detected, we can't consider it, because the doses, as you know, from a hot particle are tremendous, but they're also very easy to detect because they're so strong, and so unless there is a documented contamination incident, whether it's distributed or a hot particle, they're not going to contribute it -- count that as contributing to a skin cancer.

DR. BEHLING: This is Hans Behling. Can I make a comment here? I think the way to address it is to review basic health physics practices that should have been

documented in a manual.

Since you can determine with certainty that it was routine practice to frisk people out after they left the radiological control area, if there was a routine attempt to assign people anti-cs in areas where there was a high potential for contamination, that in itself would basically limit the likelihood of an undetected skin exposure and thereby eliminate this argument in its entirety.

The question is, in the fifties and early sixties, were there protocols in place that would detect skin contamination? Did they have pancake friskers at step-off pads where people would have a chance to say, "I am," or, "I'm not contaminated"?

Were they given anti-cs? Were they given -- was the air monitored, or were there surveys done that would detect contamination on the surfaces or other materials that would come in contact? Those are the things that

can be answered by looking and reviewing health physics manuals that apply to various periods of time during this facility operation.

MR. CALHOUN: Well, what we're talking about here is non-uniform undetected skin contamination. I guess you could say clothing contamination, too, if you want to get really crazy, and hot particles. Certainly anything uniform coming out of a plume wouldn't count, because that would be measured on your badge. So, again, you know, we're chasing windmills trying to come up with a position on that.

MR. DARNELL: The other thing that you're going to have to have to accompany this, if the situation was set up to where a worker could actually get this type of exposure, you would also have to have documented incidents on area contaminations, contaminations in people's offices, contaminations that just show up helter-

skelter, because that's what you're saying is happening to the worker.

You know, all of these sites have monitoring programs. They do. They went out, and they checked their radiological areas for the spread of contamination. It was done even before the advent of DOE Order 480.11, so if you're saying a worker could be walking around and get a flake and a high dose from skin contamination because this flake fell on him, that same flake could be on the ground, and unless you could show some sort of correlation between unexplained contaminations all over the site, you're not going to get it for the worker, either.

DR. MAURO: So the criteria would be if there's evidence.

MR. CALHOUN: Documented, yes.

DR. MAURO: If there's evidence that these types of particulates were, in fact, created and settled out because of the nature of the operation, it's plausible that a person

may have experienced this type of exposure on his skin.

MR. CALHOUN: I think our position until I'm told differently is that unless there is documentation that John Mauro has a skin contamination incident, he didn't.

DR. MAURO: Well, as far as I'm concerned, we have covered all the internal. If you wanted to --

MR. CALHOUN: Number 10 I think should be fairly easy.

MR. ZLOTNICKI: This is Joe Zlotnicki. Can I jump in with a quick comment?

MR. DARNELL: Kiss of death there.

MR. ZLOTNICKI: In terms of there should be documentation, there's another, in my mind, potentially circular argument. I think what it boils down to is is there evidence that the program documented incidents in any given time frame, let's say the fifties and sixties.

If there are no examples of anything ever being documented, there's two possibilities. One is that nothing ever happened, which I doubt, or two, more likely, things were not documented, so to say there has to be documentation, there has to be some reasonable confidence that things will be documented if they were discovered.

Otherwise, you've got two strikes against the worker. One is that the contamination has to be detected, and then, two, it also has to be documented, and it seems to me that --

MR. DARNELL: You can only have this one of two ways. You can either say that there was some type of program that we can base our technical program on to do dose, or there was no program, okay. We're going to go back and forth in this hypothetical realm, and what you're saying now is, "Well, this casts dispersions on whether they ever wrote anything down."

Then there is no way to do dose reconstruction. We should all quit and just give them money. I mean, that's basically what you're saying here now.

MEMBER MUNN: That's been suggested often, and, as a matter of fact, there are people around this table who would agree with you that that is what --

MR. DARNELL: Okay, I am firmly against that, but that's what you're basically saying now is, "Well, maybe they didn't write anything down. Maybe they hid this stuff."

MR. ZLOTNICKI: No, no, no, no, no. I think we all know that standards change over time, and the fact that today we might document something when someone got a dose of a rem, for example, back in the fifties they might have considered that insignificant and not written it down or not had a policy to document anything.

I don't know, but I'm saying your position would be supported if you can show

that there is documentation contemporaneously of some incidents where there is skin or clothing contamination. Then you could say for another person, "Look, you don't have anything, yet we have evidence here that this sort of thing was documented," but just to say there is nothing in the file documenting an incident, if there weren't any incidents documented, then it might just be that they didn't bother to write them down in those days.

DR. BEHLING: Or they didn't possibly even monitor. For instance, I'll go back, and for some of you who were party to some of the discussions relating to Ames Laboratory, they talked about in almost a joking fashion, the Green Hornet.

These people were covered with green salt to the point where they were basically using it as body paint. In those days, they didn't bother even concerning themselves with skin contamination, so

monitoring was not in effect, and if you don't monitor, you're not going to find anything.

The other issue that Joe just brought out, even when they do find it, perhaps they didn't document it, but my bigger concern is early on people may not have been monitored for skin contamination. It was not considered a relevant or significant threat to human health, and so the use of pancake probes for frisking people out may not have been a standard practice early on.

MR. DARNELL: You're absolutely right. At some sites they actually even made the decision that they weren't going to monitor, because they knew the job would fall within a certain range of doses, and they just reassigned the workers. You're absolutely right. That did happen at some DOE sites.

What I'm saying here is that there was monitoring done. There was recording of incidents. Exactly how far back in time that goes, I don't know, but to take that and go to

the opposite direction and say, "Well, there wasn't enough of that done, or they didn't record them during a certain time frame, so we have to give dose to people," there is no way to physically do that either towards the negative or the positive of your premise.

DR. MAURO: I just want to be in a position that if a person came down with skin cancer who worked 1957, 1958, or whatever it is, and he feels that that very well could have occurred because he was exposed to airborne particulates while he was working at this place, because he remembers a lot of dust -- whatever.

I want to be able to answer his question why we feel he probably did not experience a significant exposure to his face or whatever, because the records indicate the following, and on that basis we feel confident that he did not have a significant dose.

MR. CALHOUN: Airborne particulates isn't the issue, because that would show up on

your badge.

DR. MAURO: Okay, good. Then --

MR. CALHOUN: Hot particles that are --

DR. MAURO: That's the first time anyone said this, and I like it. What you're saying, "Listen, if you have a ubiquitous airborne settlement problem, that stuff" --

MR. CALHOUN: Absolutely.

DR. MAURO: -- "is going to settle on your film badge. You're going to see these bright spots on the film badge."

MR. CALHOUN: Yes.

DR. MAURO: Good. I only -- you know I bring it up because I feel we have an obligation to answer that question.

MR. ZLOTNICKI: John?

DR. MAURO: Yes?

MR. ZLOTNICKI: That raises another issue. Okay, if the film badge shows a spot from the contamination, which it potentially could do, if it was a higher energy beta or

gamma, it would not necessarily show the lower energy beta, but let's just follow that one for a second.

When that film was processed, are there records to show that they took the highest spot in the filter region on the badge, or did the person reading the badge avoid that spot because, "Oh, there's a spot of contamination there. That's not representative of the whole body dose for the individual"? Again, there is a whole train of assumptions that would just arise.

MR. CALHOUN: Let's just stop. Let's just stop this by saying our position is going to be, unless Jim Neton tells me otherwise, that unless there is documentation of a contamination incident, we're not going to add dose. Done. Okay, let's move to the next one.

DR. MAURO: So you're telling me --

MR. CALHOUN: Please.

DR. MAURO: At the present time

there is a policy decision by NIOSH --

MR. CALHOUN: Yes.

DR. MAURO: -- to not address this issue.

MR. CALHOUN: Yes.

CHAIRMAN SCHOFIELD: Okay, I've got a little thing. We're not going to even worry about, per se, the skin contamination, because I know you can get crapped up real bad, personal experience many times, without it being on your badge, you know. But the other thing is, and this is something that a lot of people have experienced throughout the whole complex, is there are times when they got a large dose of skin contamination or a large exposure to their extremities, but it's not going to show up on that badge, because a number of factors could come into play, where they wore the badge on their body, what the shielding was between them and that badge, whether they wore lead aprons and whether they were required to keep that badge under the

lead apron, but yet now you've got these skin cancers. You've still got to deal with that problem.

MS. JENKINS: Well, are we assuming that it's not documented? Are we going on the assumption that these contaminations are undocumented contaminations?

CHAIRMAN SCHOFIELD: What I'm asking -- I guess this is more of a question than anything else -- is, okay, you can go in. This person has skin cancer, and you're doing a dose reconstruction. You looked at the material that -- they in the CATI interview said, "This is what I worked with at that time," and I mean it's particularly in the early days it was not documented, and nobody was concerned about it, but at the same time, these people said, "Well, that stuff was pretty hot, but, you know, we had to wear lead aprons and things like this."

How is the dose reconstructor, based on that CATI interview, going to look at

that material? It could be very significant to their exposure to cancer. Is there any way that NIOSH has of looking at that? Because it doesn't show up on the film badge.

MR. CALHOUN: Yes, we do, and you're talking two different things. You're talking contamination and radiation. If we've got some body without extremity monitoring, and they were a hands-on rad worker, like a glove box type worker of worked with metal, not just your standard haz line, if they've got -- if they've got a cancer that shows up on an extremity, we will use a multiplication factor to adjust for the geometry that potentially exists between the source and the badge. It's kind of like our glove box factor, so we do have a method to do that, and we use it.

As far as contamination goes, again, if it wasn't documented, we don't assume that it happened. Sure, people do get hand contaminations. Generally speaking, people wear gloves. You know, it happens.

I know it happens, because I've seen it happen, but generally speaking people wear gloves, and that cuts down on your dose tremendously, and it's not the same as a skin contamination, because the major contributor to a skin contamination is typically betas, and the gloves stop that.

But, again, as far as radiation dose and cancer to the extremity, we've got ways of dealing with that, and we use it. As far as contamination, undocumented contamination to any place on the body, we generally don't address that.

MS. JENKINS: There is no way to address it, unless you pay everybody.

MR. CALHOUN: There is no need to address it.

MS. JENKINS: That's true.

MEMBER BEACH: So, I'm wondering how soon we'll get responses back on all of these, just roughly.

MR. CALHOUN: Are we done?

MEMBER MUNN: It's going to be pretty much up to these guys as to when.

MR. GLECKLER: We're not done.

MR. DARNELL: Actually, Issue 10, the breathing rate, the TBD assumption appears less claimant-favorable than the ICP, ICRP or NCRP. Brian reviewed the ICRP. We're using the same numbers.

DR. MAURO: No, I skipped all of that because we talked about this in other venues. There are certain circumstances. For example, there are people working in AWE metal working facilities like Bethlehem Steel where there is heavy lifting, extreme exertion and where under those circumstances the 1.2 cubic meters -- I think it's per hour -- was replaced with some higher numbers.

I think the question here, you know, is are there any circumstances here where the higher reading rate should be. I think this is of marginal concern. This can be addressed.

If there are circumstances where the nature of the job is such that the default ICRP number may not really be claimant-favorable, then we're saying, well, as has been done at other sites, there are higher reading rates that could be used that seem to be claimant-favorable.

I'm not saying there necessarily is that circumstance here. I'd have to look back at this report to see whether we identified any job categories, but to me this is not center stage.

DR. BEHLING: I should also add to that in Section 5.1.2.7, 5.1.2.7, where this particular finding or observation was explained, there is obviously something that should jump out at you, because I believe Desmond, who wrote this, referenced the NCRP value of eight times 10^3 cubic meters per year that he identified in the RAC report, and, of course, that was intended for offsite personnel who don't work eight-hour shifts

five days a week.

So please make notice of that and realize that that was an error in even including it in our writeup, because it was a reference to the RAC report where offsite exposures were being assessed for 8,000 hours, and that was based on, obviously, 24 hours at a location offsite and not as a number of hours per year.

DR. MAURO: Are we recommending that SC&A delete this issue?

DR. BEHLING: Well, it should be stricken, because it's totally irrelevant.

DR. MAURO: Strike that.

DR. BEHLING: I mean, we certainly don't want to promote the idea that --

DR. MAURO: Issue 15. No. Issue 10.

DR. BEHLING: -- one should use 8,000 hours.

DR. MAURO: Ten. SC&A is recommending that we inappropriately included

Issue Number 10. We should delete it from the issue list.

MEMBER MUNN: Which is an observation in any case.

MR. OSTROW: Yes, so it doesn't help too much.

MEMBER MUNN: Every little bit helps. I didn't hear --

MR. OSTROW: I see a cheer coming.

MEMBER MUNN: Hans, I didn't hear your reference to where in your writeup that error occurred. Would you mind giving that?

DR. BEHLING: Yes, it's in Section 5.1.2.7.

MEMBER MUNN: Got it. Thank you.

DR. BEHLING: And it's just a short one, breathing rate, and it gives you the RAC value, which, as I said, was really meant for offsite personnel or at a given location --

MEMBER MUNN: Right.

DR. BEHLING: -- more or less 24 hours a day.

DR. MAURO: Page 79.

MEMBER MUNN: I just want to mark mine. Thank you.

CHAIRMAN SCHOFIELD: Now, we've got some people who need to catch planes, I understand, so I think we'll try to wrap this up in the next few minutes, if possible, so we can let those people catch their planes. It looks like we're going to have to come back again and beat on each other for a while.

MEMBER MUNN: The question is when?

MR. OSTROW: Why do we have to come back and beat on each other?

MR. CALHOUN: We can still provide a response to everything, even though we haven't discussed it. We can just try that.

CHAIRMAN SCHOFIELD: No, I agree. That's a good idea, but this obviously isn't going to be the last meeting we have.

DR. MAURO: We're close to -- we're basically close to halfway through the list of issues. That's not bad.

MR. CALHOUN: We can be done by 9:00 if we keep this up.

DR. MAURO: No, no. I'm saying we've been through a lot of these, and that ain't bad.

MEMBER BEACH: Are we going to ask for the issues for ANL-West to be answered, too, since we know that most likely we're going to combine them? Are we going to ask for that at this time, too?

CHAIRMAN SCHOFIELD: Yes, I mean, because some of these issues obviously are going to apply to both, and, you know, if we can just combine that answer to both at the same time, well, that just saves a lot of time and money and hassle. I mean, that's my personal opinion.

MR. DARNELL: The way the findings -- well, they're all listed as findings under ANL-West matrix that I perceive -- are written. Most of these appear to be like we feel this is occurring type issues.

What I'd ask is, while we're working on our response, if you could roll these into the INL matrix that we have, I'd prefer to answer them through the INL matrix instead of adding them at the end.

MR. OSTROW: Well, that's okay to do. It's like I said before. You can group them any way you want to. You can have your response and say, "This addresses -- this particular response addresses these five INL concerns and these three ANL concerns," because once you cover everything, you can group them any way you like that you find convenient.

MR. DARNELL: Okay. Let me give you a specific example. With Finding Number 3.5-1, on the ANL matrix it's on page 3 of 5 of the ANL matrix. "Radionuclides of concern in solubility of TBD-5 contains incorrect statements, assumptions, and recommendations.

"For example, SC&A considers NIOSH's list of radionuclides of concern to be

incomplete and too restrictive. We also contest NIOSH's statement implying the only soluble radionuclide of concern is strontium-90." We need to know each incorrect statement, and I'm sorry for reading this directly. We need to know each one and why.

DR. MAURO: It's in the report. This is just the matrix. This is what you need to be looking at.

MR. CALHOUN: It's a binder.

DR. MAURO: Binder, a three-ring binder.

MR. OSTROW: Yes, this is summarizing it and points you to Section 5 --

DR. MAURO: I mean, I would say, you know, take a look at the -- I mean, combining it, separating it, you know, whatever.

MR. CALHOUN: And if we need more clarification, that may be the response.

DR. MAURO: But if you do and if it's just a question, call us.

MR. OSTROW: If it's a simple one,

call us.

DR. MAURO: And even if, let's say, we're not available, if we do have a call in and it's not possible to tie in with any of the work group members, my standard practice is to put a memo out saying, "We had a brief conversation on this issue." I put out an email to the work group. They know we had the conversation, but I know that the work group likes to be on the line when possible.

MR. KATZ: But for a simple -- yes, but for a simple clarification, you don't even need to -- I mean, it's fine to document afterwards, but we don't need a conference call for that.

DR. MAURO: Yes, we should document that just so that everybody knows.

MR. KATZ: Call and ask your question. "I don't understand this comment," or whatever the details are.

MR. CALHOUN: Yes, because ultimately the response is going to be

available.

MR. KATZ: So time frame, just sort of general time frame so we can know about scheduling?

MR. DARNELL: 6:00.

MR. KATZ: No, no, time frame for the response.

MR. DARNELL: That's what I'm talking about.

MR. CALHOUN: That's good. Okay. So we can meet tomorrow.

MR. DARNELL: 6:00, July 4, 2012, I have it down.

MR. CALHOUN: I'm on vacation that day.

MR. DARNELL: Actually, that's really dependent on how much time these guys have, and that's not a question we can give you an answer to right now.

CHAIRMAN SCHOFIELD: Well, it would be nice if we could have these answers, at least have some discussion by phone on them

before the full Board meeting in July.

MR. CALHOUN: When is that in July?

MEMBER MUNN: It's the 27th, 28th, and 29th, but you need to bear in mind that for at least a week and usually two weeks prior to that, most of the NIOSH headquarters staff is up to their armpits in alligators getting ready for this particular meeting.

So the suggestion from this chair would be if you're going to plan a meeting in July, which would be very beneficial for us if you could do that, then it needs to be no later than the middle of July.

MR. DARNELL: That's in the middle of the Health Physics Society meeting, too.

MEMBER MUNN: Yes, that's the week that we'll be meeting.

CHAIRMAN SCHOFIELD: No, that doesn't work for us, either.

MEMBER MUNN: And so that pushes you over into August, and for selfish reasons I might suggest that you consider the week of

the 10th, since there is a meeting scheduled on the 13th for another group already.

MR. KATZ: I don't think we're trying to book the meeting itself, just a general sense for what month we could expect to get responses.

CHAIRMAN SCHOFIELD: Yes, when we can get the responses back.

MEMBER MUNN: When we can get the things out.

MR. KATZ: July? Is July a reasonable time frame?

MEMBER MUNN: End of July.

MR. DARNELL: I'll take the action item to email that information.

MR. KATZ: That sounds great.

MR. DARNELL: I can't put these guys on the spot right now, because we have them on the spot for so much. We have to figure out what that priority is, and that decision is higher than me.

MR. KATZ: That's great.

MR. DARNELL: By the end of next week I will email Phil so that he can disseminate it to the group.

MR. KATZ: Sounds great.

CHAIRMAN SCHOFIELD: I appreciate everybody's effort and time.

MR. KATZ: Good cheer.

(Whereupon, the above-entitled matter was adjourned at 3:30 p.m.)