U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES

CENTERS FOR DISEASE CONTROL

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NATIONAL INSTITUTE FOR
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ADVISORY BOARD ON
RADIATION AND WORKER HEALTH

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IDAHO NATIONAL LABORATORY WORK GROUP

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TUESDAY,
MARCH 25, 2014

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The Work Group convened in the Brussels Room of the Cincinnati Airport Marriott, 2395 Progress Drive, Hebron, Kentucky at 9:00 a.m., Phillip Schofield, Chairman, presiding.

MEMBERS PRESENT:

PHILLIP SCHOFIELD, Chairman
JOSIE BEACH, Member
JAMES MELIUS, Member*
GENEVIEVE ROESSLER, Member

This transcript of the Advisory Board on Radiation and Worker Health, Idaho National Laboratory (INL) Work Group, has been reviewed for concerns under the Privacy Act (5 U.S.C. § 552a) and personally identifiable information has been redacted as necessary. The transcript, however, has not been reviewed and certified by the Chair of the INL Work Group for accuracy at this time. The reader should be cautioned that this transcript is for information only and is subject to change.

ALSO PRESENT:

TED KATZ, Designated Federal Official
NANCY ADAMS, NIOSH Contractor*
ZAIDA BURGOS, NIOSH*
PETE DARNELL, DCAS*
BRIAN GLECKLER, ORAU
STU HINNEFELD, DCAS
JODI JENKINS, NIOSH ORAU*
JOHN MAURO, SC&A*
STEVE OSTROW, SC&A
MATTHEW SMITH, ORAU*

*Participating via telephone

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

(9:00 a.m.)

MR. KATZ: So good morning, everyone. It=s the Advisory Board on Radiation and Worker Health INL Work Group, and let me just check on the line. Do we have Drs. Richardson and Melius on the line? Jim Melius, are you on the line? And David Richardson? Dr. Richardson or Dr. Melius, are either of you on the line?

MS. BURGOS: Dr. Richardson is going to be late, Ted.

MR. KATZ: Wait, who=s going to be late, sorry? Dr. Richardson?

MS. BURGOS: Yes.

MR. KATZ: Okay. Thanks, Zaida. And have you heard from Dr. Melius?

MS. BURGOS: No.

MR. KATZ: Okay. Okay, well, then I think we could probably just carry on. I know

Dr. Melius intends to attend most of this meeting, but I know he also has a couple of things he has to attend to which why he didn=t travel here for this.

So, we can get started with B let me just do the roll call now. We=ll circle back and see if he=s joined us, then we can carry on.

So let=s just start with Board Members. We=re talking about specific sites, so please speak to conflict of interest as well. And let=s go with Board Members= attendance.

(Roll Call.)

Okay, very good. The agenda for the meeting is online on the NIOSH website under Today=s Meetings for the Board and there=s some more items than are on the agenda in terms of NIOSH White Papers, but otherwise that should be accurate.

And the papers being addressed today, almost all of them, there may be one

paper still to be posted, but otherwise, all the NIOSH response White Papers and a version of the matrix should be posted for people online and we should have Live Meeting.

MR. HINNEFELD: Live Meeting right now says, AWelcome to today=s NIOSH Conference. Please stand by, your conference will begin shortly.@

MR. KATZ: Okay. So we=re not running Live Meeting quite yet.

MR. HINNEFELD: I don=t know what has to happen for it to start there.

MR. KATZ: So that=s where we stand.

MR. HINNEFELD: Do you know what has to happen?

MEMBER BEACH: I think a presenter has to present, don=t they? Or B

MR. KATZ: No. So, Zaida, are you still on the line?

MS. BURGOS: Yes.

MR. KATZ: Can you just check out and see whether Live Meeting is ready for someone to post something or not?

MS. BURGOS: It is ready.

MR. KATZ: Okay.

MR. HINNEFELD: Okay, yes, we=re fine. I=ve got it.

MR. KATZ: Okay, we=ve got it.

MR. HINNEFELD: Yes, I can share what people want to look at.

MR. KATZ: Okay, thanks, Zaida.

So for folks on the line, if you need B if you want to see something on Live Meeting that we=re talking about let us know and Stu will post it, share it.

And, Phil, it=s your meeting.

CHAIRMAN SCHOFIELD: Well, the last meeting was clear back in 2011, it=s been a while. We had 38 items, we closed out ten. SC&A has recommended the closure of another 11,

so B

DR. OSTROW: Excuse me, Steve Ostrow, 14.

CHAIRMAN SCHOFIELD: Fourteen, okay.

DR. OSTROW: And NIOSH agreed with us.

CHAIRMAN SCHOFIELD: That=s right, I forgot about those other three, my math=s off.

So I think that=s where we=ll start off, with Steve. He=s going to give us a history and then we will just go right down the suggested items that we close before we get to the White Papers.

DR. OSTROW: Okay. Steve Ostrow.

Brief chronology. For people who want to see a little more detail, SC&A put out a report on February 24th, 2014, a month ago, which is called INL Site Profile Review Status Update Revision 1, which went into the history

in more detail and the status of every single one of the items. So I=m just going to take some things from that chronology.

The Site Profile, the original one, came out in 2004, in July. SC&A had its first review in 2005. So some of these comments date back nine years.

First Work Group meeting was in June of 2009. Subsequently, NIOSH revised all the TBDs in the period from the end of 2009 until April 2011 and those are all the current TBDs.

And one of the things they did at that time was include ANL, Argonne National Laboratory West, in the INL TBDs since physically, ANL West is located within the INL Reservation.

The second Work Group meeting was held June 21, 2011, then nothing much happened for a while after that. The SC&A was asked by the Work Group and Ted to take a summary of the

issues and we ended up producing this document I referred to before, Rev. 0 and then Rev. 1 in February of 2014 where we basically summarized all the issues and the status of all the issues and it includes the matrix. Except instead doing the traditional matrix where you end up with very narrow long columns, we had like a separate page for each individual issue. It was easier to read, same material, it was just easier to read. And today is the third Work Group meeting.

In the last two weeks or so, NIOSH came out with, by my count, six White Papers plus an updated matrix and that=s responding to different issues. They responded to issue one, issue two, nine and 23, those were combined, hot particles, issue 19, issue 24 and issue 34. So we have all that from NIOSH.

SC&A has looked at all of them and has formed opinions, some of the preliminary

opinions, not all of them, but couldn=t do a, you know, a really thorough review since then.

So issues now, originally, the 38 issues that we identified, this was one of the B I think this might have been the first Site Profile review or maybe the second one. So at that time, we made a lot of comments that some were less important than others and some could have been combined with others. We=ve gotten better over the years at focusing on issues, so originally 38.

At the June 21, 2011 meeting, the Work Group closed out ten of the issues, so ten have closed and if people are keeping track, it=s 3, 7, 10, 11, 12, 13, 22, 25, 37 and 38, those are all closed and done.

Subsequently, SC&A was asked to look at the issues again after NIOSH gave us some response and in two different rounds, we recommended closing 14 additional issues.

And the first round was 4, 8, 14, 17, 18, 20, 26, 29, 33, and 36. And then a little bit later, we recommended closing 21, 30, 32 and 35. This was based on reading the Site Profile review, TBDs in more depth and some correspondence with NIOSH.

NIOSH subsequently agreed with us that all these issues B but we recommend that the Board close it. Well, we don=t actually close them, we just recommend to the Work Group to consider closing it.

So by my count, that leaves 14 open issues. The open issues are 1, 2, 5, 6, 9, 15, 16, 19, 23, 24, 27, 28, 31 and 34, that=s 14.

And as I mentioned, NIOSH White Papers that they=ve sent in the last couple of weeks addresses most of those. A few of the, they haven=t addressed. A couple of B looking at the NIOSH=s comments and the matrix, a few there=s a few of them B a few things that they=re

still developing and that will come later.

So that=s where we are right now. And I recommend for this meeting it might be a good idea to go through the issues of the 14 that we recommend for closure and see which ones we can, you know, knock off and which ones the Work Group wants to look at further.

CHAIRMAN SCHOFIELD: Any comments?

MEMBER BEACH: I think that sounds like a good path forward.

CHAIRMAN SCHOFIELD: Okay, I guess we=ll get into it.

MEMBER BEACH: So the first one is issue 4.

DR. OSTROW: The first one is issue 4 that I recommend closing. Give me a second here to find it.

Phil, how do we want to do this? Do you want me to summarize each issue quickly, then B

CHAIRMAN SCHOFIELD: Yes, I think so, that way people understand what=s happening.

DR. OSTROW: Okay, sounds like a good idea.

Okay, if anyone=s following along in the SC&A report from February 2014 that lists all the issues, that=s on Page 20 of that report.

MR. HINNEFELD: Can I ask if people on Live Meeting are seeing that page on Live Meeting now? Is there anybody on the phone on Live Meeting?

MR. DARNELL: Stu, this is Pete. I=m not seeing anything on Live Meeting. It just has that conference will begin shortly screen.

DR. OSTROW: Should wait, perhaps, until someone knows how to do this?

MR. KATZ: Pete, I wonder if you=re

B there=s more than one link into the Live Meeting.

MR. HINNEFELD: Let me see, I don=t think I have it up.

MEMBER BEACH: Because you have to sign in as the presenter, right?

MR. HINNEFELD: Well, I=m in.

MR. KATZ: No, he=s in.

MR. HINNEFELD: I=m in, I=m trying to come in as what was called Leader.

MR. DARNELL: Okay, it just came up.

MR. HINNEFELD: Okay, all right.

MR KATZ: Good, thank you, Pete.

MR. HINNEFELD: User error on my part.

MR. DARNELL: Hey guys, I=m going to be off line for a while. Brian has my telephone number should you need me.

MR. HINNEFELD: Okay.

MR. KATZ: Okay, thanks, Pete.

DR. OSTROW: Okay, so we=re on issue number 4 entitled Completeness and Quality of INL Internal Dosimetry Programs. And the issue started out as looking at missed internal dose, how is that handled.

SC&A had reviewed at this time, and this is talking about years ago, DOE had Tiger Team reviews of a lot of the DOE sites, I think in the late 80s or early 90s, I think so.

And these reports are huge. I think the one for INL runs several thousand pages over a couple of volumes. And this was done like in the entire DOE complex so it wasn=t just INL and the Tiger Team report, a lot of places criticized dosimetry, record keeping, and a lot of programmatic things.

And so sort of a lot of bad things about how DOE did dosimetry. We made a comment about the completeness and quality of the internal dosimetry program.

NIOSH responded to us that a lot of the issues that we brought up weren=t really questioning whether the data was good or not, it was more programmatic issues than anything else.

Since we made the original comments, NIOSH had revised the TBD because we looked at the original Rev. 0, now there=s Rev. 3 of occupational external B this is environmental dose, excuse me. We=re up to Rev. 3 in that already.

We saw that NIOSH had deleted some of the things we objected to and they edited entire new sections, 5.6 which is entitled Intake and Internal Doses Assessment from Unmonitored Workers, they added that. And they referred to a bunch of OTIBs for signing the default doses for missed internal doses.

And SC&A had reviewed these OTIBs separated under the Procedures group and we

resolved all issues there. So basically at the end, we=re satisfied in the way NIOSH resolved the dosimetry issue here and we recommended to the Work Group that the issue be closed and NIOSH subsequently looked at our recommendation and they agreed that we should recommend to the Work Group to close this issue.

But basically the few objections that we had weren=t that profound and NIOSH revised its wording and its references in the latest version of the TBD, so the problem went away as far as we=re concerned.

MEMBER BEACH: So when I reviewed this, I noticed that NIOSH is going to use OTIB 18, 33 and 54 under this action or under this issue.

DR. OSTROW: Yes.

MEMBER BEACH: When I went into BRS, 054 still has 19 findings in progress out of 34

and 18 still has one in progress, two that were transferred, three that were closed.

So I guess for me, that issue is leading a reconstructor to several different OTIBs. I guess I=m wondering how that direction goes to the dose reconstructor when there=s so many different OTIBs for that issue and 54 is not finished. There=s still several items that are in progress in the Procedures Work Group.

MR. HINNEFELD: Well, from our view, you can track this finding one place. If there are findings on 54, I=m saying, that are, you know, we=re tracking those with the Procedures Review and that tracking system and the resolutions of those finding then is always to the extent they don=t change anything are carried back and revisit on the site on all the things that used them.

So the PER that would follow a

revision to 54 would pull in anything done in accordance with Idaho.

So, you know, if you leave it open in two places, you=re essentially tracking the same finding in two places. And anytime you have a finding on a TIB or a procedure, you have this sort of universe of claims that may have to be revisited when the finding is resolved and this is just, you know, these Idaho claims would part of that universe and would have to be resolved, have to be finished when the findings and the procedures system resolved.

Otherwise, you=re essentially tracking the same findings in two different B trying to find it here as well as trying to track it in the Procedures Subcommittee.

So in my view, you know, tracking it in Procedures is sufficient because the PER that follows the change, you know, then sweeps up everything that was done including these

Idaho claims.

MEMBER BEACH: Yes, it=s just a little bit misinterpreted when you say 054 is all done and everything looks good. I understand the tracking of it. But how about on the dose reconstructor side of things when you=re trying to track that dose and you=re sending them to several different OTIBs?

MR. HINNEFELD: Well, 18 and 33 are essentially the magnitude of the activity of the exposure, I believe.

Brian, if I say something wrong here, just jump right and correct me.

MR. GLECKLER: Typically for the overestimates, we use OTIB 18 and OTIB 33 is kind of like the go-between that it covers overestimates which solely is in OTIB 18 but it also goes into the best estimate approach a little bit. It allows us to downgrade the OTIB 18 doses. And OTIB 54 is used with the missed

dose so we=ll either use either missed dose approach or an OTIB 18 approach for INEL claims.

If we can go with the overestimate we will use OTIB 18, but if we can=t afford that, because of the Probability of Causation, we=ll dole out a missed dose and then OTIB 54 merely accounts for all the other nuclides that may not have been monitored for.

DR. MAURO: Josie, this is John Mauro. I have a little perspective on this too that might be helpful.

The way we=ve been looking at OTIB 18 and 33, that=s a shortcut approach when you B where if there=s a good health physics program in place, you can make certain assumptions that the airborne activity in a room is within certain fractions of the maximum permissible concentrations.

So where we came out on that, I remember this because, going over this, it was

really B the real question is, conceptually, the approach used in 18 and 33 is sound in terms of interpreting where are you within the distribution of possible airborne dust loadings if you have good health physics oversight, access controls, airborne monitoring, that sort of thing. And the approach used is reasonable.

The question always becomes for different time periods, for example, at INL or any facility, is it reasonable to assume that there was a comprehensive health physics oversight program so that you could make use of dose OTIBs.

So I mean that=s usually the issue that confronts us when NIOSH defaults to those B I would say reasonably maximizing approach to internal dose.

Fifty-four, right now, we=ve done a lot of review work on that, on the actual

methods and I think that=s very mature, our review. Where we are now and folks in the room maybe know a little bit more because I was somewhat involved in that, in 54 right now there is a workbook that is being used and it=s an extremely complex workbook and Ron Buchanan is right now seeing if the workbook itself implements OTIB 54 in a way that seems to be appropriate.

And so all of these OTIBs are fairly mature. The real question is the degree to which they apply or they can be applied.

By the way, 54 would imply that there is a significant amount of beta/gamma bioassay data upon which the base exposures to workers that worked at reactors and in effect, that=s what 54 will buy you. It=s a way to do that.

And I think basically we agree with the fundamental approach that=s been adopted.

You have to pick which, you know, which category reactor. If you do have comprehensive bioassay data in terms of gross beta/gamma in urine, you know, it=s a way to get at the problem and reconstruct internal doses and right now, the only B I believe B the area that we=re really focusing in on is the workbook and it=s one of the more sophisticated workbooks I=ve ever seen and Ron is working on that real hard.

So I think that=s my understanding of where we are with regard to these different OTIBs.

DR. OSTROW: John, this Steve again.

The OTIB 54, I=m leading the review of that and then B yes, it=s Rev. 1 of that right now and if I remember, we have some comments but none of them are showstoppers.

One of the comments we have is NIOSH did a lot sophisticated ORIGEN runs to get the radionuclides and spent fuel and we don=t

disagree with any of them. We just wanted more background information of how they actually did the modeling. You know, what data they used and what assumptions they used and things like that.

But I think the characterization is good. OTIB 54 Rev. 1, our review is pretty mature. We don=t have any showstopper type questions about it. We just wanted further information.

We=re having, as you mentioned, Ron Buchanan actually run the workbook that=s associated with it to make sure that it gives the right answers. OTIB 54 provides, just very nice, three sample problems to run. So we=re running the sample problems to make sure they get the right same answer that we=re supposed to.

I think the Procedures meeting is in about a month from now or something. We=re

going to have our report done before and we=ll anticipate we=re going to sign off on most of it, at least anyway.

MR. KATZ: And Steve, just to update further, I sent this past week to John Stiver, Rev. 2 because it=s out.

DR. OSTROW: Oh, you have Rev. 2?

MR. KATZ: Rev. 2 is out.

DR. OSTROW: Oh, I didn=t know.

MR. HINNEFELD: I think it was an additional reactor type.

MR. KATZ: Okay, it doesn=t address B

MR. HINNEFELD: I don=t know what else it has but I was just thinking that myself. I know we just published a rev.

MR. KATZ: You did.

MR. HINNEFELD: And I=m trying to remember what it changed. But it should have addressed findings, anything that was marked in

abeyance. The findings should be address in this rev.

MR. KATZ: That=s what I=m saying.

MR. HINNEFELD: And I was thinking there was some pointed out that there was a reactor type that wasn=t included in 54 that had to be in it, but I=m not sure.

DR. OSTROW: I think one of the triggers is something maybe B

MR. HINNEFELD: I don=t know.

DR. OSTROW: I=m not sure. Anyway, I=ll look at it once I get back to my office.

MR. HINNEFELD: Yes, I don=t actually know what=s in the things we publish.

MR. KATZ: My only point was that then some of the matters that were in abeyance may be actually B

DR. OSTROW: Yes, okay none of the comments we had were showstopper type comments

anyway.

CHAIRMAN SCHOFIELD: I do have something I want to put out is that there=s concern about this, particularly the environment internal is you have, well, chem plant is probably the biggest thing out there.

You know, you start looking at the Rose data for the facility and Southeast Idaho=s known for its wind. I mean, you know, everybody talks about their expert wind up there.

And so, you know, you can find numerous references, you can talk to a lot of the workers and they talk about the cornflakes coming out of the stack and, you know, depending on wind, the dispersion, where they=re going. Are those landing outside the perimeter fence for B

And then, you know, you=ve got crews come through that area doing weeding or

whatever particular job they=re assigned. Some of them probably aren=t on a bioassay sampling program because typically speaking, they would not be in a plant, something.

DR. OSTROW: Yes, well Phil, I think what you=re talking about is more addressed in comments one and two with the NIOSH=s two White Papers of the environmental routine and episodic releases. I think that=s where they go more into what=s onsite and what=s offsite, you know, as far as the environmental doses. So that=s a little bit of a separate issue.

Your point=s well taken but it=s like issues one and two for that.

DR. MAURO: The way I understood this particular issue is it=s really for workers indoors and the reconstruction of their internal doses which is distinct, of course, from the outdoor exposures from those effluents which is an entirely different set of issues

that certainly we=re going to be talking about today, I presume.

So but I think I understand that the dilemma is that if we still have certain OTIBs that are in the process of being reviewed, I know what the DR, and the question came up before, how do we deal with this situation when we do DR reviews? Well, typically, when we review a dose reconstruction, we see if the DR follows all of their procedures and their Site Profile, and follows it explicitly. And so, if it does, it is not scored down. We don=t give any negative score if they follow their procedures.

However, we do have a separate section in the DR review called Section 1.3 where we list all of the open items as best we can that pertain to the Site Profile and perhaps the procedures that might have a bearing on the case.

But we don=t score the DR negatively. We sort of leave it, you know, as Stu pointed out, we allow the Site Profile review process, the procedure you process to go forward independent of the score card we give to the DR review. So when we do the review, we just check to see if they followed their procedures.

Now the only exception to that is AWE sites where we do what I would call a full blown review.

And so the question I think that is before the Work Group is the fact that we have these procedures that are still somewhat in a state of review. Does that mean we should close this issue or, you know, because they did revise the Site Profile and explicitly make use of procedures that go right toward the issues we are concerned with. And B which is good. The fact that those procedures may still have

some open questions associated with them puts us in this sort of limbo area and that=s a judgment call on how you would like to proceed.

MEMBER MELIUS: This is Jim Melius, can I raise a related issue? Can you hear me?

MR. KATZ: Yes, we can.

MEMBER MELIUS: Okay. My understanding is that the coworker model for this site is under development still.

MR. GLECKLER: There is an internal coworker model under development, but the plan, I don't think was with the intention to ever use that model. It was more to fend off, to my understanding, the SEC type petitions that might pop up on that. Because we think the approach for INL, I think we've got it covered for dealing with the unmonitored dose assignments.

And hopefully the -- unless the internal coworker model shows dramatically

different, which it shouldn't. Because the vast, you know the vast majority of the bioassay results are negative. So it should just come out to a missed dosed assignment. And that's what we do for the unmonitored workers, is a missed dosed assignment if they had like a positive external dose.

MEMBER BEACH: In our last meeting, it was stated that we would get an external coworker model. But then NIOSH said no, they weren't planning on doing an external. So there's -- it's a little conflicting. And if you look at last -- the last meeting's notes, it's there.

MR. GLECKLER: I don't recall that myself either. I recall the internal, but not the external in that.

MEMBER BEACH: I've got it in notes from last meeting, so.

DR. OSTROW: Yes. And also it

turned up in one of the emails that Pete Darnell had sent a few months ago, it was like a little bit of a status update. And they listed the -- it was supposed to be internal lines external coworker.

But the latest matrix that NIOSH sent us like two weeks ago, had a little note with no external coworker model.

MR. GLECKLER: Yes. Because I thought we -- I think one of these issues, I'm trying to remember which one now. It's like we resolved that with -- because it was in regards to the worker, you know because to get into the major operating areas, you had to wear a dosimeter. So everyone was monitored inside the major operating areas.

And then the ones outside those operating areas were the only unmonitored workers typically. There's an exception to some construction work activities where they

would move the fence inside and use a group dosimeter, and so on. And have a separate revised internal fence for them to work in.

But the -- for the most part, everyone inside the major operating areas were -- which were where the radiological work was done, and that was monitored at INL. And so we typically have all their dosimetry for those individuals. And whoever doesn't have dosimetry, you know, that's an indication that they weren't inside those areas at any given point in time. And we assigned environmental, internal.

And I think that's one of the resolved ones from the last meeting.

MR. HINNEFELD: Yes. I think that realization of not them not having a typical need for a coworker model because of the badging practices, could have occurred at anytime during this research. So at some time we could

have said that we were going to work on a coworker model, until we realized the badging practices and decided B I mean the fact that we said that we were going to do something at one point and then just changed and said oh gee, we don't need to do that later on, to me is not really a particular telling thing. Our research tells us different things all the time.

CHAIRMAN SCHOFIELD: Yes, but another area of concern on that particular subject, you know we're dealing with over 50 reactors for this facility. You really almost have to go back and look at the ventilation system for each reactor.

How was anything generated, any off gases, anything generated from that building. Was it run through a -- I mean you know, it's not an uncommon thing sometimes, they get a lot of these really short lived, high dosed things.

They trap them and just let them sit there and decay. Or were these just generated and sent right out to stack?

MR. HINNEFELD: Well really, depending upon the state of you know, where you get your information from, if you were depending upon an emissions value, then you would have to know the major emitters. Now you talk about 50 reactors, a lot of these things are things like zero power reactors, slow flux, fast. And so because of their power level, they're just not going to have much emission anyway.

So I don't know that you need to do -- to look at each reactor. You need to look at the major emissions forces if you're doing an emission calculation for your environmental impact, you need to look at the major emissions forces, not all 50 reactors.

That's -- I would --

CHAIRMAN SCHOFIELD: So that would be covered in a pretty generic way. You could cover most of them, is that what you're saying?

MR. HINNEFELD: I think that major emission sources are numbered. Getting back to one and two again. But I think the major emission sources are known and they're documentation out there on that.

DR. OSTROW: Yes, the chem plant I think, this is also goes back to issues with it. The chem plant put out most, almost all the radioactivity other than the Aircraft Nuclear Propulsion test. That's totally separate.

And the chem plant I think had two really high stacks. Like everything went up two very high stacks. And that accounted for most of the emissions.

CHAIRMAN SCHOFIELD: Okay. Because that's a concern I know that's come up. And talking to a few people that they were

worried about, well you know, with the reactors. And true, a lot of them were small, very low power reactors. But you know, how does the ventilation, was anything generated, just sent out the stack, or you know, at some facilities you actually have a trap and you trap those and you let them decay before you send them through the filters and on out the stacks.

MEMBER BEACH: So going back to Jim's question on coworker model, it looks like Issue 15 was a -- it was indicated on that one that they were -- you guys were going to work on a coworker model for internal. And then 31, there's notes that indicate an external dose coworker model, which may have changed like you said, with new information. But that's what we had from the last meeting, so.

DR. OSTROW: You're right. That's in my notes also; I see that.

MEMBER MELIUS: So is there or is

there not an external and is there or is there not an internal coworker model being developed?

MR. GLECKLER: There is an internal coworker model being developed. There is not an external coworker model being developed.

MEMBER MELIUS: Okay. Then my concern would be on Number 4 is that we just be careful to keep that in mind. And when one talks about the completeness and quality of an internal dosimetry program, I think it's a little bit of a misnomer, when we're really just focusing on you know, missed dose here.

MEMBER BEACH: Yes, because that's important: that completeness and quality, which is what had me digging through it a little bit closer.

MEMBER MELIUS: And can I just ask also, is there a timetable for the coworker model? I thought I saw something about it being produced in June or July. Is that still

realistic or, Stu?

MR. HINNEFELD: I don't have a date in front of me right now. I'd have to do some research.

MEMBER MELIUS: Okay.

MR. HINNEFELD: To see what, when I know about that.

MEMBER MELIUS: Okay. I'm thinking that of that just as much in terms of we had talked about doing our July meeting up in the snow country there, so.

CHAIRMAN SCHOFIELD: Steve, you got any feelings on this one?

DR. OSTROW: No. It's just that the -- just a little bit of perspective. Again, these issues evolved over time since we first looked at them. We might have, when we originally said completeness and quality of unknown internal dosimetry programs, that might have been the misnomer.

And by the time we got to rev three of the document we're looking at, the focus is really on the missed dose type of a focus. You know, if we were rewriting the issue today, we would call it Issue Four Missed Dose, you know environmental dose. So --

MEMBER BEACH: So the completeness and quality of the internal data, that is covered in another issue? So one, maybe two, is that what?

DR. OSTROW: Well, one and two have to deal with the routine and the environmental monitoring program for the routine releases and for the episodic releases. The Issue Four is just basically a missed dose approach. And by timing NIOSH up to Rev Three of the document, and they gave instructions in the TBD to use these various OTIBs approach, we're -- SC&A's satisfied that they're on the right track.

And the comment, what we were

discussing before, and John Mauro weighed in on this, what do you do since the OTIBs aren't totally signed off by the Procedures group yet. There's still some open items, especially on 54. And that we understand the process, is that once the OTIB is signed off, and NIOSH goes and looks back and sees, has there been anything that's affected in any of the dose reconstructions, and they have a whole procedure for doing that, so that nothing falls through the cracks that way.

So I mean, this is the standard procedure that they do with all the OTIBs and they are signed off finally.

CHAIRMAN SCHOFIELD: So we can -- maybe we could go ahead and close this issue with a caveat that once 54's done, then they come back to see the impact.

DR. OSTROW: Yes, I think that's their routine procedure though, right.

MEMBER BEACH: Okay, so then where is quality of the data? Is there something in here that is going to cover that? Because I realize this one is missed dose and it was maybe misidentified. But quality of the data's important also.

DR. OSTROW: Well we have a few that are called quality of data, like 16 for example. It's also a quality of data and record keeping.

MR. MAURO: You know, I have a suggestion. I understand the dilemma we put ourselves in, including SC&A, and we put ourselves in. In the process of going through this Issue Four, which really starts off as very broad. Quality of data's in there. Missed dose is in there. A lot of the original Tiger Team concerns.

So what happened is we started this very broad issue which -- and to interpret it, it would include you know, matters like a

coworker model. And one could argue that that's part and parcel to Four.

So in a way, maybe the best way, as just a suggestion, is to explain ourselves better that you really would -- how we're defining this issue narrowly, and it's really pertaining to the missed dose part. And to explain that when we're -- and the other issues such as a coworker model.

And also if you would want, talk about other issues related to internal dose outdoors from the emissions. And it's not being addressed here. We're only addressing a narrower definition. Because I could see why one could interpret by closing this out means we've closed a lot out, but we really haven't.

We've only really closed out the missed dose portion of internal dose to workers working indoors. But we're not closing out the coworker model issue. That's certainly still

open.

And I think it's important that whatever we do in terms of you know, assigning some closeout statement regarding Issue Four, we should make it very clear that it's constrained. It's not as sweeping as one might think. And I think that's important.

MEMBER MELIUS: And -- this is Jim Melius again. And the call area that is those other issues, you know completeness of data, coworker, whatever you call them, need to be added onto the matrix of things that need to be addressed at some point in time if they haven't been addressed already.

MR. HINNEFELD: Okay, I want to make sure I'm clear on this. We now have some sort of task to address completeness and quality of internal monitoring data? Is that what I just heard?

DR. OSTROW: Well, I think except

before you go off in doing that, I think we have to take a look, and I don't think we can do this right on the fly right now, look at these other open issues that we have. Is this taken care of somewhere else? We don't want to do it again.

MR. HINNEFELD: Well I was just thinking, there were two B the next two are also internal dosimetry findings that you're recommending keeping open.

DR. OSTROW: Yes.

MR. HINNEFELD: So rather than drag these into Four, if there's some action to be taken, that clarify the response, it seems like we could move them into Five and Six. Because like you guys have said, from the time the original findings were written, there have been other, you know, there have been a revised TBD.

And so things have sort of morphed a little bit. The key element is to capture any

weaknesses somewhere on this finding list.

MEMBER MELIUS: Yes. And I think that was my point. You know, clearly a lot of this you may deal with in terms of the coworker model development and the report on that, so. I think a lot of this is already under way.

I don't necessarily think there's more for NIOSH to do at this point until that's developed. But let's go through the rest of the issues and see what comes up.

MEMBER BEACH: Well, and as Steve points out, 16 does talk about completeness and quality of internal beta-gamma dosimetry record keeping programs. But then it also points out that it's for external and no external coworker models are going to be developed. So, yes.

DR. OSTROW: And 31 also has the same title.

MEMBER BEACH: These aren't very

clear, so.

DR. OSTROW: You can't go by the titles of these.

MEMBER BEACH: Yes, no, you can't.

MR. KATZ: I think your current plan to just churn through what you have already, --

MEMBER BEACH: I agree.

MR. KATZ: Will help you figure out what's left on the table if there are things that are left out.

MEMBER BEACH: Yes.

DR. OSTROW: I think so.

CHAIRMAN SCHOFIELD: And part of this that sort of addressed I think, if you look at OTIB 52 for the construction trade workers. When you get into OTIB 52, it=s actually even, there's a table there for INL on page 29.

MEMBER BEACH: I don't think any of these call that out, though. But, good point.

MR. GLECKLER: Regarding the external coworker study issue, I just noticed that issue number three, and that is the one where we were -- I think we resolved that and determined that we didn't need the coworker study. That's kind of the explanation I was trying to give, of workers being monitored inside the fence line versus outside. I think we sort of hashed that out.

DR. OSTROW: Can I make a suggestion, Stu?

MR. HINNEFELD: Yes.

DR. OSTROW: That it's very -- if you guys are convinced you shouldn't do an external model, how about getting your thoughts together and just writing a memo or something? So this way the Work Group can take a look at it. You know, if you have good reasons that you don't need it, fine.

Does that sound like a good plan?

MR. HINNEFELD: Yes, I think we can -- I guess we could do that. It sounds like Brian said we've kind of done it on Issue Three previously, and don't have to close.

DR. OSTROW: Yes, whatever the justification is, it's sort of open that I think the Work Group, and we were under the impression that you were going to do an external model until we saw it in the matrix that you said you weren't. So it might be nice to just write something short, you know saying why you don't think you need it.

MR. HINNEFELD: Yes, I think it -- okay.

MEMBER BEACH: Well and Three doesn't say --

MR. HINNEFELD: And I understand, we were talking about an external or coworker model, we were talking about external model for photons and beta particles. Because there's a

different situation for neutrons.

DR. OSTROW: Yes. So to just clarify you know, what you're talking about it.

CHAIRMAN SCHOFIELD: So the action item would be for NIOSH to write their justification or how they're going to handle it.

DR. OSTROW: Does the Work Group having any more questions, concerns?

CHAIRMAN SCHOFIELD: I don't.

DR. OSTROW: So maybe you guys want to call a vote?

MEMBER ROESSLER: I don't have any questions.

CHAIRMAN SCHOFIELD: I think we can, like he says, we can close this one with that caveat, that they'll be going back and taking a look at this. And given the you know, putting out a paper, not even a whole paper, just how they're going to deal with it.

MEMBER BEACH: It's a different method.

MR. HINNEFELD: What we're going to do on Four, the issue that we need to complete on Four is when these procedures, these TIBs that are resolved in Procedures Review to make sure that the PER, you know, sweeps these in. I mean that's just going to happen.

I mean I think rather than saying a conditional closure, I think you're closing with the understanding that the process for finishing the TBD reviews will go back and address any changes with cases that were done in accordance with these old, you know, at that time, which will be old TBDs.

CHAIRMAN SCHOFIELD: Okay. That's my understanding.

MR. HINNEFELD: So I think that's what the -- what the -- I believe the suggestion is that you close Four with that understanding.

DR. OSTROW: Yes, with that recognition that this is the standard process that NIOSH does all the time.

MR. HINNEFELD: Yes. Right.

DR. OSTROW: It's not like anything unique or new for this.

MR. HINNEFELD: Okay.

MR. MAURO: I would also suggest another qualifier because when you look at the original issue, it's very broad. You know, covering things that one could interpret as being deficiencies in data quality and that sort of thing. A very broad statement.

And what we're really trying to close out here is a relatively narrow piece of that. The extent to which the original -- see that's one of the problems, the original issue was all-encompassing and could easily involve things like coworker model and data adequacy and that sort of thing.

And we're not closing that out. We're just closing out I guess the strategy for dealing with missed dose, for internal exposure indoors. And so -- so that it's clear that we're not, you know, it's easy --

MR. KATZ: But John, we don't need to qualify this closure because that will be addressed in the other findings. And if it's not covered by the other findings, we'll add a finding for that.

MR. MAURO: Oh, okay.

MR. KATZ: But so it's just --

MR. MAURO: Okay, okay.

MR. KATZ: Yes.

MEMBER BEACH: And I agree with closing it on those terms.

MEMBER ROESSLER: I agree.

CHAIRMAN SCHOFIELD: Why don't we move on to Finding Number Eight, unless Jim -- sorry. My apologies, Jim.

DR. OSTROW: Okay. So we shall move on. The next one is Issue Eight.

And Issue Eight is called -- oh, this was an interesting one. High-Fired Plutonium and Uranium Intake. And this one also evolved over time.

And SC&A was discussing this as recently as 7:30 this morning. We looked at it again and we weren't quite sure as of yesterday that everything was okay.

The issue was the -- we'd said originally the TBD didn't evaluate the hazards associated with high-fired plutonium and uranium at the chem processing plant and the radioactive waste management complex. And the NIOSH -- it goes a little bit further.

NIOSH responded that the -- that they revised the internal TBD, which is true. And they included Super S Plutonium. That's basically high-fired plutonium, as I

understand it. And they asked us what do you mean by high-fired uranium intakes?

There was a dialogue back and forth over the years on this stuff. And there were some action items. We reassessed it and we discussed about how fuel pellets are produced. And fuel pellets are typically uranium dioxide powder, UO2, centered at high temperature, 1700 degrees Celsius. And then the pellets are ground to a uniform size.

So the question is you know, this is a little bit UO2 dust and inhalation or ingestion of this centered material is what is meant by high-fired uranium intakes. And the -- we reviewed Rev. 3 of the TBD and we confirmed that Super S Plutonium has been included, and they were the solubility Class S.

And we did a little bit of research as of yesterday and today. This is a generic issue; it's not the -- INL is not the only place

that has you know, high-fired uranium or plutonium. It's sort of typical.

And we discovered or confirmed that the -- it's generally accepted that UO2 and U-3O8 have Type S lung clearance. And John Stiver weighed in with an email this morning like at 7:30, that this is actually covered in ICRP 68, where it's specified.

So based on all that, SC&A remains happy the way NIOSH responded to this. We just did like a you know, last-minute confirmation because it sort of rung a bell in our head yesterday to take another look at it.

So we think they handled it fine in the current version of the TBD, and we recommend to the Work Group that this issue be closed. Stu, do you have anything to add to this?

MR. HINNEFELD: No. Just like Steve said, whereas for plutonium, there's evidence from plutonium registry of plutonium

being retained longer than Type S, which is the longest retention in the ICRP models. And because of that, we've done the Super S Plutonium. And we did a TIB, we've done the PER and we included it now in the Site Profile for here and other places.

So we recognize that for plutonium, you know, there is -- there are materials that are retained longer than Type S. For uranium, there is no evidence of material like that. You know, this high-fired UO2 that's ground into pellets, you know the UO2 fuel that's used in reactors behaves as Type S based on the studies that have been gathered so far.

And so we don't see evidence of a Super S uranium and the Site Profile, like essentially all of uranium exposures, when there is potential for exposure to a variety of compounds, says you take the solubility, or the clearance class, slip SRM, which provides

the highest Probability of Causation to the claim. So we do that routinely.

So that's why we felt like this should be closed. Because we've covered Super S Plutonium and we don't think there is any Super S Uranium.

MEMBER ROESSLER: So Steve, when SC&A came up with this comment, that was before NIOSH talked about Super S?

MR. HINNEFELD: Yes. That original comment=s way back.

DR. OSTROW: Actually, they responded to our original comment which was on the Rev 0 of their TBD. And by the time they got to, I think it's Rev 3 or something, it's included. They have language in it, it's just like what Steve said basically.

And we checked it out and you know it -- this is correct with the ICRP models.

MEMBER BEACH: So in these Rev 1

status and review information from SC&A, that is current? That's February current, correct?

DR. OSTROW: Yes.

MEMBER BEACH: Because you've got --

DR. OSTROW: That's right.

MEMBER BEACH: Okay.

DR. OSTROW: This is a -- all these issues that we have in our report are chronological. The original one goes back like 2005, 2006 or so. And by the time you get to the bottom of the page, that's the Rev 1 status one. That's the February, 2014 --

MEMBER BEACH: Yes, and that's the way I read it.

DR. OSTROW: Of last month. Yes.

MEMBER BEACH: Okay. So when you said you had a call this morning, I was surprised because basically it showed in your current Rev in February you were clear.

DR. OSTROW: Yes, what happened -- yeah, we were clear. I was discussing all these issues on the phone with John Mauro yesterday --

MEMBER BEACH: Sure.

DR. OSTROW: And John who's a thorough health physicist, this sort of rung something in his head that he wanted just to check further, you know.

MR. MAURO: Can I speak a little bit more to this? It's good that we separate the uranium from the plutonium. There's no doubt that from -- you know that, the process that took place since all this began, the plutonium high-fired issue has been thoroughly vetted.

So that aspect of this comment is certainly clear to us, can be closed. The aspect of this comment that brought -- that came to my attention quite frankly during the preparatory work for this meeting was when I

looked at this 1700-degree centered uranium. And the fact that -- the reason that I bring it up is that I know that this is an issue for example, we're going to confront at Kansas City, because in fact I called Joe Fitzgerald up yesterday, said Joe, this whole -- I know this issue of high-fired uranium has come up previously. And he said yes, you recall that also I called Arjun because I got to say that I was sort of the one that brought this up in the eleventh hour because I don't recall looking at, not that it wasn't looked at, but I don't recall myself seeing the data on -- where a demonstration was made that you really can't see that Type S works for whether you're dealing with, you know, airborne uranium dust generated during machining during of uranium, let's say, at AWE facilities.

And you know the data, that's a certain type of airborne uranium oxide that is

produced during machining operations. And when I came across this, where this is a different process where you're -- it sounds like you might be machining centered uranium, which is produced under fairly high temperatures, I think it was 1700 degrees centigrade.

So I -- that reminded me, it goes back some time that, did we ever really close out on other sites, or other -- and when I spoke to Joe, he mentioned that. It turns out those issues were brought up, but they sort of went away because eventually the site was granted an SEC, that sort of thing.

And I have to say that the fact that, Stu, you're putting forth data and information that shows you really can't see a difference in the clearance for these different uranium oxides. Whether they were generated by milling and machining, or generated during

machining of centered uranium, that's very important. Because I think that that data and that research that shows we're not seeing a difference is important not only to this site, but it's going to be important to Kansas City and perhaps other sites as well.

So the fact that you have that information and you have a basis for saying no, there isn't. The clearance rates appear to be -- we're not seeing differences. I consider that to be very important you know, to this -- closing this issue and many others.

MR. KATZ: Okay. Thanks, John.

MR. HINNEFELD: I didn't feel called on to say anything.

MR. KATZ: No, it's a helpful perspective.

MEMBER BEACH: I don't have any questions for that one. I agree with closing it also.

CHAIRMAN SCHOFIELD: I don't have any, do you?

MEMBER ROESSLER: I don't either. I agree.

CHAIRMAN SCHOFIELD: Then we'll follow your recommendation and close that one.

MEMBER ROESSLER: But we should check to see if Melius is back on the phone.

CHAIRMAN SCHOFIELD: Jim's going to shoot me. My apologies Jim. Okay.

DR. OSTROW: So if we can mark it closed, Work Group will close it?

CHAIRMAN SCHOFIELD: Yes.

DR. OSTROW: Okay, good.

MR. KATZ: Actually SC&A keeps the matrix.

DR. OSTROW: Yes, we keep track of it. Now we'll have a hundred-page document you know, just to add to it.

Okay. Our next Issue is Issue 14.

Plutonium Monitoring. And this appears on page 34 of our summary document. So this is another plutonium one. And this is for occupational internal dose TBD.

This issue here that the -- and remember we're commenting on the original Rev. 0. The TBD does not provide any historical information on plutonium analysis methods used at INL.

It's entirely possible that selective plutonium monitoring on workers was used at INL until 1980. But with this information, the dose reconstructors would not be able to assign missed internal doses due to plutonium intakes in the time period before 1980.

And NIOSH -- our finding was NIOSH recommendation, NIOSH should provide information on plutonium monitoring. Okay, NIOSH responded and with their response, and

they said, and I guess rightly so, plutonium wasn't separated at INL.

Whenever there was plutonium, it was part of the spent nuclear fuel. As people know who are nuclear engineers and nuclear physicists, you generate plutonium 239 when you have a uranium reactor.

This is a like a little factoid. In a commercial nuclear plant, by the time it's end of life of the fuel, you're generating about 20 percent of your total power from plutonium fission and not from uranium fission because you're breeding plutonium in the reactor. It's sort of an interesting little fact.

MR. HINNEFELD: I didn't know that. Thanks, Peter.

DR. OSTROW: Well, I'm actually a nuclear engineer, so I knew that. That's my contribution to these proceedings.

MR. HINNEFELD: I actually didn't

realize it had a 20 percent fission. I knew it was there.

DR. OSTROW: Yes, with a power reactor it's about 20 percent. So anyway, NIOSH's point is well taken that at INL, the plutonium wasn't separate. They didn't do separation work.

So you didn't have to monitor for plutonium separately. You monitored for the mixed fission products, which were much easier to monitor for, and there was a program for that.

We subsequently as of last Work Group meeting, NIOSH was supposed to supply SC&A with the source documents used. And we were supposed to look at the applicable portions of the current version of the TBD.

And our reassessment, we looked at the Rev 3 of the TBD, which is the latest one, of the internal one. And we saw that it's been

revised in Section 5.1 and 6.3 to have a good discussion on bioassay monitoring where NIOSH discussed how the bioassay monitoring was done that would have accounted for any plutonium that was in the mixed fission product matrix.

So we're satisfied that this issue has been addressed by -- properly by NIOSH based on their discussion. And we recommend then that the issue be closed. So it's open for discussion.

MEMBER BEACH: I don't have anything on this one either, questions.

MEMBER ROESSLER: So you questioned originally whether it was necessary to do the selective plutonium monitoring before 1980.

DR. OSTROW: Right.

MEMBER ROESSLER: But then once you realized the type of plutonium that would be present, you decided that wasn't necessary.

DR. OSTROW: Yes, after NIOSH explained it nicely. See you know, a lot of the comments really go two different ways in all of our reviews, Site Profiles and stuff like that. It's not that we think something was done incorrectly, you know calculated something wrong, they used the wrong reference values. That's one thing.

The other class of comments, which occurs very frequently like this case, it's not that we say it's wrong, we just want NIOSH to back it up, you know. Explain it and back it up. So in this case, they explained it and backed it up, we thought.

MEMBER ROESSLER: I agree with closing.

CHAIRMAN SCHOFIELD: I don't have any problems with closing this one.

MEMBER BEACH: So you're saying that they had plutonium there.

DR. OSTROW: Yes.

MEMBER BEACH: But it was adequately monitored?

DR. OSTROW: Yes, it's not a separation plant.

MEMBER BEACH: Okay.

DR. OSTROW: If you did separation of the fuel, then you'd have plutonium by itself, you know without the rest of the fission products. And then it's a whole different ball game for monitoring for the plutonium. The internal uptake.

But in this case the plutonium was never separate -- a separate stream.

CHAIRMAN SCHOFIELD: Did they ever run any tests that you know of, like some of the fuel test pins where they were basically using this for a breeder reactor, look at that possibility? Those fuel pins, were those separated into their cycle?

DR. OSTROW: Not that I know of. But they had breeder reactors, they had like the EBR.

CHAIRMAN SCHOFIELD: Right. But I mean theirs. Did they, or did they send those fuel pins somewhere else to have separation done?

DR. OSTROW: I don't know.

MR. GLECKLER: The instances that I looked into or was able to find on that, because that's one thing that I did a lot of research on, based on your input from before, is you know, because you need to have a reprocessing facility and not recover the plutonium. And from everything that I could find, they never recovered the plutonium.

In the instances that B where they're irradiating pins and that in the reactors and everything, all the documents that I found that showed what happened to those pins

afterwards, they're typically sent off site to be processed. They're encapsulated while they're onsite.

There was -- there have been a couple Pu incidents. And then I think one, maybe two at MTR. There's definitely one at MTR, but they had the bioassay for that stuff, they didn't have assessed doses and stuff. There's an incident report on that.

And then there's some involved with the neptunium-237 work. Because they did separate neptunium-237 for a period of time. But radioactivity in that was dominated by Pu and all that was in hot cells for the most part. But I think the incidents come when they went to clean out those hot cells.

Beyond that I think they flushed them out. And so it's real limited and then because they have incidents and Pu bioassay, it looks like they're adequately monitored. And

there wasn't any routine type Pu exposure at the plant without the fission products present.

MEMBER BEACH: What about when they machine it? Because I know they machined it in one of their processes. Does that create the same issue as when they separate it? Or is --

DR. OSTROW: Yes, if you machine the spent fuel for some reason, you get all the mixed fission products come out also with it. So the plutonium is there, but it's buried with all the other stuff that you have, which is easy to find. You can't miss it.

MEMBER BEACH: So the assay program would catch that?

DR. OSTROW: That's right. They didn't have any place where they actually separated the plutonium out as a separate stream.

MEMBER BEACH: Got you.

MR. GLECKLER: And because of the

radioactivity from the beta-gamma emitters, I mean it's typically lethal levels to where it would have to be in a hot cell, so.

MEMBER BEACH: Yes.

MR. GLECKLER: You're not dealing with human contact with the plutonium at all. Not even with a glove box situation because of the radiation levels.

MR. MAURO: This is John. I just have a question. And not -- I know that we're moving along here. But in effect what I'm hearing is that you have data on beta-gamma in urine, and OTIB-54, certainly there if you know, chosen -- used correctly.

Am I hearing that -- and is there anybody for clarification, does that also have in the mix plutonium or transuranics that might be needed to be addressed? Or have you made a case that it's not an important contributor?

In other words, what I'm hearing is

that because you're working with fission products associated with reactor operations, and you do have gross beta-gamma readings in urine, you don't really need to separately monitor for plutonium because it's not separated. But do you pick up the -- do you somehow pick up the dose contribution by the mix that's used in OTIB-54?

MR. GLECKLER: Okay. I can address that. OTIB-54 does not address any of the plutonium or other actinides. Rev 0 of the internal TBD originally had some ratios in it. The ratio, the beta-gammas, either strontium or cesium to get plutonium estimates.

And one of the issues with the initial TBD version was that the radionuclide list was too limiting, especially for the actinides. When we revised that internal TBD that addressed a lot of those issues - t's like one of the things that I added was there's a

whole set of actinide ratios and there's a justification - were only used - we used the cesium strontium intake values and use a ratio value, and there's several sets depending on the fuel type that they might have been exposed to.

But you'll have like neptunium, plutonium, thorium, uranium and some other nuclides that are all included in there. And there's only one isotope per actinide, each individual actinide that gets assigned. And there's a basis for that behind the internal TBD.

MR. MAURO: I think I understand. When I was reading 54, I remember you starting with a very large list of radionuclides that are in there, that includes everything we're talking about. And you trimmed it down through a screening process, down to 17 radionuclides.

Am I correct that you were right,

what I'm hearing is that the screening process basically got rid of the one -- in other words, you kept those radionuclides that could contribute 99 percent of the dose. I know, you didn't want to have to work with this very, very large number of radionuclides, so you screened them down.

And was the plutonium for example, in some of the transuranics eliminated from further consideration in -- explicitly in OTIB-54 through that screening process?

MR. GLECKLER: I'm not an expert on OTIB-54, but the one thing that I'm pretty sure is it's limited to the beta-gamma emitters.

MR. MAURO: Okay. Well I got to say, I think -- I think we do have a little bit of a question here. And I'm sorry to do this to you, Steve.

DR. OSTROW: No, go right ahead.

MR. MAURO: But when I read the

answer, I guess my reaction was oh, okay, OTIB-54 was generated in a way that demonstrated that the plutonium contribution is there. I mean we all know that it's there, it's part of the mix.

But you know, it's not going to be an important contributor compared to all those other, what I call the 17 radionuclides that eventually made it to the table so to speak in OTIB-54. If that's the case -- see I was operating on the premise that that's the reason why we're okay in not explicitly addressing it.

And what I'm hearing is that maybe there's still a little bit of a question here. I hate to do this when we're in a position where we're trying to close something out. But in light of the conversation we're having now, I might have been wrong about the screening process.

I thought that maybe that that was

one of the radionuclides that you were able to screen out. And therefore you have a technical basis not for explicitly including plutonium in OTIB-54.

DR. OSTROW: John, I think you're going -- what you're saying might be true, but it's not germane to this particular issue. It may be an OTIB-54 issue. We're reviewing OTIB-54 like right this minute.

MR. MAURO: Okay.

DR. OSTROW: We should look at OTIB-54, that could be a possible -- I don't recall all the -- how the plutonium's treated.

MR. MAURO: Yes, I don't -- I remember they had a very nice screening process. And I thought that's why the fact that the argument was being made here that well, there is no need to separately look at plutonium, because it's really captured as part of the gross beta-gamma ratios, these mixes.

And I was interpreting it that way. But maybe I'm misinterpreting it. That's why I was arguing that yes, we could close this one out. Maybe we can and make it more of an OTIB-54 thing. I'm not sure. I need a little help here.

MR. HINNEFELD: Well, this is Stu, John. I think what Brian just said was that the plutonium, or the actinide intake approach for Idaho is sort of extra -- it's extracurricular to 54. But it relies on the cesium and strontium numbers the way 54 does.

So it's not a 54 -- you know it's not that we've screened it out in 54, what it is is that based on the fuel that these people were dealing with, we have a series of ratios of cesium or strontium to the actinides that are relevant for that particular fuel.

And so the -- in the Site Profile itself, there are these ratios and so you were

still keying off of either strontium or cesium the way 54 does. But in addition to doing the 54 work, we also have this actinide set that we drag into the intake.

MR. MAURO: And then how is the plutonium accounted for in that process?

MR. HINNEFELD: By, it's one of the actinides that is ratioed to the cesium or strontium.

MR. MAURO: I got you.

MR. HINNEFELD: Based on what kind of the fuel the person was potentially exposed to.

MR. MAURO: I have to say I misunderstood that. I thought this goes back to 54. You're saying that the -- in the mix that's used, that it explicitly includes plutonium as part of that actinide mix.

Okay, I was -- I thought you were referring to OTIB-54.

MR. GLECKLER: No, it's a similar approach though to 54, but it is distinctly separate and is site-specific to INL. And it's included, embedded in the internal TBD.

MR. MAURO: Got you. I understand. I withdraw my concern. I understand now. I'm sorry for bringing it up. But it does explain it. And I'm satisfied.

MEMBER BEACH: So that's in 007-5?

MR. GLECKLER: Correct.

MEMBER BEACH: Okay. And then just a couple more things. So the source documents used, what -- because it -- we said at the last meeting that NIOSH was going to provide SC&A with source documents. Were there other documents besides --

DR. OSTROW: No.

MEMBER BEACH: 0007?

DR. OSTROW: No, just the TBD Rev 3.

MEMBER BEACH: Okay. And then

does that cover, because I'm just going back through the answer. Does that cover the laboratory workers? Because it says the exemptions -- exceptions, excuse me, to the -- these exposure scenarios may have included exposures to laboratory workers that may have separated and/or handled laboratory quantities of plutonium.

We hadn't really talked about the laboratory workers. So I just wanted to make sure that -- what that exception was, and if it was covered. It was a limited number of workers. And we're going back to the monitoring. I mean we haven't -- how they were monitored and --

This just seems like it captures a lot. So I want to make sure all of those are covered.

MR. GLECKLER: Because with the laboratory workers, you're typically dealing

with tracer nuclides. If they're doing Pu bioassays for all the other workers, they're going to involve you know, an un-encapsulated plutonium source that -- to get their tracer nuclide, which is going to be a plutonium isotope.

MEMBER BEACH: So they --

MR. GLECKLER: That's where they would have potential for exposure there. Every -- I would think that they would be monitored. And that it's hard to verify it for sure a hundred percent whether or not they were monitored or not. It's like usually the ones with the potential for exposure that would have been monitored at INL.

INL's one of the big things that they did, it was -- they did away with routine monitoring early on for a lot of work -- for the vast majority of their workforce. And went to a workplace indicator type of an approach.

And so if there was like a camel arm, or some sort of a bench spill, or an incident that --

MEMBER BEACH: But that was later on, right?

MR. GLECKLER: They would send the groups -- that was actually probably as early as the 50s when they switched and did away with the routine monitoring of a large workforce. And that went to a workplace indicator type of approach.

So they've been doing that for a very long period of time. And so it's like, so if there was a group of workers that was potentially exposed to a spill area, they would send in the ones that were most involved with that spill or closest to that spill for bioassay measurements. And if they turned up positive, they would expand that group and look at workers further around, send them in, is our

understanding, you know, from their procedures and stuff that we've gotten.

And it's one of the things that we've also looked at is the sheer number -- you know, with them doing that approach and then how many bioassay samples that they've taken. And that was one of the statistics that we've accumulated and that's in the internal TBD now. And I have it here.

Let's see, the -- let me just flip to that page if I can find it real quick. For example they -- in the data that we've captured initially for the -- and we've since captured some of the more recent bioassay results, but this, I could get the dates that it went up to. I think it was like around -- up through 1985 that we initially captured their bioassay results.

They had approximately 140,000 urine bioassays. And out of those about 89,000

of them were analyzed for gross beta, gross gamma and only about -- or less than two percent of them were above the MDA.

So that's a very small percent that are detectable even. And so what that -- and you see in a large number of bioassay -- you know, a large monitor of worker -- if I can say it right. A large number of workers being monitored, and very little of those monitoring results being positive. That indicates that they're monitoring sufficiently. That they're monitoring more workers than need to be.

And in comparison, the in vivo measurements, they took 95,000 in vivo measurements and 69,000 of them were whole body counts. And less than ten percent of those were above the detection limits. And the in vivo measurements at INL were typically much more sensitive than the urine bioassays they

took.

And so that gives us a pretty high -- at least SC&A -- or NIOSH and the ORAU team, it gives us a pretty good level of confidence that they did adequate monitoring. It's like when they monitored that many, you know poll that many bioassay samples and that low of a percentage is actually you know, detectible.

So it looks like they had a pretty good program in our opinion.

MEMBER ROESSLER: Can I pick up on Josie's comments here, because I think what she's looking at is this case, the exceptions. And the way I understand this, and see if this is right. Is that normally they didn't have to look at the bioassay samples for plutonium because the plutonium was not separated out. So they could determine it by the cesium or strontium ratios.

However, they had some sporadic plutonium bioassay data. And the question is, why would they have had that. And I think in this case it said it was probably because in -- that there were a few workers who were probably working and separated it. And in those cases they needed to look for plutonium.

Is that what that's saying?

MR. GLECKLER: As far as from a reprocessing standpoint, they did not reprocess the plutonium. But there were some -- like an incident, the NCR incident that I alluded to, if I recall correctly was like a fuel -- you know, like a pin that they were irradiating that was a plutonium source. And I think that pin, that the encapsulating material burst on it and leaked out the plutonium. Whereas normally they wouldn't even process that pin on site.

And then the other scenario was at

the ICPP, which is their reprocessing facility, where they didn't separate out the plutonium, but they did separate out the neptunium-237. But the majority, because it's got a low -- very low specific activity and it's kind of related, because it's also an actinide, it's like they also -- one of the impurities of that is plutonium, and the higher specific activity of the plutonium dominates that material, so. But that was typically all handled in hot cells.

So you've got a few rare instances. Because this is a very large facility. You're always going to have instances where, you know, especially with like lab workers, they're going to be dealing with liquid samples and that of unconfined plutonium. Because they're actively -- that's where they'll actively separate it for a urine bioassay, for instance.

MEMBER ROESSLER: But doesn't this basically say that it's covered. That they

have it covered because they did do some of those -- they call it here the sporadic plutonium bioassay data. Isn't that what they count?

MEMBER BEACH: Well they're saying that's why it accounts for this, could be why they have sporadic bioassay.

MEMBER ROESSLER: Yes. And that it covers that exception is the way I read it.

MR. MAURO: That was my understanding too, Gen, just as you described.

MEMBER ROESSLER: Okay.

MR. GLECKLER: Yes. To date I don't recall seeing any INL claims for like their lab workers that were involved. So it's hard to answer that until we see one of those claims and the bioassay data associated with it.

But for the incidents, the ones that I have seen, there's bioassay data associated with it. So they did get and did do internal

dose estimates for them back then. Even though we don't use the internal does -- you know, the estimated internal doses that they came up with, we reevaluate their data.

But they come up with their own for this project. But there is sufficient data in those instances for us to reconstruct the doses.

CHAIRMAN SCHOFIELD: Well, lab workers are going to be in a class of themselves, though, just from the standpoint that they're going to be basically looking at small quantities and they're going to be trying to break it down into a much finer level then you would if you're just reprocessing it, I mean.

MR. GLECKLER: Yes, they're not dealing with production quantities at this facility.

CHAIRMAN SCHOFIELD: That's what I

mean, so.

MR. GLECKLER: I guess that's the big thing that usually most of these site will focus on the production activities. Did they have any production activities associated with plutonium? No they did not.

MEMBER BEACH: But they obviously had some small stuff happening in the labs.

MR. GLECKLER: Yes.

MEMBER BEACH: That has to be accounted for also. And does -- Steve have you looked at that in those terms, based on that exception if --

DR. OSTROW: No, we didn't look at the labs.

CHAIRMAN SCHOFIELD: Well, unless anybody else has any comments. Jim, you got any?

MEMBER BEACH: So is there any more work to be done on this do you think, Steve? Or

are you still comfortable with closing it?

DR. OSTROW: I think we're comfortable with closing this. It's like, I don't think it would really be fruitful to track down all the lab activities. It's very small quantities in the lab, and it's like, you know anything would be like a one-off exposure that would be noted at the time. It's not a routine exposure.

MEMBER ROESSLER: Plus they were working in hot cells and if there had been a problem, that would have been identified, I would think.

DR. OSTROW: Yeah.

MEMBER BEACH: Hopefully.

CHAIRMAN SCHOFIELD: I guess -- okay, Jim? Are you on the phone? No, I guess not, okay.

DR. OSTROW: So close?

CHAIRMAN SCHOFIELD: I think we'll

call that one closed.

DR. OSTROW: All right.

MEMBER ROESSLER: When do we plan on a break?

MR. KATZ: Do you need a break?

MEMBER ROESSLER: Yes.

MR. KATZ: Okay. How about taking a 15 minute break.

CHAIRMAN SCHOFIELD: Okay.

MR. KATZ: So it's about 10:30, so quarter of.

(Whereupon, the above-entitled matter went off the record at 10:27 a.m. and resumed at 10:46 a.m.)

DR. OSTROW: Okay. This is Steve again. The issues that we recommend the Work Group close -- we're up to Issue 17, and that appears on page 38 of our review report, and this has to do occupational external dose, in particular the original issue. NIOSH should

reevaluate the missed gamma dose due to the deficiencies in the procedures and algorithms, which were sort of general. But it came down to -- NIOSH responded the under-reporting of the penetrating photon doses to INL due to the two-element film dosimeter's limitation for measuring low-energy photon doses is a much less of a significant situation for the majority of the exposure scenarios than what is being indicated by SC&A.

SC&A=s comment was pretty general. NIOSH focused us a little bit. What we're really talking about is the two-element film dosimeter. And this is not an INL issue in particular. This is a general nuclear industry issue for using two-element film dosimeters in those days until they switched to the electronic dosimeters.

And NIOSH responded with a long paragraph here talking about the ratio of open

window to the shut window readings for the dosimeter, the two-element dosimeters and saying that the crux of the matter, the open window readings for two-element film dosimeters had a significant over-response to low-energy photons so that an unusual amount of blackening of the film -- that's how they registered radiation dose and the film actually blackened.

So the unusual amount would be observed when the dosimeter is exposed to low-energy photons. So that if you had an OW, open window to S reading ratio that was significantly higher than usual, it would be an indication that the worker's non-penetrating dose contained a significant contribution from low-energy photons. So therefore, you know, I mean you wouldn't be missing any low-energy photons when you're reading the film badges.

We looked at our action item from

the last Work Group meeting. We were supposed to read the current version of the external exposure TBD and reassess the issue. So we did and we discovered that that portion of the revised TBD did not change anything. It didn't change the wording with regard to this issue.

So we liked NIOSH's response though that they sent us that's printed here. So we recommended that the Work Group close the issue with the proviso that NIOSH include the write-up that's here or something similar in the next revision of the TBD. We thought this explained it very nicely.

MEMBER BEACH: So would it be in the TBD-007-6, or 7-5?

DR. OSTROW: 7-6. This is occupational external.

MEMBER BEACH: Okay. Because it says provide the --

DR. OSTROW: No, I see that.

MEMBER BEACH: -- response into 006. So I was confused on that, too.

DR. OSTROW: Oh, that's a good question. I got it wrong in one of the places.

MEMBER BEACH: So down under your reassessment it says five instead of six.

DR. OSTROW: That's right. That should be a six down there.

MEMBER BEACH: Okay. So I just wanted to make sure.

DR. OSTROW: Yes, when I typed it I got the wrong --

MEMBER BEACH: So don't we typically leave those like in abeyance until that is completed? Not that I don't agree with your suggestion.

DR. OSTROW: I don't think so, because this is not giving me directions to the dose reconstructor at all.

MEMBER BEACH: Yes.

DR. OSTROW: This is just clarifying for us that the --

MEMBER BEACH: Okay.

DR. OSTROW: -- what the situation is. So this is more for an SC&A thing. And we want to be satisfied that this issue was taken care of. It doesn't change how the dose reconstructor would reconstruct dose in this case.

MEMBER BEACH: It's just how you understand what the --

DR. OSTROW: Yes, that's just --

MEMBER BEACH: Okay.

DR. OSTROW: So maybe we could close it just with NIOSH -- just saying that it include this statement or something similar next time they revise the TBD. Does that sound okay, Stu?

MR. HINNEFELD: Yes.

CHAIRMAN SCHOFIELD: Okay. We'd

recommend we close it then.

DR. OSTROW: Okay. That was quick. Anybody else have any comments on this?

(No response.)

DR. OSTROW: Okay. So we'll mark it closed.

So the next open issue is -- where are we? Oh, okay. Eighteen. It's the next page, or the page after next. So 18 is on page 40 of the SC&A review.

MEMBER BEACH: You did the same thing on the numbering down below, 205 instead of 06.

DR. OSTROW: Okay.

MEMBER BEACH: Other than that --

DR. OSTROW: You wouldn't believe how many times we proofread this thing.

MEMBER BEACH: Oh, I can imagine.

DR. OSTROW: And still there can be stupid things like this.

Okay. Issue 18 is called Corrections With Beta Doses. And this is also external dose TBD. And the issue we had, NIOSH had developed a method to consistently account for uncertainties in dosimetry readings claiming favorable correction factors should be developed with beta dose reconstruction. That was the issue.

And you should realize that all these issues, while we're putting in the matrices that summarizes everything plus this SC&A document is just a shorthand issue, you have to go back to the original review report. Some of these issues go on for like several pages, hopefully. You know, there's a lot more detail there than here in the summary.

NIOSH gave a whole treatise here in the response on how they handled external dose. And they note that table 6-9 in the TBD; that's the current version, provides correction

factors for under-reporting beta doses. And gives some background information. they quote OCAS-IG-001 and so forth talking about photon energy distributions and splits between different things. That's also from the OCAS-IG-001. And it goes on.

And similar to Issue 17, our action item was to review the applicable portions of the current TBD. We reviewed it and our finding was that NIOSH didn't make any changes as a result of this observation. However, the information they provided in their response, this whole-page response, is really good, that clarified for SC&A that they're using the right procedure. And just like the last issue, we recommend that the Work Group close this issue with the understanding that NIOSH will incorporate a write-up like this or similar to this in the next edition of the TBD, next revision of it.

And as before, this doesn't affect the dose reconstruction. This is just background information.

Stu, would NIOSH also commit to providing some sort of a write-up in the next revision of the TBD?

MR. HINNEFELD: Yes.

DR. OSTROW: Okay.

MEMBER ROESSLER: In the last little section on NIOSH's comments they talk about the correction factor used at the SRS. Is that Savannah River Site that you're talking about?

DR. OSTROW: Yes. I think in SC&A's large comment, the one that goes on for a few pages, that we mention that Savannah River uses this correction factor, 1.119. And NIOSH's comment back is that's very site-specific. It's not an INL correction factor.

MEMBER ROESSLER: Okay. Thank you.

MEMBER BEACH: Well, and the other thing NIOSH at the very end said if SC&A has encountered any specific examples where INL workers' penetrating dose was likely under-reported that NIOSH would be willing to investigate this potential further. That must have been some comments from our last Work Group meeting. And I guess I'm just curious. Did SC&A explore that at all or --

DR. OSTROW: No, we didn't go through that.

MEMBER BEACH: So then there wasn't anything, any specific examples?

DR. OSTROW: We didn't have any specific examples in mind.

MEMBER BEACH: Okay.

DR. OSTROW: NIOSH gave us a little bit of a put-up-or-shut-up-type of a comment on

that, you know?

(Laughter.)

DR. OSTROW: If you think it's a -- you know, show us where it's important, which is okay. That's fair.

MEMBER BEACH: Was there any work done to look for anything or just you were --

DR. OSTROW: No, we were satisfied with NIOSH's response here. This is a good response.

MEMBER BEACH: Okay.

CHAIRMAN SCHOFIELD: Okay. We'll say 18 is closed.

DR. OSTROW: Okay. Everybody agree on that?

MEMBER BEACH: Yes.

MEMBER ROESSLER: I agree.

DR. OSTROW: Okay. And NIOSH will incorporate some words in there, next revision of the TBD.

CHAIRMAN SCHOFIELD: Okay.

DR. OSTROW: Okay. Next one is 20, Issue 20, which is on page 43. And this is also occupational external dose TBD. Okay. Our issue was it's not claimant favorable to state that the entire dose measured in the open window is due to beta dose. This refers now also to the same thing. We have the two-part film badges, open and closed windows.

And NIOSH's response, open window beta dose is discussed in OCAS-IG-001. And NIOSH again asked, please provide a basis for these opinions, whereas SC&A found data supporting less than 30 keV photons. And the action item from the last Work Group meeting was SC&A should review applicable portions of the current version of the external exposure TBD and recess the issues. And this is related to Issues 17 and 18 we were just talking about. It's the same film badge-type issue.

In this case we reviewed Revision 3. That's the latest revision. It shows that NIOSH revised Section 6.5.3 to address this issue. So NIOSH specifically addressed it there. We reviewed the revised section and believe that addressed the issue adequately and we consider it resolved now. I don't have the section in front of me so I can't say exactly what is in there, but when we reviewed it they addressed this issue.

MEMBER ROESSLER: This doesn't really explain --

DR. OSTROW: No.

MEMBER ROESSLER: -- how they resolved it, so I'm not sure where we stand on this.

DR. OSTROW: Yes, I know, we didn't include more explanatory information. I don't have a copy of the TBD.

MEMBER ROESSLER: It has something

to do with less than 30 keV photons.

DR. OSTROW: Yes.

MR. HINNEFELD: Would you like me to try to find it?

DR. OSTROW: Yes, maybe one of the NIOSH folks can weigh in here. Section 6.5.3.

MEMBER BEACH: I have that up if you want to look through it, Steve, because you could probably find it -- 6. --

DR. OSTROW: 6.5.3.

MR. HINNEFELD: I'm almost there. Okay.

MEMBER BEACH: What page is it?

MR. HINNEFELD: It's -- oh, gosh. Page No. --

DR. OSTROW: Forty?

MR. HINNEFELD: Yes. Forty, yes, titled, "Missed Electron Dose." It looks like it's about half a page long, if you'd want to me to read it.

Let's see. "Missed Electron Dose" is the title of the section. "Non-penetrating dose is important for certain cancers; for example, skin, breast and testes, et cetera, because the non-penetrating and penetrating doses were measured by the same dosimeter because a dosimeter's LODs for electron doses are sometimes higher than the LODs for photon doses. And because of dosimeter correction factors that only get applied to electron doses are sometimes significant, special instructions are needed for assigning the missed doses for cancer locations affected by non-penetrating radiation.

"The following are the special instructions for each situation that may be encountered for the affected cancer location: When the reported" -- this is No. 1. "When the reported non-penetrating result for a dosimeter is less than its electron LOD over 2

value and the corresponding penetrating result is greater than its photon LOD over 2 value, a missed dose is assigned as a greater than 15 keV electron dose due to using the applicable parameters for electron dose." That's one situation.

No. 2 is, "For instances when the non-penetrating and penetrating doses for a dosimeter are both below the respective electron and photon LOD over 2 values. The missed dose is calculated as an electron dose using the applicable parameters for electron doses that is assigned as a more favorable to the claimant 30 to 50 keV photon dose."

And circumstance No. 3 is, "When the reported non-penetrating result for a dosimeter is greater than its electron LOD over 2 value and the corresponding penetrating result is less than its photon LOD over 2 value, a missed dose is assigned as a 30 to 250 keV

photon dose using the applicable parameters for photon dose."

So it describes how to treat and what radiation type to assign for the instances -- you know, the three possible circumstances where you've got neither one detectable, neither the photon nor the beta detectable. In one case the photon is detectable, but the non-penetrating is not. And in the third case the non-penetrating detectable of the photon is not. So that's the instruction that's provided in 6.5.3.

DR. MAURO: Hey, Stu, this is John. That sounds an awful lot like it came out of OTIB-17. Is that basically the OTIB-17 procedure, because I know we reviewed that and we've been finding favorably with that approach.

MR. SMITH: Yes, this is Matt Smith with the ORAU Team, and that's exactly it. I

remember Brian asked -- I was talking with Brian about this a long time ago and that's exactly right.

DR. MAURO: Yes, we've gone through this and we use it when we do our DR reviews or we do our blind DRs. So OTIB-17 is a very mature document that's undergone a lot of consideration. And what we just heard is basically -- the INL is going to adopt -- is using OTIB-17 for dealing with this beta open window -- or penetrating/non-penetrating approach in open window. So I think we're okay.

MEMBER BEACH: I don't have any questions on that one.

CHAIRMAN SCHOFIELD: I don't have any questions.

MEMBER ROESSLER: I don't either, but I think the NIOSH response as written here is not very good. This last one, 30 keV photons

is confusing there.

DR. MAURO: It's a real brainteaser, let me tell you. It took a while for it to sink in.

MR. KATZ: Is that closed?

DR. OSTROW: Yes, I think everyone agreed that it's closed.

CHAIRMAN SCHOFIELD: Yes.

DR. OSTROW: Maybe when SC&A writes this up -- I'll talk to John -- maybe we'll say -- just put a note that this is the OTIB-17 approach just so that people can keep track of it, that this wasn't invented new for INL.

MR. GLECKLER: Yes, it was the site specific guidance for the decision was maybe incorporated into the TBD versus OTIB-17.

DR. OSTROW: Yes.

MR. GLECKLER: Been batted around for a long time.

DR. OSTROW: Yes. Yes, so we'll

make some sort of a note --

MR. GLECKLER: -- where to put that guidance.

DR. OSTROW: Yes, so if people want to track it, they can see that it's OTIB-17 basically.

Okay. Next one is Issue 21, which is on page 44. This is also external dose, and this has to do with photon spectrum split. And this gets into a little bit physics nitty-gritty here. And the issue, NIOSH should provide guidance assigning dose values for the 30 keV is less than E photon energy and less than 250 keV. So that's one energy group between 30 keV and 250 keV. And the greater than 250 keV regions.

So NIOSH wanted to provide guidance how they decide which group that an exposure falls. And NIOSH responded photon energy ranges are based upon the predominant

radionuclides found in the work place. Okay. Scenarios like those discussed by an SC&A report would be reconstructed on a case-by-case basis. And they asked us then, please provide a basis for these statements and for the SC&A opinion that a 50/50 energy range is more appropriate. Okay. I understand.

We had commented that we thought a 50/50 energy range split between the low-energy group and the high-energy group would be appropriate. And our action item, that we should explain why a 50/50 split between low and high-energy photon energy groups is preferable to the 25/75 split assumed by NIOSH. So NIOSH is assuming that 25 percent of the photon energy is in the low group and 75 percent in the high group. And we had made an opinion that maybe 50/50 is more appropriate.

Further, NIOSH basically repeated its statement again. So we did a further

review and we looked into this. And, well, our further review said that -- we talked about how a dose is recorded on a film badge, and typically a dose is recorded in three different energy groups: less than 30 keV, which is low energy. That's typically X-rays emitted by the transuranics. Then you have a typo here. It's 30 to 250 keV for X-rays and many radionuclides. And greater than 250 keV for the high-energy photon emitters.

NIOSH used its judgment on how to make this split. The split is made because the risk conversion factors, risk per rad is energy-dependent. That's what you're really concerned about, the conversion factor, this energy-dependent conversion factor. And NIOSH says they do this on a case-by-case basis and judge the reasonableness of this split on a case-by-case basis. And we note that for INL there's a really wide range of radionuclides.

Since INL was dealing with pretty much everything, every radionuclide under the sun is there.

So we concur with NIOSH's response and recommend the Work Group close this issue, that we defer to NIOSH's on this, basically.

MEMBER BEACH: So what was NIOSH's response, though, that they were going to use a case-by-case? I guess I'm missing what the full answer is.

MEMBER ROESSLER: Yes, and I'm kind of confused by the 50/50. If they=re doing it case-by-case, it seems like it's going to vary rather than be a 50/50.

DR. OSTROW: Yes, once again, I don't have the TBD in front of me. Maybe NIOSH can elucidate a little bit with --

MEMBER BEACH: Well, I have it, but I looked for it last night and I looked for it just now. I don't know where it's listed in the

TBD. Because I'm assuming we're using -6 again, right?

DR. OSTROW: Yes, this is the external.

MR. GLECKLER: Yes, the energy distribution information is on page 28.

MEMBER BEACH: Of the TBD?

MR. GLECKLER: Yes, table 6-9. And generally we'll use the 25/75 split for any of the facilities that have mixed fission products. So the reactor is the ICPP, which is a reprocessing facility. And then waste facilities, what they call the uranium handling, is actually the SMC, and that's sort of I guess a more unique one where it gets a 90 percent/10 percent split because they're dealing with depleted uranium and they don't have the mixed fission products at that location.

MEMBER ROESSLER: So is SC&A saying

that -- I'm confused as to whether you recommended a 25/75 ratio or --

DR. OSTROW: I think it's our understanding that NIOSH is using the 25/75 split in general, but in specific cases they're using something different, which is more tailored to the specific case. Did I get it right, NIOSH?

MR. HINNEFELD: Yes, it's tailored to the location the person was working.

DR. OSTROW: Yes.

MR. HINNEFELD: So in that essence, it's tailored to the claim. Claims working in SMC, which is a depleted uranium facility, then they'll get the 90 in the intermediate range and 10 in the upper range. But for the places where you have largely a mixed fission product inventory, like the chem plant and the reactor -- you know, test reactors where probably if they're doing anything they're

examining the spent pins, you know, the target pins in the hot cells where you have largely a fission product. And I think in one of our answers we even talked about we had run some codes to like estimate -- maybe that was on 54.

MR. GLECKLER: That's kind of what I was trying to --

MR. HINNEFELD: Yes, I thought we had run some codes in one of other responses, not -- separate from 54 I think we ran codes to indicate what -- where we had some information about the kinds of isotope inventories, and 75 percent sort of understates the high-energy inventory.

Now the reason why that's important is that the risk factor, the risk per ran factor is higher for the intermediate energy range. So by underestimating the fraction that's in the highest energy range, we're overestimating the amount in the more hazardous intermediate

range. Okay?

And then when you go to SMC, we put almost all the photon energy into the intermediate range because it's depleted uranium and that's where the photons tend to be.

DR. OSTROW: I see. So what you're saying basically that the actual photon energy split per se doesn't really matter. It's the risk that you're really concerned about to the person --

MR. HINNEFELD: We want to --

DR. OSTROW: -- maximize the risk to the person.

MR. HINNEFELD: Yes, we want to make sure that our dose reconstruction doesn't understate the risk. And so if you try to put too fine a point on percentages, you know, like the upper range and lower range, you just don't have the knowledge to put too fine a point on it. Seventy-five percent seems like a nice

dividing point which would cover us, meaning we would overestimate the percentage in the intermediate range for these facilities where we're using it. And it was a nice clean cut point. You don't have to mess around with saying use 89 percent in the chem plant or something, which was one of the figures I saw in here earlier. So I think that's why we arrived at these fractions.

MEMBER BEACH: I think we need a clearer answer from SC&A on this for me, because I don't think SC&A really gives us the full -- what -- I don't even know who looked at this for SC&A. And basically all you're saying is you've judged the reasonableness of the split on a case-by-case basis, but you don't really give us any information to what you looked at, how you determined that that was appropriate, I guess.

DR. OSTROW: Well, we didn't

document it here. It's basically --

MEMBER BEACH: It could be just a case of that.

DR. OSTROW: Yes.

MEMBER ROESSLER: What I heard was basically what Stu said, that they overestimate in the area where the risk is higher, and that's --

MEMBER BEACH: Yes, and I'm not saying it's wrong. I'm just saying I don't think we have a complete answer.

MEMBER ROESSLER: I think that last sentence is confusing, but otherwise it's pretty straightforward.

DR. OSTROW: Yes, I understand that. Sometimes when we're resolving these issues we did a little bit in shorthand and got a little bit lazy and didn't put another couple of paragraphs of explanation.

CHAIRMAN SCHOFIELD: So if we have

a claimant comes in and he says, you know, well, I was with the fire alarm maintenance -- so he goes from area to area, building to building constantly. You would use this kind of mid-range thing for him. Is that what I'm understanding?

MR. GLECKLER: Well, based on their dosimetry they'll get a different dosimeter for each major operating area that they go into.

CHAIRMAN SCHOFIELD: But they go in and out of operating areas on a constant --

MR. GLECKLER: They'll wear a different dosimeter to go in those areas.

CHAIRMAN SCHOFIELD: Every building would have a different dosimeter?

MR. GLECKLER: Yes. Well, not every building. Every operating area. So like the ICPP, which has numerous buildings for that operating area. Like everyone that goes into that operating area will have a location

code on that dosimeter for that specific operating area.

CHAIRMAN SCHOFIELD: Well, okay.

MR. GLECKLER: But if they go over to the MTR, another -- you know, or the TRA, more generically, they'll have another location code for that dosimeter that we can -- so some of the workers will have five dosimeters for the same monitoring period so we can tell that that's what they're doing, they're going from one facility to the next.

CHAIRMAN SCHOFIELD: Okay. That's not a policy I'm familiar with, because us, we have one dosimeter no matter where and own often you were in and out of both facilities.

MR. GLECKLER: Yes, and I think that's changed. That may have changed in the modern area.

CHAIRMAN SCHOFIELD: Are you

saying I was with the dinosaurs? Okay.

MR. GLECKLER: No, all we're saying your technique was the modern era.

DR. OSTROW: Yes, yours would be the modern era. So you're ahead of your time.

(Laughter.)

CHAIRMAN SCHOFIELD: I do kind of remember pterodactyls being cute.

MR. GLECKLER: Yes, because we don't see the location codes for the more recent -- after 1998 we don't see the location codes for those facilities.

CHAIRMAN SCHOFIELD: Oh, God, I was long gone. I don't have a problem with it. Do you, Josie?

MEMBER BEACH: I'd like to see a clearer answer from SC&A, but that's just --

CHAIRMAN SCHOFIELD: Well, I think that's a verbiage thing more than anything else.

MEMBER BEACH: Well, yes.

DR. OSTROW: Well, we're going to revise our matrix, you know, so we can easily add at the uppermost ends a paragraph or two just to work --

CHAIRMAN SCHOFIELD: Just close out.

DR. OSTROW: Yes, to close out.

MEMBER BEACH: I'd be fine with that.

DR. MAURO: You know, I think it would be helpful to this 50/50 number. I haven't seen that before and I'm not sure if that was something that was originally used in the TBD, or it was something that we in our great wisdom back in 2006 thought it might be a more prudent split.

So, yes, Josie, I agree with you. A little bit more verbiage here explaining, I guess, where the 50/50 came from. It's not

apparent to me whether that was something NIOSH put forth or something we put forth.

MEMBER BEACH: No, it was SC&A.

MR. KATZ: No, that was SC&A.

DR. MAURO: That was us. Yes, and it may have been something that was brought forth very early on. And now that we have gained such experience, I understand the current method that NIOSH uses with these splits as described is certainly reasonable. And I know when I check DRs, we can see what the splits are and the rationale for them.

And, okay, that 50/50, if that was ours, I think that was just something that we might have brought up very early on before we knew very much more about all this.

DR. OSTROW: Yes, I was reading this stuff recently, I mean, our full review, and I think that we came up with the 50/50 and I don't think it was that well-grounded in

science at that time. It was like early 2005 or --

DR. MAURO: Yes, I think that's the problem here. You're right. And we could certainly fix that in the write-up for this issue. So, you know, we're the cause of the confusion.

MEMBER MELIUS: This is Jim Melius. I mean, I don't think we should close this out until we get an explanation.

MR. KATZ: Well, I think we have the explanation, Jim.

MEMBER MELIUS: Well, we have an explanation that is pretty convoluted, trying to listen to it.

MEMBER ROESSLER: Well, it's clear to me. If they can take care of that 50/50 thing, I think the rest of it's clear.

MEMBER MELIUS: Well, but I want to see it. That's all. That's what Josie said,

also.

MEMBER ROESSLER: Okay.

CHAIRMAN SCHOFIELD: Okay. I think Stu's comment about it being more claimant-friendly, the 25/75 split, put that in there so people understand rather than trying to pinpoint --

MR. HINNEFELD: There was information that we saw today at some point where we even talked about -- we estimated what percentage of the photon dose from ICPP would be in the high range and what estimate from like MTR would be. I'm pretty sure I saw it today because I didn't know it before today. And it showed those percentages based on something we did. And so that supports the conclusion here. So I think referring to that would be part of the write-up.

MR. KATZ: So, Steve, you'll take care of that?

DR. OSTROW: Should we take care of this or should NIOSH take of this? What do you think?

MR. HINNEFELD: Okay. We can write it.

DR. OSTROW: Can NIOSH write it? Okay. So we'll leave this open item.

MR. HINNEFELD: Right.

MEMBER BEACH: Well, I think it's a two-way because if NIOSH writes it, then SC&A --

MR. HINNEFELD: What we'll do is we'll write something and we share it with everybody --

DR. OSTROW: Okay.

MR. HINNEFELD: -- SC&A and the Work Group Members, and say this is what we think. And whether we do that extra -- you know, I think we will do it as a proposed addition to the revised matrix that Steve is probably going to repair. How does that sound?

MEMBER BEACH: Well, or what section it is, because just going back in and looking at it it's not clear in SC&A's write-up.

MR. HINNEFELD: All right.

MR. KATZ: It sounds like Jim was asking for SC&A to explain why they suggested originally the 50/50.

MEMBER BEACH: And then agreed with the other.

DR. OSTROW: Oh, okay.

MR. KATZ: And now that's changed. So --

DR. OSTROW: Okay. SC&A --

MR. KATZ: -- SC&A can do that piece of the writing.

DR. OSTROW: Okay. Oh, here's a question, Ted, procedurally. Okay. We have this little action item that if NIOSH writes this up and we provide a little piece on what happened with the 50/50 --

MR. KATZ: Yes.

DR. OSTROW: -- and if we dismiss the 50/50 as not being applicable anymore, and everybody looks at it and agrees, can that be closed then or do you actually need a Work Group formal meeting to close it?

MR. KATZ: We might as well just close it at the next Work Group meeting, yes.

DR. OSTROW: Okay.

MR. KATZ: So we get the Work Group's nod on it.

DR. OSTROW: Okay. Next one is Issue 26, which is on page 50, and this is also external dose. And it's called "Minimum Detection Level," and it refers to gammas. The issue was NIOSH should reevaluate the approach in determining the MDL; that's the minimum detection limit, of the dosimetry system by taking into account the system uncertainties.

Okay. We expanded the issue a

little later. The selection of 10 millirem as the MDL for high-energy gamma is questionable. Even for modern densitometers and film it is a challenge to achieve this level as a single density click can correspond to greater than 10 millirem for high-energy gamma radiation.

Okay. In English, when you read film badges, or did read film badges, you have an optical device, a densitometer that looks at the film badge, which is a film, and sees the density of the exposed crystals in it. It's measuring that. And we were concerned that the high-energy photons -- that a single step in the density can correspond to greater than 10 millirem. So we're not sure how it can have a lower MDL of 10 millirem if a single change in the density is greater than 10 millirem. And we say this in our problem for intermediate and lower-energy gamma rays.

And we go on and we say if the claim

is made that 10 millirem is a valid choice for the MDL, then we want supporting material such as film dose to density curves and densitometer calibration data. And we mention other sites. And we looked at Savannah River, for example, have adopted 40 millirems to high-energy gamma MDL for early film. So rather than 10 millirem, Savannah River went to 40 millirem.

NIOSH's response here, this observation is similar to Issue 27, which is the next issue. And the response to that finding also satisfies this one.

So we have to go to Issue 27 in a minute to audit that.

MEMBER BEACH: That one's open for further discussion.

DR. OSTROW: Yes.

MEMBER BEACH: So are you suggesting that if we close 26 it's going to be captured in 27 or -- because the response isn't

really adequate for 26.

DR. OSTROW: Yes. I think in this case that we recommend -- okay. Issue 27 is minimum reporting level for beta gamma. And we think that Issue 27 addresses really both, basically that Issue 26 has been subsumed into Issue 27. That's what we're saying. So we think that Issue 26 should be closed out and addressed in Issue 27. Does that make sense?

MR. KATZ: It seems like you might as well get into 27 before you decide about --

DR. OSTROW: Yes.

MR. KATZ: -- closing this or whatever.

DR. OSTROW: Oh, okay.

DR. MAURO: We often transfer. We've done this on the procedures. When you have a -- one issue is really subsumed by another. Rather than clutter, we probably should track 27 and not worry about 26 because

it's really a sub-part of 27.

MEMBER BEACH: Well, and the problem with that is you don't really capture that in 27, at least not that you've listed here.

MR. KATZ: That's what I'm going to suggest. Why don't we just discuss 27 and then we'll know whether we can go with that or not?

MEMBER BEACH: Or table it until we finish with the closed items and come back to it.

MEMBER ROESSLER: That makes more sense. Table it and do the closed items, recommended closed.

MEMBER BEACH: Yes.

DR. MAURO: If this was the Procedures Subcommittee, the label that would have been given to 26 would have been "transferred." That's how they deal with this kind of issue.

(Laughter.)

DR. OSTROW: Yes, I wasn't quite sure on this procedurally.

DR. MAURO: Yes, as opposed to closing it.

DR. OSTROW: Yes. So what I'm hearing is to leave it open for now, because Issue 27 we think is still open.

DR. MAURO: Right.

DR. OSTROW: So the resolution of Issue 27, we should make sure that when we -- and NIOSH should make sure that when Issue 27 is resolved it also adds Issue 26 so we're closing both at the same time.

DR. MAURO: Right.

DR. OSTROW: Okay. So 26 I think will remain open for now.

MR. KATZ: Unfortunately they're consecutive here.

DR. OSTROW: Yes, I know.

MEMBER BEACH: Yes, except we're not -- we're dealing with a recommended closing, which takes us to 29.

DR. OSTROW: Too many issues to deal with, to keep track of them.

CHAIRMAN SCHOFIELD: I don't think we're going to get through as far as that I thought.

DR. OSTROW: We're moving along. We haven't had any violent disagreements on any of it.

MEMBER BEACH: Yet.

CHAIRMAN SCHOFIELD: No, anybody that loses their temper buys me a steak.

DR. OSTROW: Yes, okay.

MEMBER BEACH: So 29 is the next one, right?

DR. OSTROW: Twenty-nine is the next one. This is also external. And this is on failure to properly address neutron

exposures. Okay. So here's the -- oh, okay. I remember this one now. We solved the issue. We make a statement; and I think Phil had mentioned before, and INL had 52 reactors. Most of them were experimental prototype in design. A lot of them were high-powered -- some of them were low-powered, but some of them were high-powered densities. And we say it's unjustified to presume that there are no missed neutron doses given the number of reactors you have and the fact that they're all experimental and so forth and so on.

And we note there were also deficiencies associated with neutron calibrations back in the day. That was a preference.

And talking about neutron calibration, we say due to the use of the polonium-beryllium source in the neutron calibration, dosimeters would significantly under-measure neutron doses from sources with

lower energy spectrum. NIOSH should reevaluate the entire approach in the TBD to account for potential missed neutron doses.

We noted that they're using plutonium-beryllium sources in neutron calibration and we thought this would cause missed neutron doses. We expanded the issue at some point later than that. We noted that the section of the TBD -- we thought it was a bit circular, that if no neutron dose was assigned to the worker or coworker for several months, the dose reconstructor should assume that the person was not exposed to neutrons.

And we made the comment this doesn't allow for individual workers having temporary or varying assignments. Also, if the program failed to correctly identify that they should have been monitored, the record will show no assigned neutron dose.

And the TBD makes the assumption

that high-Z materials, those dense materials such as iron and lead were never used. And we put down, for example, shield penetrations in place of hydrogenous materials such as water and concrete. However, no attempt is made to validate or qualify the assumption.

And we also make the note here that OTIB-51, which talks about missed neutron dose at Oak Ridge's Y-12 facility was issued after the original Site Profile came out and has bearing on neutron dosimetry issues and it should be considered in this TBD.

So NIOSH responded here, and they respond basically the inappropriate instructions discount an INL worker's missed neutron dose has been eliminated from the section of the TBD. They're talking about now the latest TBD. So they eliminated that. And they note that OTIB-23 is considered an appropriate basis for eliminating unreasonably

high missed neutron doses for some claims and say the neutron dosimeters at INL were only assigned and read when there was a potential for exposure.

And that given that most of the reported neutron dosimeter results were reported as zero, the INL's process to determine who had the potential to receive neutron exposures appears to be appropriately adequate. And the guidance provided in Rev. 3 of the external TBD; that's the current one, now requires missed neutron doses to be assessed for every worker using the reported neutron dosimeter results unless the missed neutron doses are unreasonably high per the guidance in OTIB-23. Okay. It goes on a little bit.

The Work Group action item from the last meeting: SC&A should review the applicable portions of the current versions in external exposure TBD and reassess the issue. So we

read the current version of the TBD and we agree with NIOSH's response provided above. We reviewed the Rev. 3 and we found that the neutron correction factors given in the TBD are comparable to the ones given in the OTIB-51 guidance, which is table 8-1 of it.

Finally, we reviewed OTIB-0023 under the Procedures Review Subcommittee and originally identified eight findings. All eight of those findings are discussed and all are closed now. So we reviewed the OTIB-23 and all the findings are closed. So we consider the issue to be resolved and recommend that the Work Group close it.

MEMBER BEACH: Boy, this one's --

DR. OSTROW: Yes, this is a little complicated.

MEMBER BEACH: -- complicated, because you're using OTIB-23, 007-6, 6.5.4, table 5, which I'm looking at. And hopefully

SC&A looked at it, too.

DR. OSTROW: We did.

MEMBER BEACH: And then OTIB-51, table 8-1. Where do you start this?

DR. OSTROW: Well, we think basically the main document is that the -- we are reviewing all the procedures here. We're looking at the actual Site Profile --

MEMBER BEACH: Sure.

DR. OSTROW: -- for the TBD. And we think that the instructions are given as they stand right now in the TBD are correct and they reference the correct OTIBs, the applicable OTIBs. And that's sort of the result.

MEMBER BEACH: Right.

DR. OSTROW: This we did look at pretty carefully.

Does NIOSH have anything to say about this one?

MR. HINNEFELD: As I'm following

this, the key finding seems to have been that the original guidance in the Site Profile that was originally reviewed was we said that if a person wears a neutron badge for several months and there's no neutron dose recorded, then you should assume he wasn't exposed to neutrons and you don't give him any missed dose. That seems to be the key problem.

DR. OSTROW: Right.

MR. HINNEFELD: And that's been changed in the latest revision of the Site Profile. We don't say that anymore. We say you have to do something about this dose for these people who wore a neutron badge.

Now, the reference to other TIBs and stuff like that gives avenues out of just a -- sort of what I call a blind application of our normal missed dose approach, which is L over D over 2 for every badge exchange. Because with a relatively high LOD on a neutron badge

compared to a photon badge, if you just use the missed dose calculation, you could have these whopping big neutron doses in a much smaller possible photon dose and it just doesn't match reality for the work place. And so all this reference to other TIBs and stuff just provides there are avenues that you can use to do something other than just what I would call the blind application of the missed dose. So that's what that all is about.

But to me, for this finding -- and I'm pretty sure there are other neutron findings in the matrix, because I know we're still doing work trying to sort out the final neutron answers there. But for this specific finding I think it was that we originally said if a person's neutron badge showed zero for several months, don't assign a missed dose. And we're not saying do that anymore. We're saying you have to worry about the missed dose

and we're providing some avenues to do that.

MEMBER BEACH: And are you taking that on a case-by-case basis as well of what a person says, why I worked at this reactor and this one and --

MR. HINNEFELD: Well, in this particular instance they would have had a neutron badge.

MEMBER BEACH: Right.

MR. HINNEFELD: Okay. So it would be based on their wearing a neutron badge.

MEMBER BEACH: Wearing a badge? Okay.

MR. HINNEFELD: Now I think there's another issue in here about people who didn't wear a neutron badge and maybe were exposed. I think that's out there. There's a possibility --

MEMBER BEACH: It is out there.

MR. HINNEFELD: The neutron badges

were different than the photon badges. I think the assignment was different. So whereas we can say we're pretty confident everybody who went into the major areas had a photon badge, we can't necessarily say that about a neutron badge.

CHAIRMAN SCHOFIELD: But you would assume that if they were given a neutron badge they had that potential?

MR. HINNEFELD: Right. And so we don't say just because it read zero -- we used to say if it reads zero for several months, just assume they weren't exposed. We don't do that anymore. That's the essence of this finding. So what I'm saying is our change to the TBD; which would have been in '03, I think addresses the fundamental piece of this finding. Our change. We changed. Is that what you were saying?

DR. OSTROW: That's what we feel.

MEMBER BEACH: Your explanation was helpful, though. Thank you, Stu.

CHAIRMAN SCHOFIELD: Yes, I think that cleared it up.

DR. OSTROW: And then the problems with all these things is that it goes back so many years and so many different revisions of TBD. It's not just in this case, but in other places, too. Such a big time lag that events overtake the findings very often.

CHAIRMAN SCHOFIELD: Yes.

DR. OSTROW: So it's a little bit hard to follow all of the train -- the train of --

CHAIRMAN SCHOFIELD: Yes.

DR. OSTROW: But we think that what's currently in the -- well, it's more than think -- what's currently in the TBD is a good explanation, it's good procedure and it accounts for possible missed neutron doses for

people with neutron badges. And it's not just the generic LOD over 2 approach. It's more refined than that. So that's why we recommend closing it.

CHAIRMAN SCHOFIELD: I don't have a problem with that the way it's stated.

MEMBER ROESSLER: I'm okay with it.

MEMBER BEACH: I agree.

CHAIRMAN SCHOFIELD: Jim?

MEMBER MELIUS: I'm okay with Stu's explanation.

MEMBER BEACH: That's the one I'm going with, too.

CHAIRMAN SCHOFIELD: That's the one I'm going with.

MEMBER MELIUS: Yes, you got all votes, Stu.

DR. OSTROW: Okay. Next one is Issue 30, which is also a neutron issue and it also has to deal with occupation external dose.

And original issue was that due to the use of the polonium-beryllium source for neutron calibration, dosimeters would significantly under-measure neutron doses from sources with lower energy spectra. And NIOSH should reevaluate the approach in the TBD to account for potential missed neutron dose.

Okay. Going back and forth a little bit, NIOSH responded that the recorded dose was 11 percent high based on this calibration, so that would be conservative. We looked at it again and as SC&A understands the 11 percent refers to the difference between the americium-beryllium dose conversion factor used by INL and the americium-beryllium conversion factor recommended by IAEA. And there's two different numbers here. That's 11 percent difference. Both those conversion factors are specific to the americium-beryllium energy spectrum, however,

the issue is concerned with whether neutron sources with energy spectra lower than the americium-beryllium spectra are significantly under-recorded or missed entirely.

Okay. I'm going to say here originally NIOSH said there was like 11 percent over-estimation of dose based on how it was calibrated. We found out this 11 percent refers to americium-beryllium sources, not the plutonium-beryllium that was actually used at INL. So it's not really applicable. NIOSH didn't say anything else after that, but then we went ahead -- as an action item we looked into it in more detail and we looked at the current neutron calibration in the current TBD at Section 6.3.3.2, neutron calibration, where this time NIOSH provided a whole big explanation on what they were doing. And NIOSH noted that the initial NTA; that's the type of film, neutron badges were calibrated using a

plutonium-beryllium neutron source and that later in 1982 they switched to an americium-beryllium source.

We had commented earlier that we thought there was a neutron source energy spectra difference for the two neutron sources. I did some research into this looking at the Brookhaven National Nuclear Data Center and then the DC data for both americium-beryllium and plutonium-beryllium sources and looked at the neutron spectrum that comes off and basically found that the spectra for the two different sources are practically the same.

So we concluded that since the neutron energy spectra resulting from the americium-beryllium and the plutonium-beryllium sources are quite similar and very similar, that we withdrew our previous comments and recommend the Work Group close this issue. So basically our original comment

went away when we did some more research.

MEMBER ROESSLER: Are you meaning to say polonium-beryllium instead of plutonium?

DR. OSTROW: Yes, I keep on misstating. Yes, polonium-beryllium. PoBe. Polonium-beryllium. So you've got americium-beryllium and polonium-beryllium neutron sources.

So this is a case -- so not so much NIOSH's response, that we're withdrawing our original comment based on further research. Does NIOSH agree with this, my assessment here? That was my physics contribution to the proceedings.

MR. HINNEFELD: I appreciate the physics. Okay. I hate to do this, but let me ask this question. We've got NTA film, which has a threshold somewhere between a half an MeV and an MeV, you know, depending on the energy

for detection. And then you have -- you're wearing this is a work place where you may or may not know the neutron energy spectra that you're encountering. Was that the basis of the original finding?

DR. OSTROW: Had to do with calibrating the film using one source, the polonium-beryllium or the americium-beryllium. And we originally thought there was a difference, depending on which one you're using. But after our research we saw they both have same neutron spectrum.

MR. HINNEFELD: Okay. So then you finding related to the change in calibration and did that affect --

DR. OSTROW: Yes.

MR. HINNEFELD: Okay.

DR. OSTROW: That's right.

MR. HINNEFELD: Okay. All right. Okay.

DR. MAURO: Stu, I'm glad you clarified that because I think there are several layers to issues related to the neutron dosimetry. The one that we're dealing with here is really a very narrow issue in the calibration sources that were used and whether the differences were important.

You are going down a road that I'm very interested in also, is what is the real neutron spectrum that workers may have experienced at different times and different places? And what the -- whatever the neutron -- the NTA film probably was used wasn't calibrated for that spectrum. That's a bigger question and a richer question that has to be dealt with. I'm not sure of the extent to which that's being looked at right now and whether that is still on the table.

MR. HINNEFELD: Brian pointed out to me that that's not recommended for closure.

DR. MAURO: Oh, okay. In my opinion that is the -- well, not only on this site, but many, many sites. Knowing the real neutron spectrum and whether your calibration factors account for that properly is a recurring theme, and apparently it's one that we have to deal with here also.

MEMBER BEACH: So I agree that that should be closed, too.

MR. KATZ: Phil?

CHAIRMAN SCHOFIELD: I don't have a problem with it.

MR. KATZ: Jim? How about Jim? Jim, are you on?

MEMBER MELIUS: I appreciate John's neutron philosophy.

(Laughter.)

MR. KATZ: Closed.

DR. OSTROW: Okay. Just a comment. Issue 31 is still open, but I'll just

mention; I was looking at the notes here, that this one INL is -- NIOSH is working on a specific coworker model to deal with this. This is also a neutron dosimetry issue, and that's the one that we just talked about where coworker models are in the works.

MEMBER BEACH: That's important.

CHAIRMAN SCHOFIELD: This is the external coworker model that --

DR. OSTROW: Oh, this is the one that you said you're not doing. This is the one you decided you're not going to do.

MR. HINNEFELD: So we owe something on 31, is that right?

DR. OSTROW: Yes, I think you have to say -- yes, it was related to Issue 16 why you're not doing the external coworker model.

MR. HINNEFELD: Okay.

MEMBER BEACH: But there's probably more to this one anyway --

DR. OSTROW: Probably.

MEMBER BEACH: -- besides that.

DR. OSTROW: Okay. But anyway, that's not really for this right now.

Okay. Next on the recommend closing is 32, Issue 32, which is on page 62. This also in neutron doses and entitled, "Uncertainty Estimation for Neutron Doses." And the issue was, okay, NIOSH uses something called a "facility neutron correction factor." We wanted NIOSH to explain how these FNCFs, facility neutron correction factors, were obtained and to provide instructions to the dose reconstructor. That was our original comment. These FNCFs are exactly what it sounds like. They're neutron correction factors depending on which site you are on, what facility in the INL site. So it's site-specific and it's facility-specific.

Okay. NIOSH said look at the

latest TBD that explains it. So our action item is look at the latest TBD. And we did in the reassessment. And it appears to look at the latest TBD -- it appears that NIOSH did not develop the FNCFs by themselves, but they retained them from various references listed here.

MR. GLECKLER: And NIOSH technically had nothing to do with those FNCFs.

DR. OSTROW: Yes.

MR. GLECKLER: That was the site that dealt with those.

DR. OSTROW: Right. So we looked at the original reference also that's there.

So we agree that providing only a summary of how they are developed is appropriate, because NIOSH didn't develop it. They just say what they are and how they applied them. I can get an example here. So we consider that NIOSH's response addresses the

first portion of the issue. They reference where they got the FNCFs from. So if anyone really wants to find it, they can dig it out.

Then subsequently we held a teleconference between SC&A and NIOSH in 2005 and we say it's not clear that the -- whether the data provided in the workers' records were already adjusted based on the FNCFs or the dose reconstructor should make the adjustments. That was like an instruction thing. We weren't sure whether the data was adjusted already or whether the dose reconstructor should adjust it. And NIOSH replied the adjustments have been made in the recorded data. And NIOSH stated they would clarify the point in their future revision of the TBD. And we commented we couldn't confirm that the clarification has been provided in the current Rev. 3.

Then we looked at it again; this is our latest review, and we reviewed the current

Rev. 3 and noted that the facility neutron correction factors appear in Section 6.3.2.8 under neutron albedo dosimetry. Table 6-5 tabulates the FNCFs for different INL facilities and that's taken from this one particular reference, Cusimano 1981. And the accompanying text states this correction was applied to generate the reported neutron dose.

So we think that the current table that's currently there and the explanation is fine. We understood it. So we believe that all the points at issue were adequately addressed. And we understand where these FNCFs came from and we understand how NIOSH is applying it and the directions to the dose reconstructor are clear how to use them. So a little bit of a torturous process, but we think it converged finally.

MR. HINNEFELD: Okay. This is an albedo dosimetry thing, so this would be later

than NTA or --

DR. OSTROW: That is a different type of dosimeter.

MEMBER ROESSLER: I'll take your word for it.

CHAIRMAN SCHOFIELD: Yes, I'm going to, too. You lost me.

MR. HINNEFELD: Well, Gen, Cusimano was an RESL which did the dosimetry, so presumably they did this and built it into their Dosimetry Report. So I guess there's information from the report. So I think that's what they did.

MR. GLECKLER: Yes, the big issue initially was that the way it was worded in the Rev. 0 of the TBD it implied we developed those facility correction factors and we're applying them. And now it's like once we clarified that to the Working Group and then we clarified it in the TBD that they developed by the site, the

site applied them to the doses that they report to us. And so they've already been incorporated. And so we changed that part of the TBD to hopefully make that a little more clear.

MR. HINNEFELD: Yes, the Radiological Environmental Sciences Laboratory, RESL, at Idaho Falls did all the dosimetry. That's actually a DOE lab. And the person named here was one of the primary scientists there for quite a long time. So they would have developed these to use these albedo dosimeters and have it interpret the results of various facilities.

CHAIRMAN SCHOFIELD: I would recommend closing that. You got a problem with that, Josie?

MEMBER BEACH: No, I don't have anything on this one.

CHAIRMAN SCHOFIELD: Jim?

MEMBER ROESSLER: I'm fine with it.

MEMBER BEACH: Jim. Gen. Sounds close.

DR. OSTROW: Okay. So can we record the Work Group closes it?

CHAIRMAN SCHOFIELD: Yes.

DR. OSTROW: Okay. All right. We're getting there. There's only three more left.

Okay. The next one is Issue 33, also neutrons. And this is neutron organ dose. This is a short one. The original issue was NIOSH would provide neutron spectrum information guidance for organ dose reconstruction for workers at ZPPR. It's a zero-power production reactor? I'm not sure. Z-P-P-R.

CHAIRMAN SCHOFIELD: Plutonium.

DR. OSTROW: Plutonium. Zero-power plutonium reactor. I forgot the

acronyms. And TREAT, which was another reactor. Do you know what the acronym means?

MR. GLECKLER: Not offhand, no.

DR. OSTROW: Okay. Anyway, it's two reactors that --

MEMBER BEACH: I'm just trying to see if it's listed here, but I think it's just under the acronym.

DR. OSTROW: Anyway, it's two of the NIOSH 52 reactors. And NIOSH responded that the guidance provided is in Section 6.4, Spectrum Data in table 6-14 of Rev. 3, which is the current revision for the external dose. So our action item was to look at it. And we looked at it. Upon reviewing Rev. 3 SC&A agrees with NIOSH that the requested information has been provided in Section 6.4. SC&A considers this issue to be resolved and recommends that the Work Group close it.

So this we'll say we had a question

that NIOSH provide some information. It's in the current -- they did in the current Rev. 3 and it's not too controversial. It's just some table information.

DR. MAURO: This is John. You know, when I look at this material, I look at it also -- you know, are we getting to the root issue here? And when all is said and done, the way I always look at this; like this is a particular facility, is there a good basis for understanding the energy distribution of the neutron exposures experienced by the workers? Because once you know that distribution and feel confident that you have a good sense for it, it becomes a manageable problem. Even if the way in which your -- let's say it was NTA film was calibrated, may have used a different energy distribution to calibrate it, if you know what the actual distribution is, there are ways to deal with that with these correction

factors. And that's what we've been talking about all along.

And this other business of the albedo detector; I'd have to go back to my old textbooks, but I believe that's one way to solve the problem. I think what that does is -- unlike the NTA film where you're seeing only neutron energies that are I guess around 1 MeV or 0.8 to 1 -- and below that they start to disappear on you. And that's a problem. I think the albedo dosimetry -- and anybody on the phone or in the room could help clarify this for me, my recollection back to my dosimetry course back in graduate school.

I think that what it does is no matter what the energy distribution is, it hits this dosimeter and I think it slows down the neutrons so that you detect them all. In other words, even if they're lower energy, you'll get a response. And so somehow the albedo

dosimeter or dosimetry system allows you to -- you don't have the same problem you have with the NTA film where you don't see anything below a certain energy cut-off.

If there's anybody on the line that could help me understand that a little better, I think that -- so what I'm saying is that I think when it comes to neutron issues and you're dealing with NTA film, which is what we often are dealing with, the dilemma we always have is what is the neutron energy distribution that the worker was exposed to? Do we understand it? And what implications does it have with regard to adjustment factors for the NTA film?

Alternatively, if they do have other types of ways of gathering dosimetry data such as -- I remember there was something called a long dosimeter, a long detector, a long neutron detector, something like that; had a name like that, and an albedo, somehow that way

of measuring neutron exposure does not have the same limitations as NTA film. And that's another way to solve your problem.

Could anyone maybe a little bit more familiar with neutron dosimetry let me know whether or not I'm thinking about this the right way? I think it would be helpful for everyone. Because that really gets down to -- no matter where we run into this neutron issue, whether it's here or any other site, I always look at it from that perspective.

MR. HINNEFELD: Well, this is Stu and I bet there are people who know more about this than I do, but I'll give it a shot.

Albedo means the reflection. And so an albedo dosimeter measures the reflected neutrons that reflect off of the wearer essentially to the badge. And so the way you build this badge is your detection medium in this case, since we're not dealing with NTA film

anymore -- we're dealing probably with a TLD. You have a neutron-sensitive TLD phosphor.

And you'll usually have two badges. There are two elements. You have one where the phosphor is bare in front and so it will measure directly low energy and thermal neutrons. And then you have a second element which has a low-energy neutron absorber in the front like cadmium. And so it will not measure any incident low-energy photons. High-energy photons -- you know, the cadmium is pretty much invisible to the high-energy photons.

High-energy photons will reflect off the wearer and be moderated by that reflection and you will have a certain portion of them are moderated and come back into the back side of the phosphor which is bare on the back side. An albedo then allows you to use a low-energy-sensitive detector to measure both the low-energy of the incident component as

well as the high-energy component measuring it by reflection. So that's what albedo is. Good with that?

DR. MAURO: That's a great description. Thank you.

MR. HINNEFELD: Okay.

DR. OSTROW: Sounds good to me.

MR. HINNEFELD: Now I suspect the reason why they had facility-specific correction factors was that the extent -- you know, the amount of reflected-out neutron that you measure is dependent in some fashion on the average energy of the incident beam. And so that's why they would have to have facility correction, facility-specific corrections for their albedos, because depending upon what the incident beam was that would have a different calibration for the albedo.

DR. OSTROW: Well, because the human body is -- they can model it to the first

order as water.

MR. HINNEFELD: Yes.

DR. OSTROW: So it's hydrogen-based.

MR. HINNEFELD: Hydrogen and --

DR. OSTROW: So you're getting reflection of the neutrons off the hydrogen and the cross-section for that is energy-dependent --

MR. HINNEFELD: Correct.

DR. OSTROW: -- to the scattering cross-section.

MR. HINNEFELD: Yes.

DR. OSTROW: That's why they add these correction factors.

MEMBER ROESSLER: And who discovered that?

MR. HINNEFELD: What?

MEMBER ROESSLER: Who came up with that?

MR. HINNEFELD: I don't know. There were some really smart people working on it.

DR. OSTROW: Yes, that's a unique method.

MR. HINNEFELD: Yes. Yes.

MR. SMITH: This is Matt Smith with ORAU Team. It's kind of a sidebar, but -- actually it=s a double sidebar. When the albedo dosimetry went into use here at Hanford around the 1972 time frame, that's when they definitely saw an increase in neutron dose compared to what they had historically been measuring. And that prompted a lot of neutron dosimetry workshops that continued through the late '70s and into the '80s.

The second sidebar is with respect to facility-specific factors. You see a similar thing occurred at X-10 and Y-12 where again they did a lot of cooperative

measurements with the talent at the time and came in and did neutron spectral measurements in order to really, even with the modern TLD system, pin down what those facility-specific correction factors should be.

MR. KATZ: This is a great health physics class here for everybody.

(Laughter.)

MEMBER BEACH: Yes, I'm glad someone understands it, but when I look at table 6.14 I don't know how we get to the organ doses, but I'm sure you guys must. Okay.

DR. OSTROW: Okay. These are sort of like double, triple sidebars.

MEMBER BEACH: Yes.

DR. OSTROW: But I think the assessment -- it sounds like the Work Group agrees with us to close it. Phil?

CHAIRMAN SCHOFIELD: It sounds reasonable to me. To be honest with you, they

lost me on that one.

MEMBER ROESSLER: I'm okay.

MEMBER BEACH: I'm good.

DR. OSTROW: Okay. So close it. Thank you.

MEMBER BEACH: As long as Jim agrees. I don't know if he's still on the phone or not.

DR. OSTROW: Okay. Next issue, also a neutrons issue, 35. And this has to do with multiplying factors from missed neutron dose. So we're talking about missed dose again.

All right. The original TBD issue was NIOSH should provide data to support the two multiplying factors, 1.25 and 2, on a fixed missed neutron dose to full value of 50 millirem. This was in the original TBD.

NIOSH responded that the values are based on weighting neutron spectra with dose

conversion factors to determine the fraction of the dose below 0.8 MeV as referenced in footnote 37 of Revision 2. So this is saying this is to the problem of dealing with low-energy neutrons below about 0.8 MeV and it's always been a problem.

And they clarified, NIOSH clarified regards to the 50 millirem neutron dose TBD is not recommending the dose reconstructors assign 50 millirem of un-monitored neutron doses to the affected workers. The TBD was merely describing an instance where un-monitored neutron doses were received by INL workers, and so forth and so on.

Our action item at the last Work Group meeting, to look at the current version of the TBD and see if it's clearer now. And we noted that footnote 37 of Revision 2 is now Attribution 46 of Revision 3. So we looked for it changing from one TBD to the next, and so

forth. And it says right there that Attribution 46 states that the two multiplying factors are based on weighted neutron spectra with dose conversion factors to determine the fraction of dose below 0.8 MeV, but doesn't show the calculations.

And our review of Rev. 3 confirms that the fixed missed neutron dose to full value of 50 millirem has been removed since the un-monitored office workers' dose records were already corrected by INL. So that's where we left it.

Then we reviewed it yet again just recently and further review. NIOSH notes that the issue is related to Issue 29. Issue 29 is one that we -- the one we just discussed.

MEMBER BEACH: We closed it.

DR. OSTROW: Yes, we closed Issue 29 already. These are very related issues.

So we looked at the Issue 39

resolution.

MEMBER BEACH: Thirty-nine or twenty-nine.

DR. OSTROW: Twenty-nine actually. Excuse me.

MEMBER BEACH: Okay.

DR. OSTROW: I'm getting tongue-tied. So we looked at the resolution to that and then we looked at the Rev. 3, the external dose TBD again and looked at Section 6.5.4 about -- we were just discussing the NTA dosimeters which were used at INL before October 1976, and then the Hankins albedo dosimeters we used thereafter. And Section 6.5.4.1 points that for the earlier period when the LOD for NTA film is used to estimate the missed neutron dose, it should be multiplied by 1.25 for most workers and by 2 for workers on the MTR experiment floor; that's one of their reactors, and on the TREAT or ZPPR experiment

floor.

And data to support the correction factors; finally we get to the crux of it here, is found in extensive discussion in ORAU OTIB-51. Although the OTIB is specifically for a Y-12 plant, discussion on the NTA film response to different energy neutrons is generic and applicable to INL as well. So the discussion on the dosimetry is the same for all the plants. Hence, a range of NTA film response multiplication factors given in the INL external dose TBD appears reasonable and consistent.

So we basically are using the latest NIOSH TBD and a little of research and following it through to the OTIB. We see that NIOSH is being consistent and they based these multiplication factors on good references on their OTIB. So we recommend they close it, we close it.

Stu, you followed it?

MR. HINNEFELD: Yes.

DR. OSTROW: Okay. Yes, I see you're reading it.

DR. MAURO: I'm going to ask kind of a strange question. This is John. It looks like a lot of good work was done to deal with neutron spectra dosimetry so that doses could be reconstructed. And apparently though there are still open neutron items that we're not talking about today. I guess we're only talking about the ones we're going to recommend closing as a result of previous -- you know, the group we just went through, the 14, I guess, and we're going to be talking about the White Papers I presume this afternoon.

But just for my own curiosity, because I haven't looked deeply into all of these matters, what are some of the neutron issues that are still at play, are still open?

Because I'm watching a lot of neutron issues be closed out, and for good reason, as being resolved. But apparently there are still some open issues. Can anyone give us a -- I think everyone would benefit from a little 30-second sound bite on what's still being done to look into neutron issues.

DR. OSTROW: Okay. John, this is Steve again. I can answer some of that quickly. For example, Issue 28, which is Minimum Reporting Level for Neutrons, that's an open item. And the response is NIOSH is working on a White Paper to address this issue. And the White Paper; at least the working title, was investigation of the NTA film dosimeter limits of detection being used for INL dose reconstructions.

So INL is working on this -- I mean, NIOSH is working on this White Paper right now that's going to be dealing, I think, with a lot

of these neutron dosimetry issues.

DR. MAURO: Thank you.

DR. OSTROW: So that's just one example I got quickly. It's Issue 28.

CHAIRMAN SCHOFIELD: Thirty-four?

DR. OSTROW: Thirty-four also? Let me see.

CHAIRMAN SCHOFIELD: It=s one of the White Papers.

DR. OSTROW: Thirty-four is also open. That deals with neutrons to high-risk jobs and NIOSH is revisiting the issue. That also deals with neutrons. I don't know if that's going to be part of your White Paper or if you're going to deal with it separately. That's going to be a separate thing from the --

MEMBER BEACH: Well, and 19 kind of touches into photons and neutron doses possibly.

DR. OSTROW: No, 19 is angular correction factors such as gamma dose. It wouldn't be for neutrons.

MEMBER BEACH: I was just looking at that OTIB-10 response talking about photons and neutrons. Okay.

DR. OSTROW: Yes, anyway, so it's our understanding that NIOSH is still looking at neutrons to address a couple of the other issues. So at that time when they produce their report, we can go see if they addressed all the open issues on neutrons.

MR. KATZ: Sure. Thanks, Steve.

DR. OSTROW: Okay. John, you happy?

DR. MAURO: I'm very happy.

DR. OSTROW: Good. Okay. This was -- I lost track. So this is Issue 35, and I think we're at the point where the Work Group agrees to close it?

MEMBER BEACH: Yes, I don't have any questions on it.

MEMBER ROESSLER: I agree.

CHAIRMAN SCHOFIELD: I don't have any questions.

DR. OSTROW: Okay. Thirty-five is closed. Now, this is the last one that we recommend closing, Issue 36, which is the next one. And this is not a neutron one.

MEMBER ROESSLER: How come that one didn't come up in green?

DR. OSTROW: I don't know.

MEMBER BEACH: It did for me.

DR. OSTROW: So this is Issue 36. This has to do with missed low-energy beta doses, and it's also external dose. And here the original issue, the TBD discusses the 100 milligram per square centimeter plastic dosimeter holders and the fact that betas of less than 360 keV will not penetrate the holder.

However, the TBD does not discuss allowances for or consideration of the possibility of the complete failure to detect these betas because they may not penetrate.

And we said the general averaging approach that was used, that the missed betas was questionable, and so forth and so on. This was based on the original TBD.

NIOSH said basically go look at the latest TBD Rev. 3, which we did. And we reviewed Revision 3 of the TBD, and which includes a brand new Section 6.4.2 and table 6-12. That wasn't in the original TBD. And we agree with NIOSH that that section addresses Issue 36 now. It explains the correction for the plastic dosimeter holders for the missed low-energy beta dose.

We didn't elaborate why we think it addresses it, but we basically wanted NIOSH to explain it, and you did in Section 6.4.2.

MEMBER ROESSLER: I'm willing to take your word for it.

MEMBER BEACH: And I didn't have any questions on it either.

DR. OSTROW: Phil?

CHAIRMAN SCHOFIELD: I don't have any questions.

DR. OSTROW: Okay. So I'll record that the Work Group agrees to close this issue. And that's it. That's the 14 issues. And just off the top of my head I think; you can correct me, we closed out 13 of the 14 issues.

CHAIRMAN SCHOFIELD: Yes, that's right.

DR. OSTROW: And one of them we left open was --

MEMBER BEACH: Twenty-one.

DR. OSTROW: Okay. It was 21 that's further --

CHAIRMAN SCHOFIELD: I have one

question. It's more of a generic one that keeps coming up for a lot of sites. A lot of people are concerned about wearing their film badges under lead aprons, but there are some people says, well, that's okay because you gain enough neutron exposure to offset that reduction. How much neutron exposure -- I mean, I don't understand that part of it.

MEMBER ROESSLER: Can we ponder that during lunch?

CHAIRMAN SCHOFIELD: Yes, we can ponder that during lunch.

MR. HINNEFELD: That would have to be a real facility-specific answer or circumstance, because I don't know -- I could postulate why someone might possibly say that, but without knowing the facility or more specific, I don't think I could make --

CHAIRMAN SCHOFIELD: Okay. Well, if you take Rocky Flats, they used lead aprons

in a number of things when they were doing -- Los Alamos used a number of different things. They used lead aprons.

MR. HINNEFELD: Yes.

CHAIRMAN SCHOFIELD: One of the big factors though is Rocky Flats actually certified theirs. It's my understanding they would actually go through and QA them every once in a while and make sure they were still -- you know, there wasn't gaps in them and stuff.

MR. HINNEFELD: They didn't have crease voids and stuff like that.

CHAIRMAN SCHOFIELD: Yes.

MR. HINNEFELD: Okay.

CHAIRMAN SCHOFIELD: And so this question has come up from a number of people. They want to know, well, how do you account for that they're wearing the badges under the lead aprons.

MR. HINNEFELD: Oh, gosh, I don't

know for Rocky. I'll have to do some research. I can't really answer off the top of my head.

DR. OSTROW: It doesn't sound like a great procedure though. That doesn't absorb neutrons particularly. It's a high-Z material.

MR. HINNEFELD: Yes, it wouldn't affect the neutron badge. The argument would have had to have been made from if they said that the neutron dose, you have to overestimate, your neutron dose outweighs that. If that argument was made to them, I'd have to know more about the neutron approach and what we assigned the neutrons.

CHAIRMAN SCHOFIELD: All right. So that would really be almost a case-by-case basis.

MR. HINNEFELD: Certainly facility-specific, and I don't -- I have not been studying Rocky. I don't know what was

done at Rocky about that.

CHAIRMAN SCHOFIELD: Okay. It was just one I wasn't -- I have grappled with.

MR. HINNEFELD: I can see if we can't find something out, if there is even -- you know, if we even agree that none of our people should have ever said that. I don't know if we would have said that or not.

MR. GLECKLER: For INL I don't recall seeing any claims for lead apron use.

MR. HINNEFELD: I don't remember INL.

MR. KATZ: So lunch break. It's quarter past 12:00 right now. Do you want to take an hour? What do we want?

DR. OSTROW: Sound good.

MR. KATZ: An hour?

MR. HINNEFELD: Yes.

MR. KATZ: Less? More?

MEMBER BEACH: I say 45 minutes,

but I'm good with an hour, too.

MR. KATZ: And Josie needs to leave at what time?

MEMBER BEACH: By 4:15 or so.

MR. KATZ: Okay. So, I don't know, let's use an hour as the outside edge here. And if we can meet 10 minutes before or so, that would be great.

MR. HINNEFELD: So shoot for five after?

MR. KATZ: Yes, so let's shoot for about, yeah, five after the hour. Thanks everyone on the line. Catch you later.

(Whereupon, the meeting was recessed at 12:16 p.m. and reconvened at 1:18 p.m.)

A-F-T-E-R-N-O-O-N S-E-S-S-I-O-N

(1:18 p.m.)

MR. KATZ: Steve?

DR. OSTROW: I don't know if it's my item but the next item on the agenda's ORAU/SC&A matrices. I don't know why that's on the agenda, actually. The only thing I can say is that, as far as we know, our matrix, the current

one, is in our February 24th, 2014 report. I think Pete Darnell, in one of his emails, mentioned that it doesn't quite match up with the NIOSH matrix. But I don't know, Pete didn't go into the differences between them.

MR. KATZ: That is why Pete asked me to put that on the agenda, for that reason.

DR. OSTROW: Yeah, so I don't know what the difference is.

MEMBER BEACH: When I compare the two, I only noticed there was a few things that Pete had added to his that weren't on the one that was sent out a little earlier, the February one.

MR. HINNEFELD: The things that I've noticed where there's a difference was where Pete recorded on our matrix that SC&A was going to take another look at a particular item. And then your February matrix, it was, you know, your recommendation to stay open.

I mean, so to me, I don't know that that's particularly different. It just means that there's some more information that should be coming from our side to, essentially, fill out that response.

I don't know if it's going to work very well because I don't think I'm cognizant enough about those specific issues. But, you know, one thing we may want to do is make sure that we, on our side, know what needs to be addressed in order -- you know, what's the next item to be addressed there.

Because, from the last meeting, our thought was, well, SC&A's going to take another look at this. You guys just said you think it should remain open with no additional discussion. And so is it clear, then, to our side what needs to be done?

I guess we go back to what we did before and what you guys said before and say

that, you know, we might be able to figure it out. But I haven't gone through each one to know whether we can figure it out or not.

We could start down those. I'm not sure I could even find them real easily.

DR. OSTROW: Well, I suggest maybe the easiest thing is, when you guys start addressing the open issues, if it's not clear, just email or something, you know, what did you mean by this?

MR. HINNEFELD: I think that was what I was going to suggest, rather than try to fight through them here.

DR. OSTROW: Yeah, it doesn't make any sense to do that.

MR. HINNEFELD: Because we'll go through there, and if we don't understand the opening statement --

DR. OSTROW: Yes, just go through it one by one as they come up.

MR. HINNEFELD: Yeah, okay.

DR. OSTROW: Makes sense. I know Pete added a couple of little comments and he put a date, something like March 14th, and he had a little note on some of the matrix items that he added subsequent to our report. He had some little comments here and there, which are new, new comments.

MR. HINNEFELD: There were a couple things in there -- there are a couple of matrix items where we've added our next round of response directly in our matrix.

DR. OSTROW: A couple of them, yeah.

MR. HINNEFELD: Yeah, there are a couple like that.

MR. GLECKLER: Nineteen's an example of that.

MR. HINNEFELD: Okay.

MR. GLECKLER: And then there's a

number of them that have an additional response that we've added to the -- and that's why we added the dates, to show, okay, this is more recent and --

DR. OSTROW: Yeah, that=s not a disagreement or anything. It's just a little bit more updated.

But, anyway, this is just a suggested procedure. As you go through open issues, you know, just ask if it needs any clarification.

MR. HINNEFELD: Okay.

MR. KATZ: So then, Phil, do you want to move to the White Papers?

CHAIRMAN SCHOFIELD: Yeah, I have no problem with that.

MR. KATZ: So I assume NIOSH will sort of present. I mean, as far as to get the ball rolling.

MR. HINNEFELD: Okay, well, we have

one on Issue 1 so maybe we'll start with that?

MR. GLECKLER: Okay. Do you want me to give a little background on that?

MR. HINNEFELD: Absolutely. Better you than me.

MR. GLECKLER: Okay, for this next round of White Papers, the NIOSH/ORAU folks, it looks back in '012, April, May and June, it looks like we did a pretty significant data catch effort to look for more records to help resolve these. We spent a week in April, a week in May and two weeks in June capturing documents. We captured about 2,248 new documents, roughly, over that timeframe. So it amounts to a fairly large mass of material. There's thousands and thousands of pages that total that. And just to give an example, for Comments 1 and 2, a lot of it has to do with historical dose evaluation that was performed at the INL site. And for

that document, the base document is two volumes and it maybe totals, probably, I want to guess under 500 pages.

But when you factor in all the supplement, supporting documentation behind that, just that document alone has 4,200 pages or more of stuff to support it. So it's a fairly massive, large, massive effort for that particular document. And it's pretty massive as far as what we've captured in the Database, our Site Research Database.

And so, you know, to answer these, you have to go through thousands and thousands of pages of documentation. So it's a pretty significant effort that's been put into these. So hopefully it'll come out. And we've got enough information gathered, and some instances, it was just like looking for a needle in a haystack for some of these.

So, out of the 2011 Working Group

meeting, NIOSH was tasked to revisit the meteorological dispersion model, and especially in regards to the relatively close proximity to the release points and its applicability to that.

And I don't know if SC&A and anyone's had a chance to review that yet.

DR. OSTROW: Yeah, we did. Now, as I said, we haven't had a formal review for any of these yet. We have own preliminary look for some detail. John, you're on the line, right?

DR. MAURO: Yes, I am.

DR. OSTROW: Do you want to say something about this? You're the one who looked into the MESODIF stuff.

MR. KATZ: Well, does NIOSH want to -- before that, do you want to talk about what you did first before SC&A responds to what they make of what you did?

MR. GLECKLER: Okay, yeah. I

guess to give some background and --

MR. KATZ: Thanks, Brian.

MR. GLECKLER: All right. So, let's see, some of the key issues -- well, the key issue involved the applicability of the MESODIF model.

And one of the things we did determine was -- well, I guess SC&A indicated it was only set up for 20 kilometers or greater. In reality, from what we found out, it was actually one of the first atmospheric dispersion models that was capable of generating somewhat close, or fairly close estimates of atmospheric dispersion beyond 20 kilometers.

And, in fact, it looks like some of the stuff presented in the paper indicates that it was definitely capable of going below 20 kilometers and down to at least 100 meters. But to do that, that's where I really had to dig

into the historical dose evaluation document and the basis behind that and track down the basis behind MESODIF and all of that documentation.

Because there's a lot of it, it just references. One document references another for the information. And you go to that one and it references another. And so it's really buried deep, in some instances, where I was able to find some of the equations being used for the MESODIF model.

And part of the other issue with that comment was that resuspension wasn't being addressed. And one of the things with looking into that, weren't able to find any indication that resuspension was a significant contribution to the airborne -- to the air concentrations onsite on that.

And most of that was done by just comparing the limited amount of air sample data

that we had for onsite locations to the offsite locations. And so it's pretty much indiscernible from each other. So the focus was on a specific period of time that was identified. And I can't remember what the dates were on that. That's in the paper. Oh, fourth quarter of '74 and first quarter of 1975 is where we focused in on. And the air concentrations were pretty much indiscernible for onsite sampling locations and offsite sampling locations.

And one of the other issues touched on for this comment was in regards to the deficiencies in the INL's environmental monitoring equipment. And in regards to the equipment, we determined that it's not relevant to the environmental TBD because we didn't use any of those environmental air concentrations.

And we suspect that the original authors didn't opt to use that onsite air

sampling data because of -- based on my opinion was the air sampling network sampling for the INL, the onsite air sampling network, did have some serious deficiencies. They had these major operating areas separated by vast distances.

And they only had one environmental air monitoring station for each location. Whereas my background comes from doing that sort of work at the Hanford site, and we had a minimum of one environmental air monitoring station around each compass direction of each operating area, and then a whole bunch more, usually in key areas where we thought we would see high air concentrations.

So it had a much more extensive network, where INL, for being twice the size of the Hanford site, only had about, I want to say, about ten air monitoring stations onsite at most. And so it was very minimalistic on their

onsite, and some of those stations were up in upwind-prevailing sort of situations.

So it was like they wouldn't even be downwind in the prevailing wind direction. And so they're not going to see much of the air concentrations from that major operating area. It's probably going to be the ones -- like the best one I can think of is the ICPP on that. It was on the west side of the facility, whereas the prevailing wind direction was blowing to the east, or north and northeast direction. So it was like you're not going to see much of the ICPPs -- if I can spit this out, releases from the ICPP stuff would not be seen on that air sampler.

Predominantly, you're going to probably pick up more of the MTR and test reactor area emissions and that air supplementation. Whereas they ideally would have had one on the north side and east side and

the west side and the south side and some additional locations, given the size of those areas. But they didn't.

So, as a result, that's why we think that the original authors opted not to use the environmental air monitoring data and they went to using stack emissions and an atmospheric dispersion model instead. And so it's just a matter of being able to defend that dispersion model and its applicability for what we used it for.

And some of the issues being raised initially go back to an older document that used to challenge the historical dose evaluation document and some issues with that. But the focus of the INL's historical dose evaluation was in regards to offsite doses to members of the public.

And we're not using it for its primary focus with the TBD. We're using a

portion of what they generated. And part of that was dispersion isopleths on that where you basically graft where they have similar dispersion factors throughout the site.

And it covers the onsite portion, and so we were able to use those to estimate air concentrations based on the stack releases. So we're using that document's information for quite a bit.

A related but somewhat different purpose of what was originally -- some of the issues for Comments 1 and 2 that were raised, are applicable to its original purpose than it is for onsite issues. And hopefully the White Papers will demonstrate that.

MEMBER BEACH: Didn't this one have something to do with the evaporation ponds?

MR. HINNEFELD: Well, that would be the source of contamination for the resuspension.

MEMBER BEACH: The source? That was one of them.

MR. HINNEFELD: So I think the two issues we tried to address mainly were that, in our research, we believe that the MESODIF dispersion model is usable for distances closer than 20 kilometers. And 20 kilometers is a long way. I mean, we're not talking really particularly close in when you get inside 20 kilometers. So you should be able to work inside 20 kilometers.

And some of the source documentation from the model calculation, gives a formula for calculating a particular parameter. I think it was sigma-y, which is just sort of dispersed in the horizontal direction.

They give those factors, and it gives a particular equation for 20 kilometers and more, and a different equation for less than

20 kilometers, which is indicative to us that the model was intended to be used for less than 20 kilometers. And then I guess the innermost part is always a debate, how close are those diffusion models really good for? There's always some debate.

Helping us out in that argument is that the emissions were largely ICPP emissions, were certainly, I think, most of the main emission points, except for the Aircraft Nuclear Propulsion, were three stacks that were, I think it was 70 meters, right?

DR. OSTROW: It was more than that. I think 76, if I remember

MR. HINNEFELD: Okay, so you were over 200 feet high. And so, you know, that plume will be off ICCP before it contacts the ground. So you have some advantage with that. You only have to get in so far and you don't have to worry about it because it's not going to be

on the ground anyway.

So we believe that the MESODIF model is workable within 20 kilometers, and we believe it is acceptable to use it as we described it in the White Paper.

And then the second issue is about the resuspension. And that's where, what you were talking about, the evaporation pumps come in because that would be a source, a contamination source for resuspension.

MEMBER BEACH: Well, that's in direct relationship to what the workers --

MR. HINNEFELD: Yeah, and so what research we were able to do indicates that if, in fact -- you know, our premise is that if, in fact, resuspension is a significant contribution to the exposures in these work areas, then the onsite air sampling, which is essentially there where the resuspension is occurring, should a marked increase over what

you're showing on the boundary with the boundary stations.

And you don't see that. We didn't evaluate every year, but for the periods we evaluated we didn't see a particular difference. Those air sampling results seemed to be pretty similar, which we believe is indicative of the fact that the resuspension -- you know, we're talking about annual. And we're talking about the annual exposure. The resuspension is not a particularly important contributor to the doses of these people.

Yeah, you may have a high wind and you might have a day when it's dusty and there might be some exposure. But on the annual average it doesn't seem to be an issue.

CHAIRMAN SCHOFIELD: Well, around the chem plant there's -- they call it the cornflakes. That's a big concern because of their resuspension and the fact that one day it

may be to the northwest, one day it may be to the southeast, you know.

And there's no uniformity in the granularity of these particles coming out there. Some are going to be much larger and some of them look like paint chips, I understand, coming out. And others are just little fine, dust-sized particles that are obviously going to carry a lot farther.

MR. GLECKLER: A significant portion of those should be non-respirable. That's kind of a key thing with those. And then the ones that I get into on the White Paper is the ones that are respirable. Once they land on the soil they'll attach to a soil particle which is typically non-respirable.

So you're not going to see a significant fraction of them that's going to be respirable. And there's going to always be a portion that's going to be respirable, but we

just haven't been able to find anything to indicate that that was significant.

CHAIRMAN SCHOFIELD: Do we have any measurements of the granularities of those particles?

MR. HINNEFELD: What do you mean? In terms of the location?

CHAIRMAN SCHOFIELD: In terms of size.

MR. HINNEFELD: Oh, I don't know anything about that. I don't know of any particle size measurements, no.

MR. GLECKLER: Because one of the things that was very hard for us to find, even after the extensive data capture efforts that we did back in 2012, was the air monitoring data.

It's like the only thing that, you know, we were hoping to find summaries data in the form of either monthly, quarterly or annual average air concentration. And we found very

little. We found a few reports where, you know, a number of reports give it graphically but they don't give they don't give it a numerical value.

So you've got to physically pick the value out of the graph, which is hard to do to get an accurate value. And then some of the other results that we did find that we're hoping never to have to use, just like with the raw data on that per sample. But they do have a lot of the on and off dates, times and the airflow rates. So we have to calculate their air concentrations for them.

CHAIRMAN SCHOFIELD: A lot of their sampling was done with nothing more than a Shop-Vac. They put a piece of filtration paper into the nozzle and they go out there with a Shop-Vac. That's not calibrated. That's not -- you don't know what you're getting.

MR. GLECKLER: Okay. Yeah, that's one thing I haven't seen as much, is on the

design of their air sampling.

CHAIRMAN SCHOFIELD: They developed these in '92. That's when they came into being. They call it the silver bullet.

MR. GLECKLER: Silver bullet.

CHAIRMAN SCHOFIELD: It is calibrated. They know exactly what they're getting.

MEMBER BEACH: But before that it was the Shop-Vac.

CHAIRMAN SCHOFIELD: Before that it was just a Shop-Vac, hit and miss around the outside of the plant, even sometimes inside of the buildings. AWell, let's see, I wonder what we got in there.@ So, you know, somebody would poke a hose in there, take a sniff. And then they'd take that filter paper back. But it was just totally a random spot. I mean, there was no rhyme or reason to the way sampling was done.

MR. HINNEFELD: Okay, and we know that from -- that information comes to us from where?

MEMBER BEACH: Just the people.

CHAIRMAN SCHOFIELD: From the workers.

MR. HINNEFELD: So now they're describing that as -- they're trying to figure, you know, that would be a way to characterize what radionuclides you have present. But you really wouldn't be able to quantify a concentration by doing that, right?

CHAIRMAN SCHOFIELD: Yeah, they're wanting to find out what, roughly, do we have where. You know, what levels, what concentration. And, of course, the whole area around the chem plant eventually had to be cleaned up. They had to remove topsoil and barrel it because it was just everywhere.

MR. HINNEFELD: Well, I mean, it's

pretty clear from the -- there's a '74 Bryce Rich Health Physics Improvement document that describes pretty openly about the chem plant being a source of what were call big-holed particles, some of which were hot and some of which were barely warm.

CHAIRMAN SCHOFIELD: Yeah.

MR. HINNEFELD: And then the chem plant was a pretty constant source of emission. Now, the question comes, is this a dosimetric issue or not? And so that's what Brian was kind of talking about. Once you look at these particles, and if they're big like cornflakes -- and I think that was like a particular cleaning event or something, and they were getting the big particles. I think that was sort of like a particular evolution that happened for a short period of time.

But aside from that, they were putting particles out to stack for other times

as well. So is this really going to be a dosimetric issue? Now, from an internal standpoint, like Brian was saying, a lot of these are not respirable.

If they are respirable, by the time they settle, they probably are not going to be resuspended in a respirable fashion. They would be resuspended with the soil particle that they adhere to and that soil particle is probably not respirable. So Brian kind of spoke to that issue.

And then I guess from a -- well, I guess that would be the issue about the internal dose from these.

MR. GLECKLER: Yeah, because one of the things with -- you know, you get into the resuspension too. Some of my past experience was at Hanford doing some resuspension studies under high wind conditions. And we were putting sampling, temporary air sampling

networks around some of the areas with some of the highest outdoor contamination out there. And some of those are the tank farms. And they had over a million dpm per hundred square centimeters on the ground.

And the concern that was being raised by a number of employees periodically, was when we get these winds blowing and you see all the dust blowing in and out of these tank farms and other, you know, burial grounds and so on, it's like, well, what kind of air are we breathing?

And even though they basically shut down work in those timeframes, in the high wind conditions, the outdoor work got shut down, they still worried. But we went out and sampled that and we couldn't get anything above out of the ordinary. And from what we could tell, any of that contamination, basically, if it was respirable, got blown away in the first couple

wind storms. And what you=re left with are the larger particles that got attached to soil particles.

And they're creeping along on the ground and just bouncing to where they're non-respirable particles. And the thing with INL, if we'd seen any indication that resuspension was contributing significantly to the ambient airborne concentrations on the site, you know, we'd try investigating that further.

But we tried already, to some degree, with looking for those types of records specifically back in 2012 when we just didn't have much luck at finding any air monitoring data. We found some raw data where we had to calculate stuff, but it was sporadic. So you don't get like a full month's worth of data at any given time. You get a chunk of air sample results between these date ranges here and a

chunk here and a chunk there. And that kind of surprised me that we were unable to find that, because my experience out at Hanford was like we could have had that at our fingertips within less than a day. It's all electronic. But it's not that way at the INL site, unfortunately.

MEMBER BEACH: Brian, one of the questions that's embedded in here, and you may have addressed it and I missed it, but it says NIOSH uses do not account for the deficiencies in the environmental monitoring equipment in their location.

So does this White Paper address the equipment they used and the locations of it?

MR. GLECKLER: Well, the stance we took with the White Papers, because we didn't use the environmental air sampling data, those deficiencies aren't applicable to the environmental TBD.

We used the stack monitoring data instead to calculate the ambient air concentrations on that. And that, I suspect, had to do --

MEMBER BEACH: And that would just account for what was --

MR. GLECKLER: Yeah, because the original authors for the TBD, one of them's deceased and so we didn't have the resource to go back to to find out why they did what they did. But from what I can tell, it was probably due to the deficiency of the number of air samplers onsite.

MEMBER BEACH: So that would be a question for SC&A, then, to explore if using the stack monitoring data is adequate in what this question brings up, right?

MR. HINNEFELD: Well, from our view, the finding about the inadequacy of the environmental monitoring stations, we didn't

use the data from those stations in our calculations. So whether they were adequate or not really isn=t relevant to what we did.

MEMBER BEACH: But the -- sorry, to finish this up, just for the source term, though, wouldn't that --

MR. HINNEFELD: The resuspension thing?

MEMBER BEACH: Yes, wouldn't that account for some of that?

MR. HINNEFELD: Well, that'd be something I guess to be looked at.

MEMBER BEACH: Yeah.

MR. GLECKLER: But we would really need more air samplers on that site in order to do that adequately, too. That's part of the problem.

MEMBER BEACH: So I guess my question is can you adequately do it or not? That's one of my big questions with what we have,

what data we you have, so --

MR. GLECKLER: Can we adequately do what?

MR. HINNEFELD: Make a judgment about the resuspension.

MEMBER BEACH: Make a judgment on the resuspension and the source term, what's there. I know you're trying to, but I'm just thinking out loud because we haven't heard.

MR. GLECKLER: I guess the way to word it is we have not found anything to indicate that contribution from resuspension is significant.

CHAIRMAN SCHOFIELD: Right, but let's go back a little farther in time. Because, I mean, as we all know in this business, we progressed with safety and filtration, things like this.

So the ventilation systems for some of the earlier reactors, by today's standards,

are grossly inadequate. Well, what was the danger, or was there a danger to personnel working outside in the perimeter area, inside the fence or outside the fence, it doesn't matter, while this running?

And, I mean, without kind of knowing what ventilation system these were, I mean, I would say, you know, 1964, there would be a much higher risk of someone being exposed than there would be, say, today.

MR. GLECKLER: Well, that's a good question. But the other thing that we did look for was contamination survey data for the INL site, because that would be another way it's used. Like a resuspension factor, for instance. The contamination survey data for outdoor areas would also give us an idea how big of an issue that was. How much was being deposited on the ground is good indicator.

And that's one of the things we found

even less information on, actually. Based on our tour that we got over at the INL site back then -- and that was part of the beginning our data capture efforts -- unlike Hanford, they don't have large outdoor areas of contamination posted off. Whereas the Hanford site it's like, yeah, you go out and you have these huge areas of outdoor contamination, and some of them are probably some of the highest levels in the world because you're up over a million dpm per hundred square centimeters, which is per beta-gamma emitters, and that's really high.

But you don't see that same thing out at the INL site. And the way I look at that is, okay, that's a good indicator that they were cleaning up. You know, if they had something that showed up outside, they cleaned it up. Whereas sites like Hanford, they just let it go because we got more contamination for here than over there. And it became a bigger problem over

time.

But from also the stack emissions, the ventilation systems, like the main reactors, like MTR, early on those were pretty much the same ventilation systems that they had later on its history prior to its shutdown, so it would have had the same effect.

I don't think there's any difference there other than you had specific activities and radiological control practices that might have caused higher potential for exposure.

But from the ventilation system, I think the ventilation systems are mostly intact, or very similar to the early years as they were in the later. They might have upgraded the different filtration system.

I know ICPP added things to trap the iodine better and other types of stuff to the filtration system to reduce their stack emissions. But you always have the potential

to encounter leaks and stuff. You'll see those as an incident where they'll send in a group of people for bioassay measurement on that.

MEMBER BEACH: If you have monitoring data for the stack emissions, is that capturing from all these different facilities the major releases that would be to the environment?

MR. GLECKLER: For each facility, yes, and those will get modeled using the dispersion modeling results, take those major emission sites and calculate what the ambient air concentrations are for the various points in the site.

MEMBER BEACH: So if resuspension is not a problem and the stack monitors are telling you what the emissions are, then it seems like the only question is whether your model is right, whether your model can do. It seems like that's what we should be

concentrating on now.

CHAIRMAN SCHOFIELD: I would also like to see a little more data on the stack monitoring. Exactly, you know, the what, when and how they were doing it, you know, was this a constant thing? Did they only monitor it when they were in operation mode? Was it on again, off again? Or when did it even go into effect?

I mean, they really didn't put any monitors in until, say, 1968, 1970-something.

MR. GLECKLER: I believe the very early years, and I don't know the date range, like ICPP, that was intermittent monitoring. They would go out and monitor the stack during specific, you know, periodically they would run a sampling system on the stack.

And then eventually it went to continuous monitoring of all the stacks. So they would look at how much time because a lot of the operations were continuous, so they would

take, okay, this is what the air concentration's been going out, our stack has been this. It's like, well, just assume that it was continuous for that entire period, and then between when they were doing the monitoring.

MEMBER BEACH: What about the source term for the evaporation ponds? Do you have a pretty good handle on that?

MR. GLECKLER: I haven't seen anything on those specific ones.

CHAIRMAN SCHOFIELD: See, some of the people have talked about those, is that they would dump all this sludge, this solution in there and then they'd let it evaporate. And then they'd come in with a bucket or something and start scraping it up. And there was a number of times where it was quite windy while they were doing this. And they were generating a lot of dust.

MR. GLECKLER: Okay, yeah, because

I don't recall ever seeing air monitoring data for that.

DR. MAURO: This is John. I'd like to jump in, but I want to make sure everyone had their chance to discuss it. I do have perspectives on this also. If this is a good time, I can give you a summary of my initial impressions.

MR. KATZ: Sure, John, go ahead.

DR. MAURO: Yeah, first of all, I agree with your characterization of MESODIF, the puff advection model, in that you certainly can use that model all the way up to 100 meters.

So the statement that we made originally about the 20 kilometer was wrong. But it was wrong within the context that when you start to get closer, and I think Stu intimated, you have to change your sigma-z and sigma-y, I believe. These are the atmospheric dispersion factors. So I know that you

stood on the shoulders of the work done by John Till and Risk Assessment Corporation where he did a lot of work on characterizing the chronic and episodic releases from the facility, throughout the plant, and the releases. And then his intent was to evaluate the doses offsite, quite far away.

And he ran MESODIF puff advection, which is a great model. I mean, there's no doubt that the skill set at INL, from a meteorological dispersion perspective, is at the cutting edge and the best there is. And has always been that way.

But all of that work, keep in mind the context within which you drew upon, was the source term data and the atmospheric dispersion modeling that was done by Risk Assessment Corporation in their 2002 report.

Now, SC&A was fortunate enough to have spent a couple of years independently

reviewing that work. So that's part of the story, and I'll try to keep it brief. But from the dispersion perspective, the use of MESODIF, the way it was used to model these large releases that came off these tall stacks, especially from the chem plant, it was called the ICPP, that was where the big releases occurred, both chronic and episodic. But there were other locations.

And so the atmospheric dispersion model for that could certainly be used to bring you all the way close into the plant. As long as you changed, and I don't if you actually ran the calculations, but when you get close you do have to change the dispersion coefficients, the sigma theta or the sigma values on the spread.

I guess this is my first question. Did you folks run MESODIF yourself? Or did you simply use the atmospheric dispersion factors reported by Risk Assessment Corporation?

MR. GLECKLER: What I gather, from

Rev 0, the TBD's information, because we don't have the original authors available to ask that to, it looks like they relied on the INL-generated information. A lot that came out of the historical dose evaluation.

DR. MAURO: Yeah, the HDE was the work done by Till where he did all that dispersion modeling, and all of which is fine. We independently checked all of that work, and it's superb work. We matched their atmospheric dispersion factors offsite, so we have no problem with it.

The only question is, if you're going to use that model and try to come in close to the site, you would have to change the sigma values because the nature of dispersion changes when you get further away.

And that's just a question that, when I read, it wasn't clear that the close-in calculations from the release points, for the

elevated -- now, keep in mind we're talking about these elevated release points, which are where that puff advection model works very well. The only question I guess I will leave with you is when you used it for near-field atmospheric dispersion factors did you change -- or maybe Till did it, maybe Till actually provided atmospheric dispersion coefficients, chi-over-Q values, at touchdown, which should be like 300 meters, 400 meters downwind from an elevated stack.

Did he provide those chi-over-Qs? If he did, he would have made the change. Or did you folks run it? I guess that's just the question. Did you run it? Or, if DOE did it, do you know whether, when they did the near-field concentration from the releases using MESODIF, do you know that they did change the sigma values to take that into consideration? Because that needs to be done.

And that's just a question. My guess is that if you took it out of a DOE publication where they gave you the atmospheric dispersion factors close-in, they would have run it correctly. I just don't know that to be the case. So that's one question.

But I do completely agree with you. You can use MESODIF all the way up to 100 meters within a release point and it's fine. The only thing you have to take into consideration is that change in the sigma value.

The other observation I have is, keep in mind that the source terms, these releases that I think you based everything on, the values reported, again, by the RAC 2002. And we, SC&A, independently checked those. And remember, those were all source terms that were estimated for the purposes of reconstructing offsite doses.

We checked all those numbers, and

they did a great job except for the Aircraft Nuclear Propulsion Program. So another one of my initial observations regarding your work is I think that the source term for ANP, and we had many meetings with CDC and with DOE and the authors of the source term data for the initial engine tests, they call them IETs, were low by a factor of 2 to 7.

So we think that at least that source term, and there's plenty of documentation regarding this, as used by RAC, was probably low by, depending on which initial engine test you're looking at, and radionuclides you're looking at, could be low by a factor of 2 to 7. That was one of our conclusions.

If we didn't provide it, we can provide it where you can get a copy of that report. And the authors at DOE, when we met with them on a number of occasions, did agree in this that, yeah, they think they may have

underestimated that. So that's the second comment.

MR. GLECKLER: Okay. Hey, John, on the second comment, that one, you're jumping the gun. That's comment number 2, that's the next White Paper in line.

DR. MAURO: Oh, okay. Then I'll stay with the atmospheric dispersion then. Because I know during the discussion we just had you did cover a lot of territory. But, yes, so I guess with regard to the simple question of atmospheric dispersion, I agree that MESODIF is fine. It'll do a good job all the way up to 100, a close-in at 100 meters to the source.

The only comment I have is that you have to make sure that when you're getting close that the different dispersion factor was used.

MR. GLECKLER: Okay. And I can answer that.

DR. MAURO: Yes.

MR. GLECKLER: The one thing that we did found, and it is in the White Paper, the horizontal dispersion coefficient, the sigma-sub-y on that. For distances less than 20 kilometers it has a separate equation for that built in.

DR. MAURO: Oh, good, you just answered the question. That solves that problem. That was one of my quick observations, whether that was the sigma-y, and it might have been the vertical also, but I'm not sure.

MR. GLECKLER: Yeah, they used the same equation for the vertical. And that --

DR. MAURO: And that's okay because you're elevated. So I'm okay with that. I didn't realize that you did make that change.

MR. GLECKLER: Yeah, you'll see that in an excerpt of the document that that came from in Figure 1 of the White Paper.

DR. MAURO: Yes. Okay, good. One of my concerns, though, is that the source terms, remember, were all gathered and collected and used by RAC, Risk Assessment Corporation, for offsite doses. But there were a number of locations onsite where there were ground level releases, which were small compared to the releases, the episodic and chronic releases that were going out.

I think there were a couple of stacks, at least two. The question I have is I'm not sure about the Aircraft Nuclear Propulsion Program, whether that was an elevated or ground level release. You may want to look at that.

MR. GLECKLER: It was an elevated.

DR. MAURO: Pardon me?

MR. GLECKLER: It was an elevated.

DR. MAURO: It was elevated, okay. But I do recall there are a number of places,

and this was mentioned during the conversation you just had, where there could have been ground level releases which were nowhere near the magnitude of the releases that were going out from the stacks.

But since there were ground level releases, there could be -- and after there were workers nearby, even though they were much smaller than the big releases, because when you release something from a high stack it's not going to touch down for quite some distance and you're going to get a tremendous amount of dispersion.

So even if you emit a large amount of material it may not have very much impact onsite. However, a small amount released from ground level sources, which didn't get very much attention, especially in the RAC report because they were small and there was no way they were going to be important contributors to offsite

dose.

But ground level releases, even small ones, could be important to workers who are nearby and outdoors. And I don't know the degree to which you looked at that issue.

MR. GLECKLER: Okay. That, again, deals with the episodic releases, which is comment number 2.

DR. MAURO: Okay, so you're saying that all releases that were chronic were releases that went up the stack?

CHAIRMAN SCHOFIELD: John, do we have the measurements of all those stacks?

DR. MAURO: We have access, I mean, that information is out there. I mean, as mentioned earlier, the amount of information on the subject is off the charts. And we, SC&A, on a separate contract years ago looked at this in great detail over a couple of year period.

So, yes, all the information regarding the stacks is out there. But I think that there also is information on what may have been released from ground level. And I think that that's where -- I would agree completely that, when all is said and done, I think that the exposures onsite to workers from releases that were released from these very high stacks, even though they were large releases, may turn out not to be very large compared to, perhaps, the releases that occurred at the ground level onsite.

I'm not sure. But this is one of my, as I mentioned, one of my initial reactions to the report. That even though they were relatively small, I don't think we can disregard the ground level releases. In a similar manner, Phil, you had mentioned these particles. And it goes toward this resuspension factor issue. The argument that

you make, that you really don't see a difference in the concentrations, airborne from airborne onsite monitoring and offsite monitoring, that's a very compelling argument, that resuspension was not important.

But at the same time, we have this bit of a dilemma that the -- that would be an air sampling, argument. But, as you pointed out, we wonder whether or not that's reliable data to draw that conclusion.

I've got to say, I would like to see, I mean, if you look at the modeled amount of activity on the ground or airborne, airborne or on the ground, and you try to predict what might have deposited and then run models that resuspend, I mean, that's the way you folks have done it on so many occasions where you say, okay, we could estimate what might have deposited on the ground.

And both from the elevated, large

elevated releases and also from material that may have settled out, particles that were heavy that settle out pretty quickly, and also any ground level releases. You see, I feel as if these issues were not explored deeply enough so that you could come up with, or you could argue that, well, we looked at both the elevated and the ground level releases and what kind of airborne exposures workers might have experienced who are nearby, outdoors, and you can get an idea of what those exposures are.

I still feel as if we still don't have a good feel for that. And the material that deposited on the ground, either because they're relatively large particles or because they were ground level releases and deposited out, and what you would predict would be on the ground in becquerels per square meter, and then you use your classic resuspension factors that

are out there.

I mean, that type of probing, I don't believe was done to really put this to bed. I think you made a lot of strong heuristic arguments that I can't dispute. But at the same time, I feel that there are analytical techniques in order to say, okay, let's try and put a number on this. And I didn't see any of that.

MEMBER BEACH: So, John, this is Josie. Are we going to expect an answer for this one, Comment 1, from SC&A?

DR. MAURO: Regarding the atmospheric dispersion model, I could give you the answer right now. The answer is yes, we agree with them that --

MEMBER BEACH: Okay, good. I got that.

(Simultaneous speaking.)

MEMBER BEACH: But that's more

questions. So I'm just wondering if we're going to get a written response.

DR. MAURO: Well, I guess we're looking for direction from you folks. All I'm doing right now is I read many of the White Papers. This is one of the ones that I looked at pretty closely because that happens to be a subject I'm very familiar with.

And I'm verbally giving you my impressions. Our expectation is that we'd write something up. How far we would go with it, for example, the kind of things I just described, in theory, are things that we could do.

But then at the same time, no, maybe all you really want us to do is sort of outline the things that we think NIOSH needs to follow up on. And then write something up like that.

CHAIRMAN SCHOFIELD: Now, if I understand you right, you've already got some

of this written up from information earlier.

DR. OSTROW: Yes.

MEMBER BEACH: We just haven't heard it.

DR. OSTROW: I think what we're going to do, in general, just for all these White Papers, right, today we're giving you sort of the impressions. We looked at all of them. What we're going to do is actually formally write a response for all of them.

We're going to try to restrain ourselves from redoing the whole issue. But we're going to try to clarify any comments we have for NIOSH as to, you know, we agree with Points 1, 2, 3, 4. Point 5, either we disagree with it or maybe we want you to elaborate, gather more information.

So we're going to try to be specific, but not actually try to solve the entire problem in our paper.

MEMBER BEACH: Well, and that's why I cut in, is because it seems like we have a lot of White Papers to go through.

And maybe if we could just go through the technical, like what don't you understand and what do you understand so that you can go back and write a response and we can expediate just to get through all the information.

DR. MAURO: Right, yes, I realize I went on a bit, as usual. But I wanted to give you my impression. That was it.

MEMBER BEACH: We appreciate that.

DR. OSTROW: To basically sum up, I think, for Issue Number 1, there were three issues. The first one was source terms. And we agree with the source term data because we looked at that back all the way when we were doing work for CDC. So the source terms are good.

DR. MAURO: Except for ANP.

DR. OSTROW: Except for the ANP, yes, okay.

The dispersion model, we think, is good. The MESODIF, we agree, can be used within 100 meters or so if you have a high release.

So, resuspension factors, we understand your argument but we're not convinced that it's the final word. We have some comments on the suspension and suggestions which we'll look at further.

MR. GLECKLER: Yes, well, one of the things to realize regarding the resuspension is the amount of air monitoring data and outdoor surface contamination survey data is very limited, if not nearly non-existent.

DR. OSTROW: Yeah, there might be Plan B then, I think, that NIOSH comes up with.

MR. GLECKLER: Yeah, it's kind of hard to prove a negative.

DR. OSTROW: I know.

DR. MAURO: Well, I think, as you've done in the past, when you do have models that you run to predict airborne concentrations as a function of distant due to the source term, you can predict what the concentration -- using, the term is called the d-over-Q. Just like your have an rBover-Q giving you the atmospheric dispersion factor and airborne concentration, you can predict what the concentrations is on the ground by deriving the d-over-Q.

So, just like you model airborne activity you can model deposited activity. Granted, you'd be better off actually having air samples, and that would solve all your problems. But if you don't have that, you could run it and come up with a d-over-Q.

I expect that the resuspension contribution from the elevated releases is going to be small. So we'll write all this up

and explain where we think it might be worth probing. I don't want to go into any more detail now, but there are a number of things, lines of inquiry, that it might be worth pursuing to be this to bed.

CHAIRMAN SCHOFIELD: Okay. Jim, are you on the phone still?

MEMBER MELIUS: Listening.

CHAIRMAN SCHOFIELD: You got any comments?

MEMBER MELIUS: No. John said everything and more.

(Laughter.)

DR. MAURO: As usual, right?

MEMBER BEACH: Okay, Number 2?

CHAIRMAN SCHOFIELD: Yes.

MR. GLECKLER: Okay, so the White Paper for Number 2, back in 2011 NIOSH was tasked to review the SC&A report, ACritical Review of Source Terms for Selected Initial Engines Tests

Associated with the Aircraft Nuclear Propulsion Program and INEL,@ and the Risk Assessment Corporation modeling approach that was used for the INL.

And based on the main body of that document, or the main body of the Site Profile review, it pointed to IETs, initial engine tests No. 3, 4 and No. 10 as being the main ones for their potential underestimates of the total radionuclide releases. And so that's where the focus is of the NIOSH review was, is on those three.

And then it looks like we went back and pulled up some of the supporting documentation for the historical dose evaluation. And for IET No. 3 and No. 4, we were actually able to find the release trajectory information that demonstrated that it was the plumes from those initial engine tests just actually just went offsite and didn't go back

over any of the facilities onsite.

So it was just an issue with offsite receptors and members of the public versus the onsite workforce on that. So even though it looks like they might have underestimated the releases, it doesn't really matter because those releases blew offsite, off mostly to the northeast quadrant, another direction from the site. So it didn't blow back over any of the operating facilities at the site. And so the workers didn't really have a potential to be exposed.

Whereas for IET No. 10, however, it covers a much broader timeframe. And we didn't have the dispersion isopleths or trajectory stuff that they produced for the other IET tests.

And so we looked at that and we had two different periods identified. They referred to it as IET No. 10-A, which was from

December 1957 to February 1958; IET No. 10-B, ranging from March 1st '58 to March 6th of 1958.

And our focus on that, it looks like they subdivided that into three phases. And they had all these different runs, you know, Phase 1, Phase 2 and Phase 3 with different runs. But it's predominantly the Phase 3 runs that were the ones in question that were underestimated, where they underestimated the releases.

And from looking at that, it looks like, yeah, there may be a basis for some of those, for that issue being raised by SC&A to where we need to look into that and also look into the dispersion values for those. But we don't have dispersion isopleths, unfortunately.

And so that's one of the things NIOSH is proposing, is that we'll look into the IET No. 10 and those specific runs and, you know,

reevaluate those.

And one of the things we started to look into is additional data capture. We've done a lot for the site regarding the dispersion modeling information to see if they didn't have any of that original dispersion model stuff set up yet.

And it doesn't look like anyone has that capability to run the MESODIF model anymore. There's a replacement for it that they're now using at INL and it sounds like it's a similar type of a model. It's just now a 3-D type model instead.

And, in addition, we have confirmed that they do have the raw meteorological data, even though they don't have the original MESODIF runs, they do have the raw meteorological data. And so we're going to be looking at capturing that.

But it's the DOE=s site. It's a

matter of their resources. They map and coordinate that so it's to say when that information will be able to be captured at this point in time. But once we get that we'll look into that.

And we may try to, if we're lucky, what I'm hoping to be able to do is just, if we just are able to get the meteorological data, we might be able to show the wind trajectory for each of those runs of concern and show whether or not, maybe at least eliminate some of them if they can show that, okay, the wind blew it offsite in a northeast direction, like it typically does.

Because they had real limiting meteorological conditions that they could do the initial engine tests for anyhow. And so it's really, when the runs were long enough to where the wind conditions might have changed in the middle of the run that are the bigger the

concern.

Because then they might have had to finish their run and it might have blew that plume back around over the INL site proper and over some of the operating facilities. And so what I suspect is for the short-term runs, it's probably not going to be an issue. The trajectory of those plumes is probably going to show that it didn't blow back over the operating facilities.

But the longer term runs, there's a chance that the wind direction changed directions during the longer term runs, which hadn't happened with some of the others.

DR. MAURO: I can sort of comment a little on that just to help out.

MR. GLECKLER: Okay.

DR. MAURO: I agree completely that looking at the wind direction at the time of the test, and if we could show that it was going a

direction where it couldn't impact any workers, that's great. That's a quick way to solve that problem.

With regard to when the wind was blowing, let's say, in a direction where it could have impacted workers, I mean, to try to get joint frequency data at the time of the release, then run, there are computer programs like CALPUFF, which is very similar to MESODIF.

You can run it, but it's a big deal. It'll take you a lot of work. You may want to do just do a simple hand calculation using some conservative chi-over-Q, you know, using the Gaussian dispersion model with an appropriate conservative chi-over-Q for the elevation of the release, and some conservative deposition velocity, given that it is a particulate.

All of this could probably be done by hand. That's how I would do it, particularly, because I don't run these

sophisticated programs. But you can get a fairly good sense of whether or not the doses that you are assigned right now, whether or not they could be overshadowed by the issues that we're talking about, including any other ground level releases.

One of the things you'll be seeing from us is that there are a number of other places where there could have been ground level releases. And the question is could they be - it=s possible they might be important.

And the way we'll probably do it when we write up our report is a simple hand calculation just to show the scope, whether or not it's possible it could be important or not important. And I think that very often you could put these things to bed with some simple calculations.

CHAIRMAN SCHOFIELD: Well, John, I've got a question for you. Okay, we'll say

that some of the release is short-term, very fast dispersion. But my concern is how do we pinpoint people that may have been in that cloud under that dispersion?

DR. MAURO: You don't. I agree with you. What we do is we run it and we see, if there were people, this is what they would have gotten. And if it turns out to be still small and negligible compared to the numbers that you have right now, the problem goes away.

If it's not, yeah, then we take it to the next step. You're right. You're always going to be with that dilemma, how do you know were people outdoors at that time, downwind from the release. I'm not sure if you're going to be able to answer that question.

MEMBER MELIUS: Yes, this is Jim. Can we think about what if -- do we want to identify if there were people, or possibly people, that we may not be able to identify the

people right off. But were there people downwind? Because it seems to me that would play into somewhat how much effort you would put into doing this.

MR. HINNEFELD: Yeah, Jim, I think that's the first question that we're trying to -- it's an object of our data capture, is to pinpoint wind direction during the course of these runs so we'll be able to make a judgment about whether or not there were people down there.

MEMBER MELIUS: Okay.

MR. HINNEFELD: And then, beyond that, then you could, maybe for people who don't go into the general areas, maybe you just decide, you know, hey, this environmental dose is going to get assigned to everybody because who knows within those areas. And so, I mean, there are ways to do it.

MEMBER MELIUS: Yeah. No, I think

it depends on the level of the dose and how we can deal with it.

MR. HINNEFELD: Yes, right.

MEMBER MELIUS: Okay, I just wanted to throw that out. Thanks.

MR. GLECKLER: The environmental intakes are assigned based on major operating areas. So there's Test Area North-specific intake values, ICPP-specific intake values, Test Reactor Area-specific values, CFA and INL-West. And so we can account for that on an area-by-area-specific situation.

MR. HINNEFELD: And this is one of the data captures that we have on our planning list that involve this specific question.

CHAIRMAN SCHOFIELD: Do you know if they actually, when they were expecting one of these dispersions to possibly carry out over the fence line, I guess, what you want you to say, boundaries of the facility, did they put

monitors out there? I mean, put personnel out there to take measurements?

MR. GLECKLER: They actually had a pretty large monitoring network in what they anticipated would be the downwind direction on that. Unfortunately, we have not been able to find that data. That's probably data that GE retained and took with them when they left the site.

It was encouraging news that we got here recently that it looks like the DOE does have the wind data on that. Because no one maintained that. Because even for Test Area North, back in that timeframe, we've got the wind data, supposedly. It's just a matter of getting it from the DOE as this point.

It kind of comes down the their resources and so on. So that data is available but we haven't found a trace of any of the air monitoring data. And I've got documents that

I found that show that it's a pretty extensive network of air sampling stations but I've not found an ounce of the data.

But a lot of the records from the ANP project left the site with GE and went to the Evendale site for a while. And now they've been relocated again, I think. And so it doesn't look like we're going to be able to ever find those.

CHAIRMAN SCHOFIELD: Maybe it's with those little green bodies from Roswell.

MR. GLECKLER: Yes. They even had fixed air sampling stations in those networks and they also had sampling stations on vehicles that were portable, to track the plume and follow the plume even. So there=s a wealth of data that we would have loved to have found. But we didn't have any luck.

CHAIRMAN SCHOFIELD: Guess you kids never heard that about the Evendale, the little

green bodies with the UFO being moved there.

MR. HINNEFELD: Oh, I thought they went to Wright-Patterson.

MR. KATZ: It's all news to me.

CHAIRMAN SCHOFIELD: Yes, supposedly, at least according to one guy who posted recently, you know, wrote an article. Then they were shifted over there because people found out where they were.

MR. HINNEFELD: Yeah, have we gone to GE about this air data? Do you know?

MR. GLECKLER: Specifically regarding that I'm not sure. But that has a lot to do with why the Evendale site's got an SEC is because we weren't able to recover data for that site. I was kind of involved with that site for a little while.

MR. HINNEFELD: Yeah, we got some dose records from GE for Evendale. You know, external dose records. I mean, we didn't get

internal from GE. But we have --

MR. GLECKLER: For the covered period for that site?

MR. HINNEFELD: For a portion of it at least.

MR. GLECKLER: Okay.

MR. HINNEFELD: And we had a contact at GE -- I think that we had a contact that produced their personal exposure, external exposure rankings.

I'm just wondering, if we've only gone to Idaho for this and we think GE kept it with the GE Nuclear Aircraft Program, we might have a contact at GE where they might be able --

MR. GLECKLER: Yeah, there's documents that we kept from INL that indicate that a lot of the records from the ANP went to --

MR. HINNEFELD: Went to GE.

MEMBER BEACH: It'd be worth pulling the string, wouldn't it?

MR. HINNEFELD: I mean, it's been a number of years since we talked to these GE folks, but I think we've got -- at some point we had somebody who was at least marginally responsive.

MR. GLECKLER: Yeah, it's been a long time since I've been involved with that site but I started putting together stuff for an SEC for that site because they were non-responsive, basically.

MR. HINNEFELD: Well, they didn't have any internal data. We didn't get any internal data. But we had some external data, but we didn't really think their monitoring practices were necessarily comprehensive data monitoring.

MR. KATZ: But here you're talking about for offsite, right? And the data you

don't have is offsite measurements, right? Isn't that what you're talking about right now?

(Simultaneous speaking.)

MR. HINNEFELD: It would have been on the property but not in an occupied area.

MR. KATZ: Oh, okay.

MR. HINNEFELD: See, if you look at the map, Test Area North is sort of by itself, up to the north, sort of amidships. You know, east to west, it=s sort of in the middle, but to the northern part of the site. And that's where the ANP runs were done, right, Test Area North?

MR. GLECKLER: Yes.

MR. HINNEFELD: And so if the wind's blowing to the northeast, you've still a stretch of the plume that's on the INL property, but there's nothing there.

MR. GLECKLER: Yeah, and the air sampling network that they had set up, the fixed

stations, was in that northeast direction, roughly, is where they anticipated it. That was one of the restrictions of wind conditions and meteorological conditions for them to run the IET test.

MR. KATZ: So are we moving on to issue -- what issue are we on now?

MEMBER BEACH: Nineteen, isn't it?

MR. HINNEFELD: Got the one for 9 and 22?

DR. OSTROW: That'll be the next one, the 9 and 23 one, the hot particle one.

MR. HINNEFELD: Yes, okay.

MEMBER ROESSLER: Let's do that one. I like that one.

CHAIRMAN SCHOFIELD: When you're hot, you're hot.

MR. KATZ: Hot particle, that's 9 and 23.

CHAIRMAN SCHOFIELD: Nine and 23?

It looks like we have a similar issue at NTS.

MR. GLECKLER: Yeah, that one's fairly common in the nuclear industry, hot particles.

Regarding that one, I think I'll let Jodi Jenkins take that. Is she still on?

MS. JENKINS: I'm here. Can you all hear me okay?

MR. GLECKLER: Yes, we hear you very well, thanks.

MS. JENKINS: Okay. So, regarding the hot particles, in the last Working Group meeting we came to the agreement that Issues 9 and 23 could be merged. And NIOSH was tasked to look into the possibility that hot particles could be deposited on the skin and go undetected by investigating the facility's health physics practices.

So what I did was I went through a lot of the documents in the SRDB and the stuff

that we got in the 2012 data capture. And I looked at different facilities and the site overall. And what I found was that from the beginning they had health physics programs in place. Employees were issued plant clothing to wear and removed their personal clothing. In some situations they had additional protective clothing on top of that for work in contaminated areas. There were limits on the amount of time they could wear that clothing. It was laundered. Surveying was required when leaving areas and when contamination was suspected. They had special work permits to cover jobs that were out of the ordinary, some types of maintenance where you had radiation and contamination. And as part of that they surveyed the work area, their equipment, personnel.

Now, that's not to say that hot particles did not exist and that they did not

have issues. I think someone already mentioned Bryce Rich's report from 1974 regarding problems they identified with the health physics program.

I also looked at hot particles, where they had found them, how they quantified them and what not. And what I did find was that there were instances where hot particles left the areas. They found some on the buses. They had a problem at ICPP. They had the 1974 report issued about degradations in the program and what they were going to do to fix it.

When SL-1 occurred there were contamination incidents resulting from that. That's when they found particles on U.S. Highway 20 and some of the other roadways.

Let's see, what else. They did have, throughout the operating of the facility, there were contamination incidents. I found documentation of these.

So the evidence I found was that there was a health physics program in place that required surveying, protective clothing, special work permits and all of that. They continuously monitored their program to see where it was failing. And if there was a problem with it, they identified it and they instituted corrective actions.

They were capable of identifying hot particles. So if one did get out they would find it, they quantified the activity, and, as necessary, they did dose reconstructions.

Now, that's not to say that we would use -- there was an iridium contamination incident where they did a dose reconstruction based on the hot particles. That's not to say that we would not use that data, but the data does exist so that, when a dose reconstructor gets the employee's record, their documentation of the particles and sufficient information

exists so that we can do our own calculations for our dose reconstruction purposes.

Comments? Questions?

CHAIRMAN SCHOFIELD: I've got a question. This is Phil.

MS. JENKINS: That's a broad overview of what I get.

CHAIRMAN SCHOFIELD: When these releases, they didn't realize they had one, how many of these were, say, automatic because they had stack monitoring or they had some kind of monitoring data that triggered alarms? Or were largely generated because all of a sudden personnel started showing up with contamination where there shouldn't be any? I mean, what was the main trigger here?

MS. JENKINS: Well, they were doing, as far as the roadways and the buses, after SL-1 -- the particles on the roadways were pretty much, based on what I read, thought they

were attributed to SL-1 and subsequent activity based on that. So that was a distinct incident.

The bus incidents, they did routine bus surveys. But they were always checking their buses. And as far as personnel contamination, those were based on problems with jobs, someone set off a monitor, that kind of issue. CHAIRMAN SCHOFIELD: Okay.

MS. JENKINS: And then the report from 1974 where they talked about degradations to the program improvements, that was based on -- another thing they were also doing was issuing annual reports where they were reviewing their programs. So the upgrades that they instituted because of that were based on their annual reviews.

MR. HINNEFELD: Okay, this is sort of a non-obvious argument that we're making here, because if you read some of the documents,

and particularly Bryce Rich's '74 document, you'll see accounts of particles.

And they don't call them necessarily hot particles, they call them particles. And they range from hot to barely warm, you know, you can barely find them with a pancake probe.

So, they talk about the regular encountering of these particles outside of what you would call a controlled area today, you know, on the bus, things like that. They had a couple accounts of people alarming a portable monitor on the way into work. You know, things like that, wearing the clothes they were wore.

So there are accounts like that, and you would say, you know, you're initial reaction when you read accounts like that is, my god, they're completely out of control, what's going on? But the argument here is that they monitored so much, so regularly and so many things that they generated all this data

about inconsequential particles, for the most part. It's not every one of them. But for the most part, these particles that they encountered were inconsequential from a dosimetry standpoint. These just weren't hot enough.

And that the ones that were consequential were recorded. For instance, the two where they alarmed the portable monitors, or when anybody alarmed the portable monitor whichever way they were going, it was written up and it was dosimetrically important, meaning it was a hot one. There would be an incident report written and then recorded in that person's file.

So the fact that they have this large set of data, including quarterly bus surveys -- and they always found particles on the buses. But the fact that they have that large amount of data is indicative that they looked really

hard, recognizing some of the design deficiencies that they had that allowed these particles to come out of the ICPP stack in the first place.

So that's the reason for this litany of things that Bryce Rich is describing in 1974, not because they're dosimetrically significant but because, realistically, it's a pain to keep checking yourself so hard and keep surveying.

And so he was really pushing for improvements on the ventilation system for ICPP and improvements in the program in general so they didn't have to do all these additional surveys and chase all these things and write these quarterly bus reports. So that's kind of what he said, Awe shouldn't be having to do this, we should be able to confine this stuff and not have to do this.@

CHAIRMAN SCHOFIELD: Makes sense.

MR. HINNEFELD: So when you read

these things, and my initial reaction was the same. I said, my gosh, there's all these accounts of things all over the place. How can we say that they had control? But the argument here that we arrived at is that because they recognized the design deficiencies and they recognized some of these particles were getting now, that they had to do all these things. They had to do all this looking. They had to find all these things, almost always finding dosimetrically inconsequential particles.

CHAIRMAN SCHOFIELD: Yeah.

MR. HINNEFELD: So that's kind of what we've put out there. I think this may warrant some careful evaluation and say is it dosimetrically inconsequential or isn=t it.

You know, if you get one particle on the bus, and that's the kind of activity we're talking about, well, that doesn't seem dose consequential. But if you've got a number of

particles on the bus, does that really sum up to inconsequential then, in general?

So there might be room for some evaluation and discussion here. But just because there's a lot of survey evidence that particles were observed outside what we would now call the controlled area, I don't think that's indicative that there's an important dose element here that's not being captured. Because the important ones were captured and written in incident reports.

CHAIRMAN SCHOFIELD: Was there a trigger level that there was basically, would there be like 500 dpm, 1000 dpm or something before any, you know --

MR. HINNEFELD: Well, if it's 500 dpm you'd be able to find it with a pancake probe.

CHAIRMAN SCHOFIELD: Well, I'm just throwing out numbers --

MR. HINNEFELD: They probably had a instrument response that they would consider definitive, but usually it's two or three times what is was in background is.

CHAIRMAN SCHOFIELD: Okay.

MEMBER MELIUS: Stu or anybody, do we know, if there were "consequential" incidents, did they make it into the worker's records in some way?

MR. HINNEFELD: Yes. Yes, we have incident reports in people's records that describe contamination.

MEMBER MELIUS: Okay, so you've gone through that and identified that as part of the dose reconstructions that have been done?

MR. HINNEFELD: I'm pretty sure that was part of this. But I don't want to be too confident here.

MEMBER MELIUS: Okay.

MR. HINNEFELD: Maybe Jodi can help

me out.

MEMBER ROESSLER: And then in addition to Jim's question, did they know the radionuclide and did they know the position on the body?

MR. HINNEFELD: Yeah, well, a personal contamination incident will generally identify the contaminant and the contamination location, for sure, and a radionuclide maybe.

MEMBER BEACH: Well, the one, the particles on the bus calls out quite a few radionuclides.

MR. HINNEFELD: Yeah, they had a particular issue with ruthenium particles from ICPP.

MEMBER BEACH: Yeah, and there are several listed here.

MR. HINNEFELD: Yeah, so you can certainly do that. You can certainly characterize a particle. I won't sit here and

say that an incident report did it in every case.

MEMBER ROESSLER: Well, I mean, but they will have location on the body, for sure.

MR. HINNEFELD: An incident report, I think, will have the location.

MS. JENKINS: Yes. As far as incident reports go and stuff, depending on what was done as far as from the dose reconstruction perspective, if you have an incident report, the incident reports that I observed have, I found different things.

At a bare minimum they would have particle activity and location on the body. With just activity and location on the body, the dose reconstructor can make conservative assumptions based on radionuclides. And based on knowing an activity and a location, you make conservative, claimant-favorable assumptions to get a DOE.

In other situations you do have

actual information as far as what the radioisotope was. And the way it appeared to me, looking over the records and everything, is depending on the magnitude of activity of the particle, the hotter the particle was the more they studied it. Does that make sense?

MEMBER MELIUS: Yes, that makes sense but I think my question was a little bit more fundamental, was are all these incident reports getting into -- are the individual's records? So are you retrieving those when you do a dose reconstruction on an individual?

Like we found at many other sites where those incident reports don't seem to get into the individual's records, so they're not available for dose reconstruction purposes.

And someone can follow up on that. That's fine.

MEMBER BEACH: Well, one part of this, the last paragraph says that these surveys

were discovered by, in some cases, personnel monitoring. So, yes, but you're right.

MEMBER MELIUS: Yeah, does it --

MS. JENKINS: I found the documentation that I presented in contamination control reports, SRDB documents. I mean, I can pull some names that I discovered. And if they have filed a claim that is a -- well, if they have filed a claim we can see if it's there.

MEMBER MELIUS: Okay.

MR. KATZ: Yeah. That=s a good call. That makes a lot of sense.

MS. JENKINS: I mean, I can pull a few names, but --

MR. HINNEFELD: Well, I mean, we won't be able to resolve it on the phone today, Jodi, but --

MS. JENKINS: No. I'm just wondering if we can pull big enough samples.

MR. HINNEFELD: Well, I think, going forward, I mean, the first thing we can do is see if you have incident reports that were in our SRDB, which is Site Research Database, which is not claimant-filed.

MS. JENKINS: Yes.

MR. HINNEFELD: And you have names. Well, just like you suggested, the first step is to take down some names. I'm not going to tell you how many. And check and see if they're claimants. And if they're claimants, you know, open up their claim file and see if the information we got from DOE on their exposure record includes those skin contamination incidents.

Because, as Jim said, that is a directly relevant question as to whether or not these incident reports are available for us when we do an individual dose reconstruction.

MR. GLECKLER: I can elaborate on

that a little more. My understanding is the DOE and INL is supposed to be providing us the incident reports when they exist.

In addition to that, because we know we have records in the SRDB and we actually had this set up because of the Pinellas Plant and that first stuff for them because we were missing dosimetry records. But they'll do a run for each claim and they're looking for any of that information, like the claimant's name and stuff. And it'll pull up those excerpts of those SRDB references, the pages with the person's name of it.

And sometimes we only get that page with the name on it. We=ll have to go back to the original to get the full story, but that will tell us, like if their name popped up in an incident report that we've captured, we now have their incident report.

And I'm not sure if we've seen the

scenario to where we've got an incident report coming out of our SRDB but don't get anything from DOE. I can't remember that.

MR. HINNEFELD: Good, yeah. Well, I mean there are several relevant questions here. But the easy one is to do what Jodi suggested first. And then, as you said, I mean, if these are coming in, if we=re only getting them through SPEDELite then we only have a period of comprehensive list if we've managed to capture all the incident reports. See, that's an issue. So it's really better if we're getting them from DOE.

CHAIRMAN SCHOFIELD: Have you found any document that states what their limits are? I mean, somebody=s got a 95 dpm nasal smear so that's basically the end of the road there on it. But if they have 100, then now it becomes an incident. I mean, they've got this level that it has to go over before it becomes a formal

incident.

MR. GLECKLER: The radiological control procedures are one of the key things that we were targeting for the 2012 data capture trip, and had high hopes for that, but it turned up a lot of goose eggs.

We captured a few more documents but no broad procedures and stuff that we were hoping to catch. We do have a few procedure, back in the timeframe for specific facilities, ICPP is one that we=ve got some.

MEMBER BEACH: Brian, that kind of leads into kind of what my question was going to be. The last paragraph -- and, Jodi, this might be for you too. This is Josie.

It says that in addition there's complex-wide guidance in place. And I guess that goes back to the procedures. Is there a guidance document? Do you have it? Is it available for SC&A to look at it, or for us to

look at?

MS. JENKINS: Hold on a second, last paragraph that --

MEMBER BEACH: It's the last sentence. It says in addition there is a complex-wide guidance in place that addresses skin contaminations and hot particles. I guess I'm look to what you're referencing there. Is it a document?

MS. JENKINS: TIB-17.

MR. HINNEFELD: TIB-17.

MS. JENKINS: TIB-17 covers the technical --

CHAIRMAN SCHOFIELD: Okay, so it's not an INL document.

MEMBER BEACH: I thought it would be an INL document. That's what it appeared to me.

MS. JENKINS: Okay.

DR. MAURO: This is John. I think the hard part of this is going to be, as Jim

Melius mentioned, you know, will we know when we have a person that had a contamination incident when we do his dose reconstruction?

Once you know that and you have the information that we think you'll have, then you use TIB-17 to reconstruct that dose. So, I mean, I think you're in good shape once, you know, you've identified the person and the radionuclide.

But if you can't, you know, if you have a situation where there could have been particles coming down exposing individuals. You're telling me that they did have a comprehensive -- when they left the site they were all scanned, probably clothed, and whether this is indoors or outdoors, now. And then you'll have a way say with a degree of certainty that they did survey people, that theoretically those people that were contaminated did make it into their records.

See, that's the big issue.

I believe that they probably did have some type of survey, access and egress surveys performed. But when they did trip something and the alarm went off, whatever the trip level was, whether that made it into a person's record. And if we know that to be the case and we feel confident with that, I think you're in good shape to be able to reconstruct those doses using TIB-17.

CHAIRMAN SCHOFIELD: Did they also talked about, like, the RCT logs?

MS. JENKINS: No, what do you mean?

CHAIRMAN SCHOFIELD: Well, I mean, you know, the health physics monitors there are going to be on a job or in a certain area and stuff. And if they find someone above a certain level, whether it's a nasal smear, whether it's skin contamination, contamination of their clothing, then it becomes reportable.

But if it's under a certain level it's like, go change your coveralls. I=m assuming they=re keeping some kind of log book or record?

MR. HINNEFELD: Well, I guess what we'd have to say that we would not propose to go recapture all the RCT log books and look through that. I think, kind of like what you were talking about, when something mattered and when something got written up.

CHAIRMAN SCHOFIELD: Yeah. No, I mean, you wouldn't look at just the general stuff but --

MR. HINNEFELD: Yeah, maybe some of the incident reports will tell us, you know, by seeing what kind of levels are on there. Maybe that might give us some hint as to what got written up.

And, you know, potentially less than that was sort of considered inconsequential from a dose standpoint. And it might be the

right decision still today, who knows. We won't know until we kind of try to get into some judgments about that.

But I don't think we would propose trying to recover all the RCT logs.

CHAIRMAN SCHOFIELD: Well, I didn't mean that. I meant there's more like when you have, you know, I mean, there are certain --

(Simultaneous speaking.)

CHAIRMAN SCHOFIELD: Yeah, all of a sudden you see somebody comes up in the RCT, comes up and this person's got 500,000 K on their face then there's something, you know, there should be something followed up on that one.

But just run of the mill stuff, you know, somebody's got a few K on their skin, you know, you go clean it and get it off and go to work. MR. HINNEFELD: We'll have to put that on the list of things we might pursue if we need to, since we couldn't find the

HP -- you said you couldn't find the HP procedures that dictated when you did various things.

MR. GLECKLER: Yeah, it's pretty limited. We've got some from way back when, one of them Jodi references in her White Paper with the ICPP Health Physics manual on that. And then most of the other stuff's the modern era.

MS. JENKINS: No, I mean, there's also a difference between distributed low-level radioactive contamination and hot particles.

CHAIRMAN SCHOFIELD: Yes, right.

DR. MAURO: And OTIB-17 provides for all that.

MR. GLECKLER: Right.

MS. JENKINS: Right, it provides for both. But this, I was focusing more on that particle aspect. But I did throw in the other stuff as further evidence that they were discovering problems and they were quantifying

what they found.

MEMBER BEACH: So, two actions out of this, for NIOSH and for SC&A?

DR. OSTROW: Well, we'll respond. Yeah, we'll respond to the paper. And it sounds like NIOSH is still looking into it.

MR. HINNEFELD: Yeah, we are specifically looking into whether the incident reports got included on the claim files.

MEMBER BEACH: Yeah.

(Pause.)

MR. GLECKLER: So on to the next one?

MR. HINNEFELD: Yes.

MR. GLECKLER: Okay. Sorry, I was taking my notes out.

MR. KATZ: We're making nice progress. Does someone need a break? No, we're good.

MR. GLECKLER: Okay, we're on

Comment 19, I guess. This one, I think either we've got a White Paper or just a response in in the Issues Matrix. And the White Paper provide a little more of the background and some excerpts of the Issues Matrix response, and then the main body of the document.

But the history behind this one was our initial response that we put together. And during the last meeting Dr. Taulbee identified that there were some inaccuracies in our prior response and indicated that we'd revise that. And we've since gone and revised that.

And it has to do with the angular dependence issue. And, basically, it's along the same lines. It's like we're still referring to DCAS-TIB-10 for handling that issue or addressing that issue.

So it's hopefully worded accurately this time. And then we've also committed to put some additional guidance to the eternal TBD for

the LNL site. I think everyone's had a chance took at that, if you have any questions.

DR. MAURO: This is John, I read it, and I think you've been fully responsive, taking into consideration this angular dependence issue. So my initial impression was, yes, you=ve proposed the revisions and dealing with this seems appropriate and fine.

MEMBER ROESSLER: I think you are pretty good at finding sources of information and knew to go to our 1956 book to get this.

DR. MAURO: Yes, nice job.

MR. GLECKLER: Okay, so that'll take us to the next one.

MEMBER BEACH: I didn't have any questions with it.

MR. HINNEFELD: Process question. People seemed okay with this. Are we then thinking of closing it? Or does that mean that there's going to be a more careful evaluation?

DR. OSTROW: Well, SC&A will respond and probably will say it's okay.

MR. HINNEFELD: Okay, so, no action today, but --

DR. OSTROW: No.

MR. KATZ: Yeah, let's wait until we get the paper from SC&A.

MR. HINNEFELD: Okay, that's fine.

MR. KATZ: But that was a good question. So SC&A will write a response.

MR. HINNEFELD: I was going to say something, Steve, but I figured anything I say might sound like a dare of something --

(Laughter.)

MR. GLECKLER: The next one, Issue No. 24. And I'll let Jodi take this one.

MS. JENKINS: Sorry, I had it on mute.

MR. KATZ: No rush.

MS. JENKINS: Okay, so what we did

as a result of this, we were tasked with conducting a review of the INL claims with extremity cancers. And I did that. Just a second. I have too many things open on my desktop. I apologize.

Okay, so there were 63 total claims with extremity cancers. The different types of jobs the individuals worked on ranged from security guards, physicists, laborers, technicians. It encompasses a wide range.

Let's see. The total, there were 62 total cancers. I apologize. Out of 1,736 overall claims. So three percent of the claims involved extremity cancers.

And when I talk about extremity cancers, the ICD-9 codes I looked at were 172.6-7, 173.7, 172.7-1 and 172.7-2, 170.79, 232.6 and 232.7.

And when I did this I looked at the NRC definition of extremity, which is arms below

the elbow, legs below the knee, as far as determining that. And some of the employees actually had extremity dosimeters.

And in the paper I put out I identified whether or not the individuals actually had an extremity dosimetry. I also was tasked with looking over the interviews. And I did a summary and it pretty much ranged the gamut from evidence that extremity dosimetry was issued to no one ever got an extremity dosimeter attending.

INL did assign the dosimetry based on a case-by-case basis. And we have the ability to look at that and identify issues, as we do the DRs, based on the workers' jobs, whether they had dosimetry or not.

Dose constructors, with the use of TIB-17, have the ability to make professional judgments as far as that goes. And that's what I've got for that.

MEMBER ROESSLER: Could I back up? This is Gen, Jodi. What was the motivation for doing this?

MR. GLECKLER: I think I can address that. Back in our original response to Issue 24, Comment 24, that I had to do, we basically do this on a case-by-case basis because there weren't that many claims out there to, you know, the warrant putting it into the Technical Basis Document.

And that's where we got the task to go, you know, well, how many might there have been out there. That's where this task came from, to go out and look at how many. So we now know that it's less than three percent of the claim's about extremity cancers.

But then also, of those claims, how many of them had extremity dosimetry that would need to be factored in? That's an even lower percent, you've got to lower that three percent

even lower. So the likelihood of someone having extremity dosimetry, a special dose, non-uniform type dose exposures that need to be accounted for for that extremity, and then extremity cancer, is pretty unlikely.

And so that's something that we've already, you know, warrants being addressed on a case-by-case basis versus generically on a TBD.

DR. OSTROW: Okay, I'm just curious. What do you actually do in a case where someone got an extremity dose and there's no external dosimetry? I mean, how would you actually solve --

MEMBER BEACH: Good question.

MR. GLECKLER: That implies that they've never worked in the radiological area at INL.

MR. HINNEFELD: Well, what you're saying is they had no extremity dosimetry?

DR. OSTROW: Yes. No extremity.

MR. GLECKLER: Oh, no extremity? Oh, okay. I thought you said external.

DR. OSTROW: No, maybe I did.

MR. GLECKLER: Okay, that would be an easy one. That's where we have to look carefully what's in the CATI then, like especially to check if they did glove box work or say that they did any work behind a shield or they were extending their hands and --

DR. OSTROW: You look at all the details, yeah.

MS. JENKINS: We also looked at job titles, like one of the extremity cancers we've got a security guard who has moles on his foot, but if you have like a security guard with a cancer, extremity cancer and didn=t have those extremity dosimeters, you would factor all that in.

MR. GLECKLER: Yeah, pipefitter is

another one that we're real sensitive to because that we have to look at carefully. It's like for unusual exposure scenarios.

MS. JENKINS: Some types of jobs lend themselves to more concern as far as could they have had an extremity exposure, as opposed to another type of job.

DR. MAURO: This is John. I don't know what more you can do. I mean, I agree with what I'm hearing, that from our perspective there's not much more that you can do than that. Then what will happen though is that, for those cases where you have an extremity cancer and no extremity dosimetry, you know, that's going to require some soul-searching in terms of how far you need to go and what's your threshold going to be when you do assume that something -- that's where your problem's going to run into.

But there really is no other way to deal with it than what you've just described.

CHAIRMAN SCHOFIELD: I've got an off-the-cuff question for you on that. Just for general information, what kind of levels are we talking about, extremity exposures, here? Ten, 15, 25 R a year?

MR. GLECKLER: From what I've seen with the extremity dosimeters, it was very intermittent, like it can vary from some decent doses. But I think it's under a rem, is the max for an individual dose.

I don't know. Did you encounter anymore dose information than I've seen? Because I just -- it's not that common. And then I've only seen what's in the claims, Jodi.

MS. JENKINS: No, not really.

MR. HINNEFELD: It's our view that extremity dosimetry would be issued sort of like on an a job basis. Like if somebody was going to do a particular job that was going to warrant, you know, that they were going to get their hands

close to a source more so than typically would, that they'd get an extremity dosimeter for that, and then that would be --

MR. GLECKLER: That's correct. I think Jodi touched on that, that it was issued on a case-by-case basis by the site.

MR. HINNEFELD: Sort of like on a job basis as opposed to someone wearing an extremity dosimeter all year.

MEMBER BEACH: Wasn't it rare that they had dosimetry for extremities before '80, I think? I mean, in the earlier years wasn't there --

MR. GLECKLER: I've seen them back in the '50s, going back in the records form the '50s. They did have them back then.

MEMBER BEACH: And then is NIOSH, are you guys working on a TBD to address this? It says in your write-up that you are.

MR. HINNEFELD: We are working on,

I think it's a modeled run to do kind of like generic adjustment from hand to badge. I think Matt was mentioning that.

(Simultaneous speaking.)

MEMBER BEACH: How many worker comments do we have on this issue? Have you guys done very many interviews and asked the question on --

MR. HINNEFELD: Well, what we've done here is extracted from what the interviews that SC&A did here.

MEMBER BEACH: Right, I got that part.

MR. HINNEFELD: I don't know that we've interviewed people specifically about that since this came up.

MS. JENKINS: Yeah, I based my summary of the comments on SC&A's -- basically NIOSH committed to doing a review of the SC&A's interviews, which I reviewed their summaries.

MEMBER BEACH: Okay.

MR. GLECKLER: For this particular issue, the last meeting that we had, we were just tasked to look into how many extremity cancers there were to support our claim that they're not common.

MEMBER MELIUS: Hi, this is Jim Melius. If someone could bring me up to date, how many interviews has SC&A done?

DR. OSTROW: This goes back to our original Site Profile review. And I don't know off-hand how many interviews we did at that time. We did do site interviews but I don't recall how many people were actually interviewed then.

MR. KATZ: That'd be in the addendum, wouldn't they, of the report?

DR. OSTROW: Yes, it's in our report. It's in the addendum of our report, in one of the appendices.

MR. GLECKLER: I know we had it on that one.

MEMBER BEACH: I think so.

CHAIRMAN SCHOFIELD: Me too.

MR. GLECKLER: Okay. And the last one we have is Comment 34, the White Paper. And it has to do with, back in the 2011 Working Group meeting, it looks like NIOSH and SC&A will look at the interviews appearing in SC&A=s Site Profile review and elsewhere for relevant anecdotal discussions on neutron exposures.

And I guess the key focus on that was I guess not as much the high-risk, but the unmonitored. Well, there are some high risks incidents, specific ones that were mentioned in the SC&A interview summaries. It was just like a summary of all this information that they gathered out of their interviews. And so let's see if I can find it now.

I think we found three instances in

there that indicated there may have been areas where workers received unmonitored neutron doses that were more than incidental.

And the first one of concern had to do with the MTR and -- it=s probably just easier to read this. This is a quote that I took out of the SC&A document on that incident where the MTR had -- I guess it's a summary of the interview, so it could be more than one person's input being summarized here.

The MTR had several neutron beam ports for experimental work which could be plugged or unplugged to project beams to ground floor area. The beams were controlled by temporary shielding but they were detectable out to Highway 20.

In one case, radiation leakage exposed a truckful of film, ruining the film. One beam had what was referred to as a neutron chopper. Two discs were tied together with two

slots. The chopper speed could be adjusted to obtain a particular neutron energy.

This unit was used to produce a neutron beam that could be used for analysis and research. There were some reported neutron leaks in the area of the reactor shield that were not intentional. During one occasion, leakage radiation set off an alarm in an area that had to be evacuated.

And so it looks like there's a number of interviewees that are providing that input, and the key one that we're mostly concerned with is the uncontrolled beam that was detectable out to Highway 20.

The MTR was designed with the ability to have a beam, a neutron beam extend outside the building itself. And from what I could find on that, it's like they never utilized that. I haven't been able to find any more information to indicate that they utilized

-- you know, that it was designed for that. That is a possibility, but I suspect that they might not have used it.

But even then it would have been limited to a much shorter distance than Highway 20. And we looked at, oh, a lot of their early periodic reports that were available, ranging from 1952 up to 1965, because we had to put a date range on the incident.

Something like that likely occurring, our guess, was during the early years, and I searched through the periodic reports in there and found nothing to indicate that something, anything like that occurred.

There were a couple neutron beam incidents that I come across. But they were within the building to where the workers, you know, there's a part of the MTR where that neutron beam extends out a little beyond the building, but it's part of the building yard.

You can see it on the floor plan for the building. It's like the couple incidents involved the workers going back there to get, you know, to do some work and they forget to shut off the beam, and they walked through the beam.

But there's incident reports for those incidents and they assessed what their localized doses might have been, to where, you know, it=s like in the belly button, butt cheek area, on the waistline, is where the beam would hit in both of those. 3 14 46

In the circumstances where that they hadn't an incident, it looks like they were as least assessing those. So anything being detectable our to Highway 20 or beyond the structure itself it's like, you now, when you start thinking about it, it's like it doesn't sound like a credible incident.

Because in order for it to ruin a

truckload of film, you ask yourself, what's the likelihood of a truckload of film being out there at that time and for that amount, sufficient time to get hit? And film, unless it's NTA film, it's not likely going to be very sensitive to neutrons. So it's going to take an awful lot to ruin the film.

And so the likelihood of that, it's either we're missing some information or something. It's like we weren't able to find anything on that. So we don't think that there's any situation there.

They did have issues inside the building. But then they also had neutron monitoring for workers who were involved with taking out the beam ports and handling that stuff, so they would have been monitored on that.

And there's another incident, or instance as I call it, where although there may

have been an absence of neutron monitoring in some areas of the ICPP, there were wall-mounted neutron systems used in the corridors of some buildings. And also located in these areas were emergency dosimetry systems.

And that basically sounds just -- yeah, they were the emergency dosimetry systems to where they were probably set up there for criticality purposes versus any sort of routine monitoring of any neutron radiation fields.

Because the ICPP, everything's in the hot cells there. And so even when they did have criticalities, the only indicator that the criticality occurred was typically through their stack emissions versus any radiation alarms in the building.

And there's nothing that we've come across that indicates that there's any potential for neutron exposures at the ICPP other than the ones dealing with like some of

the calibration sources.

And then there's the third instance that we found. There was a potential for a missed neutron dose in the early days due to incomplete monitoring of the exposed population. For example, many laboratory analysts and chemists did not have neutron dosimeters as they were not aware that there was an issue with neutrons. This lack of neutron monitoring could be verified by evaluating the ambient neutron sources and cross-comparing this information with dosimetry processing data.

And I think I dealt with that one. The problem is that it's not identifying any specific areas and we subsequently couldn't find any areas or laboratory locations where unmonitored neutron doses may have been received. So in order to do any additional follow up on that we=d need more information.

Other stuff that I compiled for this one is we did a search of all claim data where we've got data entry files for. So it's not all the INL claims but it's all the one where we've created the data entry file, and so it might exclude a few where those individual claims where there's just a handful of dosimetry data, because they typically didn't create data entry files back then for that.

And looked at how many of those claims have neutron dosimetry and what the neutron doses were. And typically, out of the vast majority of the claims that we had, it's like the measured neutron doses were below the LOD/2 value.

And since that gives -- like some of the comments I had on the internal monitoring, most sites will target the people with the highest potential to receive dose for either bioassay or external dose monitoring. And when

we look at those doses, and the majority of those, the doses being received are less than detect, then that tells us they're probably monitoring a lot more people than they actually need to be monitoring.

And so that's a good indication. And one of the other things that we found was a document from back the 1950s. I=m not seeing that page now.

Okay, here, yeah, 1952 vintage memorandum that indicated that 47 percent of the workers monitored for external photon doses at the MTR were also monitored for neutron doses.

So, later and later years, we see that we're not monitoring many people for neutron dose. It looks like they started out, at least, monitoring almost half of the plant for neutron dose and probably cut back based on what they learned from those dosimeters.

So that was a key document that I

came across when I was doing the research for this. And we did find some stuff, some locations that we do need to add to the TBD. If I can find my pages. Oh, here they are.

It looks like those other locations include, let's see, ETR, that's Engineering Test Reactor. And the TR, the test reactor area, for handling the Pu-Be source. The ICPP, the ambient air where they handle the ambi source. And, let's see, a loft facility. Looks like maybe add those to the TBD areas.

Anything in the test reactor area won't really change what we do for INL dose reconstructions because we treat them as MTR workers anyhow. So I guess it's like if they have any neutron dosimetry and stuff it's like it'll be assessed and an MTR dose.

And that=s where we got the higher dosimeter correction factor. And that gets applied, and so it's just a formality to add the

ETR and the test reactor Pu-Be source amounts to it, to the TBD.

And also the ATR, if that=s not already in there. So does anybody have any questions on it? Comments?

DR. OSTROW: No, we didn't review this particular one anyway. I didn't know you actually had this issue until earlier today.

MR. GLECKLER: Okay.

DR. OSTROW: But I understand what you're saying.

MR. GLECKLER: Yeah, hopefully these will be better spelled out in the White Paper. It's kind of hard to summarize and identify where the various pieces of information we had and where we looked. And so the White Paper will hopefully point to all those things and substantiate what we come up with.

DR. OSTROW: So the action item here

is for SC&A to read the paper and comment on it?

MR. GLECKLER: Right.

MEMBER BEACH: Yes. The only thing I wrote down, on the high-risk or high-dose jobs, how were doses assigned? But we'll wait for that.

I went back through the 2005 and 2006 Site Profiles for who SC&A reviewed and I didn't see any attachments on the front or back. So I'm wondering if maybe -- I know you've got the list.

DR. OSTROW: Which? The actual people?

MEMBER BEACH: Yeah. I'm sure it's somewhere but --

DR. OSTROW: I don't know if it ever appeared, the actual names, in our Site Profile review. I'm sure we have the information somewhere.

MR. KATZ: Well, it's normally a

summary. I mean, it wouldn't be their names, right.

DR. OSTROW: No, that's right, it's just a summary.

MEMBER MELIUS: This is Jim Melius. The problem is it's all sort of mixed together in terms of how the data is reported. So it doesn't even pull out, you know, percentages or something like that. So it's a little hard to tell from that. And these interviews were done in 2005, it looks like.

DR. OSTROW: Yes.

MEMBER BEACH: Yeah.

MEMBER MELIUS: So it's nine years ago. And it seems to me there's an awful lot of issues that have changed or come up since that time.

MR. KATZ: Right, so I think the first step is to see how much coverage we did get with interviews from SC&A. And the second

is to what more interviews might be needed.

MEMBER MELIUS: Yeah. And my other related concern, which I brought up earlier, is that if we do go ahead and make our July meeting in Idaho, I think we want to be able to make use of that meeting, or the public comment period anyway, to get more input on issues, including input on the internal dose model, coworker model, that we may or may not see before then.

Stu was going to check the schedule on that. But I think we sort of know the questions that come up in terms of who's monitored, did everybody follow the same monitoring protocol and so forth.

And so I think some thought ought to go into is there work that we could do ahead of that meeting that would help inform that meeting. And either can we get people to turn out for that meeting, which we've not have much luck with at INL, or whether we try to use that

time to -- or the time before that to gather some additional information.

MEMBER BEACH: Well, I still have some concerns that we might be missing stuff in the Site Profile. I know I gave a list to Steve this morning of something that was sent to me back in 2009. So I'd like to kind of follow up on maybe that avenue too with some new interviews possibly.

CHAIRMAN SCHOFIELD: There have still been concerns raised about how they did calcining and handled the materials from that.

Another area of concern was trying to grab and package up the noble gases and stuff, and the fact that they did have such a tremendous problem with them leaking.

MR. HINNEFELD: Are you talking about the chem plant?

CHAIRMAN SCHOFIELD: Yeah.

MR. HINNEFELD: The chem plant had

a calciner. They had an old calciner and a new calciner.

To the issue of more employee input into this, ATL has periodically been in discussion with, essentially, labor unions at Idaho. And I think the key element would be for us to frame the questions. You know, what is it that we would like more discussion from workers on? And I think we got some of the notes, or some of the items from today. Or really the issues in front of the Work Group for what we're interested in.

And can we try to pursue, through that avenue, getting a cadre of people to speak to those issues, interested in speaking to those issues? Then would we want to do that as a Work Group activity? I mean, to me, it's always a good idea for us and SC&A to go together to these interviews.

MEMBER BEACH: Right, I agree.

MR. HINNEFELD: So we=re not interviewing people separately and things like that. Maybe make it a technical effort on our part, make it a Work Group activity, or make it a technical effort on our part and invite Work Group participation, which seems to be the easiest.

CHAIRMAN SCHOFIELD: There's one area I'd really like you to look at more, both SC&A, the Work Group, and you. I mean, this is one of the facilities that's handling a lot of fuel rods, spent fuel rods. It's not something everybody does and it's very high risk, very high potential exposures.

What is the impact on these people and how are they handling these rods? Where are the areas that we maybe have not covered that we should be looking at? I know there's one thing they're talking about. Some of the fuel rods, when they got to move them, they have a

little 2-inch wide hole in the floor.

And these guys sit there, bent over with a flash light, you know, in their eyes. They're right over that hole where they're trying to jockey to snag the top of the fuel pin loading so they can move them. MEMBER BEACH: I think that was one of the issues that was on the list that I gave Stu.

CHAIRMAN SCHOFIELD: Right. And there's been some concern about some of the people having a lot of cataracts and stuff. Well, I don't know if that's germane to that exposure, but it could be.

Because, I mean, their film badges and stuff are not going to be -- I mean, basically they're putting their nose almost on the ground and it's their eyes that are directly aligned with that. And there's no real shielding there.

MR. KATZ: Well, if NIOSH takes the

lead in organizing an effort to sort of collect and organize what are the issues that are in some fashion open that could stand for more input? If they organize it with SC&A and with the Work Group Members contributing whatever they can to that sort of matrix of issues. And then it seems, in terms of process, if we can organize some interviews in advance of the INL meeting, if we're going to go to INL for the Board, I mean, that will also help pop up participation at the meeting by doing those interviews in advance, if that's possible.

And if not, we can also organize the INL part, which we'll do before the public comments session. We can organize that presentation so it's not just a here's where we are with things, but actually quite specific on here's some issues we'd love to hear from you all as part of that session.

We've never really done it so much as a directed sort of interaction with the public, but we certainly could do that. And I did speak with Brad, because, although he's conflicted in being involved at INL, I asked to get from him, and he was happy to do that, contacts.

I know you'll have that from ATL but I asked him just for his input on the different union groups. Because there's a number of them up there, and their retiree groups, the contacts that he knew to help with that outreach effort. And I'll provide that input if that's -- I told him to hold off until we decided whether we're going to INL.

But I will provide that to you folks and you can add that to whatever you have from ATL to help with that outreach effort. And, again, I think also getting DOE to do what they can to raise interest in the meeting, and DOL

would be good too as part of the process.

CHAIRMAN SCHOFIELD: I like that idea. And, like I said, my concern is they're bringing in these spent fuel rods. They're having to cut them up, they're having to dissolve them up in some cases. And that's a real high risk area that I feel we haven't really covered per se.

DR. OSTROW: Well, Phil, I can't quite picture this. So you were talking about the hole in the shield and you=re trying to hook the fuel rods.

CHAIRMAN SCHOFIELD: Yes.

DR. OSTROW: Are they underwater or what?

CHAIRMAN SCHOFIELD: Well, at that point they're still under the water but not real deep water at that point, because they're manually trying to snag, the way I understand is -- now, I may be totally wrong in this.

The way I understand it, basically it's an eye-hole that sits up there on top. And they can't do this automatically. It's a manual thing and you've got your nose right down almost on that water.

DR. OSTROW: Oh.

CHAIRMAN SCHOFIELD: And it's your eyes that are looking through there.

DR. OSTROW: Kind of like in commercial reactors, the spent fuel pool. They usually have, I think it's about 40 feet of cover, water cover, above the top of the fuel rods.

CHAIRMAN SCHOFIELD: Yes, I mean, they do have other pools too that are much deeper.

DR. OSTROW: So these are shallow?

CHAIRMAN SCHOFIELD: My understanding, at this point it is much shallower at this point. But, yeah, they have

others. I mean, they have the one that looks like a big Olympic swimming pool. I mean, I've actually been in that facility and stuff.

But this is where they're having to run to risk of getting much higher exposure to their face than normal. I mean, normally, they can reach out there and they manipulate things. But in this case it's the fact they're having to get down right on the deck that raises that level.

And then what do they do when one of these casks gets dumped off a truck? And don't tell me it doesn't happen. It has happened.

MR. KATZ: Well, I mean, Phil, these are good examples for you to lay out in an email and contribute to the pile, in effect, of issues that would be looked at.

MEMBER BEACH: Ted, I have an email from a site foreman that was sent to me in 2009. I just made a copy and gave it to Steve. But

I'll send it to you. It has a whole list. Some of them pertain, some of them do not. Well, you can distribute it. If somebody wants to take a look at it.

MR. KATZ: Yeah, because, again, if NIOSH is willing to organize this with SC&A and then the rest of the Work Group supporting it then, yeah, we need to get all this to Stu, I guess, Stu and Pete?

MEMBER BEACH: Well, I'll send what I have to you. And we still have six items that --

CHAIRMAN SCHOFIELD: Send me a copy of that too.

MEMBER BEACH: Well, yes. He would send it to everybody.

CHAIRMAN SCHOFIELD: Okay.

MR. KATZ: And we're going to have to take into consideration all that's already covered in looking at all those comments.

MEMBER BEACH: Sure.

CHAIRMAN SCHOFIELD: Exactly.

DR. MAURO: It's almost a theme that's emerged here, is that there was a lot of coverage by way of internal and external dosimetry. But there are also lots of very unusual exposure scenarios where there could be localized exposures whereby the dosimetry, especially external, could be very localized, especially the extremity dose, the point that was just made here.

So this list, what we're really looking at is a list of jobs that were somewhat unique where a person may have experienced an exposure that is not necessarily represented by whatever health physics dosimetry they receive. You have to sort of think of it in those terms.

So people who are very familiar with the operations, the kind of things Phil just described, it's going to be important in

thinking through what we want to do by way of interviewing, kinds of information we're trying to seek.

MEMBER MELIUS: Jim Melius. To the comments or questions. One is I think the other theme is this has gone on for a long time and personnel has changed and so forth. So we're not quite as sharp as we usually are in reviewing some of these issues in terms of their historical, who did what when and so forth.

Secondly, though, I think what would be helpful is if NIOSH and SC&A, when you sort of decide what questions you want to ask or what issues you want to deal with, if you could circulate that to the Work Group for input so we don't miss the opportunity.

Same time recognizing that we can't have a thousand questions to try to address that. It has to be reasonable.

MR. KATZ: Right.

DR. MAURO: Could we start and talk to Brad, interview Brad?

(Laughter.)

MR. KATZ: Let's not get into that right now, John, at least --

(Simultaneous speaking.)

MEMBER BEACH: We still have six items we haven't discusses that we should probably figure out how we're going to go forward on those, too.

MR. KATZ: Yeah.

MEMBER BEACH: Not that anybody's pressed for time or anything.

MEMBER ROESSLER: Well, if we are looking at another Work Group meeting before July, or anytime, I=d recommend we do whatever we can as soon as possible. It's really difficult to read all the material and kind of get up to speed on something. We're all up to speed. So if we're going to have another

meeting, I'd say do it as soon as we can.

DR. OSTROW: Well, look, SC&A should have responses to all these White Papers in the next couple of weeks, not months but a few weeks, since we=ve already formulated a lot of our opinions anyway.

We've heard today amplifications and so forth, so this is sort of towards the end of March. Probably like by the end of April, something like that, because it takes a little while to get things out the door. So like end of April I assume we could have responses to NIOSH=s White Papers.

And we'll also incorporate that into our report and just update the different issue or the items, the ones that we closed out and the ones that are still open and the new responses. So I=ll have like one document that'll have everything in it. We should be able to do that by the end of April.

MR. KATZ: But then aren't there still, beyond what the White Papers have addressed, there are other open issues.

DR. OSTROW: There's a few open issues, yes.

MR. KATZ: And how are those getting disposed?

DR. OSTROW: Well, there's a couple of them. I don't know off-hand on all of them but there's a few that are waiting for NIOSH to do something or other, like extremity doses. Let me think.

MEMBER BEACH: Number 5's the first one.

MR. HINNEFELD: Five and 6 are internal dosimetry models where we owe something because, you know, it came out at the last meeting, SC&A was going to go back and look, you know, re-look at something and they did. And they feel like it still is open. So that's

two of them.

But I think we could get a comprehensive -- see, maybe I know this list from what we did today.

MEMBER BEACH: Fifteen and 16, 27 and 28 are the ones I wrote down.

DR. OSTROW: All right, and 31.

MR. HINNEFELD: And 31.

MEMBER BEACH: And 31?

MR. HINNEFELD: Okay, so let's see, 5, 6, 15, 16, 27, 28 and 31.

DR. OSTROW: Right, these are the ones that I have that are open.

MR. HINNEFELD: Okay, based on a note I made a while ago in my hasty jottings, those are also the ones I have.

DR. OSTROW: Twenty-eight, I know, is you're having this paper on the NTA film dosimeter report. It's supposed to be --

MR. HINNEFELD: That's a data

capture issue.

DR. OSTROW: Yes, that's supposed to be Issue 28. I know that.

MEMBER BEACH: Well, 26 we tabled to go with 27.

MR. KATZ: Right, I knew there was one of those, right. And 27 is open. So I guess having a path forward for those, not to put anyone on the spot here.

MR. HINNEFELD: Okay, well --

DR. OSTROW: And 15 and 16, but I have to look to see what's supposed to happen with 15 and 16. MEMBER BEACH: I thought NIOSH said they were --

MR. HINNEFELD: I think there's a tentative time to do this. I'm thinking the second half of May.

MR. KATZ: For a Work Group meeting?

MR. HINNEFELD: For a Work Group meeting, maybe. Before I commit to that I'd

like to get back and get -- because we still have June, because the Board meeting is not until the of July.

MR. KATZ: Right, end of July, very end of July.

MR. HINNEFELD: So we've got some time and we don't need to rush it. I know that the second week in May we're already -- the specific people who work on this are getting pretty committed because we have outreach meetings we're scheduled to go to with the Joint Outreach Task Group meeting the second week of May.

We've been asked to do a one-day dose reconstruction seminar in Oak Ridge the second week of May. The Kansas City Plant site visit is the second week in May. And so we're getting pretty heavily committed unless we start changing some of this.

I mean, the DR, we might be able to

do the DR Subcommittee another day, but a lot of times you go with the convenience of the --

MR. KATZ: We can push it later in May.

MR. HINNEFELD: So we want to go passed that, that bulk. And even if we get into June, it's not a crisis in terms of --

MR. KATZ: We have all the month of July too, right.

Mr. HINNEFELD: So I'm thinking we don't need to rush this. I want to make sure we get back to -- because I've got to talk to ORAU management about availability and what's going to happen in that going forward.

MEMBER MELIUS: What about doing a meeting the day before the Board meeting in July?

MEMBER BEACH: That's always good.

MR. HINNEFELD: Out there, you mean?

MEMBER MELIUS: Yes.

DR. OSTROW: That may make too full of a schedule if we're going to interview people too before the meeting or something.

MEMBER ROESSLER: Yes, it seems like we should have this resolved before then.

MR. HINNEFELD: Well, I think the interviews -- well, what were you saying about doing the interviews, Jim? The day before?

MEMBER MELIUS: Well, I=m hoping the interviews would be done before then.

MR. HINNEFELD: The interviews would be beforehand.

MEMBER MELIUS: And by the time they get summarized and go through Privacy Act, et cetera --

MR. KATZ: That's true. That takes some time too.

MEMBER MELIUS: Again, that wouldn't rule out a meeting, a Work Group call

in May or June. We'll look at the schedule. It's probably too early to tell.

MR. HINNEFELD: Yeah, I have no particular -- I mean, we were really struggling with an agenda for the Work Group meeting anyway -- I mean, Board meeting. I don't think the Board meeting's going to be very long.

MR. KATZ: Right, I mean, the only reason I was thinking that the Work Group meeting you might want to have sooner, as opposed to abutted with the Board meeting, is another Work Group meeting might help focus what we do at the Board meeting.

MR. HINNEFELD: Right.

DR. OSTROW: I agree. It would be good to leave some time.

MEMBER MELIUS: Yeah, I think the main thing that will focus what we do on this site is going to be the coworker model.

MR. KATZ: Well, these other open

issues too, right?

MEMBER MELIUS: I know, but I think the most consequential one.

MR. KATZ: Okay, yeah.

MEMBER MELIUS: Is the coworker. And I don't think that's going to -- I'm not even sure we'll have time to review it before the Board meeting, but Stu will let us know that. The finding on that.

MR. KATZ: Yeah, that will be part of what we follow up on, right. So it sounds like we should just go ahead and plan on doing the Board meeting at INL, no? Idaho.

MEMBER MELIUS: I don't think we have a better possibility right now.

MR. KATZ: Right, I need to commit to a place.

MEMBER MELIUS: Well, the Idaho Work Group, I move on behalf of the Idaho Work Group that we do it there.

CHAIRMAN SCHOFIELD: I'm all for that. Josie?

MEMBER BEACH: I'm fine with that.

MR. KATZ: Okay, so I'm planning on that then. I'll get that ball rolling.

CHAIRMAN SCHOFIELD: Brad's taking us all fishing.

MR. KATZ: Yes.

MEMBER MELIUS: If we don't move this along he's going to take us bear hunting and leave us in the woods.

(Laughter.)

MR. KATZ: What's next? Are we finished?

CHAIRMAN SCHOFIELD: I think we're done for the day.

MEMBER ROESSLER: We just did deliverables and future meeting plans.

MR. KATZ: Yeah, okay.

DR. OSTROW: Oh, one question

before we finish, talking about deliverables. We've just been like on the fly discussing these items that are still open. Should we write them down somewhere, like just list the items that are still open, in one sentence each, you know, who does what?

MR. KATZ: Yeah, because we're going to get path forward emails back and forth from NIOSH and you guys as part of the follow-up to this meeting. And that'll be the place to sort it out.

DR. OSTROW: Okay, good.

MR. KATZ: Yeah, that'd be great.

MEMBER BEACH: So those eight we just discussed?

MR. KATZ: Yeah, whatever the number is, exactly.

MR. HINNEFELD: I think, as a default assumption, the onus is probably on us to provide something, or to let SC&A know we

don't what's missing here, can you clarify the remaining issue?

DR. OSTROW: Okay.

MR. HINNEFELD: So I think, from that standpoint, the onus is on us to start.

DR. OSTROW: Good, done.

MR. KATZ: So this has been a productive meeting. Thank you, everybody, for your homework. You've all been making this work well. And thanks, everyone on the line. Have a good day. Take care.

(Whereupon, the meeting in the above-entitled matter was concluded at 3:46 p.m.)