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

convenes the

WORKING GROUP MEETING

ADVISORY BOARD ON

RADIATION AND WORKER HEALTH

SAVANNAH RIVER SITE

The verbatim transcript of the Working Group Meeting of the Advisory Board on Radiation and Worker Health held in Hebron, Kentucky on August 22, 2006.

C O N T E N T S
August 22, 2006

TRANSCRIPT LEGEND

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GLOVER, SAM, OCAS
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P R O C E E D I N G S

(9:30 a.m.)

WELCOME AND OPENING COMMENTS
DR. LEWIS WADE, DFO

DR. WADE: Good morning, all. This is Lew Wade, and I'm the Designated Federal Official for the Advisory Board and I would like to welcome you to a meeting of the workgroup of the Advisory Board. This is the workgroup that's looking at the site profile for the Savannah River Site. As currently constituted, that group is now chaired by Mike Gibson, and members are Brad Clawson, Dr. Lockey and Mark Griffon.

What I would like to do -- we'll go around and identify ourselves here, and then we'll go out onto the -- the conference call and I would like certainly people who are working for the government on this call to identify themselves, members of the SC&A team, and then anyone else -- other Board members who are on, I'd like them to identify themselves. And then anyone else who would like to, and then I would turn it over to -- to Mike.

When the SC&A people and the NIOSH team

identify themselves, if there's anyone with a conflict, I'd like them to also identify that conflict so we can start with a complete disclosure.

Around this table, again, this is Lew Wade with the Advisory Board.

MR. GIBSON: Mike Gibson.

DR. GLOVER: Sam Glover with OCAS.

MS. THOMAS: Elyse Thomas with ORAU team.

MS. ROBERTSON-DEMERS: Kathy Robertson-Demers with SC&A, no conflict.

MR. FITZGERALD: And Joe Fitzgerald with the SC&A team. I have no conflict.

MS. HOWELL: Emily Howell with HHS.

DR. NETON: Jim Neton with NIO--

MR. CLAWSON: Brad Clawson, Advisory Board.

MR. ALVAREZ: Bob Alvarez, SC&A, no conflict.

DR. LOCKEY: James Lockey.

MR. GRIFFON: Mark Griffon with the Advisory Board, no conflict.

DR. NETON: Jim Neton, NIOSH, no conflict.

DR. WADE: Okay. Any other Advisory Board members beside Brad on the call at this moment?

(No responses)

Okay. Any other members of the NIOSH/ORAU team

on the call?

MR. SCALSKY: Ed Scalsky.

MR. FIX: Jack Fix.

MR. BIHL: Don Bihl, no conflict.

MR. LABONE: This is Tom -- Tom LaBone. I have a conflict.

DR. WADE: Other members of the NIOSH/ORAU team?

(No responses)

Just for the record, would anyone on that team who has a conflict identify now?

MR. LABONE: This is Tom LaBone. I -- I worked at Savannah River for about 20 years.

DR. WADE: Okay. Anybody else in the ORAU/NIOSH team who has a conflict?

(No responses)

Anyone on the SC&A team with a conflict?

DR. MAURO: This is John Mauro. I spent three or four months at Savannah River as part of graduate school. I'm not sure that would constitute a conflict, but I did spend some time at the site.

DR. WADE: Thank you for your candor, John. Anyone else?

MR. FIX: This is Jack Fix. I certainly have

spent time at Savannah River, but I don't con-- I don't believe it's a conflict.

DR. WADE: Okay. Appreciate that. Anyone else wants to report a conflict?

(No responses)

Are there other government employees who are on this call working?

MR. KOTSCH: Jeff Kotsch for the Department of Labor.

DR. WADE: Welcome, Jeff.

MR. SAMPSON: Bob Sampson with GAO, Lew.

DR. WADE: Welcome, Bob, we're pleased to have you with us.

MR. KATZ: Yes, Ted Katz with NIOSH.

DR. WADE: Welcome, Ted.

MS. CHANG: Chia Chia Chang with NIOSH.

DR. WADE: Any other federal employees, federal contractors who need to identify themselves?

MS. CHANG: Chia Chia Chang with NIOSH.

DR. WADE: Thank you, Chia Chia. Anyone else on the line who wishes to identify themselves?

MR. BUCHANAN: This is Ron Buchanan with SC&A.

DR. WADE: Hi, Ron.

MR. BUCHANAN: Hi. No conflicts.

DR. WADE: Thank you. Any more telephone

introductions?

(No responses)

Okay. Just before I turn it over to Mike, you know, this workgroup has been recently shifted. When originally appointed it had Dr. DeHart as chair, with members Gibson, Griffon and Lockey. Dr. DeHart will be res-- will be retiring from the Board and Mike has stepped forward as chair and Brad Clawson has joined, so the makeup now is Gibson chair, Clawson, Lockey and Griffon. And Mike, it's all yours.

SAVANNAH RIVER TBD FINDINGS MATRIX

MR. GIBSON: Okay. Thank you, Lew. As Lew said, we're here today to try to resolve some outstanding issues with NIOSH and SC&A on the Savannah River site profile. And I think we'll be working off of a August 16th draft of SC&A responses to Savannah River TBD findings matrix dated June 5th, 2006. Matri-- comment number one, someone from SC&A wants to go ahead and start off...

COMMENT ONE: RECYCLED URANIUM

MR. FITZGERALD: Sure. Sure, this is -- Savannah River being one of the earliest ones that we actually reviewed, I think it was one

of the earliest ones that NIOSH actually conducted in terms of site profile reviews. This is sort of walking back before a lot of history in terms of some of the issues that we've addressed, but recycled uranium is actually one of the somewhat more generic issues that we've addressed in the other site profiles, so the -- the -- the questions we're raising here really fall back to some of those similar issues that we've discussed at other sites and probably have also walked down similarly, as well.

And I'd like to break this down because this does cover a lot of different subject areas, but in the first issue we're concerned I think with the specificity and the scope of what's addressed as far as impurities in recycled uranium. I guess we understand the sources which are referenced, which certainly with Tom LaBone on the phone, his -- his review, as well as the 2000 review, but we're also concerned that beyond those generic references there didn't seem to be much in the way of specifics on the concentrations handled and the fractions -- the same kinds of issues I think we raised

at Y-12 and some of the other sites. And we recognize this was the early treatment of the subject at one of the first site profile reviews, but again, we think Savannah River did receive and handle various feeds of recycled uranium and with different trace materials, transuranics, what have you. And I think the treatment in the -- certainly the treatment in the site profile re-- we reviewed we felt was inadequate from that standpoint --

DR. WADE: Joe, could --

MR. FITZGERALD: -- in terms of characterizing it.

DR. WADE: Could I ask you to -- or John Mauro to --

MR. FITZGERALD: Yeah.

DR. WADE: -- sort of just identify where we are in terms of Revs. of the site profile and what you have reviewed at this point, just so we all start on the -- the same page?

MR. FITZGERALD: Well, we have reviewed -- obviously for the site profile review we conducted last year -- the first edition of that site profile, and since we reviewed that -- and that was two years ago -- a Rev. -- is it

3? I think that's correct. A Rev. --

UNIDENTIFIED: Yes.

MR. FITZGERALD: -- a Rev. 3 has been issued and we have since looked at that as well. So these comments basically take the original issues that were cited in that first review that we submitted a year ago, which was, again, based on a site profile that NIOSH conducted a year before that, so it was a 2004 site profile -- 2003 to 2004 -- and we've updated that, reflecting what was in the most current Revision.

DR. WADE: Thank you.

MR. FITZGERALD: So the way this is structured is we take the original findings that were in the review of the site profile and we've updated it in response to the comments that -- that I think we received from NIOSH.

Now as further background -- thank you for raising this question of where we stand -- we had a general discussion that was chaired by Roy DeHart on a conference call in June which we kind of walked through the matrix. And the matrix that was prepared was the first response that we've seen in terms of I think NIOSH's

reaction to our original findings on that site profile. So what we're providing here I think is the -- I guess the first response to what we saw in that matrix that we received back about two or three months ago. So again, we haven't had a chance to really discuss what was in that original matrix other than to allude to, you know, what -- what was there and we haven't had an interchange on it.

MR. GRIFFON: Joe, just --

MR. FITZGERALD: Yeah.

MR. GRIFFON: -- the last matrix was June 5th, 2006. Is that the most updated matrix?

MR. FITZGERALD: I believe so.

MR. GRIFFON: I think that's the...

MR. FITZGERALD: Yeah, June 5th, 2006 is the last one that we have.

MR. GRIFFON: Okay.

DR. GLOVER: That was our response -- or -- or what we provided for our working group conference call.

MR. GRIFFON: Right. Right. Right.

DR. GLOVER: And there were I believe, to make -- you know, in the development of the matrix, I think that conversation with a little more

clarity, and so SC&A's responses and ours, we have not updated it or tried to make any changes to that following that, and so in some cases they provided clarification I've received, so...

MR. FITZGERALD: Right, and that -- again, that confer-- that was really a opportunity to clarify what the original findings were and then to I think discuss what the initial response was, and we left it at that. So this is really the first opportunity we've had a chance I think to get into the details.

Going back to the first part of the matrix item number one, which was one of our early findings on recycled uranium then, the letter A, that first part, I think is our concern that the -- the impurities, that discussion, the information provided, in our view, wasn't as comprehensive as we felt it needed to be in order to be assured that there was a pretty good characterization on what the recycled uranium contained.

Our recommendation, quite frankly -- and again, is -- it doesn't differ too much from what we originally said -- was that we felt there was a

need to clarify better what those impurities are.

DR. MAURO: Say, Joe, this is John Mauro. I have a version of the matrix that came out on July 28th that has a column in it, and that's where, if everyone is looking at the same one I'm looking at, that indicates -- right after NIOSH response, there's a column called "Location in SRS TBD Rev 3," so I guess my question is, I'm not quite sure I'm looking at the same version everyone else is looking at.

MR. FITZGERALD: Yeah, the only --

DR. MAURO: I found that column very useful because it indicates, for each one of the issues, whether or not that particular issue has in fact been addressed in Rev 3 and where in Rev 3 it is addressed, or if it's not addressed in Rev 3.

MR. FITZGERALD: Well, le-- yeah, let me -- let me -- let me just indicate, we went ahead, for our own purposes -- this gets confusing -- we added a column just to help us know where the issue was addressed or revised in the matrix, so it doesn't change really the NIOSH response, nor does it change our response. It just is --

it just gives you a reference point in the text. That's what the additional column was. So if you have that -- that version of the matrix, it's -- it facilitates I think the discussion, but it doesn't change the responses at all.

Do you have any comments or...

DR. GLOVER: So our response in --

MR. ALVAREZ: This is Bob Alvarez, and in some instances, John, Rev 3 does not address the issues in the matrix and one of them is recycled uranium.

DR. MAURO: Oh, yeah -- no, I agree. Don't get me wrong, I just wanted to make sure that I was on the same page as everyone else. I did notice in that column there -- sort -- there are a couple of -- number of places where the Rev 3 does in fact address some specific issue related to this one particular topic in fact, that we're on right now, and then -- but by and large, on this one particular topic, the -- the Rev 3 does not contain any material related to many of the -- of the responses that are provided in the matrix, and I found it very useful. I'll give you an example. On this

very -- this very first issue, you know, comment number one, NIOSH has its response in the column called "NIOSH Response," and I noticed on the second page there -- one of the responses, right toward the top of the second page, is (reading) Bioassay for americium, curium and californium was in place during the mid '60s.

And I have right next to it a little note, yes, in fact, the Rev 3 does in fact say that. So that particular issue is addressed in Rev 3. However, many of the other paragraphs in NIOSH responses are not contained in Rev 3, and I thought that would be helpful as a tracking device. It was helpful to me.

MR. FITZGERALD: Bob, did you want to add to that?

MR. ALVAREZ: No.

MR. FITZGERALD: We discussed this in the last conference call so I'm not sure this is really a new issue. We just felt, again, that we didn't get enough of a sense that there was additional material that would be provided.

DR. GLOVER: Yeah, we had a couple -- there were several -- is it okay for NIO-- for a

response at -- all right. There were several things we were to walk away with in the last working group meeting. One was to look at the -- an older recycled uranium document. I believe we've done that. We have not updated our response, obviously. We had agreed that it needed to be included in the -- at -- at the time that was generated, recycled uranium had not really been dealt with well. The Hanford site, and I believe it was probably one of the first sites to really deal with recycled uranium, and we have Don Bihl on line, and Ed Scalsey -- Ed Scalsky to talk about that. And so we -- we have said that we would address -- we -- we understand that you still are concerned that we have not maybe looked deep enough at the uncertainty in concentrations -- is that my understanding with what we have here?

MR. FITZGERALD: Yeah, I think the -- the -- the broad comment is that we understand this is one of the first ones. We're not trying to --

DR. GLOVER: Sure.

MR. FITZGERALD: -- to say anything more than the fact that as we have progressed through the

subsequent site profiles, I think we've reached a point where there's common understanding of, you know, the level of detail necessary to put that one to bed. And all we're saying is that -- I don't think there's any disagreement that that's probably something that needs to be retrofitted into the Savannah River review that would reflect maybe later understandings of how that issue's treated, so --

MR. ALVAREZ: This is Bob Alvarez again. When you referred to the older recycled uranium document, is that the 1985 task force report?

DR. GLOVER: Yeah. Unfortunately we've got these things -- I've got three or four documents on my -- right in front of me. I can't -- but it was the '85 -- we had said we were going to go and look at that. I know -- I think we've only done some preliminary scoping. I don't think we're anywhere complete necessarily with --

MR. ALVAREZ: Well, I think one thing that may be useful is that a lot of the work that has been done that expands upon the recycled uranium issue at the sites was actually derived from a Department of Energy study that was

done, a uranium mass balance (unintelligible), it was issued in March of 2001 and each site did a site-specific workup of this. The bottom line of -- of the -- of the report as a whole was that they could not actually perform a -- an active mass balance, especially with respect to trace contaminants, and that there were important discrepancies at these sites regarding these materials. And also of course the '85 -- it reiterated a lot of what the '85 task force had to say, which was there were no product specifications between and even within sites up to 1985, which may have changed after this report, and nor were there any efforts made to measure workers who were so exposed to these materials, these trace contaminants, and some sites weren't even notifying other sites of the trace contaminant levels, particular neptunium. But you should endeavor to obtain that whole set of documents because it's really used extensively in the site profiles.

DR. GLOVER: Don and Ed, you guys have been working on this issue?

MR. BIHL: This is Don Bihl. I -- I really think a better way to go here at this point --

for about the last year there's been a group of folks working on the recycled uranium issues across the complex or the various sites, and they have drafted a Technical Information Bulletin that is specific to recycled uranium. And you know, they've really got their heads into it and done a -- you know, they're -- they're able to focus on this subject, look at all the sites, look at the transfers between the sites and -- and that sort of thing. And you know, that draft document is coming up with pretty much recommended values. It -- it'll -- some of the sites are clearly different than others, so they've got some in there that are specific to given sites, and then they have basically recommendations for most of the other sites, like Savannah River or Hanford, that -- that weren't as problematic as Fernald or Portsmouth, Paducah, or something like that. And I just -- you know, I just feel like we probably ought to just take a hard look at that document. I'll obviously go through all the review steps and then -- and then -- and then use that for Savannah River and for Hanford and -- and virtually everywhere so that folks like

myself who've read a million things to -- to study at a given site and do the best we can, don't -- don't have to get our head quite into the recycled uranium as much as this other group did. So I recommend we just use those default values as soon as they're approved.

DR. GLOVER: And that -- hey, Don, that's done by Mel Chew?

MR. BIHL: Mel Chew and Bryce Rich are two of the people on the -- involved with it that I know of, yes.

MR. FITZGERALD: Don, this is Joe Fitzgerald, what's -- again, what's the time frame on that? I know they've been working on it.

MR. BIHL: I believe it has gone through internal review and the authors are working on resolving some internal review comments. It'll go to OCAS next. So it's -- it's clearly along. It's -- but you know, there's probably a month or two yet before it's done.

MR. ALVAREZ: In this -- this particular exercise, does it build upon the data that was already generated by the mass balance, or does it just simply take those data?

MR. BIHL: I'm not sure I'm the right person to

ask --

MR. ALVAREZ: (Unintelligible) the transactions data was -- was pretty extensive in the -- the mass balance review of 2000/2001 and I -- but they -- they still had important gaps in there and a lot of extrapolations had to be done, and I'm just curious were there any new data beyond that which was generated in the mass balance report that's going to be utilized in this exercise.

MR. GIBSON: Excuse me, this is Mike Gibson. Would those on the phone please identify yourself before you comment?

MR. ALVAREZ: Certainly. This is Bob Alvarez. I'm sorry.

MR. GIBSON: Thank you.

MR. BIHL: This is Don Bihl, and I honestly cannot answer that question. You -- you would have to talk to Mel Chew or -- or Bryce Rich.

MR. ALVAREZ: Okay. Thank you.

DR. GLOVER: What I -- what I would propose doing is if you would -- we will provide the comments that SC&A has given us on this, and if you have additional comments, make sure that we can provide that so that they're part of the

review so we don't -- so that these things don't come later. We -- obviously something that's been going on for a long time. Recycled uranium is not a new issue. And as Don says, it may be best to address this broadly. So if -- we can provide thes-- I will make sure that we give -- and Elyse Thomas is sitting here. She coordinates the SC&A responses for ORAU, so I'm sure she can make sure that we get all these comments to them, make sure that they incorporate these into their -- in their Technical Information Bulletin. And then obviously this will be subject to part of the SC&A and Board review.

MR. GRIFFON: Yeah, I -- this is Mark Griffon. I don't think any of us want -- want to duplicate efforts on that, so if it's being done under the TIB, that's fine. I would just say that I -- I hope that TIB doesn't lose sight of sort of site-specific issues. I think that's -- that's what keeps coming back in in this process of recycled uranium is the -- the ways the isotopes of interest could concentrate in various processes, not -- not just the site-wide average concentration for 50 years. You

know, I can't really look at this issue at 10,000 feet, I don't think. I think there has to be something site specific. So hopefully that's being addressed in that TIB. I think -- it sounds like you got sections on each -- or at least for some sites you got site-specific sections. I don't -- I don't know, I haven't seen -- do we know the TIB number on that, by the way, so we can...

DR. GLOVER: Anybody at ORAU have a -- a potential TIB number, what they're working on, so we can --

MR. GRIFFON: Just so we can track it, yeah.

(No responses)

DR. GLOVER: We will provide that information to the Board.

MR. GRIFFON: Yeah.

MR. FITZGERALD: This Joe Fitzgerald. This is -- that was another reason I wanted to know the timing because certainly if it's going to be available within the next couple of months, it would also provide an opportunity to do a site-specific for certain sites like Savannah River. So either way, you know, I think it will lend itself that way.

Unless there's any other comments on -- on the recycled, I think that sounds like a reasoned way to go about it, to see how the OTIB handles it and then to -- to determine if there's anything else that would be necessary.

MR. GRIFFON: I just mayb-- maybe just a silly question on that. There's been a lot of Savannah cases that have gone through. I mean Savannah's one of the sites we've seen a lot of -- I don't know how many were best estimates, but -- but how -- how has recycled uranium been handled so far or -- in the dose reconstructions, or has it been mainly maximized and minimized cases and you haven't run into that as an issue?

DR. GLOVER: Do we have our --

MR. GRIFFON: Any -- any dose reconstruction --

DR. GLOVER: I don't have the tools -- do we have our -- somebody who's doing our active SRS cases?

MR. BIHL: This is Don Bihl. This issue came up for discussion when I was trying to look into what we should put for recycled uranium at Savannah River, and I asked Scott Siebert, who's one of the managers of the dose

reconstructing group, Task V, and he said what they've found is that most of the people that were handling uranium and had uranium bioassay also had plutonium bioassay, and that the missed dose that you assign for a non-detection of plutonium in a urine sample is so high that it more than readily accounts for a little plutonium or neptunium or something that's in the uranium. And so when you put together the -- the doses from missed dose from a uranium intake and a missed dose from a plutonium intake, you've got what they felt was more than adequately accounted for plutonium dose that a person might have received through that pro-- you know, the missed dose process.

MR. ALVAREZ: Don, this is Bob Alvarez. These -- these plutonium bioassays that were obtained, were these for workers in the 300 area?

MR. BIHL: Once again, I'm --

MR. ALVAREZ: Is this the --

MR. BIHL: -- (unintelligible) past my little bit of knowledge in this area. I'm not a dose reconstructor so I don't have that level of detail.

MR. ALVAREZ: Because the site-specific report that was issued by Savannah River in 2000 said there were no measurements taken for trace con- - fission products or transuranics of workers in the 300 area throughout this whole period, and that if the -- if the current revision is being used as guidance, the definition that's contained in that current revision provides no guidance other than the uranium isotopes that would be in recycled uranium and none of the trace contaminants are discussed. So it would be interesting to see whether or not workers, especially in the 300 area, who were handing these materials were -- had -- those who might have filed claims, how those particular cases were being handled because that would be an important indicator.

DR. GLOVER: Tom LaBone, are you on the line?

MR. LABONE: I'm here.

DR. GLOVER: You would know if anybody from the 300 area was -- had plutonium bioassay?

MR. LABONE: I think -- I don't understand the nuances of the dose reconstruction yet, but the -- I think if they, at some time late in their career, get a single urine sample for plutonium

analyzed, that can be used for some sort of bounding calculation. But they did not necessarily have to be samples for plutonium while they were working in the -- in -- in (unintelligible) area or -- or any of the -- you know, or A line or something like that, but it's just some time they had rotated into an area that required plutonium, that would have been useful I believe in the dose reconstruction.

Don, does that sound right that they can -- again, they can use a plutonium later on to bound it?

MR. BIHL: That's correct, and so that would account for some other cases that maybe weren't on a routine plutonium bioassay, but -- I mean the question is still value -- you know, were there people that were exposed to uranium that never got a plutonium bioassay, and how do they account for that; and I don't know the answer. I'm sure they've discussed that in Task V, but we'd have to -- we'll just have to go find the answer to that question.

MR. ALVAREZ: I guess -- this is Bob Alvarez. I guess the other question I would pose is that

plutonium bioassay was taken elsewhere, where -- where perhaps recycled uranium was not being handled, repre-- would it be representative of the exposure a person might have received handling recycled uranium?

DR. GLOVER: For that individual, obviously it represents his exposure.

MR. ALVAREZ: Yeah, but does -- is it representative of the work that person did when he wasn't monitored for transuranics, handling recycled uranium or not?

DR. GLOVER: Plutonium is a long-term excreter, so -- anyway --

MR. ALVAREZ: Well, I understand, but I mean does this mean that this was the maximum he might have received elsewhere, even though he wasn't measured, is the way I'm trying to phrase the question.

DR. NETON: Yeah, Bob, this is Jim Neton. I think the answer to that is yes. I mean these are what they call bounding calculations where one would try to determine how much could have they inhaled and been excreting that amount of plutonium six months, eight months, one year after the exposure. And then as far as the

solubility type goes, of course we would always assume the solubility type that gave the organ the highest dose.

DR. GLOVER: And for -- one thing that might be of -- of interest, when you're talking about a gram of uranium, that is about 1.2 million dpm of uranium and you're talking about 1,000, 3,000 dpm plutonium, so one part in 400 as far as the ratio of activities, so there's a lot of uranium activity compared to the other actinides that may be present. That may not be true necessarily with the beta emitters, but they also have a lower dose coefficient.

MR. GRIFFON: I think they answered --

DR. GLOVER: Okay.

MR. GRIFFON: -- answered my question on that. Yeah, I think we -- that's the question is do you have people that worked with uranium that never got plutonium sampling.

DR. WADE: That's the question we need to answer.

MR. GRIFFON: Yeah.

DR. GLOVER: We need to make sure that's a part of our -- that the TIB deals with that, yes. I agree.

MR. GRIFFON: Well, but also -- yeah.
DR. GLOVER: Or that --
MR. GRIFFON: Retrospectively, that you didn't do any cases that would have been affected by that, which I, you know, probably doubt, but could happen.
MR. GIBSON: Okay, so that's one of the actions for issue one that we'll be wait-- waiting on the answer for. And the other is -- I guess SC&A is going to wait on a -- a document that's going to turn into a TIB that's going to talk about the -- give better detail on the concentrations of the uranium?
MR. FITZGERALD: Yeah, I think that's a reasonable proposal, to see what that does, then decide if it does enough for Savannah River. But I think this question of balancing generic versus site-specific which Mark raised is probably the issue on that -- on -- on the OTIB.
MR. GIBSON: Okay.
DR. MAURO: This is John Mauro. I can add one little -- I just spoke to Hans and Kathy on the -- my cell line just to check to see if the Savannah River workbooks have factored in

recycled uranium, for example, as part of the process -- 'cause we're reviewing the workbooks right now and --and dose reconstructions, and just -- Kathy just informed me that no, currently the workbooks for Savannah River for dose reconstruction do not include consideration of recycled uranium. I -- I believe that came up a little earlier.

DR. GLOVER: I will, as -- as somebody who has done Savannah River cases, at least a while ago, oftentimes the doses from recycled uranium -- based on the contaminant levels I've seen at Hanford -- are very low. So we'll have to bal- - you know, see how much impact that really makes, depends -- you know, obviously will be organ-specific.

MR. ALVAREZ: And the contaminant levels you found are -- are -- were collected at what period of time? This is Bob Alvarez. At Hanford.

DR. GLOVER: Well, the Hanford TBD has a -- a list -- Don Bihl I'm sure can speak authoritatively with where that came from. I believe that also came from this 2000 document.

MR. ALVAREZ: Because most of the sampling in

the 2000 document was done in the '80s, after the recycled uranium task force report came out, and there was a real gap in data prior to that. The question is, is that representative of the -- of the contaminant levels that were present before that time or not.

DR. GLOVER: Again, I think this will all come out with the TIB. This -- I was just providing generic comment.

MR. FITZGERALD: Okay.

MR. GRIFFON: Are there other radi-- other nuclides in that section, Joe?

MR. GRIFFON: Yeah, there -- we -- we adopted the NIOSH response the way that was structured and just responded to the way that was set up rather than, you know, trying to deal with it generically. And in B and C we -- I think NIOSH addressed our concern about maybe the lack of specificity about transuranics, for example, in the site profile. And I think what's noted in -- in section B and C of the NIOSH response on the first comment is that in fact they did address Pu-242 and went into some specifics on the -- on the source terms involved with that and U-233. Our only comment

really in B and C -- it's right there -- is that we can't -- because of our concerns on thorium -- and this is not a new issue. I think we've raised this almost at every site now because of these -- the -- you know, the higher activity and what have you with thorium, we -- we would need more information on how the default considerations for the assignment of thorium dose is -- is done, and that's just not available right now in the site profile. And I think that's the implication of what you're saying here.

DR. GLOVER: Don, that's something you're addressing the new Revision. Correct?

MR. BIHL: Yes, the Revision that's going through the review process right now has quite a bit of new information about the thorium, the uranium-233, uranium-232 and the plutonium-242. At some point as it goes through the review process, or maybe when it comes over to OCAS, Sam, to you guys, you know, you're free of course to pass it on at that point. I mean we're little hesitant to -- to -- when these things are just coming out and being looked at, to pass it, you know, to a wide group before

they've had a chance to -- to review it internally and see if there's any issues that we identify that need to be done -- you know, something that needs to be done better. But somewhere along the line that information certainly can be passed over.

MR. FITZGERALD: I think that -- that was kind of our take, that we -- we think this is moving in the right direction I think if in fact these details are provided and I think the only admonition is that we would like to see enough information to draw a judgment on -- on thorium in particular, but certainly on the others as well, that there'd be enough basis for the -- the -- the assumptions made.

MR. BIHL: Sam, I'll leave it up -- this is Don Bihl. I'll leave it up to you to decide when it -- when you're comfortable with sending that new information over.

DR. GLOVER: I think, you know, you're correct. You guys have got to review it and make sure it passes your own internal review, and at that point you feel you're -- it would be nice if you can give us an update of what you -- time line they think it's on and we'll look at this

as an action item and certainly as we review it or as we prepare to get this Revision approved, all this has to kind of go through -- you know, we have to meet all these criteria, so that'll be part of what we can provide is -- is the table that -- specifically and let them see what we have. So do you have any idea, Don, where that stands? Are we a month or -- it's kind of the same thing as the recycled uranium response?

MR. BIHL: It stands in the -- I have received back some comments from internal reviewers and I need to look through that, and then -- you know, it has to go back to Ed Scalsky for a final look, and then at that point, you know, I think it'll go to OCAS. So I -- you know, I think we're only a few weeks away from getting it to OCAS. Now I don't know -- Ed, do you have anything more to add to that?

MR. SCALSKY: No, I think you're right. It's probably a few weeks away yet, Don.

DR. GLOVER: That sound fairly reasonable?

MR. FITZGERALD: Yeah, I -- no, I think that would be appropriate from our standpoint.

DR. GLOVER: That was Ed Scalsky?

MR. SCALSKY: Yes, I'm sorry.

MR. GIBSON: Okay, does that satisfy everyone on the issue one right now for the present time?

(No responses)

Okay, hearing no objections, we'll move on to matrix comment number two.

MR. FITZGERALD: Well, actually no, there's a couple of loose ends here on number one. We're using again the NIOSH response structure, just the --

DR. WADE: D and E.

MR. FITZGERALD: -- D and E.

MR. GIBSON: Oh, okay.

MR. FITZGERALD: We had a -- a kind of a broad finding in the site profile review originally. I think NIOSH came back and kind of gave some specifics, which we want to address. And on -- on D, the question we had on D, now the issues we indicated -- certainly there were not specific internal dose contributions addressed for transuranics and other fission products, and I think certainly D makes it clear that there was bioassay for americium, curium and californium, for example, in the mid-'60s. Our

question there, as we indicate in the piece we provided, was how in fact is one addressing the lack of bioassay, though, before that time frame when in fact people were being exposed, workers were being exposed to these constituents. It's not clear how that's being addressed from that standpoint.

DR. GLOVER: The standard internal dosimetry is -- included a plutonium-241, americium-241 contaminant that is part of the irradiation process. And so unless there's a specific program as the -- unless they're concentrating americium-241 as its own -- into its own right before the bioassay, it's really -- it's addressed as part of the plutonium dosimetry. You have so much americium as part of the plutonium. It's part of the matrix that you breathe in, that you're exposed to. So -- is that what you're asking or -- or are you talking about something spe-- different?

MR. FITZGERALD: Well, I guess the -- the question is whether americium was in fact handled exclusively as a constituent of plutonium, whether you had these sources -- sources at the site that were in fact separate,

varying assays. I mean -- I would say very similar to some of the issues we've addressed at Rocky and Y-12. They're sort of the same questions. And again, I keep -- I hate to keep going back to the -- the analogy, but you know, we have I think covered a lot of ground on very similar issues at other sites and all we're saying is using, you know, all that lesson learned -- lessons learned, can you characterize how, for example, americium, but as well as these other constituents were handled. Was it simply as a -- a uniform fraction of plutonium that was handled routinely or was there in fact a lot of instances where that wasn't as standard as that.

DR. GLOVER: At Rocky Flats it would have been different. One, you guys have got to recognize that they had old plutonium coming back, and so you had the time for americium to really in-grow. In the very beginning years you had freshly irradiated plutonium. You wouldn't have a lot of americium in that -- in that early time. As it gro-- as it grows in, plutonium-241 is created as part of the

irradiation process if you're not -- it goes 239, 240, 241, the end gamma reactions. Plutonium -- americium-241 becomes -- is part of the beta decay and so it will be a end growth before -- with about a 14-year half life that amer-- plutonium-241 has so it'll start to grow in with time. But it's -- a very, very small fraction would be present immediately. But it really -- Rocky Flats saw it because they had old plutonium to recycle. Savannah River -- it would have to be specific to what Don Bihl and Tom LaBone know before the bioassay programs there really started, but -- are you guys aware of a program which would have a separate americium content?

MR. FITZGERALD: Or one that would vary from what you were saying is the standard, you know, fraction for --

DR. GLOVER: End growth for -- yeah, right.

MR. FITZGERALD: Yeah, right.

DR. GLOVER: This other we could sort of --

MR. BIHL: This is Don Bihl. I -- I have not uncovered that in my -- my research, but I certainly don't know absolutely everything that went on at the site prior to the '60s. It's

just I -- you know, I tried my best to go through the documentation and I haven't found any program that was concentrating on americium prior to the '60s. Tom, do you have anything to add to that?

MR. LABONE: Well, you all seem to know more about it than I do. The -- no, other than the campaigns that started there in the '60s as far as where -- making the transplutonium compound, you know, I don't know of anything beyond say a chemist working at a bench where they may have been trying to concentrate something.

DR. GLOVER: There's some very specific documentation regarding the transplutonium programs. Darlene Hoffman and all the -- were very involved. Seaboard* was leaving those programs to develop higher actinides, so there's a lot a very detailed information regarding that. Savannah River was part of that where they were trying to make higher elements as part of the irradiation programs, so...

MR. FITZGERALD: So it would be a fair statement to say that you could back-extrapolate the experience from the mid-'60s on

back backwards in terms of operations involving the transuranics -- transplu-- you know, back in that time frame, the -- where they handled -- the early '60s, late '50s? You know, I -- I think the -- the comment is that, you know, essentially you have the -- this data starting in mid-'60s, and our question is well, what about the period in advance of those bioassay techniques and how would you actually handle missing dose. And I think your comment is that well, it's pretty standardized, we're pretty confident that we have those ratios and we could back-extrapolate those doses if we have to.

MR. GRIFFON: Or -- or -- or -- or --

DR. GLOVER: Right.

MR. GRIFFON: -- or I think you might need to verify -- the americium might be a similar answer to the Rocky Flats answer, which was that until after 1957 or '58 there wasn't much americium there --

MR. FITZGERALD: Right.

MR. GRIFFON: -- to do any, you know, specific americium sampling. It was all associated with the plutonium exposures.

DR. GLOVER: They were making plutonium and therefore that's --
MR. GRIFFON: Right, right, so I think you might find the same thing --
DR. GLOVER: We can make sure that, Don Bihl, in the next Revision we put some verbiage in there?
MR. ALVAREZ: This is Bob Alvarez. There -- there was, until it was moved to the tank farms, a large amount of americium/curium I believe in the S -- F Canyon, and I'd be curious what the origin of that material was and when it was produced.
MR. GRIFFON: I think we just need to track back to see if there was --
DR. GLOVER: What time frame.
MR. GRIFFON: -- specific source terms prior to '60s when they -- they --
MR. FITZGERALD: And whether the assump--
MR. GRIFFON: -- there might have been a need for an individual bioassay program, you know --
DR. GLOVER: Make sure we link the bioassay program and -- and potentially unique source terms.
MR. GRIFFON: Right.

UNIDENTIFIED: Yeah.

UNIDENTIFIED: Yeah.

MR. FITZGERALD: And also that the assumptions can be -- the assumed fractions and concentrations can be back-extrapolated, that the assumptions are sound on that. I think if that's clarified and substantiated, I think we're fine.

MR. GIBSON: Okay.

MR. FITZGERALD: But I think that was a gap in -- as far as what the justification or assessment was provided.

MR. GIBSON: Okay, any more comments on D?

(No responses)

If not, we can move on to E. SC&A has --

MR. FITZGERALD: I don't -- I don't think there's any issue with E. I think what we're saying with E and F is that -- yeah, I think the information provides value and should be reflected. I -- I don't think there's disagreement there.

MR. GIBSON: Okay, any -- any comment from NIOSH or...

DR. GLOVER: That's the best kind of answer.

MR. GIBSON: Okay. You ready to move on to --

MR. FITZGERALD: (Unintelligible) spend too much time on that.

MR. GIBSON: Move on to comment number two. SC&A has some questions and concerns about the adjustment factors and uncertainties related to the exposures measured by the dosimeters.

MR. FITZGERALD: Yeah, I -- Ron Buchanan, are you still on?

MR. BUCHANAN: Yes, I'm still here.

MR. FITZGERALD: Can you sort of outline both I guess the NIOSH response as well as our evaluation?

MR. BUCHANAN: Yes, in the site profile they initially talked about angular response and energy to response and some of the uncertainties in the external dosimeters and -- but then in the final version when they talk about making correction factors they only talk about the calibration factor and the difference between the uranium or radium-226 calibration used, as opposed to the ten centimeter dose, and they say apply prior to January of '86 the factor of 1.119 and then '87 a factor of 1.039 and then no correction after that. And SC&A's concern was that while some of these other

factors were mentioned in the site profile, there was no quantitative numbers given to them other than for the calibration difference. And so I realize this is an older site profile and this has come up at many other site profiles since then on the uncertainties of the geometry, mainly of the AP/PA rotational type geometry as opposed to the calibration geometry. And so what SC&A's concern was was that in the site profile they were not addressed in a quantitative manner. And then NIOSH's response again was not quantitative and so what we would like to know is have they looked into determining whether there was -- such as fading of dosimetry information, was there geometry factors that should have been considered in these dose reconstructions that it wasn't on a quantitative basis.

DR. GLOVER: I think Jack Fix -- Ed, you want to comment on this, or Jack Fix, perhaps?

MR. FIX: Well, this is Jack Fix. Basically the approach that we use on all of these site profiles is the one that was originally published by the National Review Council in the late 1980s in which they identified bias

corrections and uncertainty factors, and we did this in the context that with the DOE Laboratory Accreditation Program testing that's existed since the late -- the mid-1980s, we're able to come up with estimates of bias and uncertainty factors for recent (unintelligible) look at the trend in doses back through time to see if there's any discontinuities that are -- could be associated with changes in operations or changes in dosimetry systems with a goal to -- to come up initially with a bias factor and then recently relative to the HP-10 and the ten millimeter depth dose that's used in -- one centimeter depth dose that's used in -- as a -- for penetrating dose. And the reason that the 1.19 and 1.039 are applied are those are based on Savannah River's own assessment of the -- of the difference historically in their recorded dose relative to HP-10 in terms of a bias. And then we go on to look and see what would be reasonable (unintelligible) the uncertainty and the uncertainties (unintelligible) environmental radiological and laboratory sources. And many of these are -- some -- some of these sour-- certainly some of these sources

are under the control of that dosimetry program, and also the -- even with the earliest dosimeter, typically there was a -- there was a -- they used the intelligence of the dosimeter, the response of the dosimeter to assign doses and so they always used ratios (unintelligible) penetrating dose to do energy corrections and so we are trying to use what data is available to us to assign what would be the bias, the bias factor that's assigned to say the measured dose or the missed dose or the ambient dose or and medical radiation dose estimates (unintelligible) uncertainty factors.

DR. GLOVER: And we'd also choose a claimant-favorable geometry. Correct?

MR. FIX: Well, we're using the anterior/posterior geometry in almost all cases 'cause it gives the -- for most cas-- for most situations it gives the highest (unintelligible) dose.

DR. GLOVER: And those are out of the NIOSH IG guide, if I remember correctly, and those have an uncertainty and a best estimate associated with those -- for all the organs.

MR. FIX: Yes, (unintelligible).

MR. BUCHANAN: Now are you saying that the bias factor includes the AP factors -- you say that they were monitored A/P but the exposure was P/A, or are you saying that the bias factors are meant to include any uncertainty in that or is that a separate issue of the geometry factor?

MR. FIX: Well, no, I think if you have a certain claim in which a person was being predominantly exposed from the back side, that gets into a special circums-- special situation. Obviously I don't (unintelligible) person being exposed from the back side that the dosimeter will underestimate. But I don't -- we typically don't see situations like that. People are normally exposed -- not even A/P. They're typically rotationally -- they'll be (unintelligible) moving, the sources are -- surround people, usually -- usually not (unintelligible) circumstances. A/P is probably the -- the -- the situation that represents the typical highest dose scenario for workers and they -- that's when they're working close to a source, they're usually working right -- they're directly facing it.

It seems to be the geometry of choice (unintelligible) can only choose one.

MS. ROBERTSON-DEMERS: This is Kathy. Can you tell me what source you got those two numbers out of, correction factors?

MR. FIX: The -- you mean the 1.19 and 1.039?

MS. ROBERTSON-DEMERS: Yes.

MR. FIX: That's in the Savannah River internal dosimetry Technical Basis -- no, it's in their historical document. They have a -- I don't have these documents in front of me. It's (unintelligible) historical document -- external do-- external dosimetry historical document, there's a little table in there.

MS. ROBERTSON-DEMERS: Thanks.

MR. FITZGERALD: I think maybe a lot of this issue's just simply we weren't picking up some of these specific references to some of these fac-- adjustment factors, corrections factors, and it was difficult to go ahead and evaluate the basis without clearly -- you know, not to say they don't exist, but we couldn't find the references very easily.

MR. FIX: Well, I think this looks very clear, it should be very clear, I believe. But we'll

go look at it again. If it's not clear, we can -- we can make sure it is clear.

MR. FITZGERALD: Ron, you kind of got into the bowels of this one. Did you -- do you have a problem I guess picking up the references or was it just a matter of understanding the derivation?

MR. BUCHANAN: Well, as far as the 1.19 correction factor, I don't -- don't have a problem with that. I didn't look at the original data on that but, you know, that seems reasonable. My -- I guess my question was, when I wrote the summary paragraph that I sent to Joe, was that -- that the -- the original site profile did address some of the other issues, but I wasn't sure from reading the site profile how these were factored in quantitatively, such as the geometry factors are -- are addressed in -- let's see, Table 5.3.2.1.1. They talk about A/P and rotational and such, and they give some -- some numbers there in that table. However, you know, back in the back when they get down to the step-by-step instructions, the only ones they included was the calibration factor and -- which was

okay, but I didn't see anything numerically for the geometry factors. And so that -- that was my concern, where were these geometry factors going to be taken in consideration during dose reconstruction if only the calibration factors for the different types of isotopes that were used was included in final instructions. So where does the information that's provided in -- in -- in the site profile, such as in that table for -- for geometry, where is that included in the final dose reconstruction process? Is it explicit or implicit in some overall bias factor?

DR. GLOVER: It seems -- in the updated revision to the document, to me this sounds like it's part of an over-arching how we do dose reconstruction. It's not specific to Savannah River. These are how we apply geometry correction factors, and I know we've had updated guidance since probably the Rev 2 or Rev 3 that was finally done 'cause I know we went -- we had rotational in there for a while. Now we use A/P.

Jack, I think you can probably speak to that the best. Do you know what the new document --

or maybe it's Don -- what's going to be updated?

DR. NETON: I -- I can speak to that. I just signed a new version yesterday.

DR. GLOVER: Okay.

DR. NETON: So the new imple-- the revision to the external dosimetry Implementation Guide has been revised to -- you know, to use the A/P geometry preferentially over the other geometries, and there's a few other things that were incorporated into that. But this was revised in response to a number of SC&A comments I think that occurred in several different reviews, so maybe that's where we need to look for some clarity on this issue.

DR. GLOVER: So maybe the updated IG guide -- and that is going to be -- supersede any Savannah River TBD and at -- probably at the time when we wrote Savannah River some of that guidance may not have been as -- as clear as what it is now.

MR. FIX: I just wanted to say that I know this is a common -- a common concern not only from SC&A but I think also from the NIOSH team as to how to -- to do these calculations. Before too

long we should have a document published -- I think it's in *Radiation Research* -- by the International Agency for Research on Cancer in their 15-country study in which they took dosimeters -- ten widely-used dosimeters in the world and actually one of them was the Pan-- the Savannah River Site 802 Panasonic dosimeter, and where they exposed these in rotational isotropic A/P exposure geometries to several selected beams of radiation there at the IAEA Medical Radiation Physics Laboratory near Vienna, and that'll be coming out here before long and one will be able to observe what the performance of these dosimetry systems are in -- to -- in these different geometries in a laboratory setting. So it'll -- I think everyone will find that interesting because it is germane to this topic (unintelligible).

MR. FITZGERALD: Let me -- let me propose on thi-- on this one, since this is a clarity question in terms of where would one go, and it might be to this generic document, it might actually be to some other specific documents, but I think this is a -- the second paragraph to our response where we actually itemize some

of these factors and some of the bias, you know, considerations that would be addressed. If -- if we can just -- if you can just simply track those to the document that quantitatively provides the basis, I think that would put this to rest and we can move on. I mean I don't think we're saying they don't exist. We just can't clearly find the derivation in the -- in the tables in the source documents. They may exist elsewhere.

MR. FIX: I think you people have access to our workbooks, as well, don't you?

MR. FITZGERALD: Yeah.

MR. FIX: And you know, these -- these -- way these factors -- calculations themselves and the way these factors are combined, you know, are shown there.

MR. FITZGERALD: So maybe we should look at those first before we go through this process.

MR. FIX: Yeah, I think --

MR. FITZGERALD: All right.

MR. FIX: We certainly will be glad to work -- work to assist the process, but I mean that's what our staff would use if there was a question for a specific claim, or even a

specific process. I mean everything -- all the intelligence that's used is contained within those workbooks.

DR. GLOVER: So would a fair action item be that you guys will compare your response against what's really being used in the workbook, and then we'll -- and then we'll work on the issue?

MR. FITZGERALD: We'll go ahead and work the issue. I don't want to spend too much time, but I think the -- the -- the broader question is, based on the site profile, what was in there in the references, it wasn't easy or clear finding the -- the source documents for the factors, and I think that's something we can -- we can work at. I'm not saying that's a show-stopper, it just was a -- a problem in terms of independent evaluation.

DR. GLOVER: Sure. So I think if you -- and if you have anything, let me know and we'll track it down for you. Is that --

MR. FITZGERALD: We'll -- we'll work the workbooks --

DR. GLOVER: We'll work the workbooks.

MR. FITZGERALD: -- and anything that falls out

of that, we'll come back to you and just see if we can together find out where that is.

MR. GIBSON: Okay. Are we ready to move on?

MR. FITZGERALD: Yeah, on B we have in fact reviewed OTIB-17 since this was written and I think we do not have any -- any issues -- outstanding issues on OTIB-17, so we think that's a satisfactory response to the question of how shallow dose is addressed.

Unless -- Ron, do you have anything more to add on OTIB-17?

MR. BUCHANAN: No, I think that it fairly well addressed the question. I think there's some re-- a couple of comments ahead on OTIB-17 itself, but I don't think it's a problem with this particular issue on Savannah River.

MR. GRIFFON: Can someone tell me -- just going back to what Joe just mentioned -- this is Mark Griffon -- would -- as far as tracking back to the workbooks, and I've brought this up in prior meetings, but there is a document out here on the O drive called SRS external instructions, and I think these are the instructions for the people doing the dose reconstructions. And I don't know if -- you

know, that -- that -- for me, these have been helpful that they exist at several larger sites anyway, and they're helpful in terms of crosswalking with the workbooks. I think the workbooks, as we've all found, are -- you know, can get pretty complicated to walk -- to walk through from one sheet to another and un-- and understand what's going on, but these instructions are very helpful. The question I have is, I have something from the O drive dated 3/29/04 was the -- and there might be updates since then and I don't know if there's any good way to find these -- these dose reconstruction instructions. They almost seem to supplement the site profile for the people doing the DRs. Right? Is that what they're used for?

DR. GLOVER: Just try to pin it down to something that's --

MR. GRIFFON: Cheat sheets (unintelligible) --

DR. GLOVER: Not only that, and make sure that you have a -- yes.

MR. GRIFFON: Boilerplate (unintelligible) template (unintelligible).

DR. GLOVER: I guess when I meant to look at

the workbook, I actually meant the written -- I guess that, supplemented with what the tool -- the tools that exist to help support the dose reconstruction process. But the workbooks, at least in the term-- the way I use them is the written instruction. That could be a mis-- mistake on my part, but that's the way I've always kind of...

MR. GRIFFON: I don't know that we have ready access sometimes to the written instructions.

DR. MAURO: Mark, this is John Mauro --

MR. GRIFFON: Yeah.

DR. MAURO: -- I've been working pretty closely with Hans and Kathy, who are right now finishing up the review of the site-specific workbooks, and of course Savannah River is one of them. And I know that there is almost two or three times a week discussions held with the appropriate folks over at NIOSH just for the subject you're talking about; that is, to make sure we have all of the information we need, not only the workbook but all of the supporting guidance. So -- so you're correct that there is a lot of texture to the workbook reviews, but -- and I think that a lot of the issues

related to the workbook we're going to have a good grasp on by the end of September. Our plan is to deliver our review of the site-specific workbooks to NIOSH and the Board by the end of September and -- and on the -- two -- I know Savannah River is one of the big ones, Hanford is, Rocky Flats is. So maybe we'll be in a lot better position to discuss the degree to which all of these adjustment factors for external dosimetry have in fact been incorporated into the workbooks.

MR. FITZGERALD: Which I -- yeah, I think that's where this is headed...

DR. GLOVER: Jim, is there a place out there where these things exist for the Board -- or the reviews, the most updated versions?

DR. NETON: (Off microphone) The (unintelligible) themselves? (On microphone) There -- there is no generic location for those -- those documents, although SC&A has access to them via an arrangement with ORAU. I'm not exactly sure how that works. I think it'd be pretty -- pretty complicated for someone just to pick up a workbook and review it. They're -- they're essentially very sophisticated Excel

spreadsheets is what they really are.

MR. GRIFFON: They're -- they're dif-- yeah, they're difficult, but we were doing this prior to finding some of these instructions. We were -- kind of been trying to crosswalk them and --

MR. FITZGERALD: Right, you sort of meet both ways. You work the site profile down till you get to the point you almost have to have that information.

MR. GRIFFON: But these -- these instructions, as you're saying, are -- are -- really make it a lot easier to crosswalk the spreadsheets.

DR. NETON: I think what we're getting in here is an important intersection of what the site profile information is provided and then what the detailed, specific instructions for dose reconstructions are, and --

MR. FITZGERALD: Right.

DR. NETON: -- you know, where does one stop and the other one pick up, and that's really what we've been talking about.

MR. FITZGERALD: Yeah. Yeah.

DR. NETON: And -- and as you can see, we're automatically jumping out of the site profile into workbooks and -- and Implementation Guides

and such.

COMMENT TWO:

MR. FITZGERALD: Fortunately we have a right hand that's doing that as the left hand does this, so -- otherwise it would be a daunting task to jump in to even look at this information, but I think we can do that. I think that's comment two.

MR. GRIFFON: So I think -- to answer your question, Sam, I -- I think we've -- we've got access. It's not in one central location, but SC&A has access to that and (unintelligible).

MR. FITZGERALD: Yeah. Yeah, we're looking at the Savannah River Site specifics right now.

MR. GRIFFON: I think we're okay on that.

COMMENT THREE: NEUTRON TO PHOTON RATIOS

MR. GIBSON: Okay. So we're ready to move on to comment number three. Okay, SC&A has concerns about how technically sound and claimant favorable the neutron-to-photon ratios are at Savannah River Site --

MR. FITZGERALD: Well, yeah --

MR. GIBSON: -- in some cases?

MR. FITZGERALD: Yeah, this is Joe Fitzgerald. Generally I thought the response was very

responsive. The only issue we have is a matter of scoping that we raised both pre-'71 as well as post-'71, and the response really addressed the -- the pre-- I'm sorry, pre-'72, and we feel there's a -- it's sort of a continuum of uncertainties that we think should be addressed and I guess we just want to hear the basis for not considering 95th percentile for some of the later missed neutron dose.

DR. GLOVER: I think Jack Fix has been doing a -- quite a bit of work on it in this area. I would -- I look at the response concerning using the 95 percentile for all versus using the best estimate and an uncertain-- a distribution as part of your being claimant-neutral. I think that's the best estimate case. I mean if you have -- typically our -- our estimate is the 95th percentile is an overestimate, but if you have the best estimate of any measurement, then the median -- would think the most appropriate is to use the -- the best estimate and its uncertainty and propagate that through. But anyway, Jack Fix I know has been working on -- on this issue regarding -- what was that, you did some additional follow-

up with Ken Crase and some population work as well, Jack?

MR. FIX: Well, yes, we took this issue back to Savannah River this past couple of weeks trying to double-check, you know, that -- on the -- on the guidance that's there, and basically the -- I'm not sure why there's concern after 1971 because that's when the Hoy -- I think it was called the belly-button -- thermoluminescent dosimeter, it was a hemisphere, it was probably the best-performing dosimeter that -- neutron dosimeter that's ever been used in the United States. But -- and it was also supplemented with measurements, but more recent -- in more recent times they have the Panasonic 809 system with this ROSPEC which they actually go in and take routine neutron spectrometer measurements, dose and spectra measurements in the workplace. And you know, since the introduction of the Hoy dosimeter and now subsequently the 809, it seems as though that the Savannah River Site estimates of neutron dose are -- are pretty -- are -- are very defensible. And so again we use that logic of taking the measurements that are recorded

today, along with the DOELAP performance testing and then extrapolating back to a time. And before the Hoy, they used the NTA, and I think everybody realizes that we do not use the results of the NTA -- the neutron dose results from the NTA film but use the photon-to-gamma -- neutron-to-gamma ratio.

DR. MAURO: This is John Mauro. I have a question that -- in terms of participating in a lot of these site profile reviews, I -- I'm not quite sure if there's a consistent philosophy. My understanding of the philosophy in terms of these kinds of issues where in effect we're talking coworker models where you have for some time period a group of workers where you may not have neutron dosimetry or -- or adequate measurements, and somehow you're going to use another group of workers from a different time period to apply that experience to the earlier time period. Now my understanding, at least in some of the site profiles that we looked at, the general philosophy and one that I agree with is if you have a worker that is -- whereby you're using the -- you have to excuse that, that's my fax machine coming through. I hope

it doesn't interfere with this -- it should be over -- that ring should be over in a second. Let's hold for a second here.

(Pause)

If we have a worker, and you're going to be using let's say a neutron-to-photon ratio from another time period in order to predict his dose, my understanding is if you think the worker probably was not a member of the exposed group of people based on his job category, that's when you use the full distribution. So in other words, you give him the benefit of the doubt and assume he was exposed, even though there's reason to believe that he -- his job category was such that he may not have been exposed and probably was not exposed, but you give the benefit of the doubt and assume the full distribution for whatever the coworker model is.

However, if it was a worker that you believe had a job -- was a job category that should have been monitored but wasn't during that earlier time period, you assign the upper 95th percent fixed value from your coworker population. That approach is -- I've seen that

in -- in some circumstances. In other cases I -- I haven't seen that. I've seen the application of the full distribution under all circumstances. Could you -- right now on Savannah River -- for example, we're talking the neutron-to-photon ratio, could you just give me some information on whether you're going with that -- that -- that philosophy or strategy that I just mentioned or something different?

MR. FIX: Well, fortunately in the case of Savannah River we actually have neutron dose measurements and -- you know, that we -- that are reliable in recent time and basically has to do with the facility the person works in and -- going back through time. Assigning the neutron-to-photon ratio is -- is not -- is not -- is not a -- what we would really like to do, but we think it's favorable to the claimant because it gives them a -- if -- if in fact they're in that position -- when you say the full distribution, I assume what you're talking about is --

DR. MAURO: Yes. In other words --

MR. FIX: -- we do a (unintelligible) of

neutron-to-photon ratio based on data that we feel is reliable, meaning that it's been taken in recent times, that we've -- we're only using the higher doses so that we get reasonably good -- reasonable estimates of the actual neutron-to-photon ratio, and then on that distribution we take the geometric mean, the geometric standard deviation and the 95 percentile --

DR. MAURO: Okay.

MR. FIX: -- and then we can go back in time and, if necessary, say a person worked in H Canyon for many years, both before and after when the new dosimetry system came into -- the Hoy dosimeter came into being at Savannah River on January 1st, 1971, we would then look at that and apply the neutron-to-photon ratio. This particular case the person (unintelligible) actually in the area at the 95 percentile prior to that.

DR. MAURO: Okay, so --

DR. GLOVER: John --

DR. MAURO: -- what you're saying is is you would apply the 95th percentile value as opposed to the full distribution.

MR. FIX: I don't know what you mean by the

full distribution.

DR. MAURO: Well, I mean -- let's say you have a -- you have a distri-- whether we talk-- let's say we have a full distri-- we have a distribution of neutron-to-photon ratios --

MR. FIX: Yeah.

DR. MAURO: -- that you observed.

MR. FIX: And we only take certain representative values --

DR. MAURO: Right, and --

DR. GLOVER: Could I -- could I interject --

DR. MAURO: -- (unintelligible) those from 1 -- 1.2 to 1.5 or -- or whatever the distribution is --

MR. FIX: You could pick a (unintelligible) --

DR. GLOVER: Jack --

MR. GIBSON: Excuse me, John --

DR. MAURO: Yeah?

MR. GIBSON: John, this is Mike. If the gentleman you're talking with -- we're going to have to try to speak up a lit-- speak up a little bit better for the court reporter.

DR. MAURO: Oh, you can't hear me? I can take my --

MR. GIBSON: Not -- not you, John.

MR. GRIFFON: We can hear you, John.
DR. MAURO: Oh, okay.
UNIDENTIFIED: Jack.
MR. FIX: Okay, I'm sorry. I'll speak louder.
UNIDENTIFIED: Thank you.
DR. GLOVER: Just one other -- I think, John, in the context of the broad program, Jim Neton is sitting here and he probably speaks best to --
DR. NETON: Yeah, I was going to interject here. I think John -- John, we've been through a few of these, as you know, and --
DR. MAURO: Jim, could you speak up a little bit? I'm just having a little trouble hearing you.
DR. NETON: Yeah. As you know, we've been through a few site profiles and a few of these distribution discussions --
DR. MAURO: Yes.
DR. NETON: -- and -- and I am in agreement with what you stated, that we would apply the 95th percentile of a distribution to a worker who should have been monitored and use the full distribution -- that is, the best estimate and some geometric standard deviation would be

applied to a person who probably didn't need to be monitored but had some potential for exposure. I mean I think we're in agreement with that, and we just need to make sure that we're consistent across some of these documents.

Where I do have an issue, though, is where we come up with the 95th percentile for the photon dose and then apply the 95th percentile on top of that for the neutron dose. I think we're unreasonably biasing that dose extremely on the high side, and -- and we need to think about that a little more and how we're going to handle those situations.

DR. MAURO: I have to apologi-- Jim, you actually broke off in the end of your description.

DR. NETON: Okay.

DR. MAURO: It sounds like you -- there -- there are circumstances where you felt that 95th percentile strategy is inappropriate, and I'm sorry, I -- I couldn't hear.

DR. NETON: Well, what I was speaking of was -- was a situation where you have a completely unmonitored worker where one would assign the

95th percentile dose because we -- because we thought he should have been monitored for the photons.

DR. MAURO: Yes.

DR. NETON: Then if one compounds that and puts the 95th percentile of the neutrons on top of that, you end up in a situation where I think you end up with some unreasonable estimate of the upper limit of the dose.

DR. MAURO: I fully agree with that.

DR. NETON: Okay.

DR. MAURO: In other words, when you have two steps in the process, if you use 95th percentile in both steps, you're operating off in never-never land, so yes, I agree with that.

DR. NETON: Right, and we need to come to grips with that issue and talk about it internally a little better, but I agree in principle with what you said earlier completely.

MR. FIX: Yeah. No, I understand now what you meant by the full distribution. If we're doing a best -- this is Jack Fix again. If we're doing a best estimate, we do use the distribution in the context of -- of a -- if there's any bias correction in an estimate of

the standard deviation, we do do that. And I -- I understand now what you're saying. As far as applying the 95 percentile or the 50th percentile based on the neutron-to-gamma ratio, if it's -- typically it's the 95 percentile that it's based on in what facility was the person working.

MR. GRIFFON: Yeah, I -- I've been through a few -- this is Mark Griffon. I've been through a few of these workgroups, too, and I agree with John and Jim on -- on that overall philosophy. I guess I was troubled a little in the NIOSH response under this. It's about two-thirds of the way down the paragraph. It reads (reading) for likely compensable claims, the geometric mean value of the neutron-to-photon dose ratio is applied, and if necessary the Monte Carlo analysis performed taking into consideration the 95th percentile value as part of a lognormal distribution.

I'm not clear why this would be dependent on the nature of the compensability of the claim as opposed to the nature of the work that the individual is doing. I don't think you -- we should be --

DR. NETON: I agree, I think that statement needs to be reviewed and -- and reconsidered. We -- we would use the 95th percentile for a worker who was likely to have been -- or should have been monitored, that standard (unintelligible) --

MR. GRIFFON: No, I agree with your statements, Jim. I think that -- this troubled me a little --

DR. GLOVER: This is discussing a monitored worker. This is a person with a photon badge.

DR. NETON: Even if you have a photon badge, though, and -- and let's say that you -- for some reason we have determined that you -- you were in a neutron area where you should have been monitored for exposure to neutrons, we have no knowledge then at that point as to what the upper limit of the neutron exposure could have been for that person and we -- to be consistent with what we've done elsewhere, we would apply the 95th percentile of the -- of the distribution of potential neutron doses. Now you take -- you take --

DR. GLOVER: That's straight from the Science Director, so that's all that matters.

DR. NETON: Yeah, and -- and this may be something we need to talk about a little more internally and I apologize, I have not had a chance to look at these in detail before this meeting, but -- but there's -- there's -- you know, this is something that has been our position and -- and that's the direction we would go.

MR. GRIFFON: I'm just reading this now as well, Jim, so that's -- that's fine. The other -- the other question I had -- I thought came as -- as Jack was talking. Jack, you mentioned we'd use neutron-to-photon ratios -- at least the ones that we feel are reliable, and I guess my question is how -- where -- where are -- where do these exist? Are these referenced in the site profile and how -- this may, again, get back to dose reconstruction versus site profile, but you know, my -- my question is, you know, how was this determined? Which -- which NP ratios were used, from what time frame, were they representative of earlier production periods, et cetera?

MR. FIX: Right. Well, the data that's selected is difficult and that's why we work

with the site trying to find the actual data that we would want to use in the analysis, and -- and that's why we actually try to look at -- across more than one site 'cause not all sites have very many measurements. But since they've gone to ROSPEC in recent years, along with the 809 dosimeter, they've actually updated some of their own estimates of what the neutron-to-photon ratio is. And so we've been working very closely with the site, and that probably is an area that we could maybe improve on is exactly what data forms the basis of the neutron-to-photon ratio that we're applying -- recommending in the site profile.

MR. GRIFFON: And I'm not saying all the details need to be in the site profile, but it might be useful to reference, you know, what time periods and what methodology was used for the NP ratios. And I think in -- to some extent -- I -- I guess part of my concern would be if you're using more recent, more reliable data, is it representative of earlier production operations and -- and -- and you know, work practices. I mean, you know, conditions, shielding, things like that may

have changed quite dramatically over the years, which would have an effect on these NP ratios --

MR. FIX: Yes.

MR. GRIFFON: -- over time, so you know, just -- and -- and I -- to be honest with you, it's been so long since I looked at the site profile I don't know how much this was discussed in the original document, but I think it should be at least alluded to how these were derived.

MR. FITZGERALD: And Jack, this is Joe. As I recall, too, you based a lot of the NP ratios on Hanford reactors, some of that information came from the Hanford reactor --

MR. FIX: Not on Hanford reactors.

MR. FITZGERALD: Yeah.

MR. FIX: The Pacific Northwest National Laboratory people I think in neutron spectra at many of the DOE si-- not many, but several DOE sites, including the Savannah River Site, and many occasions at the -- at the Hanford site, and you recommend -- and we -- and the -- the analysis we looked at was -- so we did use the Hanford -- some of the Hanford measurements in the context of examining how they compared with

Savannah River Site. And -- and there was -- one unfortunate thing about the field measurements, the way we're using them now as far as being applicable to the general workforce, is there's always a tendency when you go to a site to take some measurements, they want you to take measurements where they've had some problems or there's been some issues. It may not have anything to do with whether workers are -- are present there or not, and so are you -- so are you referring to the one measurement location there at Savannah River where -- on a dry well, I guess it was, I forget the exact location.

MR. FITZGERALD: I -- I guess it just wasn't clear to what extent the ratios were being weighted as -- on the Hanford data as opposed to Savannah River-specific data, or whether it was just really a generic assessment -- a DOE-wide assessment.

MR. FIX: It's not a DOE-wide assessment. We're trying to use the best data that we can, but there's not a lot of measurements at Savannah River. The better -- the better measurements probably are the more recent

measurements with the ROSPEC. As far as going back through time, I agree it's very difficult. Just like people were talking about earlier about the americium-241 buildup, there's lots of issues. And quite frankly, it's been very difficult for us to try to get some of the old measurements that we would have liked to have had, just because it's classified. As you probably know, the DOE shares with the Department of Defense what's called the intrinsic radiation measurements, the neutron-to-gamma ratio for all these different weapons systems because the military has to handle these, but that's all classified information and so we're exploring ways to try to document at least a little bit of this information we have available to us.

DR. GLOVER: Is there an action item that we'd come away with on this?

MR. FITZGERALD: No, I -- I think in general, as long as it's consistent with the overall approach, I think that was the concern, that it was uniformity on that.

MR. FIX: Yeah, I -- we are preparing a -- a generic OTIB on this neutron-to-gamma ratio

issue because it's widely used, it's -- it raises questions, and we think as opposed to trying to approach the issues site-by-site, at least for plutonium-handling facilities, perhaps we could do it better in a generic OTIB.

MR. BUCHANAN: That's -- this is Ron. That's good because we have the same issues at Rocky Flat and other sites that we ran into the same identical issue, so that would be good.

DR. MAKHIJANI: Yeah, and presumably when you do this -- this is Arjun, I joined a few minutes ago. Presumably when you do this you'll -- you'll have an approach that looks at the age of the plutonium and the americium content and so on.

MR. FIX: Yes. Well, we -- I'll -- we'll present to you what we have. I agree, we all ask the same questions and we have received some information that we can use. It turns out that actually if the -- what's really important is what you do to shield or contain the material after it's available to you, and that of course varies a lot.

DR. MAKHIJANI: Yeah. Yeah, that -- that would

apply to like the weapons systems themselves, but not -- not to the manufacturing processes. Well, not to many of the manufacturing processes.

MR. FIX: Okay. Well, we all know it's a complicated area and we'll work with you to get a -- to describe what we have available to us and -- and how we can make reasonable judgments from what's available to us.

MR. GRIFFON: I guess just one action item in that area would be my -- you know, my -- just a description of the derivation of the neutron-to-photon ratios being -- you know, I'm not even -- just a current -- an explanation of currently -- you know --

DR. GLOVER: Policy?

MR. GRIFFON: Yeah, Jack's mentioned that, you know, ideally it'd be more recent higher level values --

DR. GLOVER: Oh.

MR. GRIFFON: -- that were used. I mean, how was it deri-- how were these distributions derived.

MR. FIX: Well, we've tried to explain that in the respective Technical Basis Documents, but

we -- perhaps we could have done a better job.

MR. GRIFFON: And like I said, it's been a while since I looked at that so maybe it's fine in there and -- and if it is, you can just point me to that, you know, but don't -- I'm not looking for a redundant answer.

MR. GIBSON: Okay, is that it for this issue?

(No responses)

Okay. If so, it's approximately 11:00 o'clock here and I think everyone in the room's probably ready for a short break, so we'll take a break till -- let's say between 11:10 and 11:15, then we'll reconvene?

DR. WADE: We'll keep the phone on -- connected, though.

(Whereupon, a recess was taken from 11:00 a.m. to 11:15 a.m.)

DR. WADE: ... is with us, getting his machine warmed up, turning the crank on the battery. Okay, I think we're ready.

COMMENT FOUR: TANK FARMS

MR. GIBSON: Okay, we're ready to convene. We'll go to matrix comment number four.

MR. FITZGERALD: Yeah, comment --

MR. GIBSON: Okay, Joe.

MR. FITZGERALD: -- four, and I'm going to turn this over to our in-house experts on the tank farms in a second, Arjun and Bob Alvarez, but I think our issue here is a broader one. It's the degree of characterization, and we're the first to admit that, you know, how much is enough is always an issue with site profiles. But in this case we felt this site profile would have benefited perhaps with a more comprehensive treatment of the tank farms from the exposure standpoint. And I will turn it over to Arjun just to go over some of the details that we provided.

DR. MAKHIJANI: Yeah, let me -- let me ask Jim a question -- Jim Neton a question. Did you manage to get your hands on -- on the tank farm data bank at all after the review was -- our review was published?

DR. NETON: I'm not sure I understand the question.

DR. GLOVER: Arjun, this --

DR. NETON: Sam's here --

DR. MAKHIJANI: There's a -- there is a tank farm data bank of incidents that's cited in our review quite frequently --

DR. GLOVER: We had some --
DR. MAKHIJANI: -- and that -- that has a lot of information in it about incidents in the tank farm, radiation rates, spills, radionuclides of importance and so on contained --
DR. NETON: Sam -- Sam Glover seems to be our --
DR. MAKHIJANI: -- that we used in our review that, you know, from a summary that I made a long time ago. We don't have the actual tank farm data bank and wondered whether NIOSH had -- had tried to get a copy of it.
DR. GLOVER: Arjun, I -- I will speak to that.
DR. MAKHIJANI: Yeah.
DR. GLOVER: Elyse Thomas is sitting here. She can probably give us the most recent status. She sent me some e-mails. We had a -- is that actually the database -- you're talking about an electronic database versus a document that summarized one particular time period?
DR. MAKHIJANI: Yeah, there is an electronic database. What I had worked with and Bob and I had worked with in the early to mid-'80s was a document that Bob got which was a printout of

an electronic database --

DR. GLOVER: Okay, that's --

DR. MAKHIJANI: -- up through the end of 1982, I think, but I think it was maintained after that, so there should be a more recent version of it.

MR. ALVAREZ: This is Bob Alvarez. In our comments to the matrix we identify a 1995 report regarding the status of this database, how it is used -- the -- there's a user handbook for it or a manual, who's used it, how it's set up. It basically involves approx-- I believe about 35,000 entries in the 200 area including tank farms, separations plants and tritium separation. I believe the tritium separation data is classified, but it is being used and has been used. In fact, it was used for dose reconstruction by Radiation Assessment Corporation in the past and we provide a detailed description of what it current-- what it was as of 1995 and -- and who has control of that in the reference documents.

DR. GLOVER: Okay.

DR. MAKHIJANI: Yeah, talk -- I mean the reason -- the reason I mention that at the outset is,

you know, I -- you -- you've probably had time to go -- go over our responses to your matrix comments, to the NIOSH matrix comments, and you know, starting with -- with the radionuclide list, I -- I really think -- I really think that the radionuclide list needs to be considered in light of the dose reconstruction and the various periods for which you have to do dose reconstruction and not as a general which radionuclide is short-lived and which radionuclide has large EDEs.

Joe, do you want us to proceed issue by issue or to get --

MR. FITZGERALD: Yeah, I -- I think you're --

DR. MAKHIJANI: -- an overview of everything first or how -- how do you want to do this?

DR. GLOVER: Just one real quick thing to finish up -- we did -- there are some people who've been do -- have been working on finding this. We want-- I just wanted to verify that what we had obtained or what we -- we -- to discover was what -- we were talking on the same wavelength here.

Elyse, you want to give us a status of where we are?

MS. THOMAS: Yes, and Tom, I'm going to call on you 'cause Tom LaBone helped me track this down, but he said that that database is no longer available at SRS and it's maintained by a private company. It would be available at a cost and it also contained OUO and possibly some classified information, so we could not obtain it -- easily, anyway. Tom, I don't know if you want to elaborate on that a little more.

MR. LABONE: I mean all I can say -- I called Ken Crase 'cause I had never heard of the 200 area incident database, but what Ken said was that there was an SRS incident database. This was developed back when DuPont was running the site and they used it a lot for safety analysis reports --

DR. MAKHIJANI: Right.

MR. LABONE: -- for input data into that. At -- at some point along the way, I believe when WSMS was spun off of Westinghouse Savannah River Company, they retained the database. And so for example, someone on the site wants to go look at the database, they have to go to WSMS, who would get the information for them. And

that was pretty much the status of it as of now, from what Ken said, and I got a contact at WSMS and I don't know if Elyse had time to talk to her, but (unintelligible) -- anyway, the database supposedly has -- you know, it has names -- you know, the people involved with incidents and has quite a bit of information, as you're pointing out.

MR. ALVAREZ: This is Bob Alvarez. The document that we cite in our comments in the matrix, for your information, is a 1995 document prepared by Westinghouse Savannah River Corporation called "Waste Management Facilities Fault-Tree Data Bank, 1995 Status Report," and it's referenced in our comments. This docu-- these -- these data may be held by private parties, but this is collected with government taxpayer dollars, and I find it, you know, questionable that a charge would be levied ag-- for using data that has been assembled by the government, and it certainly was under Westinghouse's control up until 1995. It is referenced. It has a handbook, as I said. There are 35,000 entries. They have a -- they have tables in this report in terms of

who -- what the data searches were for, how -- what data sources comprised this data bank. Now that's all I can tell you, but it's quite extensive and it is essentially a chronological listing of all operating incidence reports, unusual incident reports, it has special hazard investigations, teletypes, you name it. And in the comments that we did provide, we provided you the tables from this report as to the source codes and the source of data that are available to it, so you might want to take a look at that.

DR. GLOVER: Do you have the document or do you want -- do you know --

MR. ALVAREZ: Well, we -- we've referenced the document and --

DR. GLOVER: All right.

MR. ALVAREZ: -- provided tables from the document in our comments to you that we filed, which I hope we -- you know --

DR. GLOVER: I just want to make -- do you --

MR. ALVAREZ: -- have before you.

DR. GLOVER: -- do you -- do you have the full document, we'll just get a -- is it --

MR. ALVAREZ: I certainly do.

DR. GLOVER: Okay.
MR. ALVAREZ: I'm happy to e-mail it to you.
DR. GLOVER: Oh, it's an electronic document?
MR. ALVAREZ: Yeah, it's in electronic format. It came out of the DOE information bridge.
DR. GLOVER: Well, that -- that would be outstanding. That'll -- that'll minimize us trying to --
MR. ALVAREZ: Sure, I'm very happy to send it to you.
DR. GLOVER: Outstanding, 'cause we had -- there was some dis--
DR. MAKHIJANI: The thing that Bob is talking about is -- is not a general incident list. There is a document called a data bank that's specific to the 200 area and what I -- Bob and I had looked at in the '80s which I mentioned was specific to the tank farm. At that time they I think maintained two different data banks, one for the canyons and one for the tank farm --
MR. ALVAREZ: Right.
DR. MAKHIJANI: -- so far as I could discern, and maybe they merged them later on, but those are the documents I think -- at least so far as

-- that we have referenced in our work.

MR. ALVAREZ: Originally these data were assembled to do probablistic risk assessment. That's why they're called fault-tree data. And apparently, based on this 1995 Westinghouse report, it is being used -- it has been used for lots of different purposes, including dose reconstruction. And I'm happy to -- to send you a copy of this document that describes these data -- this database in some detail and -- and how it's constructed and how it's maintained and -- including references to handbooks to use the database.

DR. GLOVER: Okay, so what we can say is -- but we're -- just regarding that, you'll send us that and we will follow-up just finding out what the status of the database itself is.

MR. ALVAREZ: Sure.

DR. GLOVER: We have an (unintelligible) -- we had a false -- we didn't get the title right so we had some -- you know, exactly trying to figure out where this thing existed and --

MR. ALVAREZ: Sure.

DR. GLOVER: -- so we -- we have located it and --

MR. ALVAREZ: I'll get your e-mail address later and I'll just send you the document --

DR. GLOVER: That's great.

MR. ALVAREZ: -- so you (unintelligible) can work off of that.

DR. GLOVER: That's great.

DR. MAKHIJANI: This -- this document is very important because it -- among other things, besides assisting with dose reconstructions, it can tell you whether your assumptions about the completeness of worker records in regard to say the incidents that are listed in them is right. I mean I have -- both Kathy DeMers and I have had some questions about that which we raised in our review, whether -- whether the -- you know, we haven't looked at the individual worker files, but we cited some evidence where we're uneasy whether the -- whether the worker files do indeed have all the incidents recorded in them. And this data bank is quite important because if the incidents in the data bank are not in the worker records, then I think -- or you know, if they are in the worker record, then you've validated the worker record, you know, in a very good way and if they're not,

then you've got a significant issue in regard to the completeness of the worker record.

MR. ALVAREZ: This is Bob Alvarez. I think these -- this data bank is very unique to the DOE complex. I'm aware of -- I'm not aware of anything that's comparable to it at any other DOE site, and so I think it's a valuable resource and hopefully we can -- we can get access to it.

DR. MAKHIJANI: You mean unique to Savannah River.

MR. ALVAREZ: Unique to the DOE. I'm -- I'm unaware of any type of data bank that is -- was set up in this manner with this level of detail that would provide I think important insights as to, you know, what -- what were the incidents, what went wrong, what was the nature and -- and draws from several different sources on the site and was assembled for the purposes of ascertaining risk of accident and -- and currently dose reconstruction purposes.

DR. MAKHIJANI: But the data bank itself is not a complete list. I mean it (unintelligible) --

MR. ALVAREZ: Oh, no, no, I'm not saying it is, but I'm saying that it -- that the -- that the

data bank itself is unique to the DOE complex because I'm unaware of any other site that has done something like this. That's all I'm saying.

DR. LOCKEY: This is Jim Lockey. Did somebody say they used this as a fault-tree analysis? Is that what it was used for?

MR. ALVAREZ: Yeah, it was -- it was developed in -- initially in the 1970s to do PRA risk analysis for the 200 area facilities.

DR. MAKHIJANI: And that's part of why we looked at it was to evaluate the probablistic risk assessment that DuPont was doing at the time.

MR. ALVAREZ: But apparently since that time, at least based on the document I was able to obtain a while back, it is being used for lots of different reasons besides PRAs at the site, or has been at least until -- up -- up till 1995.

DR. LOCKEY: Is anybody aware that they actually implemented -- it went through the fault-tree analysis system and actually implemented changes? Is that -- is that --

MR. ALVAREZ: Not that we're aware of.

DR. MAKHIJANI: Well, we know they implemented some changes after the report we did came out in terms of their maintenance procedures and -- 'cause we pointed out that they were -- they had two instances of hydrogen buildup to above the lower explosive limits, and there were different documents that -- you know, people had forgotten to turn the ventilation fans on, if I remember right, and -- and I think they did -- they did go and change some procedures after our report came out, to the best of my understanding. But our report was based on -- on the data bank and the -- and the safety analysis report that came from it -- but it was called the Fault-Tree Data Bank.

MR. ALVAREZ: But as I said, it is now called the -- or was, as of 1995, Waste Management Facilities Fault-Tree Data Bank.

MR. CLAWSON: This is Brad Clawson. So I guess I'm not very clear on this. Are we able to -- are we able to see this data -- data bank or retrieve information from it, or -- what's going on?

DR. GLOVER: That's --

MR. GRIFFON: That's what I think we've got

agreement to do. Right?

DR. GLOVER: Yeah, we -- we have found the company that we believe holds the actual data, and we'll just have to find out what the status of that is. We -- we have not yet made that contact.

MR. ALVAREZ: And I would also look into why they are charging for access to these data 'cause these data were -- were collected and -- and assembled on the taxpayers' dime.

DR. GLOVER: We don't yet know that's -- I think we have to make contact and find out where that stands. I would say -- you know, I think it'll be -- I think we're going to be talking about this broadly. Those will tell the type of nuclides that were involved, the incidents --

DR. MAKHIJANI: Yeah, not comprehensively. I think -- I think in terms of the nuclide -- is that Sam Glover?

DR. GLOVER: Yeah, I'm sorry, Arjun, this is Sam Glover. I -- just to help test our hypothesis that we have covered broadly, not that that should be the only list, but I also want to speak to the dose reconstruction

process and how we do that with the constant chronic intakes and if there's bioassay that we're going to be talking about, please keep in mind how the NIOSH dose reconstruction process --

DR. MAKHIJANI: Yes.

DR. GLOVER: -- work.

DR. MAKHIJANI: Yes. Yes. Joe, you want to go on?

MR. FITZGERALD: Well, I --

DR. MAKHIJANI: You're going to get -- it's -- it -- you're going to -- the action item there, as I understand it, is you're going to try to get this.

MR. FITZGERALD: Well, I guess I -- I want your -- I guess at first I want your reaction to -- and I -- the comment that perhaps this data bank may address some of the other issues, as well, because of this question of the comprehensiveness of the nuclides cited and we can go through that, but would you agree with that, Bob or Arjun?

MR. ALVAREZ: I would tend to think --

DR. MAKHIJANI: Yeah.

MR. ALVAREZ: -- I mean just looking at the --

the sources which they used to assemble these data bank are, you know, essentially the extant reports that came about when they -- shortly after they happened, of -- of -- at various different levels, including HP reports.

MR. GRIFFON: So yes.

MR. FITZGERALD: Yeah, and it -- also it sort of tackles this question of whether the incidences that occurred were fully accommodated and identified, and it appears that would also address that better.

DR. MAKHIJANI: Yeah.

MR. FITZGERALD: Okay.

DR. MAKHIJANI: To some extent.

MR. FITZGERALD: To some extent.

DR. MAKHIJANI: (Unintelligible) it will be one very important check.

MR. FITZGERALD: Okay. With that as a lead-in comment, is there anything specific that we should talk about quite apart from whether or not the data bank will further that assessment?

DR. MAKHIJANI: Yeah, Joe, but I mean those are the substantive issues. Should we go through them one by one?

MR. FITZGERALD: I think we ought to at least

touch on them in case there's any questions.
DR. MAKHIJANI: Yeah. Yeah. Well, our -- our position, you know, in -- in regard to the NIOSH response on the radionuclides list, to take the first one, is -- is that I think the radionu-- we think the radionuclides list is still incomplete for the reasons we stated. I think the NIOSH argument is not -- is not -- is not tight enough for the actual dose reconstruction purposes, and I've given you some examples of -- of radionuclides that need to be added, or at least considered.
DR. GLOVER: I will gi-- I think this is specific enough. It may take -- it's not something we can answer off the cuff.
DR. MAKHIJANI: Okay.
DR. GLOVER: I don't -- I don't know if Don Bihl or -- I know we had some fission product approaches and different things. That may be something we need to make sure and then just verify against.
DR. MAKHIJANI: Okay. I mean if there is a sort of over-arching fission product approach to the radionuclide list, I think -- an approach that is a little bit similar to

Nevada's that actually says, you know, when the worker was involved because it will -- you know, it's not as hard as Nevada because you have a hold-up time before (unintelligible) is reprocessed, so many of the radionuclides will automatically be eliminated. But I think -- I'm not sure it's a given that -- that radionuclides like zirconium-95 are automatically excluded because in the early years I think there may -- they may well have been a concern.

DR. GLOVER: Ed Scalsky, do you have somebody on the line who -- or do you just want to hold off on this?

MR. SCALSKY: I think we should hold off on this. I don't think Gene is on the line yet.

MR. ROLLINS: Ed, I'm here.

MR. SCALSKY: Oh, you are there? Could you answer this question then?

DR. GLOVER: One second, Ed. Gene, you have to identify yourself and also provide your conflict -- that you are con--

MR. ROLLINS: Oh, I'm Gene Rollins with Dade Moeller and Associates and I did spend about 18 months working in the health physics department

at Savannah River Site back in the '70s -- '76 through '78.

DR. GLOVER: Thank you much.

MR. ROLLINS: Can I please have the question again?

DR. GLOVER: This is regarding matrix four, about the nuclide list in the -- the tank farm area being incomplete. And if we want to just hold off and review this or if you have some comments regarding what we have here.

MR. ROLLINS: I don't have any comments on that subject.

MR. BIHL: This is Don Bihl. I -- I guess I'm having a hard time understanding the -- the emphasis on this. Certainly in the -- in the dissolution facilities and the canyon facilities it -- which radionuclides may be important at that point depends on the exact fuel rods that are being dissolved and -- and then as they go through the process and, you know, these fission products get mixed with contamination in the -- in the various tanks and pots and transfer lines, and then they go out to the tank farms and, you know, they -- they may just further mix with old

contamination as well as the new stuff -- you know, there's really no way you're going to take the totality of the mixed fission products that were produced in the reactors and they're melted in the rods and dissolved and moved to the tank farms and say at any one time well, such-and-such is more important than such-and-such. You know, I -- I -- I don't think that -- what we put down there was just kind of a list of the ones that are pretty well known and -- and you know, generally contribute significant amounts. It wasn't intended to be something that asks the question do we have every single radionuclide identified whose dose conversion factor might be one percent higher for a given organ than some other radionuclide. That's not how the dose reconstruction process works, and you know, whether we put in that particular section every single mixed fission product that might have a little higher dose conversion factor than another for a given organ is kind of a waste of time. Maybe what we -- I should do is just say mixed fission products were -- you know, were significant. Because the dose reconstruction process doesn't

take that data anyway and -- and do it. They have their tools that list all sorts of radionuclides and allow the dose reconstruction -- dose reconstructor to pick out the ones that does maximize the dose to a given organ.

DR. GLOVER: That's -- for somebody who -- go ahead.

MR. ALVAREZ: Well, Don, I think that that may be so for the tank farms, but in looking at how these data have been assembled to date, they also include burial grounds at Savannah River and they were burning, you know, spent solvent in open pans for -- for years and years. And it's not clear to me whether burial ground workers received any bioassays for transuranics and so there -- there are lots of things -- I think insights that may be gained from this as opposed to just the -- a strict academic exercise in figuring out, you know, what the source terms were of the tanks at a given time, because they do tell you what went wrong, what the dose rates were, what the radionuclides were. And so those would, I presume, be -- be considered important and there may be important things that were missed, you know, 'cause these

tank farms were not just places where things sat around, as you know. They were running evaporators. They were doing various things with these tank farms and there were -- there were things that went wrong.

DR. MAURO: This is John Mauro. Yeah, I -- I think this is an important bridge because when we reviewed dose reconstructions I know that when you don't have data -- we're talking bioassay data now -- for a given worker, they -- you resort to the high five approach for Savannah River, which is this default approach for -- for internal exposure. What I'd like to hear a little bit is the bridge. It sounds like that -- you know, the -- the tank farms and the incidents and the list of radionuclides are all certainly real things that occurred, sources of information that could be of value. The question becomes when we look at that new source of information, is -- is the intent here to look at it from the context are the default methods imbedded in the high five approach adequate to accommodate this -- the fact that some workers may very well have been exposed to these incidents or radionuclides but there

aren't any bioassay data for them, and if that's the case, would the high five approach still provide us with a degree of confidence that we had not missed any important dose. I think that's the way -- that's how I'm thinking about it. Arjun and -- and Bob, is that question too narrow?

DR. MAKHIJANI: Well, that -- that's one -- but that -- one -- that's the over-arching question, in a way. But -- but there are other issues involved, in reaction to what Don said. The idea isn't that you should list all the fission products in the world in the list. Obviously you want to list the fission products that are important to dose reconstruction. NIOSH listed fission products and, in its response, said cesium-137 and ruthenium are listed as significant items but don't produce as much dose as strontium-90, cerium-144 and curium-244. Well, that's a pretty explicit statement about identified radionuclides, and in our response we pointed out that it wasn't quite on the mark, that these -- these radionuclides do produce as much dose, depending on the organ you're talking about.

So just the technical correctness of the statement is important. If it's going to be in the TBD in a certain way, represented as important radionuclides, then you ought to have the important radionuclides listed. If it's not important to dose reconstruction, one asks the question what is it doing in the TBD. So it's very misleading to have information in the TBD that's not -- that's not technically on the mark, and then simply say it's not being used in dose reconstruction.

The second point in response to Don's statement is you do have to demonstrate that the approach that you're using in regard to mixed fission product -- and it's completely legitimate to devise an approach for mixed fission products -- is claimant-favorable under the circumstances of the individual claimant. I don't think that NIOSH has done that. We've pointed out, for instance, that in -- in the tank -- I found two instances of cesium-137 intakes that were listed in the tank farm data bank that were higher than the high five listed in the TBD. And so I personally don't have confidence that you identified the high five, and I think we

said that in our review. So until you have a better grip on -- on the intakes and on the list of radionuclides, I don't think you can actually demonstrate that your mixed fission product approach is claimant favorable. And that's the reason to -- that's the technical sort of response to what John Mauro was saying, that if the ultimate question is what is useful in dose reconstruction, then you have to demonstrate that that approach is valid. And secondly, if it's not going to be used in dose reconstruction, then why put it in the TBD.

DR. GLOVER: Okay, so I -- we -- we actually later address some of the high five issues. There's additional matrix comments.

DR. MAKHIJANI: Yeah, right.

DR. GLOVER: I'd rather not go into those here.

DR. MAKHIJANI: Fine. Fine.

DR. GLOVER: And I think -- you know, our attachment -- and I know we've sort of -- it's -- it's a little piecemeal here. Maybe we've lost some of the -- there's a number of different objectives about -- it sounds like the -- the tank farms and really pulling out --

does our list -- is it adequate, and we have an attachment which we made an attempt to address for these workers this is how we do dose reconstruction and is it adequate. I think we -- we -- you guys have said you have some comments back along those lines. For this specific list of isotopes, we can check against that. The list from your database may help verify which ones were important for ac-- actually accidents, and so that may -- the evaporators, I'd have to double-check to make sure what's specifically being done. If those people would have not had plutonium bioassay -- if that's a particular class of worker who --

MR. ALVAREZ: Burial ground workers.

DR. GLOVER: -- burial ground workers, and so we -- we can check with -- if -- if there's something unusual about that, whether they had plutonium bioassay or not, I don't off the cuff know.

DR. MAKHIJANI: Yeah, Sam, I guess we can -- we can -- we have responses to your attachment A and the four scenarios for dose reconstruction as part of our comments, and if you want, we could move the last to be more specific. You

know, so far as I'm concerned, I mean our -- our comment in regard to the radionuclide list was not that you should include every radionuclide, but whatever you say about them should be accurate.

MR. BIHL: This is Don Bihl. The problem I have with that is that the -- is that the possible number of answers to what you're proposing is approaching infinity because the particular mix of radionuclide at any one time in any one tank farm or any one evaporator is -- is impossible to know at this point, and is variable enough that I can't tell you which radionuclide or which five radionuclides were most significant to the dose to any possible organ that's being looked out down to a one percent difference. You know, that -- that's just -- you know, it -- it's meaningless and to try to generate a list like that is a waste of time.

MR. ALVAREZ: Well, one thing that provides ballast -- ballast to this is this incident data bank because while it may not capture the entire universe of the source term at any given time, it certainly will tell you -- or at least

be able to tell you what happened at that given time period to -- to workers and what their doses might have been and their uptakes might have been, and -- and whether these match those that are in the files of the claimants, and whether these match in the -- in terms of the data collected by NIOSH to ascertain things like the high five, so there is an element here of -- of -- you know, of -- of reality and -- and soundness to what we're suggesting. And I -- believe me, Don, we're not suggesting that you have to come up with some sort of perfect exercise that, you know, at any given minute to tell us what the source terms were in a dynamic -- you know, these dynamic waste situations, but rather these provide you 35,000 different incidents that occurred that would -- may provide some very important insights to inform this difficult (unintelligible).

DR. MAKHIJANI: Yeah, I -- I think we're past the, you know, importance of the tank farm data bank. I think we're into something very specific. And it's important not to set up a straw man. We're not asking that every radionuclide at every stage of the process be

listed in the TBD. NIOSH chose to call out certain radionuclides as important and make certain statements that other radionuclides are not as important. That's a very -- NIOSH made some very specific technical statements, and it's our job to audit those technical statements and we've pointed out that they're not quite accurate. Now it's your choice as to what radionuclides you're going to list and how you're going to use them in dose reconstruction. But whatever you list, the statements about them should be accurate. That's one point.

And the second point is related to dose reconstruction. In what -- it's not about what's accurate to one percent, and that has not been said anywhere in our review or in our comments. The idea is a compensation program, and whatever you do should be demonstrably related to the regulation and shown to be claimant favorable. If what you are saying, Don, is correct, then you have got a problem with dose reconstruction at the Savannah River Site. If, on the other hand, you can demonstrate that a set of mixed fission

products to represent certain periods of work in the tank farm or the canyons is adequate to envelope whatever other mixture might have existed at any time, then you're okay. I mean that's sort of the principle of the high five approach and -- for instance. That's how it's supposed to work. If you maximize the intakes, then you're okay. Well, I think you have to do the same in relation to best estimates and in relation to the mixed fission product. You cannot simply say that certain radionuclides are important from general experience, trust us, and that it's okay. It has to be demonstrated that it's okay.

DR. GLOVER: I agree that -- the technical discussion needs to be verified and perhap-- there may be reasons why it is correct, but it is not innately clear from the way it was presented perhaps. And so I --

DR. MAKHIJANI: And some of the statements are not correct. The statement that I quoted --

DR. GLOVER: It -- it --

DR. MAKHIJANI: -- was correct.

DR. GLOVER: -- depends on the level -- it may be, I don't know, depending on what fission

products were there. It may not be -- relationship to one another that may not exist, so I -- it depends on what they were thinking when they said it, and so I think --

DR. MAKHIJANI: (Unintelligible) statement --

DR. GLOVER: -- I think we need to clear it.

DR. MAKHIJANI: -- in the NIOSH -- one of the statements in the NIOSH response is not correct, so you have to take the time to look at it perhaps and -- and make a judgment about what you think of our comment. I mean I don't know how you want to proceed (unintelligible). There may be -- there is or is not a to-do list of the --

DR. GLOVER: I think we need to technically respond to that comment then.

MR. FITZGERALD: Yeah, I would say it doesn't sound like you've had a chance to digest all this.

DR. GLOVER: That came Thursday, so we really -- yeah.

MR. FITZGERALD: Right, right, I understand.

MR. FIX: This is Jack Fix. We have followed up on this incident SRS incident database and generally it's not available to us as

classified inf-- potentially classified information. It has Privacy Act information and it's not something that we --

UNIDENTIFIED: Well, we --

MR. FIX: -- (unintelligible) go through very easily, and also if the radiological situation is sufficient to dose -- the dose to the worker is supposed to be included in their radiological data -- their radiological dose assignment.

(Whereupon, Dr. Makhijani, Mr. Alvarez and Mr. Fix spoke simultaneously, rendering individual comment unintelligible.)

MR. GIBSON: Could we talk one at a time?

MR. ALVAREZ: (Unintelligible) obtain them through the Freedom of Information Act without those types of restrictions --

UNIDENTIFIED: Uh-huh.

MR. ALVAREZ: -- and in 1985, and so I don't see why these data cannot be assembled and made available to you in a manner that doesn't get in the way of the various reasons why you think you can't use that data.

DR. GLOVER: Well, I think we're going to explore it. This is Sam Glover. I think we

will -- we will contact that company and see what we can and can't do and come up with path forward.

MR. ALVAREZ: Well, I'd contact the Energy Department first since this is the -- really was assembled under the Energy Department's dime. You know, having worked with DOE and worked in the Congress, I find this to be a very strange circumstance where someone is charging money for use of government data.

DR. GLOVER: Well, you're not sure that's happening.

MR. GRIFFON: Okay.

MR. ALVAREZ: I would put the request directly to the Energy Department about this and find out what's happening, is my -- my two cents, and not go through the contractor. This is a Department of Energy set of data, not theirs.

DR. MAKHIJANI: And we may be talking about two different things. I think -- let's not have a confusion. There may be an incident database that's completely distinct from the Fault-Tree Data Bank that we're talking about for the 200 area, and Bob will send you the reference on that --

MR. GRIFFON: Bob's forwarding that file so --
DR. MAKHIJANI: -- and then you have to at least make sure you're looking for the right thing.
DR. GLOVER: Exactly.
MR. GIBSON: Okay.
MR. GRIFFON: I think let's leave it.
MR. FITZGERALD: Yeah, we can leave it I think. It does appear to be maybe two pieces to this. There seems to be an incident database and a data bank. I'm not clear on -- you can clarify that. It sounds like there may be two pieces to this, one of which is probably classified in part.
Let me -- let me --
MR. ALVAREZ: Once you have time to take a look at our comments you'll see the specific references plus tables inside there that you may want to pull the string on, and I'm happy to send you the document upon which we based our comments.
MR. GRIFFON: That would be good. Yeah, that would be useful.
MR. FITZGERALD: Mike, you want to just cover this -- the rest of this internal discussion?

I don't know how you want to break this up, but this is kind of a lengthy issue. We can cover the internal and see where we stand at that point. You want to do that?

MR. GIBSON: Sure.

MR. FITZGERALD: Arjun, just to keep this going, can you go through the (unintelligible) --

DR. MAKHIJANI: Yeah --

MR. FITZGERALD: -- of Attachment A?

DR. MAKHIJANI: -- let -- let me go through the four scenarios. NIOSH had -- had four scenarios in regard to dose reconstruction. One -- one was when -- let me look at it here. Just a sec, let me get to the right page, excuse me.

For scenario one where you have the bioassay and external data and incident data, you say DR will evaluate intake and assign highest intake based on a (unintelligible) intake of data support all chronic intake. And -- and the point there is that this is fine, we have no problem with the approach, but just question whether you can implement that approach if you don't have reasonable confidence that you have

a complete incident (unintelligible), so this refers back to our earlier discussion. And I quote there -- you know, I -- when -- when we looked at the data they -- and then when -- is -- the thing that Bob said about what's in this data bank, when we looked at the data bank it was quite clear that many incidents were included in it, but many incidents were not recorded at all, and the data bank actually makes an explicit statement that until 1965 leaks in the waste tank system are not recorded until -- unless individual occurrences are of particular interest, so this raises a question as to how complete the earlier incident lists were, at least in the tank farm. And so I -- I think you do have to verify that the dose reconstruction approach in scenario one can be implemented with confidence for tank farm workers, which -- which at present I don't think it can.

DR. GLOVER: So will --

DR. MAKHIJANI: Scenario number two --

DR. GLOVER: Can we talk about them one at a time maybe?

DR. MAKHIJANI: Sure, go -- go ahead.

DR. GLOVER: I -- you know, since we're talking about somebody who has bioassay --

DR. MAKHIJANI: Yeah.

DR. GLOVER: -- typically the approach by NIOSH is a constant chronic intake. If we have a positive dose, we're going to model that and we're going to fit that to that. If we have a missed dose calculation, that's going to be modeled as a constant chronic -- unless there's some overriding reason to believe it's an acute intake. And it tends, when you look at the analysis -- I mean those things pretty much -- it's going to be claimant favorable to use that, and that's been looked at -- I believe, John Mauro, you were probably part of that. I'm sure Jim Neton sitting here looked at the constant chronic versus acute approaches, and those are pretty well hashed out techniques that have been verified against. And so I think when you refute that, we need to -- what's specific about this that makes that unique to somebody who would be a chemist at Los Alamos who could potentially receive an acute intake, or why that's different here than anywhere else we do business?

DR. MAKHIJANI: Well, I think as a general matter, I was there with John when we went through it with Mallinckrodt and had the demonstration in regard to acute versus chronic, and -- and we've accepted that as a general approach it's all right. But you do have to have some verification for the specific kind of situation in which you're involved. Savannah River tank farm, because of the nature of the radionu-- this is -- this goes back to the earlier comment, because of the complexity of the radionuclides involved and the assumptions that you have to make in that regard, if -- if you make the wrong assumptions about what's going in-- into the body and haven't demonstrated that, and if you have an acute intake of a particular kind and aren't even modeling it, then how do you know that the chronic intake is going to cover it? I think -- I think that when you have a complex situation like Savannah River Site as opposed to a uranium processing site, the -- the modeling problem to show that chronic is conservative actually depends on the availability of acute intake data to carry out

a few examples to show that.

DR. GLOVER: Okay, I think that's --

DR. MAKHIJANI: (Unintelligible) my opinion.

DR. GLOVER: All right. There may be a difference between appropriate bioassay versus the mechanism that we're talking about. If you're saying that we may not actually have the appropriate bioassay on these folks, whether it be fission product analysis or -- you know, if the data in itself is limited, I -- I -- based on the approach and the analysis -- I mean if -- this is much farther or broader than -- than say Savannah River Site, if we're talking about that you still don't believe that a -- the constant chronic intake, and so that we had not tried to address that here. That was sort of a default that we've already explained that and we felt that everybody was in agreement. If that's not the case, then I think that's broader than what we're talking about here.

DR. MAKHIJANI: No, I think a specific demonstration for the situation of the tank farms, which is quite complicated, is -- is necessary because it doesn't -- it isn't covered by -- in my opinion it isn't covered by

the general demonstration of a relatively straightforward situation. You've had uranium intakes that are acute and chronic. You know the radionuclide. And what you're simply modeling is whether acute or chronic are more claimant favorable. We've been through that and we have accepted that as a general approach in that situation, it's fine. But if you don't know the radionuclides and you don't know the time of intakes, and you don't have confidence that you don't have a complete incident list, you do have a more complicated problem at Savannah River Site.

DR. GLOVER: Well, obviously we haven't provided an answer that's sufficient enough, so --

DR. NETON: It sounds to me -- this is Jim -- that -- that what we're really talking about here is getting back to the argument we just -- or discussion we just had about the source term. I mean essentially you're saying if we don't know the source term, you know, any model we come up with with bioassay is not necessarily accurate, and I guess I can't disagree with that statement.

DR. MAKHIJANI: Jim, could you speak up, please?

DR. NETON: I'm sorry. You know, it sounds like we're talking about a source term issue here, not the -- not the appropriateness of using chronic versus acute intake models. And I can't disagree with you that if we don't -- have not identified the source term, it's -- it's going to be difficult for us to conclude that we've bracketed the dose.

DR. MAKHIJANI: Okay. Fair enough.

DR. NETON: So I think that we're back to the square one, really, here.

DR. MAKHIJANI: Yeah. Okay.

DR. GLOVER: Well, one thing that would be -- that would -- when we do missed dose calculations or other calculations, we often don't use site characterizations that are going on. What -- you know, some of these nuclides you have to have a phenomenal activity that we'd be covered in, so...

DR. NETON: Right, but -- but I guess that's what Arjun is saying is we need to make that point somewhere.

DR. GLOVER: All right.

DR. NETON: We -- we haven't done that, and I can't disagree with that comment.

DR. GLOVER: Yeah.

DR. MAKHIJANI: I'm not saying it's a wrong approach, I'm saying you've got to show that it's the right approach. You can't just assert that. And in -- in general we've accepted it, but I think -- yeah, I agree with Jim's comment, basically.

(Pause)

So now I can't hear what's going on.

DR. WADE: Nothing's going on.

MR. FITZGERALD: We're writing.

DR. WADE: Scenario two.

DR. MAKHIJANI: Scenario two is essentially the same routine bioassay, only available would be adequate. I mean it's the same issue.

DR. NETON: Yeah.

DR. GLOVER: Yeah, it -- I think based on that premise, that -- that changes the next four --

DR. NETON: Right.

DR. GLOVER: -- so I think that's probably these -- these are all sooner or later --

DR. MAKHIJANI: (Unintelligible) problems -- you had different problems with three and four.

I think you've got two covered under one, but with three and four, a badge but no bioassay, I think -- I think your assumptions regarding assignment of internal intakes -- well, you know, we don't think that you've provided a scientific rationale for -- for using the MDA for unmonitored workers because you assume that unmonitored workers were not at risk of exposure. And for instance, you've said construction workers might not have been monitored. Well, you have to show that construction workers were not at risk. If -- if you look -- if you -- if you look at the situation in regard to the open pan burning that Bob mentioned, or cleanup of spills in the tank farm, some of those spills had quite high -- quite a lot of radioactivity associated with them. And you know, the digging and moving of the dirt that must have gone on in -- in that regard may -- may have involved intakes greater than MDA. Clearly the tank farm in-- had monitored workers that had very significant intakes. And then extrapolating from that the -- this .1 times MDA and .01 times MDA seems -- seems quite arbitrary to us. It's not -- the -

- the dose seems -- at least I could not discern any (unintelligible) for these assumptions. They may be -- they may be justified but, again, it's the same point, you have to show that.

DR. GLOVER: Don, I think these -- Don Bihl, these were -- that -- that was generated as part of the update to the TBD. Right?

MR. BIHL: This is Don. Yes, and the -- you know, the factors of ten given in the different years are really based on the fact that the -- that the regulations that applied to the sites tightened up at various times. Manual chapter 524 mandated that workers were put on a bioassay program if they were felt to be at risk at ten percent of the quarterly limit. That was clearly tighter than it had been previously and so we -- we took that into account, that said unmonitored workers were at more risk during this time because there were more people being monitored at a lower level. And then again in 1989 DOE Order 5480.11 came in that said the -- the requirement for being monitored at two percent of the annual limit, and so there again that, plus the regulations

tightened things up in a lot of areas that had to do with workplace monitoring and recognition when intakes occurred, and making sure that prompt bioassay was obtained after incidents, and so as time progressed the basis that -- that you're saying that an unmonitored worker was getting intakes, you know, the -- the bar was lowered. And so we're just taking that into account here.

DR. GLOVER: What --

DR. MAKHIJANI: Yeah, I -- I think that would be a good technical foundation, but you have to -- the -- the one piece that's missing -- I mean it should be two percent instead of one percent here, but the -- the one piece that's missing usually in these discussions, and I don't see it here also, is -- you know, there has been generally a statement that workers who were not monitored were not at risk, whatever the definition of risk happened to be prevalent at the time. But when we've kind of turned over the stone, we've at least not always agreed that that was the case. And so I think in a dose reconstruction context there's got to be some kind of discussion of the protocol of

how it was established as to which workers were excluded, and when the workers that were excluded actually had -- were say monitored from time to time to ensure that they had potential for less than the stated values. If they were not, then you have no way -- then you've just got the subjective judgment about exclu-- about excluding workers and you can't make a statistical statement about the excluded group.

DR. GLOVER: What is the status of a coworker study at Savannah River on internal dosimetry?

MR. BIHL: There is none planned, and the reason is because the bioassay database is not electronic. It's kept on cards and the amount of money and time that would be spent in trying to take all of the data from Savannah River and create an electronic database was judged not to be -- was not going to be pursued. That -- that decision was made at some -- some level -- I don't know what level, but we were told in the coworker group that Savannah River was not going to be done.

DR. GLOVER: We'll have to come up with a -- perhaps a way to test the hypothesis that we've

generated. We're going to be looking at the incident database and testing it against what -- this is the hypothetical intake that would be generated from .01 -- or .02 times the MDA, and that relates to -- but we will have to -- okay, I -- I agree, Arjun, there's some additional discussion needs to be there.

DR. MAKHIJANI: In regard to scenario three you've got a specific issue as to showing that the issue -- that the unmonitored -- there was a technically demonstrable reason other than the subjective judgment of the supervisor or foreman that certain -- or health physics person that certain people were not at risk. I think -- I think there has to be some kind of periodic monitoring, job description, something that shows that they were not at risk and so were not monitored -- (unintelligible) subjective judgment, so I think that piece is -- is -- that's what it's -- I guess we meant by technical foundation must be provided for discussion of fractions of MDA proposed for later periods.

And -- and so the first three have something in common in that we don't say they are not

correct, but that NIOSH has to provide technical justification and demonstrate. The fourth one we believe is not correct.

To attribute environmental dose from -- in the way that has been proposed in the TBD we've generally not agreed with and would not agree with in relation to the tank farm workers. It's completely inappropriate to do that, for the reasons stated.

DR. GLOVER: All right. I think at this time we're probably just going to have to table this to provide you better -- this -- this is probably the most difficult of the ones we've talked about so far, and the one that needs the most work.

DR. MAKHIJANI: Right, I agree with that.

DR. GLOVER: So --

MR. GRIFFON: Can I just -- just to go back to number three for a second, the only thing I would add to that -- I'm looking at this real time, too, so it may have already been considered, but the post-1989 -- I think the other thing that might weigh into these factors that you've created is technology shortfall issues for certain radionuclides. Is -- is

that -- might need to be considered in there when you --

DR. GLOVER: That would actually jack up the intake, though, if you had a technology shortfall if you use the MDA versus the --

MR. GRIFFON: Right, right, right.

DR. GLOVER: It actually would make it worse, would ja-- increase the --

MR. GRIFFON: It would make it worse, right, so that might be part of your rationale for the .01 ti-- I -- I don't know.

DR. GLOVER: Again, we need more work.

MR. GRIFFON: Yeah, I got to look at that, but...

MR. FITZGERALD: Any more on internal, Bob or Arjun?

DR. MAKHIJANI: No, I -- I'm done.

MR. FITZGERALD: Okay. The only piece left is really a comment on external, and that actually is not addressing the NIOSH response at all but saying that a piece of the original SC&A finding on the site profile wasn't addressed, which is this question of dose geometry.

DR. MAKHIJANI: Yeah, I noticed when Joe asked me to draft some of the things in relation to

the tank farm, I went back to our review and, you know, the matrices are very compressed, and I noticed that one -- one thing didn't show up in the matrix and it -- it is quite important for certain work, I believe, especially for like cleanup work and maintenance work where people are changing their jumpers and working on the pipes and so on in the tank farm. You have a situation that's not very different than the one that NIOSH did those Atilla model dose calculations for Mallinckrodt where it was shown that, you know, the brain dose was less than the film badge dose and the gonadal dose was higher than the film badge doses (unintelligible). I think some more geometries for the tank farm need -- need to be worked on especially. Many of these incident dose rates were in the rad -- several rad per hour, tens of rads, and I've seen 100 rad or more per hour, also.

MR. ALVAREZ: I think -- I think 250 and, on one occasion, 500.

DR. MAKHIJANI: Yeah, very high.

MR. FIX: Do we have some nuclides to go along with that as well?

DR. MAKHIJANI: No, these are simply the gamma measurements I believe that were in the data bank, to the best of my recollection.

MR. FIX: I was thinking that for the modeling and I assume Mallinckrodt was modeling (unintelligible).

DR. MAKHIJANI: Yeah, but they were modeling -- at that point they just did the external dose. Jim -- Jim knows more about it than I do.

MR. FIX: Yeah, well, I'm just trying to think of the issues. Certainly we would like to do more Atilla modeling and -- but as you know, it takes time and we need to be specific.

DR. MAKHIJANI: Well, I think you need to come up with the maintenance job descriptions of the cleanup workers. My -- when I wrote that I was thinking of -- I don't have a comprehensive view of all the different kinds of work that were done, but the two different job types that I was thinking of were workers who maintained the underground pipe network and the valves and the junction boxes and so on. Their work would generally have been closer to the lower part of the body than -- than the -- than the badge, and so the geometry issue would be pretty

significant. And the second group of workers that I had in mind was workers who cleaned up spills, and some of those spills were associated with really quite high levels of radioactivity, so -- so a factor of even 20 or 30 or 40 percent could make a pretty big difference.

MR. FIX: Well, typically the --

MR. GIBSON: Excuse me, this is Mike Gibson --

MR. FIX: -- (unintelligible) are --

MR. GIBSON: Excuse me --

MR. FIX: -- really a problem is you've got beta -- primarily beta-emitting nuclides and -- so that's what we look for is scenarios where we have predominantly beta -- beta-emitting nuclides where geometry means everything.

DR. MAKHIJANI: Well, I think they're also important in the case of gamma-emitting radionuclides in -- in the examples I've given, and in the calculation that was done for Mallinckrodt I believe it was gamma. Right, Jim?

DR. NETON: Yeah --

DR. MAKHIJANI: I can bring it up.

MR. GIBSON: Excuse me just a minute. This is

Mike Gibson. Again, please, for the record and for the recorder so he can make these transcripts accurate, if you will identify yourself and Jack, if you could please -- if you're on a speaker phone, maybe go to a headset or speak up a little bit, please.

MR. FIX: Okay.

DR. NETON: This is Jim Neton. That's correct, Arjun, the photon exposures at Mallinckrodt were modeled using Atilla, and we had a couple scenarios, and I think one of them was the cleanup of a spill, that demonstrated that the HP-10 dose measured at the chest height was lower than what was actually received by some of the, you know, lower organs in the body. And actually we issued a TIB on that very subject. If there are these geometrical anomalies or exposure scenarios that you refer to, we probably need to look at that. But I'm reluctant to go out on a -- you know, on a witch hunt looking for, you know, all these little isolated pockets. But if there are unique scenarios that can be identified, we certainly would want to address them.

MR. ALVAREZ: Well, some of these unique

scenarios may be captured in the data bank that we referred to. I mean I recall looking at the data for the -- I -- I'm not sure which canyon it was, it might have been the F or H canyon, but -- and it was sometime in the mid or early '60s where they had to call upon several hundred men to go in and fix a item of equipment in the warm canyon, and these men were not given film badges. They were basically -- you know, it was a stop watch and a whistle and -- and maybe a pencil, if that, and they had to run in as fast as they could and start a bolt, and it took nearly 200 men to do this and then, if I recall in the report, after they had started the bolt, the -- the 201st or so -- so person turned it the wrong way and they had to start all over again. So there are some very unique situations involving encountering -- encounters with very high dose rates where it's clear to me that these were not process workers but construction workers, which may be very useful for you as you proceed to address the construction worker exposure scenarios.

MR. FITZGERALD: Okay.

MR. GIBSON: Okay.

MR. ALVAREZ: Okay, that's it.

MR. FITZGERALD: No, how do you want to proceed? You know, that's probably the -- the biggest issue. We have some smaller ones ahead, but it's also 20 after 12:00. We can keep going if you want.

MR. GIBSON: Why don't we maybe keep going and try to break for lunch about 1:00, if that's --

MR. FITZGERALD: About 1:00?

MR. GIBSON: -- will be acceptable to everyone?

MR. ALVAREZ: Sure.

COMMENT FIVE: EARLY MONITORING

MR. GIBSON: Okay, we'll go on to number five.

MR. ALVAREZ: Should we -- should we dial in or (unintelligible)?

MR. GIBSON: We're going to --

DR. MAKHIJANI: I'm going to sign off if the tank farm issue is finished.

MR. FITZGERALD: Thank you, Arjun.

DR. MAKHIJANI: Thank you, Joe.

MR. GIBSON: We're going to continue till about 1:00 o'clock and then we'll break for lunch somewhere around 1:00. Okay?

MR. FITZGERALD: That's fine.

MR. GIBSON: Go ahead with issue number five, comment number five.

MS. ROBERTSON-DEMERS: Okay. SC&A had concerns about the extensiveness of the early Savannah River Site workers' monitoring, and let me kind of give you a background of what the rad con organization looked like.

Basically you had a small central core group, like kind of the head of rad con, and a couple of people supporting him. Then you had, at each facility or big area, a rad con manager who ran that area. And the procedures -- the common procedures -- from the reactor area to the separations area were not necessarily the same. So we started to see some gaps in some of the monitoring in the early years, and I'll just give you an example. Do you -- do you all know --

MR. ALVAREZ: Excuse me, Kathy, could you speak up, please?

MS. ROBERTSON-DEMERS: Okay. Are you guys all aware that Savannah River had heavy water reactors moderated?

(No audible responses)

Okay. From 1956 to 1960 none of the reactor

workers, according to the -- the progress report, were monitored for tritium. And that's just an example of one of the gaps that we see in -- in this early period while they're still trying to get more centralized and focused. And what we would like to see is we want NIOSH to look into those early years and make sure that you've got a comprehensive monitoring program, and I'll think you'll find the answer is no.

DR. GLOVER: I think part of this -- Don, part of these responses are what's coming in the updated TBD. Correct?

MR. BIHL: Certainly one of the fundamental premises of the -- this is Don Bihl. One of the fundamental premises of the dose reconstruction project is that not everybody that -- was monitored and that we have to account for dose to people who were unmonitored. And I have beefed up that section, too, because I -- I agree that -- in reviewing it that it was not as comprehensive as it needed to be. It spoke almost entirely to reactor workers and not some of the other facilities. I have added language specific to

tank farms and specific to the separations plants areas, assigning more radionuclides to people that are unmonitored -- iodine-131, for instance, and more fission products and things. So I -- I have tried to address in -- in the new draft -- I'm giving unmonitored workers a lot more intakes than had previously been there and -- more intakes and more radionuclides, because I agree, I -- thorium -- you know, you guys brought up the thorium issue and I agree that has to be addressed, and the uranium-233 issue had to be addressed. So we definitely beefed that up and tried to account more for the fact that if you've got an unmonitored worker, you've got to assign them some doses, and they could have been exposed to more things than was originally shown there in the -- the -- Rev 3 or whatever version you're working on right now.

DR. GLOVER: So --

MS. ROBERTSON-DEMERS: I guess I didn't want to just pick on internal. I would apply that same request to the external data.

DR. GLOVER: As far as the badging, that they weren't badged?

MS. ROBERTSON-DEMERS: As far -- as far as making sure -- looking at all your data, especially if you go in and you're looking at a -- a coworker model for the external data.

MR. ALVAREZ: This is Bob Alvarez. One of the anomalies that we -- we found and we couldn't find -- we couldn't figure out a good explanation for it was that in the works technical monthly reports that we were provided by NIOSH spanning the early period of operation, namely the 1950s and early '60s, you know, each report had a standard format and they had a health physics department write-up every month. And in that write-up every month, for a period of years, they claimed no bioassays were taken for tritium for reactor area workers, whereas hundreds were taken for -- for workers in the 232-H area. And you know, we found incidents where, you know, tritium levels in the reactor areas were quite high and required, you know, some extraordinary activities as a result of fuel element failures and the like. And I was curious whether or not that was the case, because I just couldn't -- I just found that to be kind of hard to believe,

that they -- that they duly noted in these HP reports every month that they took no bioassays for tritium for reactor workers.

MR. BIHL: This is Don Bihl --

MR. ALVAREZ: (Unintelligible) is that --

MR. BIHL: -- I would agree, that is -- that is interesting and I don't have an answer for that.

MR. ALVAREZ: And I -- I couldn't figure out for the life of me why that was so, but it's -- I think we did mention it in our first review comments that this was some -- sort of inexplicable.

MR. BIHL: I don't -- Tom, do you have any thoughts on that at all?

MR. LABONE: No, that -- that doesn't -- doesn't make any sense to me. I -- I guess I would have to see the report to try to --

MR. ALVAREZ: Well, it -- they're referenced in our comments. You know, they're essentially works technical monthly reports and -- and they were made available to us and, you know, there's a health physics section in each report and they basically list up front, in the front of each section, the number of bioassays taken

in the -- in the -- in an area, including for tritium. And every month no -- a zero was recorded for bioassays taken for 100 area workers, whereas there were hundreds taken on a monthly basis for the 200 area workers.

DR. GLOVER: Okay, so we need to find out if that's a spe-- an unusual class of workers.

MR. ALVAREZ: Yeah, I don't know if it's an anomaly or -- I -- I mean I -- it just didn't seem right to be seeing that, but we did note it.

MR. GRIFFON: And then the other -- I mean it sounds like some revisions have been made, but -- but SC&A hasn't seen them, so how -- how do we -- I mean --

DR. GLOVER: That's going to come out -- when -- we talked about that. Once they go through internal review, we'll get them and then we'll make sure that they satisfy the comments and we can talk about making -- evaluating whether all the -- the classes of workers that may seem to be unusual or that -- that-- you know, these -- particularly these early time frames, and -- and then Jim knows what's going on with construction workers TIBs and we need to make

sure this is all covered.

MR. FITZGERALD: Well, in this case -- this -- this is -- this is Joe. This is -- it sounds like this is a -- actually the overall revision of the -- the TBD, it sounds like.

DR. GLOVER: External and internal, that's correct.

MR. FITZGERALD: External and internal --

DR. GLOVER: Yeah.

MR. FITZGERALD: -- so when that gets reissued, these -- these new elements will be added.

DR. GLOVER: Internal has been -- is fairly specific. We had some examples. You said external as well. You talking about these people who hadn't been badged in the early time frames? I want to make sure that they -- that -- did you guys --

MS. ROBERTSON-DEMERS: (Off microphone) (Unintelligible)

DR. GLOVER: What's that?

MS. ROBERTSON-DEMERS: (Off microphone) Take a look at these -- these --

DR. GLOVER: I'll look at the comments.

MS. ROBERTSON-DEMERS: -- if you have access to some of the Savannah River claims, take a look

at the early external exposure data.
MR. GRIFFON: Your --
DR. GLOVER: All right.
MR. GRIFFON: -- your sense is that there's gaps in the early data maybe?
MS. ROBERTSON-DEMERS: Even in those that were monitored.
DR. GLOVER: I'll have --
UNIDENTIFIED: I can't hear, but I guess we know that we assigned a missed dose throughout the entire employment period if -- if there's not the records, so...
MR. GRIFFON: I mean what -- what -- what --
MS. ROBERTSON-DEMERS: It's not necessarily...
MR. GRIFFON: What do we know about -- I mean what do you know, I should say, what --
DR. GLOVER: We can ask Scott --
MR. GRIFFON: -- what do other people know about the monitoring program in the early years, but it wasn't 100 percent?
DR. GLOVER: I'll ask Scott Siebert -- I'll ask Scott Siebert to get on the line, maybe after -- we can maybe get him on and he's doing -- they -- they've done -- they're the ones who actually looked through all of the early

Savannah River Site information, so they'd have the best evaluation and when you go through the cases you'd have the best feel for that, so maybe I can get him on the line after lunch, or --

MS. ROBERTSON-DEMERS: You know, I'm not talking about somebody who shouldn't have been monitored. I'm talking about somebody who was in the (unintelligible) radiological work.

MR. FITZGERALD: It sounds like the action here is just to defer to these new revisions that will be at some point coming, or maybe actually some pieces to this that will be separate, such as the construction TIB and some of the other pieces.

MS. ROBERTSON-DEMERS: (Off microphone) (Unintelligible) six has been (unintelligible).

MR. BIHL: This is Don Bihl. While we're pausing for just a minute, I want to go back to a question that came up in the first item. There was a question about what the OTIB number was for the draft TIB on recycled uranium. I've looked that up, it's 53, five three, per the notes.

MR. GRIFFON: Okay.

COMMENT SIX:

MR. FITZGERALD: Let me -- let me comment. We're going to get into comment number six, but there's three or four matrix items that deal with high five in different facets, and the first one is really dealing with the compliance issue and whether it conforms with CFR 82, which is one of the objectives of what SC&A looks at, but I guess our response is the NIOSH evaluation is responsive to that particular issue and, Kathy, you want to --

MS. ROBERTSON-DEMERS: (Off microphone) (Unintelligible) the switch to bioassay solved a lot of these issues.

MR. FITZGERALD: Right, so six goes away as far as a concern that we've had in the past on the original review. That brings --

DR. GLOVER: Tom LaBone, what is the status of the -- that revision?

MR. LABONE: I'm sorry, what revision?

DR. GLOVER: The high five, redoing it with the new models.

MR. LABONE: I do not know how many of the -- the cases have been done. Gus Potter is working on that.

DR. MAURO: This is John Mauro. I have a concep-- I guess an over-arching question. The high five approach -- I just want to be refreshed a bit -- that was an upper-bounding method for the purpose of denial, or is it also used as a plausible upper bound for compensation?

DR. GLOVER: It's an overestimate.

DR. MAURO: It's an overestimate, but is it used in both capacities as --

DR. GLOVER: No, overestimate --

DR. MAURO: Okay, so -- so then if I -- then it's very much like OTIB-2 -- bear with me for a minute. I'm trying to create a pattern whereby this is a method that you could -- that someone could default to then, the high five. Granted that there are some questions regarding whether or not it's truly high five or not, but the idea being it's a way to assign an upper bound as -- to a worker whereby you feel confident that, for that particular worker, by all means that assumption is going to place an upper bound on his internal dose and -- and it still -- you still come up with less than a POC of .5 and therefore he's appropriately denied.

Then tiering down from that is OTIB-17 and I believe OTIB-33 where -- then you said well, if you don't want to go that route but you want to be a little bit more realistic, then you start to key in on the -- the assumption that well, if there was a comprehensive air sampling program then you're in a position to make some judgments as to what the -- for a person that was not monitored now -- what the upper bound -- not upper bound but reasonable upper bound and in the -- for the intakes might have been, and that's where you -- you fold in whether you're at one NPC or .1 NPC, so I just want to get a picture -- does the high five approach fit into this whole hierarchy of decision-making the same way that OTIB-2 does, and I think OTIB-2 was used primarily for Hanford.

DR. NETON: John, this is Jim. That's correct. I mean it's -- it was a document that was written early on to essentially process cases that we could demonstrate pretty readily that they were not going to be compensable, no matter how much research we did. And we have never used it -- to my knowledge, at least intentionally -- to -- to compensate for a

case. They've always been denials. It falls into that realm of what I like to consider health physics, which is -- you know, you do a series of successive approximations, and if your first approximation -- which is very rough -- demonstrates your point, then you're done.

DR. MAURO: Uh-huh.

DR. NETON: But in certain cases, with the high five approach, when you apply it would tend -- would put someone over 50 percent, then you've got to sharpen the pencil a little bit and say well, that -- that first approximation was way -- was maybe an order of magnitude or two off. Let me try something a little closer to reality, and that's exactly --

DR. MAURO: Within that concept then, a lot of the subjects that we've been talking about -- namely the tanks, unmonitored workers, incidents, perhaps workers were not monitored or appro-- you know, during an incident or inadequately monitored -- so then you're in a realm where you really can't -- what I'm hearing is you could certainly use -- well, you'd have to first make a demonstration that for those scenarios where a worker might have

been exposed to one of these incidents or exposures near the tank farms that were not monitored, first of all you have to feel a level of confidence that the high five approach would in fact be bounding for them. And I guess there's some question whether that's the case or not.

DR. NETON: Yeah, well, I think the -- the high five approach specifically talks about people -- I think it's only applicable to workers who were not monitored who, in our judgment, did not need to be monitored. In fact I think it's even more --

DR. MAURO: Oh -- oh, and -- and did not need to be monitored.

DR. NETON: Yes, I think it's even --

DR. MAURO: Oh, okay. I thought --

DR. NETON: -- it's even slightly more res--

DR. MAURO: -- it was used as a default --

DR. NETON: No.

DR. MAURO: -- as a way to quickly deny.

DR. NETON: It is, but if -- if they did not -- if they, in our judgment, did not need to be monitored, had no monitoring data, then we believe that those intakes that were assigned

are bounding of their -- any plausible exposure they could have received. That sort of goes to the argument -- doesn't -- they don't necessarily have to be the highest five in recorded history. They just have to be plausible upper bound exposures for that worker to which it's applied.

DR. MAURO: Okay. So if we have a worker -- let's say -- it's almost like a little wrap-up of what we've done. I'm trying to get oriented. We have a worker that is -- of concern that he might have received some exposure but was not monitored, but he -- you know, we don't know whether he was involved in one of these incidents or not. Let's say we go into this incident scenario. I think that's what -- a lot of concern here. We're in a situation where somehow we need to be able to -- to make a judgment based on this worker's records whether he may or may not have been involved in an incident and whether or -- and if there's no bioassay data, how do we deal with that worker? Let's say he wasn't monitored. Is -- is that a -- is that a situation where we are -- we have to deal with,

namely possible incidents, possible exposures, a worker was outdoors and wasn't monitored, but given his work history it's possible he may have been involved in one of these incidents that are in this big database.

DR. NETON: I'd have to look -- refresh my memory as to the exact wording of the -- you know, how the high five approach is applied. I -- my recollection is that it was -- it was fairly restrictive in its use, and I think it was -- even went beyond workers who didn't need to be monitored, but was applied primarily to administrative type personnel and others in that category. Although I -- I -- I have to say I can't say with certainty right now exactly what that language is.

MR. BIHL: This is Don Bihl. If we get Scott Siebert on the phone he'll be able to provide that answer in -- in quite a bit of detail. I think the rest of us are kind of -- if we tried to answer that we would be just kind of out on the margin of our knowledge and -- and why don't we wait till Scott's on the phone.

MR. FITZGERALD: I guess the other comment is it --

MR. ALVAREZ: This is Bob Alvarez. I want to -- I have a question about the data that's being used for bioassay. Does -- is there a centralized set of data for workers in terms of compilation of bioassay that is somehow being used?

DR. GLOVER: There is no -- there is -- we're getting hard copy records and we -- they get it entered, we enter the -- the data.

MR. ALVAREZ: I see. I see.

MR. FITZGERALD: I just had a comment. The -- the high five is only unique to Savannah River. I mean it -- it's been supplanted or found to be a -- not a necessarily relevant tool elsewhere. Is that --

DR. NETON: I think that's generally true, yeah. We tried this at other sites, but Savannah River had a -- what we thought was a pretty good database that -- you know, and gave us a good feel for what the highest exposures may have been -- may have been in the past, but...

MR. ALVAREZ: I'm sorry, can you speak up, please?

DR. NETON: Yeah, we -- that's true. Joe asked

whether the high five approach is really on-- is unique to Savannah River, and the answer is yes.

MR. GRIFFON: I -- I think the other question, it seems to me -- now I'm just kind of gelling this today -- is that you don't have all the other bioassay data in electronic form so you can't do your --

DR. NETON: Correct, right, so coworker --

MR. GRIFFON: -- distributions by nuclides, you can't do your --

DR. NETON: Right, although -- although --

MR. GRIFFON: -- (unintelligible) percentile.

DR. NETON: It appears that way, but I can say -- the historical reason it was a high five was because we just didn't have coworker models at all at the time and --

MR. GRIFFON: Right, right, 'cause this (unintelligible) -- first (unintelligible).

DR. NETON: I mean -- and reality is now it's even better because we didn't have --

MR. GRIFFON: Right, 'cause one of my questions coming in today was why not do it like all the other sites now that we're doing all the other sites that way, you know. It seems like it's

the hard copy issue.

MR. FITZGERALD: Yeah, yeah.

MR. ALVAREZ: So -- this is Bob Alvarez again. So the -- the reason I asked this question about the database is that McClarty in 2001 made a statement that records indicate that 99 workers received (unintelligible) internal doses of uranium over the history of the plant, which were well documented in site incidence reports. And in reviewing the works technical monthly reports we found there were over 205 positive bioassays between 1950 and 1960 alone, which raised questions about what data is being used here.

DR. GLOVER: We actually -- later on we have some information regarding that. Those are 100 -- 99 workers who had more than 100 -- 100 millirem committed effective dose equivalent, not that there were 99 -- more than 99 positive uranium bioassay measurements. But their committed effective dose equivalent was -- exceeded some threshold, so --

MR. ALVAREZ: I see. Well, this was written in a manner where that distinction was not made. It simply said received internal doses.

DR. GLOVER: Yeah, I -- that's -- I think later on or -- I have some additional information regarding that.

MR. ALVAREZ: Thank you.

MR. FITZGERALD: If we -- if we can -- John, are you still on the phone?

DR. MAURO: Yes, I am.

COMMENT SEVEN: GAUSSIAN MODELS

MR. FITZGERALD: We're up to the environmental -- occupational environmental issue in terms of Gaussian models, something that's right down your alley.

DR. MAURO: Yes, that -- that would be, and I saw your -- by the way, basically -- I had a series of comments related to the way in which the environmental doses were estimated, and my concern had to do with the use of average annual chi over Q values, atmospheric dispersion factors at the site, mainly taking the source terms, releases that occurred, and then applying average annual atmospheric dispersion factors. That's certainly an appropriate approach when you are confronted with product releases -- or even episodic releases that occur randomly and often. And

then you could probably come up with a pretty good estimate of the average annual exposures to any receptor at any distance in any direction from the releases. My -- but my concern had more to do with the fact that -- and not that I -- that this has really happened, but I was concerned that some of these releases may very well have been episodic, large, and occurred only a few times during the course of any given year. And -- and as a result, the approach of modeling that dose from that source could grossly overestimate the dose -- for example, if a person wasn't downwind at the time of that release and the wind was blowing in a different direction and there was no one downwind, well, then no one's getting dose. However, on the other hand, if during that release the person was downwind and there was fairly stable atmospheric conditions, the doses could be substantially higher than what the average annual chi over Q would predict.

Now -- and correctly so now, the -- recently I received a response to that concern which said that well, the monitoring data that I believe

was along the fence line or on-site for tritium and iodine, which was -- they actually measured the conti-- the concentration of airborne radioactivity on site from the emissions, and the determination was that the average annual chi over Q Gaussing model did a real good job. It's not overestimating -- you know, estimating what the actual measured concentrations were. That is very assuring and that confirms that the chi over Q approach really works very well when you're dealing with chronic releases. And so I'm not going to dispute that at all. My main concern is, though, are there scenarios where there may have been incidents of relatively large releases occurring only occasionally where that -- we could -- there could be some surprises to people on site and the average annual approach will miss that. And that was my -- that was my first concern. And the other one I had had to do with resuspension factors, but let's hold off on that until they -- we -- I could hear some response back on this concern I just raised regarding episodic releases.

DR. GLOVER: John, will this be a release that

was intentional?

DR. MAURO: Yes, it would include releases that are intentional and also of course inadvertent releases, both.

DR. GLOVER: All right.

DR. MAURO: Anything that is episodic and not -- and not frequent -- and random.

DR. GLOVER: All right. I guess -- I can't speak to what SRS was doing at the time. We could try to do some more -- you know, delve back into how they -- if they did upscale release, usually tried to minimize the dose to personnel if you knew you were going to release something, I would assume, so that would be something we would -- we'd probably need a little more description.

Gene, do you have any comments on episodic releases and how they would have handled intentional releases or these episodic releases?

MR. ROLLINS: No, I really don't have anything on that.

MR. ALVAREZ: Well -- this is Bob Alvarez -- the two things I would look for right away is the burning of spent solvent in open pans which

went on on a constant basis throughout the '50s and at least through the early '60s where you might have had the on-site deposition of transuranics from the smoke, and possible exposures. And again, going back to the Fault-Tree Data Bank, there were stack releases from the 200 area on several occasions that required them to wash down cars in the parking lots. And to my knowledge, those issues -- while they may not have resulted in significant off-site doses that Atilla might have picked up -- it might have resulted in a dose that's of concern for dose reconstruction purposes for this program.

DR. MAURO: Yeah, in fact while that -- I'd like to add to your -- one of the things I didn't mention is yes, the -- I believe you did rely heavily on the -- the off-site dose reconstruction dataset for emissions, and that's certainly reasonable 'cause that -- what the -- you know, because that was a very exhaustive assessment. But if there were other releases that may have been relatively small, from the big -- from the -- lo-- local and episodic, theoretically those doses could have

been missed. Because I guess the intent of the rack work was really to evaluate doses pretty far away. You know, beyond the site boundary to where there were off-site populations, and so I guess there's that part of it, too. That is, is there a level of confidence that the source term data used for deriving on-site exposures that -- you know, they came from I believe primarily the rack work -- is adequate and sufficient to capture what the exposures may have been on-site, and that of course coupled up with the episodic question, whether or not there might have been some unusual meteorologic conditions -- and not even unusual. You have stability class F at the time of release. The people immediately downwind from that release, especially if it's ground level -- in fact only if it's ground level, such as these open burning, the -- those doses can be substantial. And if the workers were not monitored, bioassay or external, you're going to miss that.

DR. GLOVER: Ed Scalsky, do you have any comments, or if -- do you have anything on that area to sort of -- you know any -- any -- Gene

doesn't really have much. It may be an area we just can't -- we haven't -- we're going to have to add more work on, but -- is Ed still on the line?

(No responses)

I may have lost Ed Scalsky, who's the document owner.

MR. ALVAREZ: Well, I would suggest as a starting point to take a look at the works technical monthly reports. The health physics sections discuss -- in not, you know, great detail, but they do discuss open pan burning of spent solvent that went on quite frequently throughout -- you know, throughout the '50s and early '60s.

DR. GLOVER: Now John, is open pan burning something -- if it's a continuous activity -- something that has --

MR. ALVAREZ: No, it was episodic because they weren't doing it 24/7 --

DR. GLOVER: No, no, hold on, I'm going to ask John 'cause this is sort of -- in your -- in your description that didn't seem to be really what you're talking about. You're talking about the --

DR. MAURO: That's correct, the --
DR. GLOVER: -- the Poisson kind of thing, the very low prob--
DR. MAURO: Yeah, I would agree with what you're saying. If you have an episodic release that's occurring once or twice a week, week after week, randomly, as opposed to at a given time of day, in effect when you average it out over the course of a year, it's going to behave as if it was a continuous release, an average annual chi over Q will work. Of course in the case of burning, you know, is you used chi over -- the average annual chi over Q approach, you probably will overestimate dose because the burning will have a plume -- a plume rise component to it which will help to increase dispersion. So I think that the -- if the burning was often and random in time, average annual chi over Q will probably work. In fact, it may overestimate it. So yeah, I'd have to agree with you folks there at ORAU that --
MR. ALVAREZ: For purposes of clarification, the -- the burning did not occur every day. It occurred every two or three months and it tended to occur for a period of several hours,

then that was that.

DR. MAURO: Well, see, that would place it into one of the areas I'm concerned with. When you start to spread things out that rarely, you know, once a month, once every two months, then it becomes something that you just can't use annual average chi over Q, it'll just -- you know, you could really miss the dose by quite a bit. The only thing you got going for you, though, is since it is burning you're going to get a little a bit increased dispersion because of the plume rise from the -- the terminal plume. But it cert-- you know, what it is, it's probably something that's worth putting to bed and looking into because if it was only once a month or once or twice a month -- and this is a judgment call. There's actually some Nuclear Regulatory Commission guidance related to this matter on -- for accident analysis when you -- when you could -- when you should go from puff avection modeling -- use that type of modeling, as opposed to average annual chi over Q, based on frequency that the event occurs. There's a reg guide out there at the NRC that was used many years during the licensing and

accident analysis at nuclear power plants.

DR. GLOVER: And that's exactly what I was really -- the previous description sounded like it was all the time, so --

DR. MAURO: I think we're in agreement.

DR. GLOVER: I agree. I agree we agree.

MR. ALVAREZ: Now may I ask a question? Would this particular modeling discussion be fully applicable for larger particles?

DR. MAURO: I can answer that, the answer's no.

MR. ALVAREZ: Because of (unintelligible) --

DR. MAURO: Gaussian modeling, and -- and even in deposition of particles, the standard deposition velocity approach to determining what's on the ground, that only applies to very small particles.

MR. ALVAREZ: So I think that with the burning, we prob-- we might have been dealing with particles certainly larger than 0.5 micron, and for stack releases that result -- you know, where the non-volatile beta-emitters and possibly alpha-emitters were depositing on the parking lot nearby and not necessarily going off-site, then the trajectory of the plume may not be applicable to this model.

DR. MAURO: Bob, I agree with you. If it's a large particle, it's not -- again, Gaussian modeling just doesn't work.

MR. ALVAREZ: Yeah, so I would also, you know, make sure you check that one out.

DR. MAURO: Even -- even puff avection modeling, when you take the time period into consideration, doesn't work for these large particles because what you really now is have just like a trajectory and, you know, large particles come out and settle out --

MR. ALVAREZ: Right.

DR. MAURO: -- on its own and it doesn't really matter what the meteorology is very much. It's going to have its own -- it's going to be (unintelligible) ballistic, you know, a -- but now I'm talking flakes. You know, large -- large flakes, if that's in fact what (unintelligible) was dealing with, I don't know.

MR. ALVAREZ: With (unintelligible) burning you don't have a stack, either. It's very close to the ground.

DR. GLOVER: Okay. I -- I heard the issues and I think we have to follow up. I don't have

some of the people I'd -- on the line, so -- good points, and I think they need to be specifically addressed.

MR. FITZGERALD: John, resuspension factor?

DR. MAURO: Yes, and this is a very -- very simple comment. I notice that you're using your resuspension factor of ten to the minus nine per meter. That is the one recommended by Anspaugh for material that's on the ground for very long periods of time. Let's say several years. So if you have some cumulation of radioactivity on the ground and it's been accumulating for many, many years, it sort of like weathers its way into the ground, and therefore the resuspension factor of ten to the minus nine is probably a reasonably good number. He has plenty of empirical data that -- that shows that's the case. However, there's a treat-- there's also -- there are other analyses when -- when you have anything that disturbs the ground, whether it's high winds, anthropomorphic activities, people walking, vehicles going by, and -- and also even the ten to the minus nine itself has some uncertainty in it, like a factor of ten. What I'm getting

at is, I was just concerned when I saw the ten to the minus nine, the antennae went up because when I used to do a lot of these dose calculations I usually used ten to the minus six as my resuspension factor, five times ten to the minus six, sometimes ten to the minus five, and I was just surprised to see that you were using ten to the minus nine. Now I noticed in your response that you said well, the -- the empirical data for I guess the F and H area was a grass-covered area where there was very little potential for resuspension because the -- the moisture content of the soil, the -- the -- the growth of the grass would keep the radioactivity from re-- from resuspending. And I would agree, yeah, under those circumstances you would expect to see something close to ten to the minus nine. So right now I guess I'm at a place that says well, I'm used to seeing ten to the minus six, but geez, if there's good reason to believe ten to the minus nine's the right number, I -- you know, I really can't argue with you.

DR. GLOVER: We've -- we also looked at it quite a bit or it's begin-- you know, talked

about it. It is a low -- it sounds like a very low number. However, you know, having colleagues down at Savannah River, it is snakes and swamps and stuff -- such down there, too, so it is a different kind of area compared to let's say a Nevada Test Site where you have a desert type of environment.

DR. MAURO: Yeah, you know, I understand. Any effort made to see what kind of dust loading? You see, one of the things that -- I -- I -- when it -- when it comes to the long term deposition of material on the ground -- see, to me, the resuspension factor approach is --

MR. ROLLINS: I think I can answer that question. I did some calculations this morning --

DR. MAURO: Good, good.

DR. GLOVER: This is Gene Rollins.

MR. ROLLINS: Gene Rollins talking. In fact, I was the one that did this work that you're discussing now. I went back and looked at some environmental impact statements that actually have dust-loading factors for Savannah River Site. The one that they quoted as a 24-hour maximum was 135 micrograms per cubic meter.

DR. MAURO: That's -- that's in the realm that I would expect like normal outdoor environment to be like, yeah.

MR. ROLLINS: All right. If I take this a little bit further -- now I -- I don't have soil profiles for the contaminated areas in F and H area, all I had was the average concentration in the soil in these areas for the first eight centimeters. So application of just using that soil concentration and the mass loading factor that I just -- maximum 24-hour -- which would be an upper bound, in my opinion --

DR. MAURO: Uh-huh, okay.

MR. ROLLINS: -- would give you numbers approximately 80 times higher than what we are currently reporting in table C-18.

DR. MAURO: Okay.

MR. ROLLINS: Now I also did some sensitivity study that shows what that really works out to in dose. And this would be for 30 years of intakes. The -- the most highly affected organ would be the thoracic lymph nodes, and if we increased the -- the numbers in table C-18 by a factor of 80, or just make it a factor of 100,

we're still approaching a maximum, after 30 years of exposure, of about ten millirem per year from plutonium-239 only.

DR. MAURO: Sounds like you put this one to bed.

MR. ROLLINS: Well, I'm trying to.

DR. MAURO: Yeah, I agree. I tell you what I -- I mean -- what -- what really is the clincher to me of what you did -- the only thing I might have done differently is there's a lot of literature on the concentra-- when you have a resus-- when you have the dust loading, the dust is coming from the surface, you averaged over eight centimeters. As a result -- one of the things --

MR. ROLLINS: I agree, that could give us another factor of ten in there.

DR. MAURO: Yeah, that's -- right, exactly, you've got it. That's where I would be coming from. There's -- there -- I would -- I would assume an exponential decline with that -- lots of data on that, by the way. NRC's published a lot of information on a vertical --

MR. ROLLINS: Now (unintelligible) -- now keep in mind now, that was a 24-hour maximum

resuspension --

DR. MAURO: But -- so you got -- yeah, you're at the upper end there (unintelligible) --

MR. ROLLINS: And if you go to an annual average geometric mean maximum, it's about four times lower than that.

DR. MAURO: As far as I'm concerned, the story you just told puts this issue to bed. You know, it may be worthwhile putting it together. In other words, I believe what you -- you know, I'm hearing you -- the story and that's exactly the way I would have come at the problem. And if in the end we're talking about doses that are in the ten millirem per year range, I think we by and large have said that listen, notwithstanding the issue -- I mean I think that we have made some valid technical concerns regarding the resuspension factor. I think you have just made an argument that says notwithstanding the fact that we may have used a small resuspension factor, even if we go with some other approach which would come up with a substantially higher dust loading and dose, we're still talking about doses that are in the millirem -- you know, a few millirem per year

range. As far as our concern, this problem's -- this issue has been resolved. I hate to speak -- but I think we could -- that would close her down. The story you just told, as far as I'm concerned, would close out this issue.

MR. ROLLINS: Hey, Sam, I'll write that up and get it to you.

DR. GLOVER: Outstanding.

MR. ROLLINS: We can go to lunch now. Right?

MR. GIBSON: Is everyone ready for lunch? Well, how long do you guys -- ready for lunch? Okay. Is an hour good for lunch?

(No audible responses)

Okay, let's all try to reconvene at 2:00 p.m. eastern time.

DR. GLOVER: Thanks, everybody.

DR. WADE: Thank you.

(Whereupon, a recess was taken from 1:00 p.m. to 2:00 p.m.)

DR. WADE: This is the conference room with working group assembling. We should be ready in just a second.

COMMENT EIGHT: METAL TRITIDES

MR. GIBSON: Okay, we're ready to reconvene. I

think we're ready for comment number eight?

MR. FITZGERALD: Yeah, I think -- on -- on metal tritides I might also add that after I think number six on this list we're getting into -- increasingly getting into the observations or secondary issues, so again, a lot of these are questions of basis and factual accuracy.

MR. ALVAREZ: Excuse me, Joe, could you speak up, please?

MR. CLAWSON: Hey, Dr. Wade, this is Brad Clawson. We need to remind people to put their phone on mute. I can -- I can pick up somebody typing on their computer and stuff and I can't -- it blots out everybody else.

DR. WADE: Okay. So take that as a -- a request, please. If you are not speaking, put your phone on mute.

MR. FITZGERALD: Okay. Again, talking about matrix comment number eight if you have the handout, and this is a finding we spent some time talking about in the June conference call involving special tritium compounds, you know, metal tritides, organic trit-- tritium, and the issue here is that we're frankly seeing this

same issue at a number of DOE sites. I think this was the first site we had seen this issue. And the question of low or almost minimal solubility is the question we're dealing with here, and the fact that for both security reasons as well as detectibility reasons, the -- the monitoring and the record-keeping for special tritium compounds I think everyone would agree is not -- not very good. And our concern here is whether they've been characterized and addressed from a dose estimation standpoint adequately. And I think we had a good discussion, and there's an attachment B to the matrix which is sort of a intended pathway I think NIOSH is considering and -- but -- but one concern we have is, beyond how you model this, we're frankly concerned -- based on experience at Los Alamos, Mound and other places -- whether in fact you can establish where it was used, how it was used, who was exposed to it, what facilities may have contained it -- I mean there's a lot of issues about even establishing precedents that we think is an issue. Kathy.

MS. ROBERTSON-DEMERS: Don, are you on the

phone?

MR. BIHL: I am.

MS. ROBERTSON-DEMERS: After the last working group Don gave me a call and he thought it was a good idea for us to discuss our issues with the NIOSH approach, and we kind of agreed to submit some questions, first of all, which we have included under matrix comment eight, some of which cannot be answered in this room. But what we've -- what we kind of feel is that on the surface the method looks conservative, but we don't know what tritides we're dealing with or organically bound tritides, we don't know how much, we don't know if it's formed elsewhere on site besides the tritium facilities. We don't understand why there were no tritides prior to 1975, these type of things. And this is -- we can't make a judgment on whether the technique bounds the tritide situation without knowing some of these things.

And Don, I don't know if you have the questions.

MR. BIHL: Yes, I do have the question. In terms of which tritides were there, I don't

have the answer to that. From a dose assessment point of view, from a dose reconstruction point of view, it isn't essential to know that. The language that we have there is -- is to tell the dose reconstructor to use either -- assume either class or type M or type S, because the tritides can come in either form, and they just assume whichever one creates the largest dose to the organ of concern. So it's -- it's claim-specific as to which one they assume, and that's how you handle that when you don't have the specific knowledge. Basically you're picking the one that will provide the largest dose to the organ of concern.

As far as the organically-bound material, I do have an article where they studied that and they -- they said it was methane. I'm not sure that makes a difference. I could add that to the write-up if -- if you feel that's important to say that it was methane. It won't make a difference to the dose reconstruction, I don't believe.

In terms of the date, there was a -- one of the history documents said that they converted over

to the high-dried storage procedures in the -- or -- or -- not procedures, but the facility in the mid-'70s, and that's -- that's the on-- that's as close as I could get they would have a source of metal tritides so I -- you know, I just said start in 1975. I guess we can, you know, negotiate it if that doesn't feel right to you, but that's all I know is mid-'70s. As far as looking at the exposure to the other places besides the tritium processing facilities, the doses -- even to the people most exposed, which would be in the tritium processing facilities -- were so low that by the time you dilute this material in anything else -- D&D work, waste management, whatever -- you know, you're going to be well -- well below a millirem. You know, I'm assuming every day exposure for the people at the -- at the tritium processing facilities, chronic, every day exposure, and their doses still come in the neighborhood of a few millirem, up to ten millirem for -- for the lung, so clearly the other -- anyone else at the site just wasn't getting enough of this to -- to have a dose of concern.

As far as the last question goes, historic percentage, I -- I don't -- I don't have a lot of history. I have basically one document, this document that was done -- the study that was done by Millham and Bodie -- or I guess maybe it's Boddie. At any rate, where they looked at the various compounds coming out -- the effluence from various facilities in the -- in the '70s and, you know, they -- they were able to, you know, show that it was -- it's mostly water, of course, and there is tritium gas of course, and then there was some organics. The organics were generally less than one percent, even from the area where they suspected it would be most prevalent, which was the tritium processing facilities. There was one time when -- by one time I mean one process where the organics were considerably higher than one percent. They were up to about 80 percent. And that was during the purging of the -- the (unintelligible), these molecular sieve beds that -- that held up the material prior to release. And during the process of -- I don't fully understand the exact process, but during the process of capturing this material

on the molecular sieves and then purging it later, which I guess involves heat, they create the methane. And for that period of time when they're purging, then about 80 percent of the effluent was -- was organic. But the total curies that came off then they recorded as 290 curies of methane or organic coming off at that period of time, and that compares to over 3,000 curies a week released from those facilities in terms of water vapor and 1,300 curies per week coming off as HT gas. Oh, yeah, and they didn't purge every week, you know, it was -- it was an occasional thing. But again, even though it was high that one time, when you look at it on any sort of longer time scale, the amount of organics being created was pretty small. So I -- you know, we did a calculation that looked at this. Assuming that inside the facility the organics might have been higher, I arbitrarily said instead of one percent, I went with ten percent, that the workers were exposed to ten percent organics, and did calculations and said if they were exposed to -- which -- which is what the DR's doing now, that says if you assume 100 percent HTO, how much dose are

you going to be assigning, and then say okay, instead of that, it's 90 percent HTO and ten percent organics, OBT, how did that change the dose relative to what the DRs are actually calculating, the dose reconstructors are actually calculating, and it turned out to be an insignificant change. So on the basis of that, that -- and that was also looked at by Tom LaBone. He did a separate calculation and came up with the same conclusion, that the OBT just isn't a significant enough factor in terms of calculating dose that it has to be addressed specifically.

I believe that addresses the four questions that you had there.

MR. FITZGERALD: All right. Well, the -- the action that's really there is just simply to continue what we started at the last conference call, which was to make sure that there was some interchange as far as the -- this -- this kind of data, and we don't really have anything more at this point then. We want to continue that just to get -- 'cause this does affect other sites and we have the same issues and findings coming up at other sites.

DR. GLOVER: Do we have any -- there's not a TIB on -- on tritides. This is just being added to SRS. Right?

MR. BIHL: Yes, that's true, I -- well, I think -- aren't they also included at -- was it Mound? I guess I haven't read the Mound --

DR. GLOVER: I'm certain that they're at Mound as well.

MR. GIBSON: Yes.

MR. FITZGERALD: Yeah, and also Los Alamos. And so the intent is not to try to settle this specifically for Savannah River as much as just it's a generic issue and if we can sort of get an understanding of how you're approaching it and addressing it, that will help address this issue across the board. One thing we're finding in the site profiles, even though this is characterized -- there isn't a lot of details as far as the derivation of some of these assumptions, and certainly that would help.

MR. BIHL: I think one thing that is -- that is clear and understood is that to monitor for the tritides, the standard urinalysis method doesn't work real well and most sites didn't --

didn't -- in fact I think still don't use fecal sampling, which would be a preferred way to go, and so you definitely do -- if you have that source term in any significance, you do have to write that up as something that was unmonitored, and that's what I've tried to do here.

MR. FITZGERALD: Right. We would agree with that.

MS. ROBERTSON-DEMERS: Don, is there some reason why you don't want to go and find out what tritides Savannah River worked with?

MR. BIHL: Well, again, I -- I don't think it's necessary for the dose reconstruction, and I honestly don't know how -- whether we would be bumping up against classification space. I certainly think -- anything that's classified, you've got to have a -- a right and a need to know, and in this case you don't -- you don't have any need to know because we just allow the DRs to choose the worst case, and so it isn't necessary to know.

MR. FITZGERALD: I guess -- again, not going into that space -- it would be a distinction if one were handling tritium routinely, of which

you would expect this to be a component or a possible -- you know, an artifact, an issue -- as opposed to actually dealing -- or processing tritides specifically. In other words, pure tritides.

MR. BIHL: Well, my understanding -- and I certainly don't want to pose myself as an expert here, but my understanding is that people don't really handle tritides. They happen because they're used either as a target for an accelerator, for instance -- you know, they -- they can be generated in a -- in an accelerator where you have a certain type of target that creates metal tritides and -- and then when you do target change-out there may be some loose particulates that have been knocked off the target that would be contamination. But it isn't -- you know, it comes about because of -- I mean the -- the reason for tritides is because it's a very stable way of holding hydrogen and you don't get a lot of contamination out and about because of particulate and you're not selling it or cutting it or rubbing it or doing anything like that. You're heating it, but -- so I think

you've got to look at it from the perspective that there's going to be some contamination around the object that is the metal hydride itself, so when you're handling it, then you're at risk of these particulates. But it isn't -- they aren't going to be just generally all over the place.

MR. FITZGERALD: Well, again, I think we had some operation concerns that have to be resolved on that particular point relative to Mound, for one, and Los Alamos as a secondary thing -- less so Savannah River. So we'll leave it at that because it does get a little sticky from a security standpoint. So if we can just leave that as a -- we'll carry this conversation in a generic sense. I know there's no OTIB or anything, but again, we'll have the same action for Los Alamos, the same action for Mound, and it would be very useful just to put this one to rest. I think we're getting closer. I think we just haven't had this conversation. This is the first time I think on tritides.

MR. GRIFFON: Don, can you -- can you just tell me -- this is Mark Griffon -- you mentioned 100

percent HTO versus the 90/10 split and it didn't make much of a difference in terms of dose. What -- where did you get the 90/10 -- how did you come up with that sort of ratio?

MR. BIHL: Well, what the -- what the dose reconstructors are doing now is assuming 100 percent HTO, so that was my baseline. That's what they're doing, and the question was if we factored in some OBT, would -- would it be enough to change the dose to -- to require this to be reckoned with. I mean it does slow down the dose reconstructor a lot. OBT is a whole different way of calculating tritium and -- and is much slower than normal methods and tools that are developed for -- for HTO. So the question is, was it worth it. The 90/10 split came because at the tritium processing facilities they've done the measurements and showed that OBT was about one percent at least of the effluents. I said well, maybe there's some operations inside the facility where it was ten times higher than that. That was an arbitrary thing. Frankly, I doubt if it's -- if there's that much difference between inside the building or the effluent, but I arbitrarily

said let's make it ten percent. So that means inside the building it was -- I'm assuming 90 percent HTO and ten percent OBT.

Now what in -- what in fact inside the building really was was, you know, probably 50 percent HT -- you know, 45 percent HTO and five percent organic, you know, something like that, but I don't have the data. I -- you know, I can hypothesize that from logic, but I can't prove it 'cause I have no data.

DR. MAURO: This is John Mauro, a quick question. On the organically bound tritium, the dose conversion factor for organically bound is not that -- I guess that the clearance rate is just a little slower, a factor of two or three slower, and then as a result the dose per becquerel inhaled is just a -- two or three-fold higher, so I could see why, you know, it's just not going to be important. Is that also true for the tritides, the metal tritides?

MR. BIHL: Boy, you know, off the top of my head now, I -- I mean I've done the calculations, but I -- I can't answer that question off the top of my head. The tritides

-- you know, you can have a type S tritide, so the dose to the lung would be -- I would -- you know, it would have to be quite a bit higher.

DR. MAURO: So that -- so that rule of thumb doesn't -- doesn't necessarily apply to the tritides. In other words then -- well, even if you assume ten percent -- if you assume ten percent you -- you could have a significantly higher dose, you know, from the tritides. In other words, the -- the sieverts per becquerel inhaled for tritiated water is substantially lower -- let's say to the lung -- than it is through metal tritides by orders of magnitude.

MR. BIHL: You know, that's something I can look up, but I can't -- I can't pull it off the top of my head.

DR. MAURO: I -- you know, I suspect we have talked about this before. Am I bringing something up that we already discussed?

MR. BIHL: No, not necessarily. I mean I didn't look at it from the point of view of -- of the dose conversion factor, per se. I just did the calculations based on the knowledge I had here, and calculated the intakes that should be applied to these workers as an

unmonitored intake -- and the numbers came out fairly low, but -- but you know, not -- I mean we're -- we're going to include them. They're not that low. But as far as dose per unit intake comparison between HTO and the metal tritides, I don't have that off the top of my head. I'd have to go look that up. Clearly, though, for the lung, it's -- it's for a type S metal tritide, it would have to be quite a bit different than --

DR. MAURO: Yeah, because the --

MR. BIHL: -- the HTO.

DR. MAURO: -- the -- I guess the turnover rate, the effective half-life of tritium in the body is days, while the minimum of type S would be years and -- you know, it's a ten-year -- what is it, ten-year half-life? So I would imagine it would be quite a bit -- quite a bit difference.

MR. BIHL: Well, yeah, seven -- 700 days to -- to longer if it's a type S particle.

DR. MAURO: Yeah. Yeah, that could be important.

MR. BIHL: Yes, I would agree.

MR. FITZGERALD: And just to recap, it would be

up to the dose reconstructor on a case by case to determine when to assign say a type S metal tritide-based value?

DR. GLOVER: No.

MR. BIHL: Well, they run both. They would run type M and they would run type S, and whichever one comes up with the higher dose to the organ, that's what they would apply. You know, if it's the lung, it would be clearly type S. If it's one of the systemic organs it might be type M, but without running it -- you know, actually making the calculation -- I don't want to sit here and --

MR. FITZGERALD: Right.

MR. BIHL: -- try to guess.

MR. FITZGERALD: And going back to Ka-- one of Kathy's original questions, if you don't really have the record -- 'cause again, they couldn't really monitor for it so it's all surmising what people may have been exposed to -- is it just based on the CATI interview? I mean I'm just trying to get some sense of how you would know to even assign a potential, you know, type M or type S metal tritide dose. We're finding from other sites that really it's kind of --

you can't even get a classification by categor-- I'm sorry, by facility or operation. It's really worker by worker and whether or not they knew what they were handling. A lot of workers did not know that they were handling tritides, so it's a -- it's a, to me, a quagmire just to even know when to -- when to give credit for that potential exposure.

MR. BIHL: Well, in this case we know that the -- the -- the storage system that was the metal hydrides was in the tritium processing facility, so I -- and I don't know -- facility by facility, I didn't know so I just said if anybody's working in the 232-H, 233-H, et cetera, buildings, that we're going to assume they were exposed. And I calculated approximately how much that would be, based on surface contamination and resuspension and an assumption that 50 percent of the material was metal tritides, which I'm sure was -- was way high. I -- I'm sure that the metal tritides in the room was not anywhere near 50 percent of the total tritium, but I assumed it for the calculation and, you know, the doses come out a few millirem to ten millirem, so -- so there's

no need to sharpen the pencil, I don't think. They're pretty small doses.

MR. FITZGERALD: So it's a facility-specific judgment.

MR. BIHL: That was particular to these two (unintelligible) --

MR. FITZGERALD: To Savannah River, yeah.

MR. BIHL: -- or 23X-H buildings, yes.

MR. FITZGERALD: Okay. Yeah. Yeah. All right.

MR. GIBSON: You know, a secondary issue -- this is Mike Gibson. A secondary issue to these exposures or potential exposures that I know it don't affect the dose of record, but some group needs to look into also what type of metal these partic-- particulates these may have been and what toxicity could affect the lungs and may -- you know, it -- again, it doesn't affect the dose reconstruction, but there could be toxicity in these metals -- particles in the lung.

MR. BIHL: Perhaps, although -- this is Don Bihl again. You know, I think you've got to remember that tritium's got a very high specific activity and so, you know, it doesn't

take that many particles -- it -- it's kind of -- it's kind of doubtful that, in terms of grams of these particles, that there's, you know, anything even measurable if they weren't tagged by a radioactive material like tritium that has a high specific activity.

DR. MAURO: If you were taking -- this is John Mauro. If you were taking an air sample 'cause you're concerned about tritium -- tritium gas or tritiated water -- and -- but in fact some of that stuff that was airborne was metal tritide, you -- there would be no way for you to know that, you would just detect it in liquid -- you -- after you pull your air sample and you -- do you catch it -- I'm not sure how they did it in the old days, would catch it on silica gel and then liquid assimilation detection, you would just look at that beta in the window and you would say well, I've got some tritium here but I -- you don't know if it's tritide or it's -- or if -- tritium -- tritiated water, I guess. And I guess if it's tritium gas, you may not pick it up at all. Is that right? I'm just trying to -- thinking about the practicality of -- of knowing whether

you have this. And also is -- a tritide is not -- it doesn't -- it's not gaseous. Right? That's a -- that's a particle that's going to stay down, unlike tritiated -- I guess -- I'm -- I'm picturing if you -- you're handling gaseous tritium, not tritiated water, it'll convert to tritiated water pretty rapidly I guess in the air, oxidize, but -- and therefore you've got yourself airborne tritiated water vapor. But tritides don't do that, I assume. They -- they're going to more or less stay pretty much down, so when you -- when you modeled it, you -- you based it on surface contamination -- I'm just trying to get a picture of the scenario.

MR. BIHL: This is Don Bihl again. I used what I thought was a very claimant-favorable resuspension factor of ten to the fourth --

DR. MAURO: Oh, okay.

MR. BIHL: -- so you know, again, I kind of went ov-- went overboard to give them -- give these workers a heck of a lot of metal tritide, and the doses still come out to be millirem up to ten -- ten millirem or so a year.

DR. MAURO: How'd you get the surface

contamination to start with?

MR. BIHL: There was a limit for the facility they -- they controlled to a surface contamination limit of a million dpm per 100 square centimeters for tritium in the facilities.

DR. MAURO: Ah, okay, very good. Okay, I got it. And the resuspension factor you applied, I'm sorry?

MR. BIHL: Ten to the fourth.

DR. GLOVER: Minus fourth.

DR. MAURO: Ten to the minus fourth?

MR. BIHL: Yeah, ten to the --

DR. MAURO: Minus fourth per meter, okay, that's a high one.

MR. BIHL: Yeah. I purposely picked one where they're disturbing it pretty -- pretty heavily. They're working it pretty hard and kicking it up.

DR. MAURO: Right, you didn't do ten to the minus nine.

MR. BIHL: No, I didn't. Now you know, if they'd come up with rem doses to lung, then I might have kind of sharpened the pencil. But because the doses were low, I felt that I could

get away with ten to the fourth and -- and not worry about it.

DR. MAURO: And you assumed half of that was tritide.

MR. BIHL: One -- 50 percent, that's correct.

DR. MAURO: Okay, I got it. That -- Joe --

MR. FITZGERALD: Yes.

DR. MAURO: -- that sure sounds pretty --

MR. FITZGERALD: Yeah, we --

DR. MAURO: -- bounding to me.

MR. FITZGERALD: As I was saying earlier, we had less of an issue with the -- with the bounding analysis than we did with the question of what did we know was there and how did we know it and how do you actually come up with the -- the source terms for this. Just based on our interviews and looking at data, other sites, it was very difficult to establish the source term. But once you have the source term, I think we agree that what Don has done is a very conservative modeling approach to coming up with the estimate. So we don't have really an issue with that part of it, but we're still struggling with this first part and -- now I think for Savannah River, assuming that

the -- these facilities are pretty well demarcated and this is it for tritium handling of this sort and the presence of tritides, I think we're -- we're pretty satisfied. We still have a generic question of how you handle that at the various sites, though, so -- but I think as a going-in proposition, this -- this approach seems to be a pretty reasoned approach and claimant-favorable approach. So...

MR. GRIFFON: I guess the only outstanding question for me in that regard would be the -- still the who.

MR. FITZGERALD: Yeah.

MR. GRIFFON: I think you know the -- the facilities and -- but -- but I'm not sure how people worked at this site. You know, whether they were in and out of those buildings, whether it's going to be easily definable in a -- in a claimant's case.

MR. FITZGERALD: Let me give you -- give you an example of that --

MR. GRIFFON: You know, that they were in that building or not in that building for any extended period of time. I mean I don't know how the job ti-- you know --

MR. FITZGERALD: Yeah.
MR. GRIFFON: -- if it's that obvious or not.
MR. FITZGERALD: We -- we interviewed a worker at one of the other sites -- not Savannah River -- and just inadvertently found somebody who handled metal tritides as a key part of his activity. And I -- I guess I was taken by surprise. I thought it was more or less a by-product, but that was mainly what he did in glovebox environment. And when they changed out the gloveboxes, took material out of the gloveboxes, they did have releases. So you know, my -- my question is well, you know, how much, who else was doing this, how would you know -- there was no monitoring -- and, you know, I think if you establish that, then you can actually apply this model and I'm quite satisfied it's claimant favorable. But to get to that point I find a lot of difficulty when you don't (unintelligible) --
DR. MAURO: Joe, what you -- this is John Mauro again.
MR. FITZGERALD: Yeah.
DR. MAURO: What you just described is a scenario that's different than the one that was

modeled. In other words, what you're saying is okay, there -- there are multiple pathways by which a person might be exposed to these tritides. One -- the one that was modeled is -- is that there is this widespread contamination on surfaces that are maintained within the regulatory limit and therefore that would be bounding to that scenario.

What you just described is that there might have been a transient in a glovebox that where -- that's a whole different scenario where the exposures could have been substantially different than the one that was modeled. Is -- is that a scenario that is -- is that what we're referring to -- there's another scenario that certainly you -- could result in substantial exposures and -- and they -- and that theoretically may not be readily picked up in your bioassay program if it's a tritide 'cause that's -- would be locked up in the lungs, more or less.

MR. FITZGERALD: Yeah, perhaps, and -- and the other issue, though, is in the facility in question you did have tritium operations, so it gets real complicated.

DR. MAURO: Yeah, (unintelligible) --
MR. FITZGERALD: The individual may have been exposed preferentially to tritides, but you had a general background of tritium contamination so, you know, it's not clear you would even know. And I -- I think -- this may not be an issue for this particular case. It sounds like the model fits the exposure scenario and it's a pretty good clarity about which facilities are involved. But I think generically that's not the case at other -- other facilities. Now I don't know where you go with this. It's just a hard issue.
MR. CLAWSON: Dr. Wade, this is Brad Clawson.
DR. WADE: Yes, Brad?
MR. CLAWSON: I have to -- I apologize, but I've got some prior commitments. I have some transfers I have to make and I need to excuse myself at this time.
DR. WADE: Okay. Thank you.
MR. CLAWSON: I just wanted to let you know. Thank you.
DR. WADE: Thank you for your time.
MR. FITZGERALD: So if we can leave this issue, I just suggest that this has been very helpful

and I think we're reassured on Savannah River, though I think this needs to be clarified more in the TBD than it is now. I think a lot of this is not as clear as it could be. But we still are left with I think a general issue that we're going to have to revisit for Mound and Los Alamos, and maybe it's more of a source term question. How do you characterize who's exposed and where they're exposed when a lot of times even the workers weren't allowed to know they were dealing with this stuff because of security issues. So you really have a dilemma on that.

MS. ROBERTSON-DEMERS: Hey, Don, why did you exclude the tritium facility in 200-F? It was operated very early on.

MR. BIHL: That may have been ignorance on my part. I'd better look into that. What -- what facility was that again?

MS. ROBERTSON-DEMERS: I'm going to have to give you the exact number here in a (unintelligible) --

MR. BIHL: Again, if it operated really early on and shut down, then they -- they hadn't developed these metal hydride systems for

retaining the -- the hydrogen (unintelligible).
MS. ROBERTSON-DEMERS: That would be -- I (unintelligible) --
MR. BIHL: No, that was something that they -- they were proud of that they developed and implemented there in the mid-'70s. They were kind of bragging about having gone over to this. But if there's a facility out there that handled tritium but it al-- it shut down before the mid-'70s, then it wouldn't be an issue.
MS. ROBERTSON-DEMERS: Well, it -- it shut down well before the mid-'70s, I believe in 1956.
MR. GRIFFON: So they probably didn't have a tritide issue --
MR. FITZGERALD: Sounds like it.
MR. GRIFFON: -- on the site.
MS. ROBERTSON-DEMERS: Did you consider the formation of tritides from the presence of a lot of tritium in the reactors?
MR. BIHL: Well, my understanding -- and if Tom Labone is still on the call, he can speak to that as well -- but my understanding was at these heavy water reactors the HTO produced just swamps virtually everything there's so much produced. What little -- I mean I don't

know how you -- how tritides would be made in a reactor, but it certainly couldn't have been significant in terms of quantity or dose, that I could see.

Tom, do you want to speak to that?

MR. LABONE: I think that's pretty -- you know as much as I know about it. The -- you know, the -- the special thing about the tritium faci-- the handling facilities was the fact that they were intentionally making it by -- by using it to store the tritium gas, whereas -- I mean I'm -- I'm sure there's -- there's something around a heavy water reactor, but I mean the -- just the tritium water from the -- from the moderator and coolant itself is -- is going to, you know, predominate just everything, even the fission products that might be around.

MR. GIBSON: This is Mike Gibson again. What about the issue of naturally-occurring tritides just due to tritium settling into rust, as metal rusts, and then the workers go in and do D&D work and cut this stuff apart?

MR. LABONE: Don, I -- do you want to answer that or...

MR. BIHL: No, I don't want to answer that, do you?

MR. LABONE: Yeah, well, the -- my -- my feeling about it is it has to do -- theoretically, yes, it can happen. But it's a matter of specific activity of the material. If you -- here -- here again, on the one hand you have something being intentionally produced by a lot of tritium gas versus something that was incidentally produced by some tritium that may have been present in some form. So it's just a matter of, you know, what is the specific activity of the material that you have there. And that was a -- something that was chased around quite a bit, the rust and dust tritides, when we wrote the -- the good practice manual for -- for DOE on that. And I mean theoretically it could be there, it's just I -- you know, I -- I do not think it's a -- you know, as much of a hazard as when, you know, you're intentionally making it.

MR. GRIFFON: Tom, was there any conclusion in the DOE good practices manual with -- with that regard?

MR. LABONE: I don't recall 'cause -- you know,

we -- we wrote that thing and then it disappeared for a couple of years and then it came out all of a sudden. I don't recall it -- there's really not a whole lot you can -- you can do about it as far as, you know, trying to track it down. I mean you can do -- you can do -- take a smear survey and you can analyze it and -- but then you have to figure out what -- you know, do I -- am I looking at tritiated water on this swipe or is it a particulate, and so there -- you have to bake off the water and -- and then analyze it again, and I really don't know of anybody who -- who was doing that. To answer your question directly, I don't recall if -- if any conclusions were put in there on the rust and dust issue. I would have to go back and look. Exc-- except if you do -- if you do the math on this stuff, there has to be a lot of it around. I think -- I think I did a calculation for the back of that good practice manual and -- and again, this is from an operational perspective, not -- not a dose reconstruction, but I mean you had to have many, many curies of loose contamination around in order to produce doses of interest -- for --

for an operational program, again. I'm not saying that it's not worthwhile looking into for the reconstruction process, but you have to have a lot of it there. It's not a slight contamination issue.

COMMENT NINE: HIGH FIVE

MR. FITZGERALD: Okay. Can we move on to comment number nine? This is another facet to the high five issues that we raised in the report, and this one really gets to whether the -- the largest intakes were included in the database upon which the high five was derived, and I think we have some specific examples of where it appears there were a number that were not. That's -- that's the essence of the issue. And I think those examples are provided in the -- in the SC&A response.

DR. GLOVER: We actually looked up some of the -- there were -- anyway, that's probably -- I think we've discussed what the purpose of the high five is and... I know we -- we actually did look up some of the intakes and -- and compared -- these are actually the intakes that were confirmed by the site, is how that was actually put together, so -- where was that,

I'm just trying to -- yeah, Liz Brackett looked into this. Let's see -- (unintelligible) investigated the high results and noted that airborne levels at the time were low or they're not just false positives -- anyway, I think -- do we really -- is this a cl-- is this something we really need to actively --

MR. FITZGERALD: No, no, it's clarified -- one thing, we're getting into I think some of the secondary issues, ones of clarification, factual accuracy as -- I think this is in that context of --

DR. GLOVER: All right.

MR. FITZGERALD: -- we're trying to understand better whether or not -- how complete this database was and whether you verified or validated -- it sounds like you've done that since.

DR. GLOVER: Yeah, we've done some additional research, and again, these are confirmed intakes by the site, and so there may be incidental -- you know, air -- -- some information in there or in -- like in this case they actually went back and looked at the air monitoring data. They do not seem to support -

- but they didn't say it was a false positive, but they -- it didn't seem to support a -- but Liz Brackett I know went back and looked at the Tab 67 dose reconstruction. And so I think you've got some additional numbers in here that -- that perhaps weren't...

MR. GRIFFON: Do we have access to this database with the confirmed inta-- I -- I've heard that before, the confirmed intakes from the site. Is that on the O drive or this database that you're referencing, or --

DR. GLOVER: Does anybody -- does anybody know? ORAU te-- Tom -- or Don Bihl, maybe, or Tom LaBone?

MR. LABONE: The list from the registry, is that what you're asking for?

DR. GLOVER: This is a -- is it a registry or the confirmed -- let's say a confirmed --

MR. LABONE: (Unintelligible)

DR. GLOVER: Oh, okay.

MR. LABONE: It's not -- it's not your registry, you know, it's not the -- the Transuranic Registry.

DR. GLOVER: Right.

MR. LABONE: Yeah. Is that what you're asking,

a list of the people who had --

MR. GRIFFON: Yeah.

DR. GLOVER: Confirmed intakes.

MR. GRIFFON: Well, just the whole -- the whole database, whatever it contains, I guess the listing and the information on the exposures.

MR. LABONE: When I was at Savannah River we sent that to -- to NIOSH. Now I don't know where it resides at.

MR. GRIFFON: Sent it in electronic form or --

MR. LABONE: It's in -- it's in electronic form.

MR. SIEBERT: Yeah, Liz would know specifically where that was.

MR. GRIFFON: I would just ask if you can make sure that's posted on the O drive somewhere, that would be helpful, so we -- if you have it in electronic form, it must be on the server somewhere, so --

DR. GLOVER: We'll let you know where the location is.

MR. GRIFFON: -- maybe you could just point it out, where it is or what -- yeah. And then -- I guess you -- you indicated what confirmed intakes mean now. I -- I guess prior to this

meeting I was trying to understand that. I think now it's a little clearer that all the urinalysis data was hard copy. Ri-- 'cause I was trying to understand why -- why this type of model, and I -- now it's a little more clear --

DR. GLOVER: Yeah.

MR. GRIFFON: -- that you don't have -- database for all the data.

MR. FITZGERALD: But the confirmed database is that collection of -- of paper-based or (unintelligible) --

MR. GRIFFON: Right, right.

MR. FITZGERALD: -- based, I mean -- and you might have other information, but that's not the official --

MR. GRIFFON: Yeah.

MR. FITZGERALD: So I would assume you will find these exceptions coming from other sources if in fact the official database is this registry then. There sure certainly would be other information here, there and everywhere, but it's not official, so to speak.

MR. GRIFFON: Right.

MR. FITZGERALD: Okay.

MS. ROBERTSON-DEMERS: There are I think two sources that these came from, one of which is the Fault-Tree Database. But the other one is the three-by-five cards that dosimetry maintains, and it might be helpful for you if I faxed you one of them --

DR. GLOVER: That's fine.

MS. ROBERTSON-DEMERS: -- with -- with an example of an intake. And my concern is those that are not covered at all in the high five.

DR. GLOVER: Okay, we can look at them. A lot of times incident records -- when you have something, you make an initial estimate and they're often followed up and refined, but I'd -- so I'll have to see what you've got. That may be easier. Again, for the purposes of creating the high five, it has a very specific purpose and so -- not to get light in trying to -- what -- refine too greatly what we mean by the high five.

MR. GRIFFON: Can I -- can I ask, when -- when did that registry -- was that in place throughout the history of the site or did it start in a certain year? When was that initially...

DR. GLOVER: Tom, do you have any idea of when that was created?

MR. LABONE: Yeah, I don't know if you knew Roscoe Hall, or did you -- did you know him?

MR. GRIFFON: I've heard the name.

MR. LABONE: Yeah, he -- I guess he took over the internal dosimetry program in the early '60s there and -- and the registry -- when I -- when I got there in '86, what -- what it was was he -- he had books where he basically wrote down every incident that he was interested in. He said this -- you know, this incident -- this took place, this was the dose, and then when we switched over to the ICRP-30 models, we used that -- his -- his books basically, his notes, to -- to say these are all the intakes that we had and we went back and re-evaluated them in terms of -- at that -- at that time the new ICRP-30 models. And so that's how that whole database was constructed was from his notes he had kept since the early '60s. And prior to him was Marshall Sanders, who was there and I have no idea whether -- what kind of turnover was between the two of them, but you know, there were significant intakes in his list that

were there before he was, and so -- but -- but anyway, that's why -- and so, you know, if you say you have found one that you think is -- is larger than -- than another one that's in that list, then for some reason, you know, he -- he may not have -- have thought so at the time and did not put it in there or whatever. But that's the origins of that list. It was basically the tribal knowledge of all the interesting or significant events that happened while we were there. And in the -- the mid-'80s we kind of formalized it into say anybody who we think got over ten millirem committed (unintelligible) dose equivalent in the new system would go into that list. And so it was -- it wasn't so much of a judgment call. It was more of a formal -- you know, a dose number.

MR. GRIFFON: I guess what struck me, and I'm taxing my own memory here, but if I remember the high five correctly, a lot of the intakes were in later years. That's what surprised me. I thought a lot of the highest intakes would have been in the really early years, and I -- again, I'm going by memory from when I read

this site profile probably two and a half years ago.

MR. LABONE: Yeah, I -- I think if -- if you look at it, a lot of the -- the -- lot of the fission products may have been in later years, because early on they would have looked at those and said, you know, compared to the plutonium intake we just had, this really isn't much.

MR. GRIFFON: No, I doubt I was looking at fission products very much.

MR. LABONE: Yeah, well, at the -- most of the big plutonium intakes occurred in the '70s when we had, you know, the 238 campaigns and the -- and in the '60s from the weapons grade material. I think that they were -- they're pretty much uniformly -- they -- everything just pretty much dropped off in the '90s. I mean they were really --

MR. GRIFFON: Yeah, that makes sense.

MR. LABONE: Yeah, that -- they were -- I don't know if there are any on the high five from that time period, but -- we'd have to look at it to see are there any patterns, but fission products, I wouldn't be surprised if they -- if

they didn't have a lot of early ones on there.

DR. MAURO: This is John Mauro. Just a -- a ques-- a question of clarification for me. I understand that these are the average of the highest five for each radionuclide over the history that this program was maintained. But how many radionuclides are we talking about -- would that -- that you've averaged over the highest five of those?

MR. LABONE: I'm trying to remember -- you know, I wasn't involved with the development of this, but it was -- you know, plutonium-238, 239, 240, americium, neptunium, uranium-234 took care of all the uranium --

DR. MAURO: Uh-huh.

MR. LABONE: -- and then we had some various fission products like cesium, then strontium -- I'm -- I'm guessing probably eight or nine --

DR. MAURO: Okay.

MR. LABONE: -- radionuclides.

DR. MAURO: All right. And the -- the -- the other thing that might be interesting is the spread between -- for any given radionuclide, the highest and the lowest. For example, for example if they spread -- if the -- if the high

five covered three orders of magnitude and took the average, you could see that that would be an interesting average.

MR. SIEBERT: Well, all -- all the information on the Savannah River high five are in OTIB-1 --

DR. MAURO: Okay.

MR. SIEBERT: -- page 4, Table 1.

DR. MAURO: Okay, my apologies. I had not looked at that. But it's good to know it's there. I'll take a look.

MR. GRIFFON: Well, and -- and -- just -- I think we can end -- you know, I don't know whether we can go anywhere with this, but if you can just make sure that database is somewhere where we can --

MR. LABONE: Yeah, I --

MR. GRIFFON: -- it's been nice --

MR. LABONE: -- (unintelligible) looking for it on the O drive for you.

MR. GRIFFON: It's been nice when we've had -- in the last workgroups we've put everything under that AB review section, you can make a new folder for Savannah there.

DR. GLOVER: My only concern about doing that

is getting duplicated things that they find -- they think's had a -- are not getting updated when you make too many copies, but depending on the location, I'll see what -- what makes -- whatever work-- whatever works, so --

MR. GRIFFON: As long as we know where it is, yeah.

DR. GLOVER: Yeah.

MR. BIHL: This is Don Bihl. While we're on the issue of high five and we have Scott Siebert, we should probably go back to some of the questions we had earlier. I -- I don't remember them all myself, but they're probably in the notes. I think one of them was exactly under what circumstances were -- was the high five technique used, and how do you account for unmonitored dose to workers when the high five can't be used. There may have been some other questions, but we should probably have Scott answer those while -- while we've got him here.

COMMENT TEN:

MR. GRIFFON: I think that -- that even goes into number ten, Don, where the NIOSH response -- I had a question on that first line, but that -- yeah, I guess Scott, if you're on

there, maybe you can answer that question that Don just raised.

MR. SIEBERT: Generally speaking, I'm -- I wasn't over the group that was doing the cases where we'd use the high five most recently. I was doing the more complicated stuff. But generally speaking, what I remember is if we could throw the high five on it, whether they were monitored or unmonitored, we would try it first if it was going to look like a non-comp case. And then any positive bioassay that may be in the claim would be assessed separately and then thrown on top of that as well, just from a simplification, overestimating point of view.

DR. NETON: Scott, this is Jim Neton, I'm -- I'm not sure I'm understanding exactly what you're saying, or if I did I might not agree with that. I -- I think what happened was if there were bioassay results, the high five was allowed to be used as long as the projected bioassay results from the high five bounded the actual monitored results.

MR. SIEBERT: That's correct, but if we also had additional monitoring -- additional

positive bioassays that were above that, we could also assess those separately and throw that additional dose on top of the high five.

DR. NETON: Okay.

MR. GRIFFON: And -- and let me ask Scott, in the response to number ten in the document we're working from here, NIOSH response says this approach is used as an overestimate for people who were not monitored. And -- and you know, I -- I guess just to be clear here, you know, we were discussing it earlier and -- and it -- it was unclear to me whether it was -- you know, how do you determine people who were not monitored and shouldn't have been monitored or people who were not monitored and just kind of missed in the -- you know, in the scheme at the time. For example, you know, administrative people, it would seem if they didn't have monitoring records and they were in certain buildings then they, you know, didn't have monitoring records for a good reason, 'cause they didn't need to be monitored. But there could be other people who had no monitoring records but, based on their job description or areas, you know, should have

been monitored.

DR. GLOVER: Scott, I don't -- hey, Scott, I don't know if you have the benefit of the matrix in front of you.

MR. SIEBERT: Yeah, I just got it.

DR. GLOVER: Okay.

MR. GRIFFON: Oh, I'm sorry.

DR. GLOVER: That's okay, he has -- 'cause he wasn't provided as part of -- part of this comes up as the tank farm worker issues we've been discussing and were they appropriately monitored, and if you apply the high five approach for that worker type in an unmonitored situation, have you properly bounded it. So unfort-- you're going back several matrix issues later and I know you haven't had a chance to look at -- review it, but -- so if -- perhaps -- what I'd like to do is maybe --

MR. GRIFFON: Well, I think --

DR. GLOVER: -- Scott will be part of our oncoming -- and we're going to address all this in detail, Scott or somebody from Task V, so they'll be part of the next phone calls so as -- so we will make sure that these get answered appropriately.

MR. GRIFFON: So maybe if you -- just for clarification, Scott, it doesn't have to be now, but in the next meeting or whatever, you know, how you -- how you determine that if -- if...

MR. SIEBERT: Right, most -- generally most of the main things we'd be looking at is locations and external dosimetry records if they exist for the individual, and obviously the CATI.

MR. GRIFFON: And external dosimetry records, explain that to me. What would that --

MR. SIEBERT: Well, it would be --

MR. GRIFFON: -- that would be indicative of somebody who was likely to be exposed? Is that what you're saying or...

MR. SIEBERT: Whether they were actually monitored or unmonitored from an external point of view itself.

MR. GRIFFON: Okay.

DR. GLOVER: One thing that came up earlier, Scott, you -- the -- if I remember correctly, the SRS external monitoring is pretty detailed on where these people worked. Is that correct? Is --

MR. SIEBERT: Somewhat. However, most of the

codes that they used are not going to be decipherable as to area. Much of the determination as to where people were actually came from incident reports and internal dosimetry records.

DR. GLOVER: Oh, that's right.

MR. SIEBERT: But you're right, there were codes for external, but we've -- they weren't necessarily consistently used.

DR. GLOVER: It was the internal part that had the pretty detailed part of that.

MR. SIEBERT: Correct.

COMMENT ELEVEN:

MR. FITZGERALD: I think -- well, beyond that, the thrust of this comment actually has been pretty well addressed by the -- you know, the modification of IMBA. I think we were concerned about the -- the -- beyond just some questions on the technical nature which have been answered by high five, the use of the surrogate -- surrogate radionuclides, and that was addressed in the revision. So this one and number 11, I think both, are kind of resolved --

MS. ROBERTSON-DEMERS: Yeah.

MR. FITZGERALD: -- you'll be glad to hear, by the -- that change.

MR. GRIFFON: Oh, yeah, that --

MR. FITZGERALD: Right.

MR. GRIFFON: -- different ICRP. Right?

MR. FITZGERALD: Right, right. Just -- just the fact that -- the models used and the use of the surrogate I think were two hiccups that we had on those two, so those are both a leap forward on the matrix. I think both of them are addressed by that issue -- by that resolution, so 11 -- ten and 11. Right? Yeah, ten and 11. We can move on to 12.

THE COURT REPORTER: Well, how did we do 11?

DR. GLOVER: It was sort of -- the response was acceptable.

MR. FITZGERALD: We can start over if you want. We're getting ahead of the court reporter. Okay, that was ten and that was 11.

THE COURT REPORTER: And 11, okay.

MR. FITZGERALD: These really go fast now. This is the tail end of the observations.

MR. GRIFFON: (Off microphone) (Unintelligible) always go fast, yeah.

COMMENT TWELVE: ORO-NASAL BREATHING

MR. FITZGERALD: Number 12, actual-- I wish -- I wish Arjun was on the phone for the -- for the oro-nasal breathing issue, but I'll be the first to say that we have spent endless time debating the oro-nasal breathing issue --

MR. GRIFFON: Oh, yeah.

MR. FITZGERALD: -- and don't even want to talk any more about it.

DR. NETON: Well --

MR. FITZGERALD: It's a -- it's a generic issue being addressed --

DR. NETON: -- I was going to suggest that that issue is being evaluated as a complex-wide issue and we were hoping to get a draft report in our hands from our EG&G contractor folks by the end of this month sometime, at least a preliminary status, so...

MR. FITZGERALD: That's our understanding as well.

MR. GRIFFON: That was my only question was what was the status on the generic -- yeah.

MR. FITZGERALD: So we understand it's a generic issue, so we'll leave it at that and defer that particular point to -- to that one.

COMMENT THIRTEEN: REPORTING INCIDENCES

So that brings us to 13.
This gets back to reporting incidences. I don't know, Kathy, you want to elaborate on that one?
MS. ROBERTSON-DEMERS: Okay.
MR. FITZGERALD: This is the issue -- I think we've almost raised it at --
MS. ROBERTSON-DEMERS: At the (unintelligible) tank farm.
MR. FITZGERALD: -- most of the site reviews, yeah.
MS. ROBERTSON-DEMERS: We've also raised it under the tank farms issue earlier.
MR. FITZGERALD: I'm not sure how to take this because it's really getting down to how we treat incident -- incident reporting in the site profiles, and I think we've had this debate before and this was probably one of the earliest times we've raised this in a site profile review. So with that preface, I'm -- I'm pretty familiar with how we have debated that. I'm not sure what the resolution is, though. And maybe the resolution is the data bank is going to be the biggest source of that kind of information for the tank farms where I

think our biggest issue is at Savannah River.

DR. GLOVER: I think the tank farm question is where this has to -- you know, us showing that the calculations are claimant favorable or best estimates in those -- for those analyses.

MS. ROBERTSON-DEMERS: Have you all looked at --

MR. ALVAREZ: Well, I -- I just -- just for clarification, keep in mind that these data -- this database encompasses tank farms and probably the F and H areas, as well.

MR. GIBSON: Could the speaker please identify himself?

MR. ALVAREZ: Oh, Bob Alvarez, I'm sorry. The database that we examined encompasses -- encompassed the tank farm, burial grounds and F and H facilities.

DR. GLOVER: I was being generic in the terminology. You're right. I mean the calculations that we're performing are bounding, I guess, at SRS, so it goes back to that discussion we were having.

MS. ROBERTSON-DEMERS: Have you all looked into getting the special hazards investigations, which are actually more general health physics

incident reports? They don't always have names in them, but they do sometimes have names in them.

DR. GLOVER: I don't have anybody from Task III so I don't know.

MR. BIHL: Yeah, this is Don Bihl. We do have those now. We just got them. Kathy's right, they don't have names in them -- at least the ones I've looked at -- so we're not able to associate the incident with any particular people. I'm not sure what we're -- what we would do with those, Kathy. Are -- is there something you're expecting that we would do with those?

MS. ROBERTSON-DEMERS: I thought some of them had names in them.

MR. BIHL: Maybe you're right. I have not looked at every single one yet.

DR. NETON: This is -- this is Jim Neton. This is an issue that's been -- been surfacing. It surfaced a while ago and keeps reoccurring, that the site profiles do not include all incidents. And -- and we said from the very beginning that they were never intended to include all possible incidents. And in fact,

if we look at the way we've been doing dose reconstructions, we've designed a process that is essentially -- attempts to be incident-independent. That is, you take the worker's monitoring data, if monitored, and assess a dose that bounds any potential incidents that would have occurred in between those samples. Now if you have an unmonitored worker, you have to make a value judgment was he or was he not potentially exposed. If he was, then you pick something, like a coworker or some available data that you have that will assure the dose reconstructor at least that he has bounded those potential incidents as well with the available monitoring data. It's just not reasonable to me to -- to assume or to think that we could possibly find all incidents and get this project done in -- in the time frame that we're trying to do it. I think the approach we have adopted is -- is reasonable and reasonably bounding and is a fairly efficient way of moving these claims, and in fact is fairly claimant favorable. I just feel that -- you know, this -- this comes up time and time again, and I'm somewhat frustrated by

that, that you know, we don't have all the incidents. Well, we'll never have all the incidents. It's just not possible to do that.

MR. FITZGERALD: Well, I think we -- I prefaced my remarks by saying this is a -- first time this issue is raised, but we've had a lot of history of discussing this and -- and I think, again, if one can look at the data bank as the source of additional information for the tank farms where I think there's more concern there about the contribution, I -- I think we'd be satisfied with that.

DR. NETON: Right, I -- I agree with --

MR. FITZGERALD: I understand the broader question. This was (unintelligible).

DR. NETON: Yeah, I don't want to sound defensive or -- or nasty here, but I just -- this has been coming up in a number of other fronts, and -- and I do agree that if the source term is not understood very well, such as at the tank farm, I totally agree that that is a separate issue. But where we have what we believe to be adequate monitoring -- you know, bioassay data -- then I think -- I think we -- we've made a fairly good argument that -- that

we don't need access to all these incident reports. Not that we shouldn't look at them, if we have them, and review them. But the fact that we don't have the complete compendium of them shouldn't prevent us from moving forward dose reconstructions.

MR. FITZGERALD: I think we would concur with that.

DR. NETON: Okay.

DR. LOCKEY: This Jim Lockey. Can I ask a question about that? Could -- since -- since you have an incident data bank at Savannah River, which I take it is not what you have at other facilities -- is that correct?

DR. NETON: Are you talking about the dose -- what did Tom refer to it as, the --

DR. GLOVER: Registry.

DR. NETON: -- registry or whatever? Yeah, that -- that's -- well, that's somewhat unique in the sense we have that. But we also, as Mark pointed out, we don't have a computerized database of the bioassay records, either, at Los Alam-- at Savannah River, but -- but it is unique.

DR. LOCKEY: What I wa-- since that's unique,

what I was wondering is -- I'm just throwing this out -- could that be used as a test to verify that the technique that you're using at other facilities in relationship to incidents is a valid technique? Could you -- could you go back to Savannah River and reconstruct as if you don't have an incident database and then test it against the database to see if in fact (unintelligible) --

DR. NETON: I think there's some work that we could do there, and -- that's a good suggestion and it's one -- one way to get at this. I think another way is to do some sort of sampling of the actual data itself, pull some cards and -- and look at these records. We've done -- done this, for example, in the construction worker area. We've actually polled bioassay records -- and I've forgotten how many now, but you know, hundreds of bioassay records for construction workers and hundreds of records for the -- the -- all monitored workers and compared them and were able to make some inferences about the -- we think the levels of exposures that -- that may have occurred and the differences between those

two populations. So I think with some selective polling of the data -- in fact, we have computerized, I think, all of the data for the claimants in this program. So you know, we have -- I forget the number now, but there must be somewhere around 1,200 or more Savannah River cases where we've asked for and received bioassay data that have already been entered. It seems to me that there's something we could do with that, as well. I'm not exactly sure how to go about it best yet, but -- but there is some -- some more fine-tuning I think that needs to be done.

DR. LOCKEY: If you had a way of verifying that your technique is in fact valid based on the incident database, that could put this issue to rest, couldn't it?

DR. NETON: Well, although what you've heard here is some -- some uncomfortableness with the completeness of that incident database, it is essentially a -- a convenience database that was maintained by dosimetrists for their use and has not really ever been purported to be the complete compendia of -- compendium of all incidents, so we have to be careful there. But

I think there's something that could be made out of it and I -- I just -- I get uncomfortable when people say we have to have all the incident reports, I guess.

MR. GRIFFON: I was out -- out of the room, but I just -- from being at so many of these workgroup meetings, I think I know what Jim --

DR. NETON: You probably could have finished my little speech, yeah.

MR. GRIFFON: -- was speaking of -- yeah, yeah. We have been around the block with the incident issue.

DR. NETON: Yeah.

MR. GRIFFON: But the -- the only thing that -- that -- and this is coming a little more clear to me at this meeting, I -- I don't think I would have disputed this earlier, but now I question -- you -- you said that you have good bioassay data for Savannah River, and I'm not sure I understand the basis of that statement now because you don't have a databa-- in the past you've always reviewed databases and said, you know, we sampled -- you know, it was clear that the program was sampling this percentage of people for these time periods, they were

monitoring for different radionuclides. We don't have the --

DR. NETON: No, what I --

MR. GRIFFON: -- we don't have the benefit of being able to analyze that here, do we, because you don't have --

DR. NETON: If I said we had good bioassay records, I didn't -- I didn't mean a good bioassay database.

MR. GRIFFON: No, no, no, you didn't say database, but you said you --

DR. NETON: What I -- what I meant was we do receive bioassay results for a large perc-- large number of these workers. I don't know the percentage off the top of my head, but if we have bioassay records for a worker, and even if he was sparsely monitored -- for example, annually -- one can take that plutonium result or that uranium result and put a upper bound that would bracket any potential incident that he may have been involved with because his -- his bioassay record speaks to his past exposures.

MR. GRIFFON: But I guess that's --

DR. NETON: And that's what we intend to use.

I mean so to -- to say that this worker who was monitored, we don't have all the incident data for him, we say well, it's probably not necessary to have that. It'd be good to have, but not necessary.

MR. GRIFFON: But -- but I guess that's my question, is -- for the -- and I guess most important for the claimant, some of the same questioning we've asked on other sites, you know, what percentage of claimants have you found have bioassay records, at least enough to bound like you're saying?

DR. NETON: Right, I think -- I think the question that's emerging --

MR. GRIFFON: (Unintelligible) close to 100 percent on -- on that or...

DR. NETON: Oh, I don't know.

MR. GRIFFON: You don't -- yeah.

DR. NETON: But -- but the question really is, if you -- if you have monitored workers, I think -- I hope we're in agreement that we can move those forward and incidents may appear not to be relevant necessarily, or useful. Now you have the high five approach that is applied to people who were not monitored, did not appear

to have to be monitored, and I hope that we can convince people that those are bounding estimates for that group of workers. What's left in the middle here is the unmonitored workers who probably -- who should have been monitored, in our judgment, and we have a hole there. And honestly, from this discussion it's not clear in my mind exactly how we're handling those, and we need to come to the table with that approach and --

MR. GRIFFON: We're on the same page.

DR. NETON: -- we'll do that. So I -- I don't disagree that we have some holes here, but I guess I got off on my little soap box about the incidents and got carried away.

MR. FITZGERALD: I just want to remind everybody, this was a year-and-a-half-old issue.

DR. NETON: Yeah, that's why I get frustrated.

MR. FITZGERALD: And in the context of today's discussion, we're perfectly happy to see the tank farm registry data actually be accessed and that's as far as we'd see it. So again, I think we go backwards in time on some of these issues. We're going backwards on our

understanding of where things were.

At any rate --

MR. GRIFFON: I think just to clarify -- I think there's two different databases. There's this tank farm incident data and then --

MR. FITZGERALD: Right.

MR. GRIFFON: -- there's the --

MR. FITZGERALD: That's what I thought.

DR. NETON: Registry data.

MR. FITZGERALD: Registry.

MR. GRIFFON: -- registry Tom LaBone's -- sort of intake registry, yeah.

DR. NETON: Right, right. That was the -- that was the genesis of our -- source document for the high five approach, the registry data.

MR. FITZGERALD: And again, we're getting into the tail end of the observations on that site profile, so these are -- a lot of these are just clarification issues.

COMMENT FOURTEEN:

And number 14 -- we can move along -- is exactly that, that as -- as we're going through this it seemed like there were additional sources of -- particularly neutron dosimetry information that did not seemingly get

addressed in the site profile, and from a -- again, from --

MS. ROBERTSON-DEMERS: (Off microphone) (Unintelligible)

MR. FITZGERALD: -- from the standpoint of just providing some references -- providing some references for that additional information. Kathy?

MS. ROBERTSON-DEMERS: Actually it was Savannah River's problem. When I went down there for site expert interviews --

MR. FITZGERALD: You need to speak up.

MS. ROBERTSON-DEMERS: -- some -- probably two years ago, I was told by the records person at the time that he was not providing the pages from the neutron log books for 1963 through 1972 because they had not been pulled back from the archive. He did not have them in his possession. And this is just simply telling you there's data out there, and if one of your criteria for assigning missed neutron dose is does a person have neutron dose, well, this log sheet may tell you that. It's just really additional information.

DR. GLOVER: Are you saying that it's --

MS. ROBERTSON-DEMERS: That is --
DR. GLOVER: -- not contained in their annual report?
MS. ROBERTSON-DEMERS: That is not given to you.
MS. THOMAS: It's not submitted as a part of the DOE submittal is what you're saying --
MS. ROBERTSON-DEMERS: Right.
MS. THOMAS: -- it's in the archive and --
DR. GLOVER: Maybe a specific --
MS. THOMAS: -- or it's not convenient --
DR. GLOVER: -- request to pull it.
MS. THOMAS: -- for them to...
MS. ROBERTSON-DEMERS: Now this was two years ago when we had talked, and I did try to get ahold of the records person to verify that this was still the case, but he must be on vacation.
MR. SIEBERT: This is Scott. I have a quick question there. Did that mean it also would not show up on the HPAREA annual results?
MS. ROBERTSON-DEMERS: It depends upon whether they terminated in 19-- prior to 1979.
MR. GRIFFON: If it terminated prior to that, wouldn't show up; is that what you're saying?
MS. ROBERTSON-DEMERS: Right. HPAREA, in

general, is for those who terminated from 1979 forward. Assuming that you're talking about the 1999 version.

MR. SIEBERT: That just surprises me because I've seen many cases where a person has HPAREA results only for like the '50s and '60s, but I -- I could be just misremembering.

MS. ROBERTSON-DEMERS: That's why I said in general, because there are -- there are people in there who terminated prior to 1979. There are --

DR. GLOVER: So you're saying there's a potential source of information that would not be in HPAREA for neutron monitoring. Okay.

MR. FITZGERALD: And the references are pretty specific, so I think you could probably make the request and track it down.

MR. GRIFFON: Right.

MS. ROBERTSON-DEMERS: And those T numbers I believe are box numbers. Or record numbers.

MR. ALVAREZ: So am I to assume that -- this is Bob Alvarez -- that the bioassay data or data that is centralized is not based on the review of the bioassay log books?

MR. GRIFFON: You -- you're talking bioassay

now? We're talking neutrons.

MR. ALVAREZ: Yes, bioassay.

MR. GRIFFON: You're back to bioassay? I think the bioassay registry is based --

MR. ALVAREZ: Well, I heard that was based on the collection of -- of exposures of interest of an individual who was a senior figure in the health physics program, but what I'm getting at is, you know, at Mound the -- Mound Laboratory the bioassay program was pretty much reconstructed on the basis of the log books and am I to understand that the data you're using is not based on actual compilation of the log books?

DR. GLOVER: They're from a series of cards, if I remember -- correct, Scott? The actual -- the people have a series of bioassay cards that record all their plutonium and tritium and -- and uranium exposures.

MR. SIEBERT: That's correct.

MR. GRIFFON: That's what's in the individual files.

DR. GLOVER: Right, we get the original copy that was written down.

MR. ALVAREZ: I see.

DR. GLOVER: So those are all just hard copy records.

MR. GRIFFON: So -- I was just going to say this -- I mean this seems to be ten years of potentially missing neutron data. That seems like more than an observation, to me -- potential (unintelligible) --

MR. FITZGERALD: Well, it was -- it was an observation about the completeness of the records that were being accessed.

MS. ROBERTSON-DEMERS: Being provided.

MR. FITZGERALD: Yeah.

MR. GRIFFON: Right.

MR. FITZGERALD: Yeah, the distinction between the primary findings that we've made were ones that had direct influence (unintelligible) dose reconstruction. Some of the factual accuracy and completeness issues we've put in as observations, and this is how this one's listed.

DR. WADE: All right.

MR. FITZGERALD: But it sounds like it's fairly straightforward. We'll assume that -- that NIOSH can report on what happened on this.

COMMENT FIFTEEN: GUIDELINES

For number 15, those who know Hans Behling will recognize this finding from way back when, which gets to the difficulty in terms of going through the guidelines and -- and impenetrable, complex array of guid-- again, I think we've covered that, Task III. Hans has -- I think has sated his concerns in the task he's been working in for a year and a half, so we think this has definitely been overtaken, but it was an issue a year and a half ago -- almost two years ago now.

MR. GRIFFON: Your last line is correct there I think, deferring it to the --

MR. FITZGERALD: Right.

MR. GRIFFON: -- dose reconstruction procedures review.

COMMENT SIXTEEN: CONSTRUCTION WORKERS

MR. FITZGERALD: We'll certainly defer it to the procedural reviews that are going on, and likewise, on number 16, at the time -- again -- we were concerned about the issue of construction workers, and we understand better now that that's been a special activity that's been going on. I don't know, is it -- I guess it's still going on now.

DR. NETON: Yeah, I've been saying this for a while, but its release is imminent. That's my story and I'm sticking to it.

MR. FITZGERALD: We're not pressing.

DR. NETON: Yeah. Well, I'm expecting something today or tomorrow, another revision, so...

MR. FITZGERALD: Okay.

MR. GIBSON: Does anyone have anything else?

MR. FITZGERALD: I guess as far as overall, revisiting the matrix I guess would be the only way to keep sanity in this process, just given the -- the length of time. How do you want to proceed on that?

DR. GLOVER: (Unintelligible) -- I'm sorry?

MR. FITZGERALD: Just trying to update the matrix and just trying to address these issues -- just process those questions.

MR. GIBSON: I'll try to go ahead and update the matrix as far as a separate column of what I think we've accomplished today, and I'll e-mail it out to the different parties and you guys can give me your comments and we'll revise it and go from there, and then send out a final to everyone else, if that's acceptable.

MR. ALVAREZ: May I just -- this is Bob Alvarez. May I ask one other thing? There is a paper that is I think going to be published, if not recently published, from University of North Carolina looking at the -- evaluating external radiation exposure records at Savannah River Site. And this -- I -- I have a pre-publication draft, but if I recall -- I'm looking it up right now -- there -- there were -- I think these researchers found -- yeah, 15,752 annual dosimetry records in historical log books that were not included in HPAREA. Now this is -- I need to talk to the authors to make sure this is published, but this is by Richardson, Wing and Daniels from the University of North Carolina and this was done (unintelligible) with NIOSH.

DR. NETON: Yeah, I have -- I -- I am aware of this publication coming out and, you know, we need -- we need to address these issues when they're surfaced, but I think -- you know, we need to look at HPAREA versus also what we get from the hard copy records from the site and -- it's not clear to me from what they found how relevant it may be to dose reconstructions that

were conducted.

MR. ALVAREZ: No, I'm just simply mentioning it for purposes of information.

DR. NETON: No, I understand.

DR. WADE: Thank you.

MR. GRIFFON: And -- and for those of us who are just coming up to speed on the data sources for Savannah River, HPAREA -- or I've been calling it HP area, but I guess it's HPAREA --

MS. ROBERTSON-DEMERS: Actually that's -- that's the annual historical reports, H -- well, they were in the process of changing it over when I was down there, but they had HPRAD, which was supposed to contain bioassay data and external data, and HPAREA is just simply a historical file spun off every year and compiled.

MR. GRIFFON: Now the -- the HP -- oh, I see, H-P-A-R-E-A, area, whatever, that's on the O drive -- it seems to me that has claimant information only or -- or is it site-wide data or what is it?

MS. THOMAS: I think if it's on the O drive it contains data for all --

MR. GRIFFON: (Unintelligible)

MS. THOMAS: -- no --
MR. GRIFFON: Oh, for all.
MS. THOMAS: -- the claim data would be in individual -- in claim files in NOCTS, so if it's on the O drive, it's probably the entire database, which would be people who -- you know, cla-- Energy employees and --
MR. GRIFFON: Okay.
MS. THOMAS: -- all Energy employees, whether they've filed claims or not, is what I'm trying to say.
DR. NETON: We need to verify what's -- what's -- what that is. Sam, --
MR. GRIFFON: Yeah.
DR. NETON: -- could you make sure we know what that is?
DR. GLOVER: (Unintelligible) what's on...
DR. NETON: I know at one point -- I know at one point we -- we imported the Health Energy Research Branch's HPAREA data files into OCAS. And to what extent they were transported onto the O drive, I'm not certain. We need to make sure we understand what's there. It could -- it could be that, but I've always -- I've -- I've learned not to assume anything these days.

DR. WADE: And Mike, next steps, once you get that out, are you thinking of a meeting sometime in the future or...

MR. GIBSON: That, or possibly a phone call before the September Board meeting so we could have -- you know, update the Board.

DR. WADE: Okay. With a likely report to the Board then from this working group in September.

MR. GIBSON: Hopefully, if that wouldn't be over-reaching.

DR. NETON: I know Sam is new to the process. I'd like to also encourage the use of the -- sort of the minutes version -- conference call -- the technical conference calls to -- to deal out -- deal with very specific issues are okay to have without the full court reporter as long as the issues are well-defined and dealt with and minutes are taken. Sometimes those are very helpful to deal -- I think some of the issues that's come to mind here are maybe this -- the database for the --

DR. WADE: Tank farm.

DR. NETON: -- tank farm issues and maybe the high five approach. Those are some very

specific technical issues, and maybe tritides, that could be discussed inside. Of course Board members are welcome to participate or sit in on these calls, but not oblig-- obligated to. We -- we've had very good luck with those in the past at the -- I know the Y-12, we did several of those, at Bethlehem Steel we did some and they're -- they're very good technical -- down and very nitty-gritty technical exchanges.

DR. GLOVER: That's a good idea.

MR. GIBSON: Once I get the -- the matrix updated and sent out to the -- the parties and you guys give your responses, maybe you can help me decide whether we think we need another face-to-face meeting or whether a phone call would be sufficient.

DR. WADE: Very good.

MR. GIBSON: Other than that, anyone has anything else, I'd say we're finished for the day.

DR. WADE: Yeah, that you all very much.

DR. GLOVER: Thanks to everybody from ORAU.

(Whereupon, an adjournment was taken at 3:30 p.m.)

CERTIFICATE OF COURT REPORTER

STATE OF GEORGIA

COUNTY OF FULTON

I, Steven Ray Green, Certified Merit Court Reporter, do hereby certify that I reported the above and foregoing on the day of August 22, 2006; and it is a true and accurate transcript of the testimony captioned herein.

I further certify that I am neither kin nor counsel to any of the parties herein, nor have any interest in the cause named herein.

WITNESS my hand and official seal this the 29th day of September, 2006.

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STEVEN RAY GREEN, CCR

CERTIFIED MERIT COURT REPORTER

CERTIFICATE NUMBER: A-2102