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

FERNALD

The verbatim transcript of the Working Group Meeting of the Advisory Board on Radiation and Worker Health held in Cincinnati, Ohio on October 24, 2007.

STEVEN RAY GREEN AND ASSOCIATES
NATIONALLY CERTIFIED COURT REPORTERS
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C O N T E N T S

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TRANSCRIPT LEGEND

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

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

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

-- “^”/ (inaudible)/ (unintelligible) signifies speaker failure, usually failure to use a microphone or speakers speaking over each other.

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

(By Group, in Alphabetical Order)

BOARD MEMBERS

ZIEMER, Paul L., Ph.D.
Professor Emeritus
School of Health Sciences
Purdue University
Lafayette, Indiana

EXECUTIVE SECRETARY
WADE, Lewis, Ph.D.
Senior Science Advisor
National Institute for Occupational Safety and Health
Centers for Disease Control and Prevention
Washington, DC

MEMBERSHIP

CLAWSON, Bradley
Senior Operator, Nuclear Fuel Handling
Idaho National Engineering & Environmental Laboratory

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

PRESLEY, Robert W.
Special Projects Engineer
BWXT Y12 National Security Complex
Clinton, Tennessee

SCHOFIELD, Phillip
Los Alamos Project on Worker Safety
Los Alamos, New Mexico

IDENTIFIED PARTICIPANTS

ABITZ, RICHARD J., FORMER SITE GEOCHEMIST
ADAMS, WELDON J., FORMER ASST. PLANT MANAGER, FMPC
BALDRIDGE, SANDRA, PETITIONER
BALLART, TERESA
BEHLING, HANS, SC&A
BEHLING, KATHY, SC&A
BRACKETT, LIZ, ORAU
BURGOS, ZAIDA, NIOSH
CHEW, MELTON, CAI
ELLIOTT, LARRY, NIOSH
FAUST, LEO, ORAU
HOFF, JENNIFER, ORAU
HOWELL, EMILY, HHS
KENT, KAREN, ORAU
KISPERT, BOB, FERNALD EMPLOYEE
MAKHIJANI, ARJUN, SC&A
MAURO, JOHN, SC&A
MAY, MARY P., CLAIMANT
MORRIS, ROBERT, CAI
POTTER, GENE, ORAU
RICH, BRYCE L., CAI
ROLFES, MARK, NIOSH
SHARFI, MUTTY, ORAU

P R O C E E D I N G S

(9:00 a.m.)

WELCOME AND OPENING COMMENTS

DR. LEWIS WADE, DFO

DR. WADE: This is the work group conference room. We're about to begin. If I could ask someone out there to acknowledge the fact that you can hear my voice.

DR. MAURO (by Telephone): Hi, Lew, it's John Mauro. I can hear you very clearly.

DR. WADE: Okay, thank you.

And as we go through our introductions if there's anyone out there who has difficulty hearing anyone around this table by virtue of how they make their introductions, please let us know, and we'll try and adjust the equipment.

As I said, this is Lew Wade, and I have the privilege of serving as the Designated Federal Official for the Advisory Board. And this is a meeting of a work group of the Advisory Board. This is the work group that looks at the Fernald site profile and SEC petition.

Ray, are you ready?

COURT REPORTER: Yes, sir.

DR. WADE: Then that group is chaired by Brad Clawson, members Griffon, Ziemer, Presley and Schofield, and all of those individuals are present at the table.

I would start by asking if there are any other Board members who are on the call by telephone?

(no response)

DR. WADE: Are there any other Board members on the call?

(no response)

DR. WADE: Okay, so we do not have a quorum of the Board which is appropriate for a meeting of the work group. What I would suggest we do is go around the table and introduce those of us around the table. And please, if you have a conflict with regard to Fernald, please identify that, particularly members of the SC&A team, members of the NIOSH and ORAU team identify. Then we'll go out into telephone land and have introductions made also with conflicts identified. Then we'll have a little bit of a talk about

telephone etiquette, and then we'll begin the deliberations.

So again, this is Lew Wade. I work for NIOSH and serve the Advisory Board.

MR. CLAWSON: I'm Brad Clawson. I'm the work group chairman, no conflict.

DR. BEHLING: Hans Behling, S. Cohen and Associates, no conflict.

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

MR. ROLFES: Mark Rolfes, NIOSH Health Physicist, I have no conflicts.

MR. CHEW: Mel Chew with the O-R-A-U team, no conflict.

DR. ZIEMER: Paul Ziemer with the Board, no conflicts.

MR. SCHOFIELD: Phillip Schofield with the Board, no conflicts.

MR. RICH: Bryce Rich with the O-R-A-U team, no conflict.

MR. MORRIS: Robert Morris, O-R-A-U team, no conflict.

DR. MAKHIJANI: Arjun Makhijani, SC&A and CDC has said that I have a conflict.

MR. PRESLEY: Robert Presley, Board member,

I have no conflict.

MS. BALDRIDGE: Sandra Baldridge, petitioner.

MR. ADAMS: I'm Weldon Adams. I'm a former Assistant Plant Manager at Fernald.

MR. KISPERT: Robert Kispert, former long-term employee at the Fernald site.

MR. ABITZ: Richard Abitz, former site geochemist at the Fernald site, no conflict.

MS. HOFF: Jennifer Hoff, ORAU team, no conflicts.

MS. KENT: Karen Kent, ORAU team, no conflict.

MR. SHARFI: Mutty Sharfi, ORAU team, no conflicts.

MR. ELLIOTT: Larry Elliott, NIOSH, I have no conflicts.

DR. WADE: Thank you.

Let's go out onto the telephone. I guess I would ask for other members of the NIOSH or ORAU team who are on the line to identify themselves.

MR. FAUST (by Telephone): Leo Faust, ORAU team.

DR. WADE: Could you make a comment as to

conflict, please?

MR. FAUST (by Telephone): No conflict.

DR. WADE: Thank you.

MR. POTTER: Gene Potter, ORAU team, no conflicts.

MS. BURGOS (by Telephone): Zaida Burgos, NIOSH.

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

(no response)

DR. WADE: How about members of the SC&A team?

DR. MAURO (by Telephone): John Mauro, SC&A, no conflict.

MS. BEHLING (by Telephone): Kathy Behling, SC&A, no conflict.

DR. WADE: Other members of the SC&A team?

(no response)

DR. WADE: Are there other federal employees who are on the call by virtue of their employment?

(no response)

DR. WADE: Any other federal employees with us?

(no response)

DR. WADE: Do we have any other petitioners, representatives, workers who are on the call who would like to be identified?

(no response)

DR. WADE: Members of Congress or their staffs?

(no response)

DR. WADE: Is there anyone else participating who would like to be identified for the record?

(no response)

DR. WADE: We have one new attendee.

Could you identify yourself?

MS. HOWELL: Emily Howell, HHS.

DR. WADE: Again by way of telephone etiquette, again, some simple rules will help us do our business. Please, if you're speaking, speak into a handset and try to disdain the use of a speaker phone. If you're not speaking, mute whatever you can that's around you.

And again, be mindful of background noises that might be second nature to you but could be very distracting to people that are on the call. I think we're doing much better

with regard to our telephone etiquette, but please keep those simple rules in mind so that the Board can make its, the work group can make its deliberations open to those on the telephone. I think that goes well to the issues of transparency.

So Brad, it's all yours.

INTRODUCTION BY CHAIR

MR. CLAWSON: Well, first of all I'd like to make sure if everybody's got the new matrix that we're going to be working to today.

As you know, the last time we met we went through the preliminary responses from SC&A. Unfortunately, I don't think that we really felt that we gave Hans enough time to be able to discuss some of those things. But as we're coming into this, we'll just start from the very first of it and continue on down through it.

Hans, if you want to –

SITE PROFILES, PER'S, SEC REVIEWS DISCUSSION

DR. BEHLING: Yeah, I hope by this time everyone has had a chance to review our review of the SEC petition. And one of the key features that I want to point out is that in

most of the statements and findings that I made, I used documents that reflect memoranda and other official documents that were part of the record including documents that were contained in the SEC petition itself.

So to notice that most of the comments that are made in the form of findings reflect issues that reflect documents that are part of the official record. And I say that because I want to divorce myself from any kinds of bias in a sense where I'm not interpreting things. And for that reason this particular review may be somewhat different from previous reviews.

It may be more lengthy than previous reviews because I incorporated a lot of exhibits, and exhibits that identify certain statements that I found to be an issue and stated as such. And for the convenience of the reader, most of the exhibits that I incorporated into our review, I underlined or highlighted key statements that reflect the particular finding.

And I hope everyone's had a chance to read them because some of the issues are quite complex, and they do, in fact, need to be

looked at in very careful terms. And part of that review should be the exhibits that are incorporated in the report itself.

I also want to say the last time when we met we were somewhat surprised because the opening statement made by Mark was that we, NIOSH, was in the process of revising many of the things that are part of the TBD as well as the SEC. And having said that I was somewhat at a loss to figure out how to approach our discussion because of the changing in the dynamics by which this TBD and SEC was being reviewed.

And so I guess today we're looking at a new matrix that may have a lot of different responses that were not addressed in the first go around. In fact, I was almost thinking that I was going to get a new or revised site profile that would accompany some of these changes.

And I guess that would be my first question to Mark as to whether or not there will be a revision to the TBD for Fernald.

MR. ROLFES: Yes, there's certainly going to be a revision to the Fernald Technical Basis

Document. ^ a direct copy has been made available to the Advisory Board for the environmental intakes, and that incorporates information regarding the internal exposures from K-65 venting of radon as well as other things that have been discussed previously. That's for the Advisory Board's review. It is not a final copy for distribution and use in dose reconstructions at this time though.

In addition, there's going to be a revision of the internal dose TBD coming out relatively soon. I believe one of the key pieces of information that we are waiting on for finalization was the coworker modeling. And the coworker model is, I believe, in its final stages. So as soon as that is completed I believe it will be released in a revised internal dose TBD.

Do we have any, is there an external TBD question at this time?

MR. CHEW: Yes, there is a draft external TBD with some additional information in it.

DR. BEHLING: And I have at this point reviewed many of the documents that have been put out on the O drive with the expectation

that those data will be used to perhaps revise some of the TBDs for environmental, internal, external. Am I correct?

MR. ROLFES: We have prepared many white papers, and there are white papers that are available with the sample dose reconstructions that were provided back in February during the first meeting of the Advisory Board when the Fernald SEC evaluation was presented. Many of those white papers have, in fact, been working documents. They are going to be incorporated into the internal dose TBD as well. So when we have a methodology and a white paper, it gets incorporated into the final approved version of the TBD.

DR. BEHLING: And the reason I ask this because we're going back and forth. Now I understand the dynamics of the site profiles and all the other documents, the nature of revising them as we go along. But it does complicate matters in tracking the issues. I think we heard yesterday in the Congressional hearing the issue of what's taking so long.

But it's always the question of how many times do we go back and forth before we

come to the final end product that says this is our best and final. SC&A go ahead and review this, and whatever criticism we can now talk about in terms of resolving these findings. And as we're going along here, we find ourselves going back and forth, and we realize we're never at the end because as we're talking right now, we're obviously informed that there's going to be another revision to at least three of the TBDs for Fernald, and I'm not sure we're going to be in a position to address them today.

MR. ROLFES: This process is not a one-shot process. It's a living document, and when we receive new information about exposures that we didn't previously have, we want to make sure that we incorporate that information into the site profile so that we can give credit to the people for whom we're doing dose reconstructions.

We want to make sure that when we have to turn down a compensation claim, that we have given that person every shot that we can. So in order to do that we want to make sure that we have a living document that we can

revise at any time.

DR. MAKHIJANI: Mark, could I ask a question about that? We've understood from the beginning that site profiles are living documents, and you prepare them as fast as possible, and you're constantly reviewing them internally, and then you publish. I've not understood until now that evaluation reports are living documents. Is that part of the implication?

MR. ROLFES: I don't believe I said that.

DR. MAKHIJANI: Well, because this is being addressed in the context of an evaluation report. I mean, understanding that it has implications for the site profile, but these revisions are being made in response to Hans' review of the evaluation report.

MR. ROLFES: Sure. Certainly, in many of the issues we're discussing, really NIOSH's opinion is that these are not SEC issues but issues that affect how we complete a dose reconstruction.

MR. ELLIOTT: The program evaluation report is triggered by a change that we make in our dose reconstruction methodology that would

result in an increase, a potential increase in the dose estimate. And so when we arrive at that trigger point, that's when we would set forward a program evaluation review and a report.

DR. MAKHIJANI: Yeah, Larry, I completely understand, and I'm in agreement. As you know we've worked this process for some years, and we're in agreement that that's a good process. That when you're doing dose reconstructions, you should have the best, most recent, the widest scope of information to have a fair process. And then you have your PERs which I think are very responsive to that question.

But the confusion in my mind arises because this is occurring in the context of an SEC. We had an ER, and we completed a full review of that ER. We had a site profile review. We completed a full, the site profile, we completed a full review of that. Many of those issues are overlapping. But it seems like --

I mean, I don't know, Brad, we're just seeking some clarity because John -- I mean, correct me if I'm wrong -- John and I had some

discussions about this, and I've also discussed this in the context of Hanford with Jim Melius. And I, myself, am not clear what the Board and the working groups are asking us to do because are we to wait in terms of the SEC process until NIOSH is done or are we to go on going back and forth as if this is a site profile review?

I'm very confused. As SEC task manager trying to figure out how to approach this, it would be helpful to have some guidance from the Board.

DR. MAURO (by Telephone): Arjun, I think you clearly articulated some of the discussions we've had. And I guess we're looking to the working group and to the Board -- this is John Mauro -- as to are we engaged in a process now, and that's fine, where as white papers are produced, SC&A is directed by the working group and the Board to review those white papers as living documents, participate in working group meetings, as we're doing at this moment? Or would the working group and the Board prefer that we review the final product that comes out?

Let's say it's a site profile or I don't know if there's going to be any revisions to the evaluation report in light of the revised site profiles.

Right now we are engaged in a living process where we're continuing the, what I would call, an ongoing review of white papers and issues resolution that are relevant to both the evaluation report and the site profile. We're operating on that basis as we speak now. That is, it's going to be ongoing.

I just wanted to seek a little guidance though. Are we interpreting that correctly because we are expending resources, and we believe we're doing what the working group and the Board would want us to do. But quite frankly, we really haven't been directly said, no, we want you to engage in this, operate in this manner. I guess that's the clarification we're seeking.

DR. WADE: This is Lew Wade. And let me speak to some issues of clarification. If there are judgments that the Board needs to make, then we need take those judgments to the Board obviously. But let's just sort of step

back and look at the entire playing field.

With regard to site profiles I think we all understand that those documents are constantly in flux and will constantly be changing. And if SC&A is asked to review a site profile, they can well expect that they are reviewing a document that is actively in the process of being rewritten. And I think we've dealt with that. I think we understand how to do that, and I think that's fine.

Again, it makes for lots of, a lot of work. Some people could say it makes for extra work. I guess we don't feel that way. I think it's appropriate.

But when you get into the SEC arena it becomes a little bit more in need of clear definition. And there you need to focus on the NIOSH evaluation report. That report stands and should be the document that you're reviewing. NIOSH can modify that report, and if it does, then that is an event in time that the working group or the Board needs to then ask you to review as a new entity, as a new document.

Really what's happening here is that

there are many technical issues that will be uncovered in the process that will affect the way NIOSH does dose reconstruction very specifically. But in NIOSH's mind it well does not affect the judgment presented in the evaluation report that says we believe we can estimate or cap dose with reasonable accuracy. It's only when that bar is passed that NIOSH will issue an addendum or a modification to an evaluation report.

So when SC&A is tasked by a work group or the Board to look at an SEC review, you need to always keep in mind that there's an evaluation report that's out there. It stands. It's the document under review. If that document is modified or changed, then you will be asked to review that document by the work group.

DR. ZIEMER: In fact, I think we've had at least one case where in the process of the petition review, new information came to light that caused NIOSH, in fact, to pull an ER and develop a new one. So that certainly can occur. But until it occurs we're, in a sense, locked into what's on the street at the

moment.

DR. WADE: And if it does occur, then the work group needs to turn to its contractor and say we would like you to review that new document.

DR. ZIEMER: And if we know it's coming, and I think we're in a position to say hold up on something until we get the new information or the new review.

DR. WADE: So a pertinent question to NIOSH would be is there a rework of the evaluation report underway?

MR. ROLFES: No, not at this time. There's nothing that we'll be changing so the evaluation report that was released for Fernald will be unchanged at this time.

MR. PRESLEY: I've got a question. When we do this, one of the things that I'd like to intervene in here is that if we ask SC&A to go back and review something, that they only review the portion of the document that we revised. Going back and reviewing the whole document and coming back with another big old thick final review for the document that's already been, the whole thing's been gone

through once, I have a problem.

DR. WADE: We have data points on that. I mean, if you remember back to the time of Savannah River when SC&A reviewed the Savannah River report, it stood. Time passed; activities passed; a new Savannah River Site profile was issued. The Board then asked SC&A to take up the complete review of that new document. So that's one path.

The other path the Board might say to SC&A we'd like you to focus on this particular technical issue. Then SC&A will do that, and that's what they've done. So I think there are two pathways to be followed. Now it is confusing, but I think we need to talk about it periodically.

MR. ELLIOTT: I would like to add to what you said, Lew. It is confusing.

And I might have misunderstood your question, Arjun. If you meant is an evaluation report for an SEC petition a living document? I hope you heard in Lew's answer that it is. If there is something that comes to us late in the process that we need to change the document or pull it back, we would.

But it's not a living document in the sense of our site profiles and technical basis documents.

In an evaluation report for a petition, we're putting forward our official position regarding that petition. In a site profile document, we're putting forward our best capacity and ability to start working claims with the understanding that we're going to improve upon that to the benefit of the rest of the claims and those that were previously done that didn't find themselves to be compensable.

That's been our strategy, and I hope that's coming clearer, but there is a difference. And I may have misspoke about a program evaluation review. I heard that.

DR. MAKHIJANI: And I think it's clear to me. The procedural part is still not clear, but I think the definitional part is clear.

MR. ELLIOTT: We have muddied the waters in our eagerness in this working group in dealing with the site profile issues to share these draft documents, these draft environmental dose approaches, before they become finalized.

That's the difference.

That's what you're seeing here in our eagerness to show you that we're addressing what we're hearing, that we're understanding what you're offering as constructive criticism. That's how we're reacting, and I hope that hasn't been to the disadvantage but to the benefit.

DR. WADE: But the title of this work group is to review the site profile and the SEC petition. It's somewhat unique. And the Board is, I assume, very specific in how it charges and titles these groups.

Mark?

MR. GRIFFON: Yeah, I think one thing, and Arjun alluded to it, one thing I thing we're not, that hasn't been mentioned yet is the procedural aspect of this. And I think when we task SC&A with an SEC review, we have Board procedures that we have defined how we review an SEC petition.

And unfortunately, here's one of the problems we're having in Rocky Flats, as an example, and in all of these as we go forward is that the regulatory requirement for NIOSH

to meet their 180 days is slightly different than our procedural requirements. We're asking for a higher bar, and there's a lower bar set in the regulation which basically says that NIOSH has information sufficient to reconstruct doses for all members of the class da-da-da-da-da.

In our procedures we're asking that we specifically look at issues of data integrity, data completeness, and we ask for this last thing, which always has slowed us down into the point where we need that specific models and data, and that is that you can do the proof of principle. You can demonstrate that you can calculate a dose for a thorium worker.

So then we have to, well, how can we evaluate that unless we have the model. So then we get into this position of, yes, NIOSH met the, in the evaluation report it might not even change, but we can't really complete our procedural review until we have additional details.

DR. WADE: Right, and that's just certainly attention and a confusion. But, see, the Board, what I've heard the Board say is that

we can't pass our judgment as to whether or not NIOSH can, indeed, cap dose with sufficient accuracy until we see certain things. And that's the Board's right to ask. But then that takes us into a very gray area where now you're looking at things that are constantly in flux.

MR. GRIFFON: And that's why it is necessarily iterative. I mean, some of this has to happen this way I think because we have to wait for some of these models to be completed. And therefore, that's going to require a sort of a serial analysis. We'll have to have SC&A look at certain models, maybe not all of them. Maybe some of them are obvious on their face that we as a work group can say, looks good. We don't need to review this any further. But others we may say we need SC&A to look at this as a follow up to make sure for proof of principle reasons or for whatever.

DR. WADE: So that's the tension. And there'll always be a tension between timeliness and completeness. And certainly, the Board feels that.

MATRIX AND PRIVACY ACT INFORMATION

I have something else I need to talk about before you go back to your deliberations. And that is to the matrix and the fact that the matrix as the work group is talking about it now has not been cleared for Privacy Act information. In the opinion of counsel, it contains information that has Privacy Act implications. And therefore, we cannot give the matrix to the general public.

I would also caution the work group members that as you have discussions, steer clear of any verbal statements that might go to anything that has Privacy Act implications. If you're treading in that direction, Emily will certainly let you know.

I think a bit of explanation is needed for our friends that are here. The Act that this Board and its work group meets under imagined that these work group meetings would be closed, that these deliberations would be closed to the public because the work group is talking about things that are in the process of change, and their work products that are not finalized and well might contain Privacy

Act information.

This Board has decided to open up these work groups, and I think that's a good thing so you can be here. You can listen to the entire discussion. The work group will be talking about certain documents that haven't been scrubbed, and that's by virtue of the fact that these documents have only been in existence for several days.

We apologize to you for the fact that they might be talking about documents you can't see. I think it is better that you're here and able to hear the discussions than if we close these meetings, and so apologies to all.

MR. GRIFFON: Can I ask? The previous version of the matrix prior to NIOSH's recent addition in the last column, that should have been reviewed and available, right?

DR. WADE: I don't know that, but if it is, I'd be glad to give it out.

Emily?

MS. HOWELL: I would have to check my files.

MR. GRIFFON: Because at least I could follow along with the discussion. I think

that would be helpful if we could make that available.

DR. WADE: Do you have a copy, does someone have a copy of that document that's not --

DR. ZIEMER: Here's one from last time, August 3rd. It doesn't have the NIOSH responses.

MR. GRIFFON: Does it have Board actions in it?

DR. ZIEMER: Or it doesn't have the Board actions in it.

DR. WADE: But does it have anything on the bottom that identifies it's Privacy Act limited?

DR. ZIEMER: It says it's protected by the Privacy Act.

DR. WADE: Does it say disclosure to any third party --

DR. ZIEMER: Disclosure to third party is prohibited. So it's not scrubbed then, I guess.

DR. WADE: We'll look into that.

MR. GRIFFON: From August 3rd I would think we would have --

DR. ZIEMER: But what would it be by now,

that's the question.

MS. HOWELL: The matrices are not sent to us for review. I mean, there's some confusion about products that are supposed to be reviewed. We can discuss that certainly if there's a need for this matrix or others, we can work on that, but I don't have a copy that ^ make available at this time.

MR. GRIFFON: I don't know that we're clear on those rules because I know the Rocky Flats matrix did go for reviews.

DR. ZIEMER: Every time?

MS. HOWELL: Right, but they were specifically --

MR. GRIFFON: At the end anyway. We might have not done that in the beginning. We didn't do any of it in the beginning.

DR. WADE: When the matrix becomes part of an SC&A deliverable, for example, then it's Privacy Act reviewed. But there are many working versions of it that go on that are not. Again, the Board when it meets in full session could decide it wants those documents reviewed, and then we'll have to deal with the time implications of that in terms of the

process and how it proceeds.

Again, working groups are really supposed to be able to work on things that are not complete and not finalized. And I applaud opening up the meetings, but it brings with it certain needs for explanations.

MR. GRIFFON: Can you check that, Emily, though to see, because I would like to see if we can provide the folks in the room with the one that has the Board actions in it even from the last meeting.

MS. HOWELL: I can, but I don't have it with me. I can see if it's been reviewed, I can verify if it's been reviewed, but I cannot fax it.

DR. WADE: So we'll work on that.

MR. GRIFFON: Okay, thank you.

DR. WADE: Thank you.

And again, with apologies, but please listen to our discussions.

Okay, Brad.

MR. CLAWSON: I've listened to all this go back and forth, but Mr. Presley made a comment that kind of bothered me in somewhat of a fashion because he said when we ask SC&A to

review something that they can't bring anything into anymore. And I beg to differ with that because if the findings that they find changes some of the other avenues, then they have to bring that forth. That would be like telling NIOSH once you get us this paper, you can't ever change it. So this is an ever moving process, and I know it's very difficult. But when we get done with this, we want to be able to have the best product that we can for the petitioners and so forth. So I --

MR. GRIFFON: Yeah, I think I agree with the spirit of Bob's comments though that we don't want to review the whole site profile --

MR. CLAWSON: No, we don't want to.

MR. PRESLEY: That's what I meant.

DR. ZIEMER: I think you're not excluding the possibility that if it changes, something else --

MR. CLAWSON: No, I just want to make sure we are on that because, you know, all of us are here for one thing and that's to be able to get the best product that we can for the claimants and also to be able to get to the

bottom line underlying truths of everything. And I just wanted to make sure that we were on the same page.

DR. MAKHIJANI: I just would like some specific clarification because maybe Mr. Presley is talking about a document we recently delivered to him. We were asked -- so it would kind of clarify things for me a great deal, for all of us I think. I was responsible for that. A number of us contributed.

It was the Nevada Test Site external dose document. It was a completely redone document partly at least in response to the TBD review. We were given to it to review. I don't believe there was a specific instruction although it was within the context of discussing the matrix.

The way we interpreted it was to focus on the matrix items so the main part of the review concerned the matrix items, but you do have to read the whole document. You can't, because the document isn't rewritten according to the matrix items. It's a completely redone site profile for external dose.

In the course of reviewing it certain things just leap out at you, you know, there are certain things that appear to be not quite correct. So we made a laundry list of things that leaped out at us and kind of put it in a miscellaneous set of items that were not in the matrix, but also said that we have not performed a comprehensive review of this document.

So I don't know whether that's in a gray area or how you want to do that or whether you strictly want us to remain within the matrix items and say nothing else even if something egregious leaps out at us; that I think would be important.

MR. GRIFFON: I think in part it depends on the modifications that were made. If one small section was modified, based on a matrix item, then I would, I think then we would focus on that small section. But if an entire rewrite was done --

DR. MAKHIJANI: Yeah, this was an entire rewrite.

MR. GRIFFON: Right, right, so I don't know that specific situation.

DR. MAKHIJANI: No, no, the cover said it's a complete rewrite so we read the whole thing.

So, were you referring to anything that we did more than what you expected?

MR. PRESLEY: In that regard more in that regard than I expected when I got that thing.

DR. MAKHIJANI: So then we really need clarification because if a TBD is completely redone, and we are asked to review it, and we focus on the matrix items and made some other comments, I guess what Mr. Presley is saying that other comments are out of order.

MR. PRESLEY: No, I wouldn't say they're out of order. There was more there than I would think. I mean, that's a total, we've got to go back and start from scratch now.

DR. MAKHIJANI: Well, we didn't feel that we did a complete review of that write up. We made some additional comments as they came upon them. We did not do a complete review of that write up.

DR. ZIEMER: Well, of course, we can't solve that one here, but it sounds like you identified things that appeared questionable as you went but did not review them in depth

and simply said here are some other items that maybe need to be looked at.

And I think as long as it's sort of at that point, then the Board can decide whether you need to go back in depth on those. It seems to me if they see something that looks a little questionable, why not raise it as long as you're doing the rest of the review?

DR. MAKHIJANI: We want clarity on that. We're not looking to raise it or not raise it, but I think it would be important for us to know --

MR. GRIFFON: We do have to spell our timeliness, but if it was an entire rewrite, I would say in that case I would expect at least a read through of the entire document, yeah.

DR. WADE: Well again, the Board when it's in session needs to discuss this and --

DR. MAKHIJANI: That would be very helpful to us.

MR. CLAWSON: Okay, I'll turn it back to Hans.

DR. BEHLING: Yeah, I guess the way I would hope or expect this to proceed is for me to just simply summarize each of the findings as

was stated in the reviews. And I have to tell you, I only got to the matrix yesterday and among all the other things, flying in here and so forth, I didn't really have a chance to look at it in detail. So I'm probably going to be looking at the matrix as we're discussing it and assess it for its ability to accommodate the issues that were raised in the first place.

So let me just start out with Finding --

DR. ZIEMER: Excuse me, Hans. Before you start can you give us a, you said you had been citing the other documents. I'm not seeing that in terms of you said the references were underlined in the matrix.

DR. BEHLING: Well, not in the matrix.

MR. GRIFFON: In the report.

DR. ZIEMER: Oh, you're referring to the report.

DR. BEHLING: In the report itself. And our matrix is just --

DR. ZIEMER: No, I was looking, I thought you were talking about the matrix.

MR. GRIFFON: Can you tell us, Hans, though

in your report can you give me a title or a file name for that just so I can find it? I know I have it, and I've reviewed it, but I don't. Is it Rev. 1?

DR. BEHLING: Yeah, June 2007.

MR. GRIFFON: So this is the SC&A review document, number five, Task 5-0056, Rev. 1. Everybody's looking at that.

DR. BEHLING: And if anybody is trying to follow each of the findings as they were described in the original review, I'm going to give you the actual finding number and the page on which that finding was cited in our review. So if you're following or tracking each of the findings as they're being discussed, I will give you the page number on the report to make it easy.

FINDING 4.1-1

And I guess we need to get started here. Let's start out with Finding number 4.-1, and that was on page 25 of my report. And the issue there was strictly one of identifying limitations associated with the use of fluorophotometric urinalysis data. And what is come down to is this. The initial

intent at Fernald was to assess worker exposure to uranium, not because it's radioactive, but because it's a chemical toxin.

And so the measurements were essentially recorded in units of milligrams per liter of urine excreted. Now for toxicity purposes, that's all you need to look at obviously in terms of how much uranium, and it really doesn't matter because the atomic weight of U-235, -234, and -238 are close enough where a single unit of measurement in terms of milligrams per liter would suffice in assessing the potential exposure, and therefore, chemical toxicity that a worker may be exposed.

And if I recall, also among some of the other documents, it was really intended to only supplement the air monitoring data which was supposed to be the first line of defense. So our question, or my concern was that in light of the fact that we're dealing with the radiological impacts of uranium, we need to obviously have a more definitive understanding with regard to what was essentially taken in

by the body whether it's through inhalation, ingestion, in terms of the isotopic mixture because that's very critical.

And we also do recognize that at Fernald we were dealing with uranium in the form of depleted uranium, natural uranium, slightly enriched and up to, I believe, up to 20 percent of, I've seen numbers like three percent, seven percent and even ten percent. And of course, as we enrich, the specific activity per unit rate rises dramatically to the point where at some point it is U-234 that dominates almost exclusively the activity.

And so understanding the milligram per liter of excreted urine is one parameter that now has to be defined in terms of its radiological impact. And up to this point in time we have had certain default values, and here I see again a default value of two percent which clearly would, in my mind, say that is fair for the average person. But the SEC has to address everyone, and that means people at the far end, and that is one of the concerns.

What do we do when we don't know and

all we have are data that is defined in terms of milligram per liter and we now have to convert that into a radiological unit that obviously makes more sense for our concern? And there were five people for periods of time at select locations who may have been exposed to much greater than the default value of two percent. And this is raised here.

And I know we've had previous discussion about the ability to look at these blank data that is only defined in milligrams per liter and somehow or other make it claimant favorable by assuming certain, making certain assumptions that are claimant favorable, specifically with regard to the solubility that is now defined in terms of the tissue that is obviously of concern. And I understand all those things and I applaud the attempt to make all of these unknowns into a claimant favorable assumption.

But there's also the question in my mind, and I will repeat that probably several times today, is the issue of plausibility. And I think the last time we were talking somebody mentioned that these very difficult

cases will be handled by select people who have a very firm understanding of all the issues that we will be discussing here, and we'll address these issues. And if that is the case, I would retract my concern.

My concern is always dealing with someone out in the field who was not privileged to these discussions, who may not always understand the issue that he may have to address when he unfolds a document that contains all the DOE records. And he now has to make decisions about which assumptions. May this person have been exposed to highly enriched or moderately enriched? Was the solubility in question the right one I chose?

And if there are people, and I think we have a gentleman over here who tells me that he is mostly involved, I will walk away saying I think it's in good hands. And that's my concern is that oftentimes, yes, plausibility is there, but a lot of things are plausible, but there's always a question of will it actually be done as we have promised the worker that we will do.

MR. ROLFES: Yeah, that is true that Fernald

was concerned about workers' health, nephrotoxicity was certainly one of the primary reasons that uranium was monitored for in urine. They wanted to make sure that personnel were not overexposed because of chemical effects.

The information that we have from those urinalysis data does not prevent dose reconstruction with those data if you have information on the source terms to which the individual is exposed. And we do. We've focused quite a bit on conducting interviews with former employees, looked at various campaigns and enrichments, various processing areas at Fernald, as well as air monitoring data that have personal identifiers on them, and information regarding the source term. We feel that the default of two percent is supportable.

There were some individuals in the later time period. Fernald never had any significant quantities of enrichments. There may have been some, up to 19.9 percent enriched uranium at Fernald; however, the quantities were very, very low in comparison

to the great majority of the production that was completed. And in the early time periods the primary source term was natural uranium.

Prior to 1964, now if you take a look at the specific activity toward the U-235 composition in natural uranium, that's 0.71 percent. What NIOSH is using for dose reconstructions in that early time period is actually one percent U-235 which results in a higher dose estimate for those claimants.

After 1964, from 1965 forward, we are defaulting to a two percent enrichment which is even more claimant favorable. In reviewing the mobile in vivo radiation monitoring laboratory results which we have obtained for all employees at the site, we cannot support anything higher than two percent enrichment.

There were some people that were identified on projects that were working with 4.9 and 6.5 percent enriched uranium. And so what we did, we did a sample dose reconstruction for these individuals. And in looking at all sources of data, which we would use for dose reconstruction, we could not support that these individuals were exposed

solely to the higher enrichments. Based on the in vivo data, we feel that two percent is a bounding value for these individuals.

DR. BEHLING: Let me ask you -- and excuse me for the interruption, but let's assume that post-'68 when the mobile in vivo measurements were done, chest counting, and you have urinalysis, how do you deal with two sets of data that may or may not be necessarily compatible?

MR. ROLFES: Two sets of data?

DR. BEHLING: Such as urinalysis versus chest counting for uranium.

MR. ROLFES: If you've taken a look at the Fernald records, nearly everyone at Fernald had a urine sample at some time in their history. What we are using as our first piece of information -- and most important pieces of information for a dose reconstruction do not exist in the site profile but rather in the person's dosimetry records.

That is the first and foremost piece of information for a specific individual's dose reconstruction from which we start and use as a basis to complete an evaluation of

that claim. Information in the site profile allows us to interpret that information. So when we would complete a dose reconstruction, we would take a look at the DOE response files that we receive for every individual, and on an individual basis we would take the urinalysis results in that person's DOE dosimetry response as our initial basis for the dose reconstruction.

We would take a look to see what plants they worked in, what their job title was, and most importantly, their urinalysis and radiation exposure history. For assigning the internal dose, we would take those urinalysis results and take a look to see if they were in a position where they could potentially be exposed to higher enrichments above our default of one percent or two percent based on the time period.

We would estimate an intake based on those urinalysis data, and then we would also take a look at the in vivo data that we have for that individual during the appropriate time period. And you can determine information regarding the enrichment to which

the individual is exposed. In many times in our reviews we find that individuals that were working with higher enrichments, were not solely exposed to those higher enrichments.

And by higher enrichments I'm referring to something, for example, something such as 2.1 percent. Anything at Fernald that wasn't natural uranium and had a U-235 content above 0.71 percent was referred to as enriched uranium. So I don't want to mislead anyone by indicating that Fernald had highly enriched uranium as you alluded to. Fernald did not ever have highly enriched uranium at the site. It had a limit of 19.9 percent U-235 content in very limited quantities. Nothing at that level was produced as a long-term, routine product. These were very unusual campaigns when higher enriched uranium of short duration that occurred.

So we must consider all sources of information. We want to make sure that if a person was, in fact, exposed to higher enriched uranium, we account for that. And so that's why we spoke with former employees, reviewed former historical documents, excuse

me, and various other pieces of information to make sure that we are, in fact, defaulting to a claimant favorable assay for assigning internal dose.

DR. BEHLING: So let me sum up. Your default values of one percent and two percent based on time period of employment?

MR. ROLFES: Uh-huh. The one percent and two percent defaults are based on information regarding the production at Fernald. And in the early time period, like I said, the great majority of the products that were being were produced on a routine basis and in the highest quantities were roughly natural uranium.

After that, in 1965 forward, the greatest mass of uranium that was being produced was, I believe -- there were some smaller campaigns that were completed for Hanford reactors. There were some enrichments of 0.95 percent and 1.25 percent I believe off the top of my head. And during that time period, we're actually defaulting to a two percent enrichment which is above those routine operations.

DR. BEHLING: Does the mobile in vivo data

give you some clue? Because obviously we have the 185 keV photon from the U-235 that you can look at.

MR. ROLFES: Certainly.

DR. BEHLING: And then look at the total uranium. Have you come across anything that looks out of place in terms of the ratio based on the micrograms for U-235 versus milligrams for U-2 -- total uranium? You can clearly come to some understanding of what the ratios were.

MR. ROLFES: Certainly, however, you need to be cautious in doing that because you need to consider only positive values for both total uranium and positive values for U-235 in order to make an assumption about the, so... For the higher exposure, the more clear-cut image you can get of the isotopic information to which the individual was exposed.

DR. BEHLING: Also, one last thing, and I don't want to belabor this. This, however, goes beyond the finding here. I did take a look at some of the data involving certain individuals that were exposed to fairly high levels as indicated by uranium excretion data

in the early period, ’52, ’53.

And one of the things that struck me, and we’ll come back to that later when we talk about the issue of uranium toxicity, but I was surprised when you look at some of the incidents where your person was exposed to a single moment in time to a large dose. And it was recognized that there was a radiological incident, and that person was followed by successive urinalysis for periods of days or even weeks.

And then you plot the uranium measurements taken for that individual. And in some cases -- I’m looking at one here, and again, it’s Privacy Act so I can’t share this with anybody here or at least not talk about it specifically, but I have an individual here who took on Day One time zero in a very, very high dose, quantity as indicated by a urine excretion number.

And on that same day he was tested several more times, and the numbers are all over the place. And again, he was tested the next day and the following day, and the numbers just fly all over. If you didn’t know

that this was an issue here involving that individual, you'd never conclude that this was the same individual whose urine was being analyzed. And it clearly does not conform to any ICRP excretion model regardless of which solubility you select.

And I was wondering, to what extent when people look at these data for a given individual that, in this case, involves a moment in time a radiological incident. How do you assess that data? Do you apply the highest number and apply the ICRP dose model as incorporated into IMBA? Or do you look at these data and say, well, these somehow don't comply, and do we sidestep the IMBA model?

MR. ROLFES: As you alluded to in your report, of the individuals that were exposed in the case study that you had selected from the Health Physics Journal, I noted that you had indicated that NIOSH would significantly underestimate potential exposures if we looked at only limited data. However, I do want to make sure that everyone is aware that we do not only select one or two urinalysis results. We will take every single urinalysis result in

that individual's file to estimate his dose. And if you do, in fact, take one urinalysis data, that's true. There's going to be a highly uncertain dose estimate with that. We want to take all sources of information that we have for that individual to use for his dose reconstructions.

DR. BEHLING: Like I said, this is somewhat, you know, and it was in context with that particular article that I looked at others to see, well, how does the ICRP model, and I think in one of the exhibits that I enclosed, there was the ICRP model for, I think in those days it may have even been still classified as Class D, W and Y, and for three different micron sizes.

And you see, however, they're superimpose-able. You just have to slide the Y axis up and down to make these basically superimpose. And they all start at the very high end and exponentially reduce in concentrations. And then when I look at some of these data on the same day, and I won't give you the specific numbers again because I don't want to be told to not identify them,

but on Day One, one of the urine samples measured excretions in the thousands of micrograms per liter on that very same day. And in a matter of hours I would think it went from thousands to less than ten. And so the question is what does that mean?

DR. ZIEMER: But the nature of urinalysis, people don't excrete in a nice smooth manner --

DR. BEHLING: Oh, I agree with that. It could be 24 hours --

DR. ZIEMER: -- their liquid intake varies throughout the day, so any tiny thing like that can be very misleading. You have to smooth that over a long period of time --

MR. ROLFES: Total area under the curve.

DR. BEHLING: You can go and drink ten glasses of water and --

DR. ZIEMER: I would be more suspicious of data where the outputs were the same throughout the day. That would look suspicious. The jumping all over is very common in urine analysis.

DR. BEHLING: Yeah, and I understand that, but the question remains. What do you do? Do

you take that first day, the highest, the big data, and say let's put it into our IMBA and --

MR. ROLFES: No.

DR. BEHLING: -- let ICRP dictate?

MR. ROLFES: No, we take the entire amount of uranium excreted from that incident, the total area under the curve, the total quantity of uranium excreted from the body is used to analyze the intake. Then once we have that data, we essentially, based on the scientific information that we have at hand, we consider multiple solubility classes for the type of uranium for which the person could have been exposed.

And we take a look at excretion patterns also and make a claimant favorable assumption regarding the solubility. So that we are essentially assigning a worst-case dose to that individual's organ where the cancer occurred for historical dose reconstruction.

DR. MAKHIJANI: I have a question about enrichment.

DR. ZIEMER: Well, I do, too, but go ahead with yours. It may be the same thing.

DR. MAKHIJANI: Well, last time we discussed the question of production information and the original site profile contained internally contradictory information plus -- Stu Hinnefeld was here, and he said that you had available to you the original ^. So far as I know, the amount of enriched uranium in the 1950s were not small. They were in the hundreds or thousands of tons at least. And cumulatively they may have been quite considerable.

So I don't think, offhand, without looking at the corrected materials count, I'm not comfortable with the assertion -- at least from everything I know, whatever was classified as enriched uranium is probably about 20 percent of the total Fernald production. The total Fernald shipments are listed in the materials that comes from the 1980s as being upwards of half a million tons. And the total enriched uranium shipments that I remember -- I don't have the document with me -- are upwards of 100,000 metric tons.

In the 1980s Fernald was processing primarily depleted uranium if memory serves me

right. And so the enriched uranium would have been focused in the ‘50s, ‘60s and ‘70s. ‘Seventies production was quite low, so we’re talking primarily about the ‘50s and ‘60s. So I think settling this question of enriched uranium, and I think we can’t just toss a one percent number at it without actually looking at the materials and counting data that is available.

I’m not at all confident, especially in face of the fact that the TBD numbers, some of them, are certainly wrong because they’re internally contradictory. They don’t add up. The recycled uranium number in the TBD is more than the total uranium, one of the total uranium numbers in the TBD. So something is definitely wrong.

So I’m not comfortable with any resolution of this question until there are some clear data on enriched uranium. Because I happen to be quite familiar with these numbers, and I know that the numbers on the table are not right.

Secondly, I think there would need to be some, some of the numbers are not right.

That's certain. There would need to be some demonstration I would think that since upwards of five percent uranium was used since we're not talking about an SEC, but you are covering the class with two percent.

And I haven't personally heard an argument, I would readily agree that a two percent assumption would be claimant favorable for, if you're just saying as a population. I have no problem with that, and I think actually we said that in our site profile review. I don't think that is an issue. I think that's quite clear if you look at the overall production.

However, in an SEC context and we had this discussion the last time, I think sort of hand waving we're comfortable that it's okay, and the individuals that we have looked at are not, you know, more than two percent is not justified. At least I'm not clear that it meets the charge that we have in our criteria for looking at evaluation reports.

MR. ROLFES: For the enrichments in the early time period, Fernald referred to enriched uranium as anything which exceeded

the natural isotopic composition of uranium, anything above 0.71 percent. So as a matter of record Fernald had to refer to uranium which was 0.73 percent, only two one-hundredths of a percent higher than U-235 content, as enriched material.

So they reported, so, yes, that is very possible that 0.71 percent or 0.72 percent was the majority of the product there. However, if it exceeded 0.72 percent, it was reported as enriched material. Our one percent default will bound the enrichments for the greatest majority of the materials produced in that time period, and likewise for two percent.

So, yes, we have reviewed many source documents. We've conducted interviews in this regard, and I believe we have provided some of those interviews but not a complete set.

DR. MAKHIJANI: Is there the production data that you reviewed on the O drive? I mean, I can't, it's impossible to look at the reference material on the O drive because it has no titles, only numbers to the documents. And one doesn't know what to open in order to

prepare for this.

MR. ROLFES: I was able to find them.

DR. MAKHIJANI: Well, of course we can find them if we open 70 documents and then you've got to keep track. You have to --

MR. GRIFFON: Maybe we can cross-reference on the matrix just to make it easier for the future.

MR. ROLFES: Sure, sure.

DR. BEHLING: Yeah, and just to, on page 32 of our review, there is an exhibit, actually Attachment 4.1-4A. And if you go to page 32, I'll just read you a statement for those who may not have access to the report. But it says projected and anticipated U-235 enrichment process -- and this is an inhouse document.

And it says, "Discussions with the CAO and NLO personnel have indicated that the ^ process, cold fuel from several reactor sites including Hallam, Bonus*, EGCR, Piqua and perhaps from Savannah River, significant portion of fuel will range from three percent to seven percent U-235 enrichment. In this regard a campaign is scheduled to begin

February ’69.” So they’re talking about significant quantities of fuel that will have enrichments of ^ percent.

MR. ROLFES: Sure, that’s very true. Under the commercial assay program during the 1970s, there were some high enrichments material that were brought into the site. And this is during the time period that the whole body counter was operating, in fact. So we have information regarding isotopic content for those who were exposed to this uranium.

Furthermore, we do have documentation of individuals that were involved in the Hallam Reactor Project. And we have provided that information to the Advisory Board for their review as well as prepared a sample dose reconstruction for one of those individuals that were involved.

And based on the information it does say that these individuals were, in fact, working on two enrichments with the Hallam Reactor elements. We know that they were working with 4.9 percent enrichment and 6.5 percent enrichment. And when we looked at their urinalysis data, we estimated an intake

based on those two enrichments. I think we actually used the bounding enrichment of 6.5 percent.

However, when we looked at all the sources of data, when we considered their in vivo data, we could not confirm, because we could not confirm that these individuals were solely exposed to the 6.5 percent enrichment because their lung counts would have been very, very high. Our urinalysis data way over-predicted -- excuse me. Our intakes based on the urinalysis data way over-predicted the observed mobile in vivo lung count data.

DR. BEHLING: Well, I would expect that your lung count data would be more indicative of a recent exposure as opposed to urine which can be from years and years ago. It's an integrated exposure that covers many years realizing that it may be released from bone tissue that was deposited many years ago as opposed to a lung even if it's fairly insoluble. It may have a relatively shorter time period or life span in the lung as opposed to in the matrix of the bone tissue.

So my gut feeling is if you looked at the mobile in vivo lab data, you would probably have a better indication of exposure to a higher, a more enriched -- I won't say high enriched -- more enriched uranium as opposed to urine data. So the two may not be compatible.

MR. ROLFES: The two are compatible and are used as, you know, we have to consider all evidence. We can't selectively choose one piece of information that contradicts another. We have to incorporate all information that we have for an individual.

Go ahead, Mark.

MR. GRIFFON: I just wanted to clarify your follow-up response in the matrix. It says, "Higher enrichments were handled as special projects and some people directly involved are identifiable from the dosimetry data, work locations and telephone interviews allowing bounding calculations to be done."

When I read that I thought, I mean, the question for me, some words jump out, work location, some. Some tells me not all probably. And then allows for bounding

calculations to be done told me that that was different than your two percent default. But now you're saying -- I guess, are you saying that you've looked at these cases, this list of people, and determined that even, and this is the sample that you gave us that you provided? That sample DR demonstrates that even using the 6.5 for this particular individual, looking at all the other in vivo data available, couldn't justify that they were only exposed to the 6.5 material? Is that --

MR. ROLFES: Correct.

MR. GRIFFON: -- therefore, when you say a bounding calculation can be done, it should say -- well, I don't know. Are you saying using the default enrichment values?

MR. ROLFES: I'm not sure of the question. Could you clarify? I'm sorry.

MR. GRIFFON: I guess I'm saying you're saying that you picked out this one sample, and their in vivo couldn't support using the high enrichment level. Certainly you didn't go through this entire list and check that kind of thing. I wouldn't --

MR. ROLFES: Oh, no, no, no, we didn't ^ for everyone onsite, no.

MR. GRIFFON: But you've made this argument that we have one individual off this list that worked with this high enrichment material documented in this list. And we compared the situation, and we can't support using a higher enrichment value for this case. And therefore, for any other case? Or is it individual specific or --

MR. SHARFI: You'd have to consider the specific scenario of the different claimant.

MR. ROLFES: Sure, this certainly has to be done on a case-by-case basis. We cannot, without looking at the data, I could not make --

MR. GRIFFON: So for each case you'd go and look at the in vivo, and if there's any indication that there might have been enriched work based on ratios, but in a lot of cases you're not going to have positive values so how are you going to --

MR. ROLFES: Well, if we don't have a positive value --

MR. GRIFFON: You default to your two

percent?

MR. SHARFI: Just because you don't have positive values doesn't mean you --

MR. GRIFFON: I'm just trying to understand the decision process.

MR. SHARFI: So I mean, if you ^ six and a half percent off the urine, you may or may not, depending on the size of the urinalysis results, expect positive chest count. So it may fit or it may not fit --

MR. GRIFFON: So to follow up on the may or may not, if you don't have the in vivo data, then how do you decide?

MR. ROLFES: If we have an individual that we know, based on documentation ---

MR. GRIFFON: Whoa, whoa, whoa, based on documentation, what documentation? What does that mean? You know, job title, work location? What was the --

MR. ROLFES: Well, plant one was one of the locations that had the majority of the enrichment. There are some people that had been exposed to higher enrichments in plant one, and those individuals are identified by breathing zone samples. And we have

information regarding air concentration data. We have information regarding uranium mass data in the air.

So from that -- and we also do have their swipe samples taken associated with those results. Now keep in mind that these are very short campaigns involving one or two people, so I want to make sure that we're clarifying. We're not discussing a very large population of people. These individuals are identified by breathing zone sample results and the enrichment. And I have observed some enrichments of about three percent, 3.5, 3.9 percent on a very short campaign basis.

However, these individuals were also monitored by the in vivo about two years later so we'd still be able to, if there were significant exposures, we'd still be able to make some inference based on the data about what isotopic content they were exposed to previously.

But the great majority -- and these were the people that were working with enrichments that exceed our default of two percent in that time period. There were not a

significant amount of, there was not a significant amount of uranium which exceeded our defaults in the technical basis document. And for those people that did exceed it, we believe we have data that we can use to bound their doses.

MR. GRIFFON: And you're talking ones and twos, not tens and twenties of people. I don't know enough about --

MR. ROLFES: Sure, based on the information, for example, there were a couple of short campaigns in plant one that I saw some receipts of materials. People had breathing zone samplers on, and there was information regarding the enrichment. And it was approximately a week for the one operation, and then another week later on in the year involving the same person.

MR. CLAWSON: What about the maintenance people and stuff that would have to go into those because some of the information that I've read on these plants, they had an awful lot of problems. In fact, they were even shut down numerous times. So now you've got a whole 'nother revolving group that's going to

be rotating through there.

MR. ROLFES: Certainly, that is very true that people did go in and out of the plant; however, if you take a look, these individuals didn't work just on this enrichment. These individuals would have been working in other plants that were handling other enrichments, mostly which would have been natural uranium or something below our default of two percent at the time.

So these individuals would, in fact, be exposed to natural uranium for 50 weeks out of the year, and could have potentially been exposed to the three percent enrichment on a very limited basis for a week or possibly two weeks. So it is possible. We cannot say that with 100 percent certainty that an individual was not exposed to this higher enrichment. It is very possible, but it is very, very limited.

So does that answer what you're --

MR. CLAWSON: Well, I just -- yeah, they may have been there, but you're digging for this one person. You've got a lot of breathing zones and everything else, but you don't have

it for these other people going in and out that are actually, actually going to be right up there, hands on and --

MR. ROLFES: Certainly, just like chemical operators were. These individuals we also, we do have mobile in vivo data for these individuals as well. So maintenance people were included in the schedule for receiving monitoring from the mobile in vivo unit. So if, once again, there were significant exposures to this very limited operation, if they had a significant exposure, it would be detectable in the mobile in vivo units.

MR. CLAWSON: You were talking about the enrichment and stuff, now were they able to actually enrich it up to the three percent at Fernald or were they blending other uraniums in?

MR. ROLFES: In the later years, I believe in the ‘60s, they did begin receiving some uranium back, recycled uranium, from Hanford which typically had an isotopic content of around 0.8 percent. That material -- I guess I’ll probably ask Bryce to give us a little bit more detail about that.

Bryce, I wondered if you could explain a little bit about the receipt of, now the three percent material was not used in this early time period for blending. Typically, in the earlier time periods, I'd like to ask Bryce to comment on this because there was a limit to which assay of U-235 Fernald could use for blending, and that was typically about two percent enrichment I believe. And that came in as UF-6 from the gaseous diffusion plant. However, there was also material that came in from Hanford that was about 0.8 percent enrichment, and that was used and blended I believe.

Bryce, could you elaborate on the process a little bit about the blending of the use of one slightly higher assay such as 0.8 percent or 1.25 percent enriched uranium to sweeten or enrich the isotopic content of natural uranium? Would you care to elaborate, please?

MR. RICH: My understanding, and we have the experts in the room that actually did that, but there was an accounting restriction from a cost standpoint. Higher enrichments were

accounted for very rigorously and, in fact, were, had to be blended on a teaspoon basis as opposed to a reasonable blending on a pound-per-pound basis to blend up to a certain level.

So the blending was done with materials that matched more the, a slight blending up to the level that could be done more accurately in order to blend materials in a blending machine. If you blend a teaspoon with a ton, why you had to blend more carefully in order to get the entire lot blended to a certain amount.

However, in addition to that the accountability rules prevented higher enrichment. Normally, they were sent back to the gaseous diffusion plants because they weren’t good blending material. So they were just temporarily, or some of the campaigns for the Hallam fuel, for example, was recovered in a special campaign but not used for blending immediately. There was an inventory that was stored at the plant temporarily and not used for blending because it was at the higher enrichments where they couldn’t afford the

price associated.

And as a matter of fact, certain blends of certain enrichments had to have not only upper management approval at the site but had to have AEC approval in order to use that material. It cost a lot of money to blend it up to a very high enrichment, and so you just didn't casually use that to blend up to the 1.25 to two percent that was used in the routine reactor fuel.

And I'm not sure if that answers specifically the issue associated with the blending and the use of higher enriched fuels or high enriched uranium or blending material.

MR. GRIFFON: Was that all done in Building 1, the blending operation would have been done there, too?

MR. RICH: There was some blending in four.

MR. KISPERT: Right, and then refined in plant two and three where most of it was done. And plant four also did dry blending, powder to powder. Plant two and three did liquid blending as uranyl nitrate solution.

MR. GRIFFON: So these different emissions were not just in one, right?

MR. CLAWSON: The reason I bring this up is because going through some of our data in Idaho, we sent some of our processed over to see if they could blend it. And I guarantee you that wasn't two or three percent. Much, much higher. That's why I'm having this issue.

MR. RICH: The material from Idaho, however, most of it went to Y-12, and it was used primarily at Savannah River driver fuel. A little bit went to Rocky, and some others went to the Portsmouth Gaseous Diffusion Plant. But I'm not aware that they sent any to Fernald.

MR. CLAWSON: Well, in going through some of our data, we gave, the earlier years they took some of the 601 process material to see if they could blend it, and my understanding of the records that we showed was that it didn't work out so well because of, it was too highly enriched.

MR. RICH: You can't blend a teaspoon at a time. That's just what it amounts to. You have to blend forever in order to get mixing.

MR. CLAWSON: That's when they were trying,

my understanding was in the powder form where it was a little bit more, but it was too highly enriched to go.

MR. RICH: Early on in the Idaho campaign they shipped as liquid, but then that stopped shortly or thereafter because of safety issues. They simply didn't want to ship these uranyl nitrates because the nitrate had been sent as powder. But even as liquid the blending is still a problem. Precise measurements, for example, to get a precise total batch enrichment is a problem.

MR. CLAWSON: Well, and see, this is kind of one of my issues is, and I've said this before, all these sites are integrated in one way or another. And a lot of times this stuff isn't really documented that much. This is why when you start getting into the enrichment and this and that, I can guarantee what came from Idaho was a lot more than that.

And in reading it, and it might have been for just a short period of time there because my documentation that I ran into and stuff said that, just what he said. It was too highly enriched. They were looking at

some other fuels, but they only did the very, very high fuel amounts. And I believe it did go on to Oak Ridge and Savannah River to be able to be split up.

MR. RICH: Yeah, they decided very early on and shortly after 1953 that Savannah River was coming up about the same time, and they were going to use highly enriched driver fuel. And in that case the highly enriched stuff in the 75 percent plus range would serve well for that. And so most of it was used for that purpose, and it went to Y-12.

MR. KISPERT: We did not normally receive from Idaho. They were not part of the Fernald circle.

MR. RICH: I'm not aware that any Idaho fuel went to Fernald.

MR. KISPERT: No doubt were shipments made from INEL that were experimental, but they would be non-routine, non-recurring.

MR. CLAWSON: But you did receive some?

MR. KISPERT: I have no doubt that to my recollection, yes, we did from INEL.

MR. CLAWSON: And I read a little bit of the history, and basically, it was too far up

there to be able to bring it down. They were looking at being able to use this uranium to be able to help the process along, but it had already been cleaned up way too far to make it. I just, when they start to say out to me that we never had anything over three percent enrichment, then I start reading these documents.

MR. ADAMS: We did not have anything above 20 percent. That was our absolute limit, the material. And there was very little of that material. The material was in that five-to-six percent range.

MR. KISPERT: The receipts that we got from Y-12 were all, most of them were blended.

MR. CLAWSON: We need to get you to introduce yourself.

MR. KISPERT: Oh, Robert Kispert.

DR. ZIEMER: Mark, could I have you clarify in the NIOSH statements where you say higher enrichments were not processed until the mid-'60s, you mean higher than two percent or higher than natural levels?

MR. ROLFES: No, there were some that exceeded natural levels.

DR. ZIEMER: But not two percent?

MR. ROLFES: Well, there may have been on a very limited, for example, in 1965 there were a limited number of people --

DR. ZIEMER: ^.

MR. GRIFFON: Just ^ your phrase in your resolution.

MR. SHARFI: For one percent ^.

DR. ZIEMER: I'm trying to get a feel for whether two percent is bounding in terms of the absolute records, or if it's bounding in terms of, as I understand it, if you had an individual whose record showed that they worked at -- I don't know, pick a number, four or five percent -- you could actually reconstruct on that basis for that period if you knew when it was.

And I think what you're saying is if you assumed it was two percent for their whole time, the final number you would come up with would be at least as great as if you took the 0.7 percent and then the little period when they worked with higher, and then --

MR. ROLFES: I certainly am fully confident --

DR. ZIEMER: Is that --

MR. ROLFES: I certainly feel that applying two percent would bound a person's integrated exposure over their career. I'd certainly feel that --

DR. ZIEMER: But for those who had higher you could actually do the reconstruction for the period for which you knew --

MR. ROLFES: Oh, certainly, certainly, certainly can. However, we would --

DR. ZIEMER: And in the sample you're just saying that you can show the two percent bounds even those for whom you have the data.

MR. ROLFES: Exactly, the mobile in vivo data.

DR. ZIEMER: Because if you're going to reconstruct it exactly, you'd use the 0.7 and then whatever enrichments.

MR. ROLFES: Exactly.

DR. ZIEMER: And the two percent so far has bounded all of it.

MR. ROLFES: Yes, certainly.

DR. ZIEMER: You're not saying you tried everyone.

MR. ROLFES: That's correct. Two percent

has defaulted.

DR. ZIEMER: And in the absence of knowing that they worked with something or else, the two percent would seem to, you could make the case that that works.

MR. GRIFFON: That's the case they're making actually.

DR. ZIEMER: And like any assumption you can always argue that there might, there could have been someone --

DR. BEHLING: A short-term employee who happened to get the six percent.

MR. ROLFES: But that's very unlikely.

DR. ZIEMER: Well, you still have urine data for those in any event, do you not?

MR. ROLFES: I'm sorry?

DR. ZIEMER: Are there people for whom you don't have the urine data?

MR. ROLFES: I believe approximately 93 percent, off the top of my head, had urinalysis data. And for those that don't, we do have a coworker model.

MR. SCHOFIELD: How often was urinalysis done and in vivo counting done for these people?

MR. ROLFES: I think I can reiterate that some people were monitored, there's some people that were monitored in the number of tens of times per day. Some people that were not working in radiological areas were only monitored on an annual basis. So for example, if there was an incident, for example, 1966 there was a UF-6 release. There are people that were involved in this incident that were monitored. If you take a look, there are some people that were monitored more than ten times in that one day. So I think there's --

DR. BEHLING: So I think the question centers more around routine monitoring as opposed to incident-related monitoring.

MR. ROLFES: It would vary based upon previous exposures, what their actual urine data say, based on any incidents. For example, if the person felt that he had been exposed, he could go request a urine sample as well. So without, you know, I don't want to make some broad statement. I'd have to take a look at what the person did. For example, a person that had the higher potential for exposure would certainly be monitored more

frequently.

DR. BEHLING: And I looked at some of the procedures. We'll get into that I think in the next Finding, but it changed over time. I mean, you look at procedures as they evolved over time, and you realize that the frequency increases.

MR. RICH: And indicate that the sampling procedure was ^ elucidated in procedural form.

DR. ZIEMER: Can I also ask for clarity on Arjun's statement on the masses and your statements on, we have pretty good records on what came in as I understand it. And the large masses that you mentioned, is a lot of that accounted for stuff that was just over the 0.7?

MR. ROLFES: That was exactly what it is, yes.

DR. ZIEMER: Does that agree, I know you had a report that occurred in the '80s sometime, you and some colleagues did, did you have some inventory data there that somehow is different from what they're saying on this?

DR. MAKHIJANI: Dr. Ziemer, last time when I raised this, I had referred, and also in our

site profile review in the production numbers, we referred to the original material accounts that Fernald filed with the AEC and the DOE. And in those accounts, at least the ones I'm familiar with, there were only three categories. It said depleted, normal and enriched. They don't actually tell you the enrichment only subject to limitation for the site that it was under 20 percent.

DR. ZIEMER: Yeah.

DR. MAKHIJANI: And we know that, so far as my memory serves me, that enriched uranium cumulative over the site's history was very significant. It was not the majority, but it was over 100,000 metric tons, and it was being reported in the mid-'80s.

DR. ZIEMER: Yeah, but I'm sort of asking was 99.9 percent of that barely over or do we know?

DR. MAKHIJANI: It might have been one percent.

MR. RICH: Let me just comment there. In the original technical basis document there's a section dealing with recycled uranium. And those numbers -- and that came directly from

AEC’s extensive, or DOE’s at that time, extensive mass balance report dealing specifically with recycled uranium.

Those numbers were reported in the technical basis document, and they disagree with the total production at the site primarily because in the early days, they processed the African ^ ores. And then later on they processed U3OH straight out of the uranium mills in the U.S. production program. So they were processing a tremendous amount of uranium that will bring, so those will conflict with the recycled uranium.

But it was reported in the technical basis document as a consequence of the fact that the recycled uranium was used and blended and transferred back and forth between sites. DOE recognized there was discrepancies in that mass balance report between sites. The secondary transfers, for example, exceeded that that came directly from the primary chemical processing site. And so they resolved, two years later the Department of Security issued another report which clarified the primary shipment.

So, indeed, yes, there are some discrepancies between reports. But again, I guess I think we are in the new technical basis document for clarifying some of that, but there still will be some discrepancies. That doesn't deal directly with dose reconstruction, however, but it does give you an idea of what happened at the plants and I think that material is there and effective.

MR. GRIFFON: One thing I wanted to ask was the follow up. Stu did mention in the first meeting we had of some documentation that would support, you know, clarify this maybe.

MR. RICH: Yes, there are some documents.

MR. GRIFFON: Is this, I mean in number two here, action item, you have this Bogar 1986 report. Is that going to address -- so I think if I can add on just to move this discussion along, I was proposing that a follow-up action needs to be done on SC&A's part. That SC&A needs to review the sample case that you alluded to in your number three here, response number three, along with the default approaches of one percent and two percent for pre-1964, post-1964. And SC&A

will also include review of the Bogar 1986 document in this process. That answers kind of one, two and three at least here on our actions.

DR. MAKHIJANI: Just for clarification about that task. The Bogar series of documents, you know, there were five periodically, maybe even monthly. I don't remember. They don't contain any data on enrichment levels, so we won't, we just have these three categories, enriched, normal and so we won't be able to resolve the one percent, two percent, ten percent, five percent without -- and that's the problem I'm having with this is being familiar with, there's a mass of information that tells you enriched or not enriched.

And we know that a lot of the enriched dealt with Hanford reactors, so it was likely to be low enriched, in the lower, less than two percent range. So that's what I said. As a general matter, two percent if you say would apply comfortably to the vast majority of workers, this is good. I think that everything we know about Fernald says that this is good. The people who worked there

would maybe affirm that.

What I'm concerned about is if you have a small batch of 15 percent or 19.9 percent, the isotopic composition is so completely different here. Urine-specific activities that are 30 times, 25 times more than natural uranium and very much higher than two percent uranium that somebody who worked there for a couple of years who did that mostly could be, some burden remains. So I don't know how we could carry out this task that you've just said without more data from NIOSH.

MR. ROLFES: Fernald's Health and Safety individuals did recognize that higher enrichments were brought into the site and focused on those exposures. If you take a look at one of the documents I provided, there were adjustments to the individuals who had worked on the Hallam fuel elements of higher enrichments. There were adjustments to their maximum permissible exposure, the maximum lung burden data with the specific activity of the materials that they processed. So they did, they were aware of who was, in fact, working

with these materials.

DR. MAKHIJANI: Mark, my statement did not revolve around whether Fernald was being careful or not. It was just Mark Griffon assigned us a certain task, and I don't know how to be responsive to that because we don't have the documents.

MR. GRIFFON: Well, I wasn't sure what the Bogar 1986 document had in it.

DR. MAKHIJANI: The Bogar 1986, I have that document.

MR. GRIFFON: I guess the follow up is, you know, I think we need to, or NIOSH needs to provide whatever they used to make, and maybe it was the interviews that you said you still are working on transcribing, to support your statement that a lot of it was just barely above 0.7, you know.

MR. RICH: And it's extraordinarily expensive. Accounting was severe. When you get something worth more than gold, you don't let flakes of that lie around.

MR. GRIFFON: So I guess the back up document to support those default arguments and then this review of this case I think,

Arjun, to get at that question of -- because we can keep talking about it in this hypothetical realm, but I think maybe if you look at that case and say, okay, here's how they did it.

And I still have a little bit of a question, but I do want to look at that case, a little bit of a question of this was a person that had detectible in vivos. I'm still a little confused on how you're going to deal with those that are undetectable, and now it's Building one through four at least that had some enriched activities going on.

But at least to look at that case and say, I think what they're demonstrating in that case is that they looked at 6.5 enriched and converted the in vivo and the in vivo still bounded the case. So therefore, two percent even in this case would be because of all the other work that they were involved in or whatever, right?

So I guess I thought maybe just to move this along, you need to at least look at that case and then respond more specifically. But I think SC&A also needs more specifics on

how you came to that conclusion that a lot of this material that was defined as enriched was just slightly over the 0.7 rather than up over two percent.

MR. ROLFES: Weldon and Bob, I saw you motioning your hands. Was there something?

MR. ADAMS: There was a recycle between us and Hanford. We sent material out that was either 0.95, actually 0.947 to be more accurate or 1.25 percent. Most of it was 0.947 percent. If part of that material was consumed or part of that isotopic content was consumed at Hanford and it came back to us in the 0.8 to 0.9 range, then it was sweetened back up again to the 0.947 or 1.25 range and then sent back out. And that material's processed, and then the material came back to us eventually. But first it came back to us through Paducah, and then later on in the early '80s, it came back to us directly.

MR. GRIFFON: But when you received that 0.8 percent, I guess what you're saying is that it would have been assumed as enriched.

(Whereupon, multiple speakers spoke simultaneously.)

MR. ADAMS: And there was a considerable amount of that material. I mean, it was thousands of tons in total.

DR. ZIEMER: It sounds like, at least at this point, as Arjun suggested, it may account for 99 percent, but we don't really know for sure.

MR. ELLIOTT: What document --

MR. KISPERT: In the 1950s it's my recollection enriched production began in the late '50s, like '57. Let's say '58, give or take a year. The great majority, the great, great majority of uranium processed from start up through the 1950s was normal uranium in the form of E, either as uranium or concentrates from the domestic mill sites out in Utah, Colorado, or as pitchblende that came from Africa.

The relative amounts, you know, it is computable. You could look at deliveries or annual production by plant and take plant two and three production. And I would not normally for a -- was that a nominal eight to ten thousand tons a year in the '50s up until about '58. When the Mallinckrodt plant at

Weldon Springs came online in ’56 some of our production was then shipped to Mallinckrodt eventually leading to our refinery at plant two and three being shut down in ’61, ’62.

At that point we got into residue management taking care of the huge accumulation of residues that had not been processed while we were high production through plant two and three. Nineteen sixty-five our plant two and three was reactivated, and that’s where we got into short discrete runs of enriched, mostly in the less than two percent. We did have one campaign at two percent, but mostly they were to get the residues back into UNH, uranyl nitrate, form.

The report that you mentioned, Bryce, was the Ohio Field Office Report of the late 1980s. And I know I was on the team. And it was a very thorough look at obtaining a material balance amongst the user sites, Fernald, Savannah River, Portsmouth, Hanford that was principal, and Oak Ridge.

MR. RICH: And it’s repeated again in 2000.

MR. KISPERT: Yes, so I think the numbers are there that would take all, but that’s my

recollection.

And one other thing on enriched. By definition DOE declared normal U was an administrative declaration to be exactly 0.71 percent. It was done because costs were collected by depleted uranium, enriched uranium and normal uranium categories.

MR. CHEW: I think that answers the question.

MR. ELLIOTT: What documentation do we owe them, Mark?

MR. ROLFES: Certainly our interview transcripts would fit the bill I believe as well as other source documents that we've made available, I think many of which we have provided on the O drive for their review.

DR. WADE: Well, I suggest for the record that Mark is sort of taking notes and generating minutes; the Chair of the work group will do the tasking on the timelines.

DR. MAKHIJANI: My last question is, you're saying that you relied on telephone interviews for some of this, and I, you know, in terms of individual dose reconstruction under one in the matrix?

MR. ROLFES: Yes.

DR. MAKHIJANI: And I was wondering how do you deal with survivor claimants?

MR. ROLFES: These telephone interviews were related to employees that were involved at the site, so we could clarify that as well.

MR. ELLIOTT: It says that. It says conducted interviews with former employees.

DR. MAKHIJANI: No, no, that's not what I'm really asking. Under item one, higher enrichment were by handling special projects, some people directly involved are identifiable by various means including telephone interviews. And if that is one of the means, it's sort of an old concern.

MR. ROLFES: Sure, once again, we have to consider all sources of information so that's certainly one source that we would take a look at to help us get a better picture of what the employee did, and what his potential exposures were.

DR. MAKHIJANI: Let me ask a different question. When there are survivor claimants' interviews supplement that?

MR. ELLIOTT: If necessary to complete a

best estimate dose reconstruction, we would. But typically it's not necessary.

MR. ROLFES: Exactly. The most important piece -- I don't want to confuse anyone because the most important piece of information that we have for a specific claim relies on information that we received from the Department of Energy as reported to us in our response file. So for the great majority of claims that is normally sufficient with information to interpret potential doses using information in the site profile.

MR. GRIFFON: I'm still on Finding 1, but I'm down to action number four now. And the response from NIOSH is that a list of people -- this goes back to my who question.

MR. ROLFES: Can we take a restroom break?

MR. GRIFFON: Let's take a break, yeah. I was hoping to get through one first, but you might not.

MR. CLAWSON: Let's take a break.

(Whereupon, the working group took a break from 10:55 a.m. until 11:08 a.m.)

DR. WADE: We're back. For you on the phone we're just about ready to take our seats and

to begin the work group's deliberations.

Brad?

MR. CLAWSON: I want to just kind of touch base. I think we kind of got lost last time. We've got an action item though for number one, correct, Mark?

MR. GRIFFON: Yes, for really one through three, and I was kind of jumping up on number four.

MR. CLAWSON: Hans, are there any that you need clarifications on on these here?

DR. BEHLING: Well, during the break Arjun and I talked, and I think we've all come to the conclusion that on a time-integrated basis, even for one individual, especially a long-time worker who may have been there for periods of ten years or more, the likelihood of an occasional exposure to uranium that is enriched at greater than two percent may exist.

But if it's averaged out over the full duration of exposure time, then probably the one percent prior to '64 and the two percent past '64 would prove to be a reasonable and in all likelihood even a claimant favorable

approach. The exception to that would be, and then I'm assuming that maybe there will be instances where we will look at an individual case and say, well, that is the period where six percent was enriched, and this guy was there for only a year or two.

Well, we might make an exception to that default assumption and look at it in context with that individual's employment period and assess him accordingly. But if that is the likelihood for proceeding, then I think we will look at this item number one and say it's resolved.

MR. GRIFFON: Again, John, I mean, Hans, I don't mean to cut you off. I think it's worth looking at this example maybe, and instead of deciding on a break that this meets your needs maybe -- as a work group member I don't care ^. I would propose though that SC&A look at this as well --

DR. ZIEMER: To verify that calculation.

MR. GRIFFON: Yeah, to verify that those defaults make sense. And I think the more we hear about it and the fact that they were short campaigns, I'm being convinced here in

the room that they've provided us this example, I think we should all reflect on it and make sure that we're in agreement with this.

DR. MAKHIJANI: I just want to clarify my end of the conversation. From my point of view, and maybe Hans misunderstood. From my point of view I was just reiterating what I said in the formal meeting on the record, which is I've no doubt that overall these assumptions are claimant favorable for the vast majority of workers. But I have some concerns in the SEC context which is more rigorous than doing claimant favorable dose reconstructions. I do think they need to be reviewed, so in my opinion which I said in the first part of the meeting. I think maybe Hans misunderstood what I had, what the intent of my statement was.

MR. GRIFFON: If I can, I can read out what I had sort of as an action, and it covers, I didn't really put it down for NIOSH's Response 1 or Response 2, but it sort of covers one, two and three in that first set of responses at least. And I suggested that SC&A sort of

review sample case along with default approaches, one percent and two percent.

SC&A will also include a review of the Bogar 1986 document although, as Arjun said, it may not answer some of those questions. NIOSH to provide documentation to support the statement that most of the enriched material was very slightly enriched, slightly greater than 0.71 percent U-235. And that's what I have just as follow-on actions here.

DR. ZIEMER: Good, I'm just looking at the SC&A report, and they give the Bogar numbers for the categories, so I'm not sure what we would gain because you've already indicated that he doesn't provide further detail than that.

DR. MAKHIJANI: No, Dr. Ziemer, what I was looking for in terms of just trying to respond to Mark's tasking here is more detail as he has just stated --

MR. GRIFFON: Yeah.

DR. ZIEMER: But I think the Bogar --

DR. MAKHIJANI: -- the Bogar is not relevant.

MR. GRIFFON: It's probably not as relevant.

DR. ZIEMER: Well, I'm saying the Bogar numbers are in their report, and I don't think it answers the question.

DR. MAKHIJANI: Yeah, the Bogar numbers are only relevant so far as the total amounts of the three categories and sorting out the TBD --

MR. GRIFFON: So as far as the task, I'll --

DR. MAKHIJANI: -- because there are some errors and sorting out the errors in the TBD the Bogar documents are very appropriate.

MR. GRIFFON: So as far as the task I'll drop that Bogar review from that task, otherwise I'll leave it the same.

DR. BEHLING: Well, let me just go back and then if the Bogar document is insufficient to look at the sample cases and how do you judge the validity of the two cases, one percent, two percent, in the absence of more definitive data?

MR. GRIFFON: Well, I think the example is for an individual that you knew worked on a certain campaign, so you have knowledge that they worked with enriched material. And they're saying that even though he worked

during for a short campaign on this six percent -- whatever it was -- 6.5 percent enriched, it turns out looking over all at this cumulative dose, the in vivo more than bounds it and two percent probably would have been sufficient.

So I guess that's the context in which I would review it is to say, yes, they have, using the in vivo and the urinalysis do they have enough there to bound and is two percent bounding for all members of the class? I think we go back to that all members of the class statement. That's what you want to answer.

And part of that is, I think, it might get into this action item number four, but part of it is the, I think in my mind anyway, the size of these campaigns. Because before I came to this meeting, I wasn't sure. And the way they're being characterized, it seems that they're much smaller than I was envisioning.

And the other part is the who question. Can you identify either through dosimetry data or other pieces, do you have enough there to allow you to bound? Does that

make sense, Hans?

DR. BEHLING: Yeah, I haven't looked at those cases specifically.

MR. GRIFFON: Neither have I.

DR. BEHLING: So I don't know what's in there.

MR. GRIFFON: I'm just going by what's described here so I haven't looked at that case either.

DR. ZIEMER: Mark, as I understood it though, if you had a case such as Hans described, some individuals who only worked on campaigns with high enrichments for restricted times, you wouldn't have to go to the overall bounding. You could bound that individual base on the actual percentages which would meet the other side of the SEC criteria.

MR. GRIFFON: But if they were identified as working on the project.

MR. ROLFES: Once again, for example, in 1964 we have breathing zone samples for individuals that were working 3.5, 3.9 percent enrichment. That information would be used in their dose reconstruction if we didn't have mobile in vivo data.

MR. GRIFFON: So you have some isotopic BZA analysis?

MR. ROLFES: It's not isotopic, but what was done was they would take an activity measurement as well as a mass measurement as well as some swipes to determine the specific activity of the materials. And it would indicate that higher assays were being processed or higher assay work was being completed.

DR. MAKHIJANI: Now this second case is a real worker with real data or --

MR. ROLFES: Oh, certainly.

MR. SHARFI: Modified a little bit to protect the individual's ^.

DR. ZIEMER: Does that one go on the O drive did you tell us or --

MR. ROLFES: Well, this is air monitoring data that I'm referring to. What Mutty I think was referring to was the actual mobile in vivo data that was used in the analysis of the 6.5 percent enriched internal exposure model.

DR. MAKHIJANI: Mutty, which case number is it? Do you remember?

MR. SHARFI: Actually, it's not a claimant.

DR. MAKHIJANI: Sorry?

MR. SHARFI: This was not a claimant.

DR. MAKHIJANI: No, no, but which example dose reconstruction --

MR. ROLFES: I believe it's internal 14.

MR. GRIFFON: And then, Brad, if I can go on, on number four I just had a question. Really this gets back to the who question, but just a question for Mark on what actually does his response mean. We have a list of people with thorium working locations and in vivo ^, and then his provided response a list of workers with Uranium-235 and ambient environmental dose^ of at least 100 micrograms ^. Those aren't separate lists, are they? Are they the same --

MR. ROLFES: They're separate lists. Yes, they are.

MR. GRIFFON: Oh, they are? Okay. So why was this first sentence included as an action for this Finding? I'm just a little confused.

MR. ROLFES: We had asked about the assumptions to apply to the entire class. We basically, this was just a lump of our

information into this response. We had gone through --

MR. GRIFFON: Because I know we had asked about thorium workers, quote/unquote, thorium workers, but that comes up later, right?

MR. ROLFES: Then there was also some question about who was potentially exposed to enriched uranium. So I provided both listings as an indicator of thorium exposures as well as potential enriched uranium workers based on in vivo data.

MR. GRIFFON: But they're not the same list, and they don't necessarily overlap or anything like that.

MR. ROLFES: There are some people that are both.

MR. GRIFFON: And the list of U-235 in vivo count results of at least 100 micrograms more than one time's provided. Was this list -- I haven't looked at it, but was this list constructed by NIOSH or --

MR. ROLFES: Yes.

MR. GRIFFON: -- was this something that was -- so you pulled this out of in vivo --

MR. ROLFES: Exactly. Let me qualify this a

little bit. For example, the thorium worker notation was written onto the mobile in vivo data sheet by individuals at the site who were apparently attempting to reconstruct individuals who were working on historical thorium processes.

They knew that some of the people had not been previously monitored for thorium exposures in the earlier days. So they wanted to make sure that these individuals had not exceeded a maximum permissible lung burden in the earlier time periods when thorium was, in fact, processed. So there's indications on the mobile in vivo datasheets to indicate that these individuals were either current or former thorium workers.

And now this is, many of these individuals that were thorium workers were counted in the first month that the mobile in vivo unit came to Fernald indicating that they knew who the individuals were that were working on the thorium projects as well as selecting those individuals for the first round of counts.

The enriched uranium list, I just used

a 100 microgram quantity because that's a readily detectable quantity to identify a person that could have had a potential enriched uranium exposure. So that's why we're providing it.

MR. GRIFFON: And that was derived from HIS-20 or how was that --

MR. ROLFES: No, this was actually from the raw data sheets that NIOSH collected, the mobile in vivo data which are available on the O drive. We just went through by hand and looked for the results that exceeded 100 micrograms.

MR. GRIFFON: So back to my original question. I'm a little slow on the uptake on this, but I saw a thorium worker -- this goes back to this document you provided, there was a PDF called thorium worker I think, maybe I'm wrong. Is that true?

MR. ROLFES: I can take a look through my notes here, and I believe there was a list of thorium workers, a list of potential enriched uranium workers, and then an Excel spreadsheet that had both listed just by the names of the employees. And the PDFs actually included all

of the employees' in vivo data for both the potential enriched uranium exposures as well as the thorium. So anyway I do have a copy. I have the stack of mobile in vivo results for each of the categories I've just described so if you'd be interested in making a copy or something.

MR. GRIFFON: Okay. I mean, I probably have it, but I see lists of thorium and former thorium workers, but I don't see the uranium one.

MR. ROLFES: Thorium and former thorium workers at Fernald and then list of potential enriched uranium workers.

MR. GRIFFON: I can sort this out.

MR. CLAWSON: We have a comment over here from that --

MS. BALDRIDGE: Is that list including workers pre-1966?

MR. ROLFES: Well, enriched uranium --

MS. BALDRIDGE: No, reference to the thorium.

MR. ROLFES: Reference to the thorium, it certainly is, yes. I'm not saying it's 100 percent complete because in the early time

period, mobile in vivo results were not available. And what was done, there were individuals at the site who had investigated former people that were working on the thorium projects and compiled a list of individuals who were involved.

However, based on the information that we're using for dose reconstruction, we're going to be using air monitoring data for those early time periods when people did not have in vivo counts, so --

MS. BALDRIDGE: And how are you doing that for plant six when they didn't even know it was there? Have you found air monitoring measurements? I mean, they weren't available for the original site profile so did you find those?

MR. ROLFES: We certainly did, yes. That's a very good important point because NIOSH was not aware of those initially, and Fernald certainly was. Fernald documented the, they actually had prepared to, basically after the materials in plant nine in the early 1954, '55, '56 time period were produced, a lot of the materials that were left over were put

into a storage building. They wanted to reduce the volume of those materials and convert them to a safer storage method.

So they converted a furnace in plant six in the, in late 1959, they converted the plant six furnace to essentially roast and oxidize the thorium materials into a safer storage form. And that was done between, I believe, ’60, ’61 time period. I’d have to take a look at the exact notes that we do have and documents. But it certainly was documented; however, NIOSH did not initially have that documentation so in the early time period.

MS. BALDRIDGE: Another question, have you checked the workers’ records based on the exposures that were presented in the documents to see that your records agree with the National ^ of Ohio records that were provided in exposure?

MR. ROLFES: Yes, we have begun a comparison of urinalysis cards to information that we received from the Department of Energy and our dosimetry response file which is out of HIS-20. So we’ve been asked by the Advisory Board

members to compare the data that's in the HIS-20 database to information on urinalysis cards. And so we are in process. We've completed the analysis of -- I don't want to give a number. I don't have the number off the top of my head. Gene Potter, I believe, is on the line. If he would care to address some of the data comparisons, that would be helpful for us.

Gene, are you available?

MR. POTTER: Yes, let me get my mute button there. What we've looked at so far was large blocks of data that were available in the SRDB. And these are mostly plutonium results from the '80s, and those results are comparing very favorably. And we'll have all that in some sort of final report.

Still waiting to get more information from DOE. There are some smaller sets of data particularly for a given worker that are in the SRDB that can be compared also. But we're looking to hopefully do some statistical comparisons from, say like a goodly number from each decade to compare to the data in HIS-20.

MR. ROLFES: Thank you, Gene.

Is there anything else, Ms. Baldridge?

MS. BALDRIDGE: That's fine, thank you.

MR. GRIFFON: So on number four I do find a spreadsheet called "Fernald In Vivo Review", 9/25/07. And this says former thorium workers. The PDF file actually it says list of former thorium workers, but it's actually 31 pages of there are in vivo counts for 31 people or about 30, whatever it is, 29 people. And then in the next column, in Column B of this Excel spreadsheet, you say potential enriched uranium workers. And those in this list have about 74, and you're saying these are the people that were greater than 100 micrograms at any one time?

MR. ROLFES: Yes.

MR. GRIFFON: So they're not necessarily all potential enriched uranium workers for those with a significant reading anyway.

MR. ROLFES: Sure, sure, these are the individuals who would have had high ^ exposures.

MR. GRIFFON: I don't know that there's any further follow up on that.

Arjun, do you have something?

DR. MAKHIJANI: I'm a little confused. Are we on five?

MR. GRIFFON: I'm on number four actually. I was just trying to clarify what documents existed to support that it wasn't --

DR. MAKHIJANI: Four is still about enrichment, right?

MR. GRIFFON: Yeah. NIOSH's response number four to the first Finding.

DR. MAKHIJANI: Oh, response number four to the first finding.

MR. GRIFFON: First finding, yeah, yeah, yeah.

DR. MAKHIJANI: I'm in the fourth finding.

MR. GRIFFON: All right, and there's a response, part of that response, it talks about thorium again. I think we cover that in another finding, but air monitoring data for thorium tasks, '66-'72 being made available by another division of NIOSH. It's now being entered in a spreadsheet. So you have a follow up on that is to provide that spreadsheet? That hasn't been provided yet, right?

MR. ROLFES: Entered into spreadsheet, let's see. Air monitoring data for thorium.

MR. GRIFFON: This really talks about thorium. I get a little confused.

MR. ROLFES: We have provided the air monitoring data for thorium. It is available to the Advisory Board on the O drive.

MR. GRIFFON: So I'll work with you later, Mark, but we've got to cross-reference that on another action because this is kind of in the wrong place, I think, right?

DR. MAKHIJANI: I have a question about that spreadsheet, if I might.

MR. GRIFFON: Yes.

DR. MAKHIJANI: There are two or three spreadsheets actually. I've downloaded them all and there's one spreadsheet that says "Fernald Thorium Data Air Samples Combined". But only a few of these samples are actually labeled thorium. It seems like a lot of these are just uranium samples.

MR. GRIFFON: Can we come back to that when we get to the thorium action? I'm with you, Arjun, but I want to get through the ^. I think we're almost there because number five -

- I'm just going through these one by one to make sure we're thorough here.

Total production numbers and the differences. You say you're still in progress on that, Mark. Is that correct?

MR. ROLFES: Yes, the comparison of HIS-20 data, is that what we're --

MR. GRIFFON: No, it's number --

DR. ZIEMER: It's the fifth action.

MR. ROLFES: I apologize. We are certainly reviewing the total production numbers; however, these are not something that is going to directly impact dose reconstruction.

MR. GRIFFON: Right, and I would, I guess my druthers would be to do the best we can on that, but also understand that we don't need ^ because it's probably not going to impact on dose reconstruction.

MR. ROLFES: Right, I agree with that.

DR. MAKHIJANI: But production is really important only for two things that I can think of. Because one is when did these things start? When did RU start? When did enriched uranium? What were the levels of enrichment? I agree that we don't need --

MR. GRIFFON: Any precision here.

DR. MAKHIJANI: -- precision in the actual production numbers. We need precision in the other things, you know, content of RU ^ dose related.

MR. GRIFFON: So we just want to keep that in mind.

MR. CLAWSON: If I might, something else from the outside people looking in. You can go on the DOE site, and it shows this much, and you go to these actual TBD and you're talking --

MR. GRIFFON: Absolutely, we have to at least be responsive to that.

MR. CLAWSON: Just so that people can see why there is such a broad difference there. That's one of the things.

MR. ROLFES: That's very important, and we do occasionally get calls like that, and usually we're able to resolve those calls, you know, when we speak to the claimants. So we do get questions like that that we're able to resolve.

MR. GRIFFON: Okay, for number six you have see number four. But I don't know that that

sample one, you say the person's not a claimant, right?

MR. ROLFES: Correct.

MR. GRIFFON: Did you find any claimants that fit this category or were there --

MR. ROLFES: Yes.

MR. GRIFFON: And so I don't think you've answered that question. Can you provide claim numbers?

MR. ROLFES: Well, we've provided a list of names so that was --

MR. GRIFFON: They're in that list then. Okay, so they're back in that spreadsheet.

And number seven, and, Hans, I think you have a follow-up report on this, did you not?

DR. BEHLING: Yes, I think it was e-mailed to all of the working group people, and I have some hard copies here as well.

MR. GRIFFON: Do you have any comments on this one?

DR. BEHLING: Well, I'm not sure we're ready to discuss it, but the petitioner, Ms. Baldridge, had identified an issue at one of the full Board meetings and at the most recent

working group meetings that relates to the issue that -- and I'll summarize it, what happens when you have a person who has had a significant exposure to uranium that potentially renders the kidney less than 100 percent functional, and what does that do to invalidate subsequent bioassay data?

In other words for people who had been exposed either chronically to high levels or perhaps as a result of a single incident that renders the kidney less than functional in a normal sense, to what extent will that exposure invalidate the bioassay data that you would essentially look at following such an incident, or on a chronic level and essentially render that data invalid?

And as a result of that question, I looked into it, and there's very little data out there. I had to look at one of the major documents, and that is the "Toxicological Profile for Uranium". I brought with me only the draft form that was issued in 1998, and I do want to pass that on to Sandra, but I've also got the most recent version, final draft, which was issued in 1999.

And I reviewed the data which is segregated on the basis of exposure pathways that separates out from inhalation, ingestion, wounds, et cetera, and different types of compounds based on solubility. And you will see, when you go through that document, there's an incredible wealth of information, but unfortunately, always it involves animals, different species, from rats, mice, rabbits, dogs, goats, et cetera, et cetera.

There was all but one case study that involved a human. And I don't say that that was the only human study, but it was the only human study where it was clinically determined that the person suffered from toxic effects of uranium and reduced kidney function. And that is a 1990 article by Zhao and Zhao and involved an individual who was exposed to significant quantities in two incidents to uranium tetrachloride.

It was clearly shown that he had impaired renal function, and it was also shown that the excretion data for that individual as a function of time followed a track that could not be explained by the conventional ICRP

model. And in short, if you look at the document, you will see that this individual was monitored for the first 64 days following this incident.

And you'll see a steady increase in 24-hour urine excretion for that individual rose from about 152 micrograms per liter to over 3,000, and then thereafter it declined exponentially by two functions. What it triggered in my mind is let's assume this individual had been monitored up front, and the excretion was very modest at first.

That would suggest, well, there's no reason to even follow this guy up because based on the early excretion data of one hundred and some odd micrograms per 24 hour urine excretion, there's no need to concern only to realize that subsequent time when he may not be monitored anymore that his excretion had risen twenty-fold to over 3,000 micrograms. And it does, in fact, support the potential concept that when you have toxic levels of intake for uranium, that the bioassay data may reflect numbers that do not coincide with our expectation based on ICRP

excretion models.

And I do want to ask the Board now if I can make a copy of that report available to Ms. Baldridge? Because it has not gone through the review cycle of the Privacy Act, but on the other hand, she was the petitioner, and it's mostly her documents that were reviewed in context with this issue. So I will ask the Board at this time if I can offer or send her a copy of the report.

DR. ZIEMER: I don't think the Board can make that determination. It's a legal question.

MR. CLAWSON: This is the report that you're talking about, Hans?

DR. BEHLING: Yes.

MR. CLAWSON: The one you gave us? I'll get Mr. Wade to take a look at it.

MS. BALDRIDGE: Hans, I can wait until it's cleared. There's no urgency.

MR. GRIFFON: Yeah, I think we might have to wait --

DR. BEHLING: There's nothing in there that she hasn't seen before, obviously.

MR. CLAWSON: We'll give this to Mr. Wade,

and he'll get with legal counsel and make sure we vet it, and then we'll get you a copy of --

MS. BALDRIDGE: And that leads to the next question concerning the [identifying information redacted]. When we went through the interview process on [identifying information redacted] claim, I was asked questions and asked if I had any additional information. And I was making references to [identifying information redacted] records. And the interviewer said where are you getting this? I said, well, I'm assuming it's in his records. The records that were used for [identifying information redacted] dose reconstruction did not have any of the information concerning him having [identifying information redacted] which were contained in the National Lab of Ohio infirmary records when he was diagnosed by the doctors there, and evidently monitored to some degree for that damage. Now, I question, I had asked Mark, what records does NIOSH have from National Lab of Ohio because those records were turned over by the court to the employees and put in trust. So I don't know if in the

'90s a copy of that information was provided or not provided, but I know in [identifying information redacted] case those records were provided by me for his claim and that NIOSH did not have access to them. Or if they were in the databank, they haven't been located.

MR. ELLIOTT: You did provide them by claim? With your claim you provided them.

MS. BALDRIDGE: I provided them with the claim, but since the petition records that the class of workers which could be potentially 600 people apart from the 900 or so who have applied for claims, their records would not have been provided that would indicate whether or not they had issued the [identifying information redacted].

DR. ZIEMER: From what you describe, Hans, it sounds as if the [identifying information redacted] increases the uranium turnover in the urine. And if I'm a dose reconstructor, I think I'm going to be estimating more uranium in the body than I would otherwise.

MS. BALDRIDGE: Actually, it causes a retention of salts.

DR. BEHLING: Yeah, it does not --

DR. ZIEMER: Well, you're talking about a fraction of the body burden being excreted --

DR. BEHLING: If you look at, for instance, the assessment of the initial intake for this individual who is the case study, and then you look at the ICRP excretion fraction which is now a number, you would expect ^ W which was cited in this case to be about three percent or four percent on day one.

DR. ZIEMER: Right.

DR. BEHLING: And obviously, that was not the case. The 156 micrograms was a small fraction, less than one percent; and therefore, it is clearly not in concert with what you would expect to based on the relative quantity that would be expected to be excreted if you looked at the ICRP model as a reference value.

DR. ZIEMER: But you wouldn't only use day one.

MR. ROLFES: Exactly, exactly. That's a very important point because right here we've indicated that NIOSH would significantly underestimate an intake or a body burden if such an assay were to be performed in the

first few days following an acute exposure. That's a very important point because we would not rely only on a limited set of data. We would consider the total uranium excreted from the incident all the way out until the end of, until the urine sample dropped back down to below detectable levels. So we cannot --

MS. BALDRIDGE: The point is [identifying information redacted] is not something that just occurs for a few days while they might be excreting uranium levels from an incident. It causes an inflammation which affects the [identifying information redacted] ability to process and excrete the salts, particularly uranium hexafluoride or tetrachloride to the point that, as I've read, begins to excrete and causes it to be withdrawn and deposited in the [identifying information redacted] which, in fact, is not allowing the uranium to leave the body, leave the [identifying information redacted], but is actually extracting that portion from the water portion of the urine and depositing the salts, the uranium salts, in the [identifying information redacted].

DR. BEHLING: And let me make a comment

here.

MS. BALDRIDGE: The long-term excretion ability for the [identifying information redacted] in people with [identifying information redacted].

DR. BEHLING: The data suggest that there is obviously a reduced excretion early on that perhaps reaches a high point, in this case if one can look at this case and assume it may represent other individuals, you reach the maximum excretion value around 62 days after the exposure. But what it means is that if you took the day after or a couple days after where you're at the low end, you would clearly not assess this person's exposure accurately. You would underestimate clearly.

DR. ZIEMER: I think Sandra is saying that the integrated excretion will still be low regardless --

MS. BALDRIDGE: Right.

DR. BEHLING: It probably would be.

DR. ZIEMER: -- of what the ^. It seems like if there's a retention here which, if that's the case, the integrated will give you a different answer.

DR. BEHLING: If you had chronic [identifying information redacted] failure or a chronic reduced [identifying information redacted] function, and I've looked at some of the animal studies where basically the [identifying information redacted] seizes and stops. It shuts down, and you'll have to, if you're a human, you have to resort to dialysis.

MR. ROLFES: Correct. It's a very, very serious condition where the [identifying information redacted] do stop. You stop producing urine. You do not excrete urine or uranium.

DR. BEHLING: I know that, but the truth is you can have partial [identifying information redacted] that doesn't block the entire [identifying information redacted] function but is reduced [identifying information redacted] function. And under chronic exposure conditions where there's a chronic reduction in [identifying information redacted] function, not 100 percent to the point where a person stops secreting, you're altogether at a catastrophic end point.

But in the sense where you have partial reduction in urine excretion of certain metal salts, you would falsely assume that the exposure was less than what it truly is. This is what these data dictate to me.

MR. ROLFES: I don't see this as invalidating the data that we do have. This is a single data point, a single case scenario. And it's a big leap of faith to use one case scenario to apply, you know, in an acute, very serious exposure condition like this which required medical intervention, it's a very big leap of faith to try to apply that to a chronic routine exposure at a much, much lower level.

MS. BALDRIDGE: Mark, one of the documents that was submitted with the petition where 17 men had exposure and 100 percent of them had --

DR. BEHLING: It's part of the exhibits in this report as you will see. I included that.

MR. ROLFES: Yeah, that is very true. There was an incident with uranium hexafluoride for 17 individuals who received it. There were some immediate concerns about the individuals'

health because this is an unusual occurrence and a significant incident. When you have an exposure to this material, to UF-6, it's highly soluble.

MS. BALDRIDGE: I don't think you can claim that it only occurred in individuals who were involved in an incident like the one documented. It shows a pattern that uranium hexafluoride causes damage, period. Now if you can identify everyone who was exposed to uranium hexafluoride, you will know which ones to begin checking for that.

MR. ROLFES: Sure, sure, uh-huh.

MS. BALDRIDGE: I mean, to say it was limited to an isolated incident or an isolated claim or case I think is a little narrowing.

MR. ROLFES: No, certainly these are significant events. The individuals that were involved in this UF-6 release required medical intervention, and they were well monitored. In taking a look at -- I actually do have a list of individuals that were directly involved in the 1966 UF-6 release at Fernald, and these individuals gave immediate urine samples. Let me get to the results here.

There are 12 AEC employees listed on this sheet, and between these 12, there are 35 urine samples taken. The one individual -- one, two, three, four, five, six, seven, eight, nine, ten, eleven, there are 11 urine samples for the one individual. It appears that five of which are in the first 24 hours. So these are acute scenarios that are unusual occurrences.

Fernald routinely --

MR. GRIFFON: Mark, do we have that document?

MR. ROLFES: Yes, I do believe this has been made available to the Advisory Board as well. Let me take a look at my list here for a second.

MS. BALDRIDGE: I think the unusual occurrence may be that they were monitored or detected and not the fact that the exposure was a unique occurrence.

MR. ROLFES: I'm sorry. Could you repeat that, please?

MS. BALDRIDGE: I think the unique occurrence would have been that they were, that the exposure incident was reported and

these people were monitored and not that the occurrence of [identifying information redacted] was the unique occurrence. I'm sure during the course of the operation at Fernald more than 17 people were exposed to uranium hexafluoride.

MR. ROLFES: Oh, yeah, I'm not by in any way limiting this to only these individuals that are listed on this particular incident report. However, Fernald did do additional research and development with individuals who had been exposed to uranium. We have indications -- well, let me start off with on an annual basis, personnel provided urine samples.

In addition to urinalyses that were looking for uranium concentrations in urine, individuals on an annual routine basis provided urine samples that were analyzed for things that would determine whether [identifying information redacted] function was, in fact, being impaired or not. This, in fact, was the reason, Fernald was concerned about chemical toxicity, and so they monitored employees for any chemical toxicity effects.

If you take a look at the information

that was collected from a urine sample during an annual physical, there were indicators to determine whether there was albumin being excreted in the urine. They were looking for proteins in the urine as well. They were looking for a condition known as proteinuria which would be an indicator of [identifying information redacted]. They were also looking for blood in the urine. They were looking for white blood cells in the urine. They were looking for various types of castes that are formed by cells in the [identifying information redacted].

These are all indicators of, in addition, they would look at the specific gravity and the color of the urine as well. You can infer a lot of things as a medical doctor from information collected. I am not aware of any indicators where an individual has a documented case of chronic [identifying information redacted] failure based on routine exposures at the site.

MS. BALDRIDGE: Next question goes back to do you have the records that show what the albumin was, what the proteins were that would

have all have been included in their infirmary records? If you do not have those records, then you have to rely on the documentation that was provided either in the petition stating that 17 people had damage or the documentation that was sent with the claimant showing what their excretion rates were.

MR. ROLFES: We know based on the list of individuals that were provided in the petition that had [identifying information redacted]. These individuals had acute [identifying information redacted]. This is significantly different and caused by a large exposure to a highly soluble uranium hexafluoride gas.

MS. BALDRIDGE: [identifying information redacted] is not one of those individuals. His damage was discovered during a routine urinalysis. There was no record that he has ever had an exposure other than the notation, it’s apparent that this man has been exposed because of what we’re seeing in his urinalysis records.

MR. ROLFES: In a specific case like this what we would need to do is take a look at the urinalysis data. That would be the first

place to start. As a medical doctor could take a look, excuse me, at the medical records. A medical doctor would be able to infer information regarding the [identifying information redacted] function from these urinalyses results that you're referring to. The problem with chronic [identifying information redacted] failure, not just uranium can cause [identifying information redacted]. Several other environmental factors, health factors such as diabetes, high blood pressure, can all contribute to chronic [identifying information redacted] failure. So we would have to make a case-by-case analysis.

MS. BALDRIDGE: Does NIOSH have the information?

MR. ROLFES: What information?

MR. GRIFFON: Do you have the medical records?

MS. BALDRIDGE: To determine whether --

DR. ZIEMER: To determine if there's a [identifying information redacted] problem for a given individual.

MS. BALDRIDGE: -- there could be a

[identifying information redacted] problem which would affect the validity of the urinalysis records for anyone in the class?

MR. ROLFES: Once again, we do not have a comprehensive, I don't want to mislead anyone. We do not have a comprehensive documentation of everyone's medical records on the site. We do, however, have everyone's urinalysis data, and that would be the first place to start. If we observe something that was unusual with those urinalysis data, then it would trigger additional investigation into that claim.

MS. BALDRIDGE: That urinalysis data, is that uranium urinalysis or complete urinalysis?

MR. ROLFES: We would certainly know if there was something unusual because of the amount of data that is provided. We would take a look at the urinalysis data first. We would take a look at in vivo data, if the person was not excreting the uranium that would be residing within the body, it would readily detectible by the in vivo results.

DR. BEHLING: Well, that came after '68. I mean, there are a lot of loopholes here.

Let’s face the fact that if you have chronic [identifying information redacted], the urinalysis will not allow you to make that decision as to whether or not there’s something unusual. You’ll just see a reduced urine content of uranium. That’s all you’re going to see. You’re not going to be able to say whether that reduced uranium excretion value is legitimate or is the result of reduced [identifying information redacted] failure, and that’s the bottom line.

MR. ROLFES: Okay.

I’d like to point the Advisory Board members to some research that was, in fact, done by the Fernald site on this topic. There were, in fact, case studies of human exposures to uranium for individuals that were in fact employed at... There were four individuals that were directly exposed to uranium at Fernald. These individuals during their time period at Fernald did pass away from various causes.

The Atomic Energy Commission was interested in learning additional pieces of information from individuals that had worked

at the site in order to determine whether this, in fact, was a concern. I'd like to point back to the conclusions that resulted from the autopsy data.

There were organ-specific examinations of uranium content as well as a detailed investigation of the kidney tissues. The amount of uranium found in analyses of the kidneys is well below the level at which we would expect to find kidney damage. The microscopic sections indicate no kidney damage which could be attributed to uranium. It appears to us that the kidney may be the critical organ for these types of exposures we encountered.

So it shows to me that they certainly were concerned about this, and it was investigated. We have no indicators other than a single case study that would invalidate our dose reconstruction model.

DR. BEHLING: I'm having somebody from the ICRP who's one of our consultants actually look at that data and try to make heads or tails with it because quite honestly it did strike me odd to look at that excretion value

for that individual and realize it was going up for probably 64 days and then precipitously dropped thereafter.

And I'm having them look at it so to say is there an explanation that is reasonable and should be looked at in more detail in how it might apply to other claimants here at Fernald.

MR. ROLFES: This individual did have acute renal failure so he stopped producing urine. I believe it's documented in this report, but he was only producing about ten milliliters of urine in a day versus the normal excretion amount of roughly 1.5 liters.

It's very possible this individual had to receive medical intervention because of his huge exposure. It's very possible this individual was given something such as like a bicarbonate to expedite, sort of like a chelating agent, to expedite the excretion of uranium that remained within his body.

I don't know if that was the specific, I don't know if the treatment regimen, and I'm not a medical doctor so I'm not qualified to evaluate his medical history and the treatment

of this case. But I would have to take a look or have a medical doctor take a look at that information to make a judgment about this specific case. And once again, this is one single case where there was a large ^ exposures.

DR. BEHLING: And I have stated up front that human data are very few. And I looked at other data that were, in fact, also published in 1990, an article by Ron Fischer and Ron Kathrin and others and also involving tetrachloride, and unfortunately in those instances the clinical data doesn’t support renal damage. The clearance rate was given there and so forth, but I was focusing on strictly dose human data where there was excretion values associated with clinically diagnosed renal failure. And that’s the only case that I was able to find.

MR. SHARFI: Were those reported in 24 hours?

DR. BEHLING: Yes, yes, actually, they were adjusted because I believe they didn’t always collect, and then they arbitrarily said let’s multiply everything so that the 24-hour urine

volume ends up being at 1.4 liters.

MR. ROLFES: And that's a good point but --

MR. SHARFI: Because ^ concentration. I'm not sure, I wonder if the concentration changes because of the renal damage versus the total uranium output.

DR. BEHLING: I can tell you just looking at the numbers because for the first 24 hours they cite as the 21st hour urine volume as 104, I think, micrograms per liter. And then if you look at the actual figure itself, it looks to be that if that was scaled up to 1.4 liters at 152 micrograms. So I believe that all of the data points you see are, in fact, normalized to a 24 hour urine excretion volume.

DR. ZIEMER: Mark, could you clarify on some of the other markers like albumin and so on? Was that routinely done in connection with your uranium analysis or only on cases where, such as the one you cited, where there was a known high intake?

MR. ROLFES: The annual physicals at Fernald collected urine samples separate from the regular uranium urinalyses to evaluate the

individual's health.

DR. ZIEMER: And then I think the question was do we have that as something that can be coupled with the uranium data so that if there are such indicators -- let's just take a hypothetical case. Here's Worker X who has elevated albumin, say, indicating something with the kidney. What do we do with that relative to the model?

DR. WADE: First, do you know? And then secondly, what do you do with it?

DR. ZIEMER: Or do we even know of that? That's what I'm asking you. Sort of, or is that data separate. Sandra suggested it may be somewhere else and is not available.

MR. GRIFFON: That's the first question, you're right. But hypothetically, even if you did have it in the --

DR. ZIEMER: Well, do we have it?

MR. GRIFFON: I don't think you do have those references in the DR file, right?

MR. ROLFES: No, we do not receive the complete medical history; however, we do receive, for example, medical X-rays, et cetera, out of those medical files.

DR. ZIEMER: And you do have it for special cases where we know there's an extreme --

MR. GRIFFON: But then the question would be if you were to get it all from DOE, assuming you could, what would you do with it relative to the model is your second question.

DR. ZIEMER: Well, I'm not sure what we can do with it. Because you could raise the same question about any individual and their general health and say what do you do, you know, is there a separate model for a diabetic? Is there a separate model for you name it? The only time we correct for a sort of a lifestyle issue is for smoking. The uranium case is somewhat unique in that the agent itself that we're interested in has the dual function of toxicity and ^. It's not really dual. All the limits on the uranium are based on the chemical toxicity which in a sense if you've exceeded that -- well, you don't worry about the radiological because the chemical shows up sooner in a sense as far as dose limits are concerned. But in any event, I'm wondering how we --

MR. RICH: Up to about two and a half

percent.

DR. WADE: So those are the questions I think NIOSH has to think about. Do you know? If you don't know, can you find out? And then if you do have the information --

DR. ZIEMER: Well, even if you had it, what would you do with it? I think in an individual case, if we know there's definitely a medical diagnosis of renal damage, it seems to me you could maybe say, okay, what will we do in this case and consider that. If you just have indicators like the albumin level is a little bit up or nowadays if the PSA value is up on somebody what do you do with that or whatever it is.

MR. ROLFES: Another point that I think is worth mentioning that NIOSH selects the solubility type of the uranium to which the person is exposed based upon the urine data that is provided to us. So if we have indication that the uranium that the person was exposed to is not being excreted as rapidly as is expected, that would be indicative to us that the material is less soluble.

DR. BEHLING: How do you, you're making statements that you can't verify. How can you say when, if I go in and report to a location where I submit my 24-hour urine sample Monday morning, and it shows so many milligrams per liter of 24-hour volume, how do we know whether that's to be expected?

I mean, you can't tell me that you can look at the urine data and say, oh, this is abnormal. There must be something wrong. Let's do a kidney function test. That just doesn't sound right.

MR. ROLFES: Well, a urinalysis of a couple milligrams per liter would certainly be --

DR. BEHLING: It's just the opposite. You're likely to see less than what you would expect.

MR. ROLFES: If we saw less, then what we would expect, that would be indicative of a less soluble material which resides in the body.

DR. BEHLING: You're missing the point here. You don't know --

DR. ZIEMER: You just have a number.

DR. BEHLING: -- you don't know what to

expect.

DR. WADE: Sure, I think an issue has been identified at least to be looked at and it needs to be commented on.

MR. ROLFES: Once again, we cannot just consider single pieces of information. For a specific case if you can provide a specific case scenario, we would have to take a look at that specific case, use the urinalysis data, compare the in vivo data, look at medical histories. You know, it would be a very comprehensive study that would need to be done.

DR. ZIEMER: I would think a pretty serious renal damage, you would see some drastic changes in the volume of the urine which might be an indicator aside from the albumin issue. If somebody's excreting a few milliliters a day, it's indicating the system is shutting down. Then you might, the dose reconstructor might be looking at that, and I don't know what they would do with it.

MR. CLAWSON: Yeah, but the thing is when you go give one of these urine samples, you give a urine sample for your medical to check

for ^ . Every so often they give you a urine check for uranium. We always got a line. We've got to fill to there. If it takes one day or two days that's what you get. And see, this is where the big question is coming in at.

DR. BEHLING: But the classical case is Sandra's [identifying information redacted]. He was not a person who was suspect to be exposed to uranium, but on a routine medical examination, perhaps an annual, he was diagnosed to have the issue of [identifying information redacted] failure. And there was no relationship to urinalyses that were done on an employee uranium excretion.

So what do you do if on your annual routine medical exam, you end up with a clinical data that says you may have been exposed to levels of uranium that rendered your [identifying information redacted] less than perfect? And now you go back and may not even have any urine data to look at to assess what exposures. And even if you did, what does that tell you? What does that data tell you? Is it legitimate or isn't it legitimate?

MR. ROLFES: That's an important point. One thing that an individual with chronic [identifying information redacted] disease, if untreated, can lead to end stage [identifying information redacted], excuse me, chronic [identifying information redacted] failure can lead to chronic, essentially end stage [identifying information redacted] disease in which a person's [identifying information redacted] stop functioning entirely, and it requires a person to go onto dialysis.

We would have to take -- like I said, other things can cause chronic [identifying information redacted] failure.

DR. BEHLING: Heavy metals are a key issue. And for instance, when I looked at the Addel, Fischer, Ron Kathrin article that was also published in 1990, Health Physics Journal, they looked at autopsy data years later. And they say, well, there's no persistent [identifying information redacted] damage that's in evidence based on postmortem analysis, tissue analysis. And that may be true, but and obviously it's like a severe sunburn. There comes a point when that skin

sloughs off, and you regenerate, and you look as healthy as you were.

But a postmortem is not an indication that there wasn't at least transient [identifying information redacted] damage to which time he was monitored for uranium excretion. So I look at that data and say, well, you can't argue with the facts. The facts may not speak in total of the issues that we're discussing here. That is, what does [identifying information redacted] damage do for periods of time during which you were monitored for uranium excretion? And to what extent does that [identifying information redacted] damage impact the validity of that uranium excretion in modeling internal exposure?

MR. GRIFFON: I'm going to get an action item out of this before lunch. So, Arjun and -- I agree with Lew, but I think we've got to define it a little better.

DR. MAKHIJANI: I think Sandra mentioned that although NIOSH did have the information about her [identifying information redacted] that there was actually no adjustment done.

This is kind of, I would suggest that this is a case study of NIOSH having information about chronic [identifying information redacted] damage, and there was no adjustment. So to date there appears to be no procedure or perhaps I'm mistaken. If there are procedures for dealing with such a case when they're not on dialysis --

MR. SHARFI: I have some clarification, and I think Sandra can correct me if I'm wrong.

I believe they used OTIB-0002 on your claim?

MS. BALDRIDGE: Right.

MR. SHARFI: So they didn't actually assess bioassay. They used an overestimate to do her case. So I don't want to say that they may or may not have done, looked at that information since they did what we consider an overestimate approach. They didn't see the need to make adjustments.

DR. MAKHIJANI: ^ an interesting case to address.

MR. MORRIS: I'd keep a couple of points in mind. One is that the threshold for permanent damage in a 70 kilogram standard person is

about 40 milligram intake according to Brotsky. That's a big number. And then I'd also -- maybe you want to elaborate a little bit on this, Mutty, but the idea that our intake models have uncertainties built around them, geometric standard deviations on our input datasets. All are intended to accommodate the variability in the human condition compared to the standard model. Am I right?

MR. SHARFI: Correct.

MR. GRIFFON: And that's in your response, this GSD accommodates, although I'm not sure about this three number. We've disputed this before. And Owen Hoffman has also supported my argument of for some nuclides it's probably a little higher. But anyway, aside from that this GSD accommodates wide population variability in biokinetics. But that's wide population variability, that's not really referencing someone who has medical evidence of a [identifying information redacted] ^.

MR. MORRIS: That is ^ that population, isn't it? I mean, that person is sort of the three or four sigma out on the curve of

[identifying information redacted] function.

MR. GRIFFON: Well, I would argue that this GSD sort of covers your variability of a normal population. I think that's the way it's always --

MR. MORRIS: Multiply your three.

MR. GRIFFON: Yeah, yeah, I know. But the question here, and I'm reading that first line. I think, "By law, NIOSH uses the latest," I'm not sure it says biokinetic models in the law. It's in the regulation actually. I think it should say by regulation. It doesn't say ICRP.

MR. ELLIOTT: It says consensus models.

(Multiple speakers)

MR. GRIFFON: But ICRP does allow for adjustments. I'm not sure if allows for adjustments for, I don't think it, I think it's silent on the [identifying information redacted] failure or chronic.

DR. WADE: But this is an important issue.

DR. BEHLING: No, I think if you look at excretion values from your ICRP, based on sub-toxic levels of intakes.

MR. GRIFFON: No, no, no, but I'm asking if

the ICRP document ^ allows for, they allow for effect modifiers for certain other things. I don't know if it's in that. So I guess the, what I'm trying to understand is what should the action be for NIOSH because, you know, Lew said NIOSH needs to follow up and just what are we asking them to do? Because right now they don't have the medical records in the DR files, so they would have no way of finding out if someone had medical evidence of any problem.

DR. ZIEMER: Well, it seems to me we ought to ask it in a generic way and not link it, for example, to a particular case. The question is more along the lines of what, how do you conduct an internal dose reconstruction in cases where there is a medical condition that can impact the excretion? Or there's damage to, in this case the [identifying information redacted], but you could ask the same thing from fecal excretion or maybe even on lung if the person has --

MR. GRIFFON: And the lung's a good example actually because I've asked for this before. Because ICRP does allow for effect modifiers

for smokers. So we sort of in the epi model we sort of take away risk or attribute it to smoking and not to radiation, but we don't add it in for the ICRP side. So it does allow for that.

DR. ZIEMER: The reason we can do it for smokers is that we have pretty good risk data for smoking, but for other --

MR. GRIFFON: But we don't do it for smoking by the way. You're thinking of the risk side, not the dose side.

DR. ZIEMER: It's not the dose side. It's in the final analysis that we --

DR. WADE: This is a very broad question here about the ability to estimate dose for any member of the class. You're going to have to get to the intellectual issue of if potential members of the class are in some way physically impaired, how do you deal with that?

DR. ZIEMER: Well, I'm not sure you can ask it quite that way. It's got to tie in with, for example in this case, I think the organ of interest that's causing the excretion if it's damaged somehow. Not simply that the person's

impaired.

DR. WADE: Well, if you're using certain bioassay information as the underpinning of your determination, then the issue really goes to any condition that could call in question the validity of that bioassay.

MR. ELLIOTT: You don't want to underestimate the dose, but you've got to, there's a logical constraint that would retain dose in the body. You want to avoid underestimating that. But I'm clear on, we don't have a current, I don't believe a current --

DR. ZIEMER: And it may be that it's not doable.

MR. ELLIOTT: What would we use? I'd like to follow that. If the output all of a sudden decreases dramatically, we go from a liter and a half a day to less than ten, what does that trigger? How do you use that? How do you look at that and say, well, am I going to look at the internal bioassay data different now, urinalysis data different now? I don't know.

MS. BRACKETT (by Telephone): This is Liz Brackett. I'm the principal internal

dosimetrist for the project.

MR. GRIFFON: Hi, Liz.

MS. BRACKETT (by Telephone): Hi.

DR. WADE: Please speak up, Liz, okay?

MS. BRACKETT (by Telephone): We haven't looked at the [identifying information redacted] issue with uranium, but on occasion some unusual circumstances come up. And not that long ago there was a person had had 95 percent of their pancreas removed, and I believe it was pancreatic cancer in that case. And we do have a medical doctor on staff, and when something like that comes up, we check with him to get his opinion --he's also a Health Physicist -- to get his opinion on what kind of impact, if any, it would have on the case. We don't have any specific procedures for this in place, but on particular occasions, we have checked with him. But I think something like this would be on a case-by-case basis certainly, and we might have to check with additional experts to --

DR. ZIEMER: And that may be the answer itself. At least if you --

DR. WADE: And that presupposes that you

have the information available to know.

MS. BRACKETT (by Telephone): Yes.

DR. WADE: All this needs to be thought about and put together in a cogent presentation.

MR. ROLFES: Once again it does get back to looking at all of the evidence that we have, all of the information for a particular claimant. And these things are, in fact, mentioned in telephone interviews and worker histories.

DR. WADE: Well, an excellent point has been raised. It needs to be addressed. Where is the work group on this?

MR. GRIFFON: I know. I'll work on this over lunch. I'll work on an action item statement, and then when we come back we can summarize. And I'll get with Mark and others on the side.

MS. BRACKETT (by Telephone): Can I mention one more thing? This isn't directly related. It's related to something that Arjun said several minutes ago about the excretion curve for the individual who had [identifying information redacted] damage where the uranium

was very low at first and dropping and then it came back up again and --

MR. GRIFFON: I think that was Hans that said that.

MS. BRACKETT (by Telephone): Right, well, that's not a unique instance actually. We're looking at this for Atomics International or it's Santa Susana, whatever it's called now, but there was a paper published. It was specifically exposure to uranium aluminide, but that was found to exhibit that pattern where it drops for awhile. It appears to be insoluble at first, and then it starts increasing after, I think, 30 or 40 days, and it continues to rise for quite some time before dropping off again. So it's not unheard of to have a pattern like that, and maybe we're looking at something like that here.

DR. BEHLING: And, Liz, this is Hans. I think you're correct. The issue here is one of uranium tetrachloride which most, I think NIOSH regards this as Type M or Class W. In looking at the toxicological profile, they view uranium tetrachloride as a very insoluble

form of uranium.

MR. ROLFES: Moderately soluble.

DR. BEHLING: More so than you would expect as a Class W or an M, somewhere in between M and S.

MR. ROLFES: It's a moderately soluble material.

DR. BEHLING: Yes, yes, and it may --

MR. ROLFES: So it falls in between highly soluble --

DR. BEHLING: Yeah, it may very well explain the slow dissolution in the lung fluids that transfer to the blood stream, and of course, the excretion subsequently. And I looked at, for instance, the ICRP model, and I think they basically assume everything goes in a solution. It's a flaw in the data. And if you look at that curve that I enclosed as one of the exhibits, it's always highest days first 24 hours, and it may not necessarily be the way the real data demonstrates excretion.

MR. ROLFES: The highest data, you know, for a highly soluble compound such as uranium hexafluoride would likely be in the first day or two.

DR. BEHLING: Yes.

MR. ROLFES: However, with less soluble compounds, you are certainly going to see an increase in excretion rates. And certainly with this individual if he received medical treatment, he was probably going to be eliminating. I don't know if he was getting, like bicarbonate can be used as a chelating agent for uranium compounds. He could have been given bicarbonate, and bicarbonate intravenously in order to try to treat the symptoms. So I'd have to take a look.

DR. BEHLING: Well, also, one final statement before we go to lunch, I assume. That is to correct the record. I think Mark made a comment that this individual suffered from an extreme case of oliguria, which is a reduction and complete loss of urine. That is not the case for this one. You were quoting case number [identifying information redacted] which I should have basically deleted.

The case number [identifying information redacted] was a serious injury; whereas, the uranium was actually transferred through an open wound. He was burned over 70

percent of his body, and I'm looking here at the data. I didn't remember anything that you mentioned, and I'm just now going through it. And it says here that the issue of ten milliliters for the 24-hour period on the day seven. That was not this particular case. So I just wanted for the record.

MR. GRIFFON: This is included as attachments in your paper?

DR. BEHLING: Yes.

MR. ROLFES: I'm looking at page ten, Hans. Can you take a look at page ten? I do have, it does indicate that this individual underwent urinalysis, kidney and liver function tests and analysis of urine for protein.

DR. BEHLING: Yes, and the tables, Table 1, that shows the times during which these tests were done and the duration during which this [identifying information redacted] failure or reduced [identifying information redacted] function persisted to 04.6 for his exposure. But the issue of oliguria that you're referring to really is on page 12, and it's defined on the second page.

MR. ROLFES: But oliguria is indicative of proteins in the urine.

DR. BEHLING: Yeah, but you mentioned that this person would have been instantly flagged, based on the fact that his urinary output for 24 hours was ten milliliters. This was not the case ^.

MR. GRIFFON: Okay, I think we all agree there's going to be an action. I'll work over lunch on the wording of the action, but that brings us through Finding number one. I think we're finished.

MS. BEHLING (by Telephone): Excuse me, this is Kathy Behling. Can I, before we leave this first finding, can I ask one more basic question, everybody there?

MR. GRIFFON: Yes, we're here.

MS. BEHLING (by Telephone): I didn't know if you have shut me off by now. We talked a lot today already about looking at individual cases and things on a case-by-case basis and bounding doses based on individual records and so on. And I just want to be sure that we can feel confident that based on the data that that dose reconstructor is going to have in

the individual's file, we will be able to identify this individual, let's say, as a thorium worker or as a person that may have been involved in these campaigns where there were higher enrichments of uranium and so on.

And the reason I say that is I heard Mark, I believe, indicate earlier that you have compiled some lists from logbooks of individuals in the early days that may not have had lung counts, and a lung count may not be in that individual's record that indicates that he was a thorium worker, but instead you have a list from a logbook. In looking over a lot of the dose reconstruction records, I don't always see those types of lists in an individual's record, and do we have the confidence that the dose reconstructor is going to know this individual does fall into one of these categories where we have to look at him a little closer?

MR. ROLFES: I'd like to make a clarification for the record that these are not logbooks that we reviewed. These are the mobile in vivo radiation monitoring laboratory results that we have associated with an

individual's claim.

MS. BEHLING (by Telephone): Although I thought you indicated that for the earlier years, people did not have the lung counting data, and that you were looking at air sampling data and logbooks for air sampling data to identify who these individuals were.

MR. ROLFES: That's correct. For 1965 in plant one there are a couple of individuals that were working with some enriched material that exceeded our standard default in the technical basis document. Those individuals were, in fact, given lung counts at a later date, approximately two-to-three years after working on that campaign. These individuals are documented. In fact, we have the enrichment information associated with that.

Without getting into other additional information that was not part of the routine dosimetry program at Fernald, there was an aspect of research and development to quantify historical exposures that was ongoing at Fernald for many years before the in vivo unit did come. If we can wait until after lunch, I guess, to have that discussion, we'll be able

to give it the time it deserves and fully elaborate on what, in fact, took place prior to the mobile in counter being onsite.

MS. BEHLING (by Telephone): Okay, thank you.

DR. WADE: For lunch, what time do you want to be back?

MR. CLAWSON: Well, looks like now about 1:30.

DR. WADE: Okay, we're going to break for lunch. We're going to break the phone line, and we'll dial back in several minutes before 1:30. Thank you.

(Whereupon, the work group broke for lunch from 12:25 p.m. until 1:35 p.m.)

DR. WADE: We're back on.

MR. CLAWSON: First of all over lunch we were supposed to kind of word this.

Mark, did we come up with something?

MR. GRIFFON: Yeah, we got it. I was talking with Paul a little bit and Arjun about some language here. This would go under number seven I guess as a follow-up action. It says NIOSH will provide a response outlining their approach for evaluating

internal dose in cases where uranium exposure may have caused sufficient renal damage to affect biokinetic models. I'll put it in the matrix written out, but I mean I guess we thought about this for awhile -- Paul, you can chime in -- but I guess rather than trying to be proscriptive, we said let's keep it broader and ask NIOSH how are you going to handle this type of situation with fairly broad parameters. Although we did limit it to any cases where uranium exposure may have caused renal damage that could have affected the biokinetic model.

DR. ZIEMER: And we understand the possible answer is we can't do this. I don't think we want to predetermine that we know the answer, and we're looking to see whether you come up with it or not.

MR. CLAWSON: But also, too, on the same sense, what would trigger them to look at something like this, and that's where --

DR. ZIEMER: I think that's kind of a subsequent question. If they say here's how we could address this, then we might say, well, how do you find out that the condition

exists even. It seems to us, I think we felt that that was like a follow up, or they may want to include it. But at this point until they say, yes, we have a way of addressing the issue, then we say, well, okay, how do you find out that it actually exists for a person.

DR. WADE: You're asking about approach generally, Mark? Is that --

MR. GRIFFON: Yeah, we started brainstorming like what triggers and things like that. And then we said wait a second. Let's step back and just ask NIOSH.

DR. ZIEMER: Well, is there a way of handling this?

MR. GRIFFON: I'll say it again --

MR. PRESLEY: Can you read it again?

MR. GRIFFON: Yeah, NIOSH will provide a response outlining their approach for evaluating internal dose in cases where uranium exposure may have caused sufficient renal damage to affect the biokinetic model.

DR. ZIEMER: If you say, well, we really can't do that, then it doesn't matter whether you can get the information or not.

DR. WADE: But if NIOSH can do it, then I

would assume they would interpret the word approach then to talk about the trigger mechanism.

MR. GRIFFON: Right.

MR. PRESLEY: And the word uranium in there then ties it down to a rad worker.

DR. ZIEMER: Rad worker and renal damage. We didn't feel like we wanted to get into the issue of thinking about all possible chemicals that could cause renal damage in the workplace which really goes beyond the scope of this Board I think.

DR. WADE: I think that's reasonable.

MR. GRIFFON: That was our attempt to kind of keep it broad enough to let, because we didn't want, well, it's not our role to sort of weigh in on how we think the approach should be, rather just to ask the question.

MR. ELLIOTT: Mark, do you see this as feasible or reasonable?

DR. ZIEMER: Well, and sort of are we asking the right question?

MR. ELLIOTT: Are we asking the right question and can we produce an answer?

MR. ROLFES: But what I think would be

helpful for us is to take a look at the specifics of the case study that was evaluated by SC&A and see how we would reconstruct that individual's dose and see if, know what our estimated intakes would be versus what his true exposure was.

DR. ZIEMER: Well, we didn't want to tie it to --

MR. ELLIOTT: There are other ways we want to look at this, but that's one way.

MR. GRIFFON: Maybe look at that case and should say with our claimant favorable approaches, we would have done this; and therefore, we're okay with these, just acknowledge, you know. I don't want to suggest an answer.

DR. ZIEMER: Unless Mark has some other thoughts in mind.

MR. ROLFES: I think we can have some discussions with our medical doctor on the project and see what he would recommend that we do or potentially give us his input as a path forward for evaluating this.

MR. ELLIOTT: Well, I'd also like us to in this look at whether or not the uncertainty

that we assign under our geometric standard deviation covers this because we're using a model that's developed against a standard man that has an uncertainty associated with that. And does that uncertainty include this kind of example? I won't say it's a rare, but it --

MR. GRIFFON: That's why we tried to keep it broad so that you have flexibility in how you want to respond to it.

DR. ZIEMER: And it may be that Liz Brackett's comments, maybe an approach like that is another possibility that might be included it seems later.

MR. ROLFES: We'll definitely pursue this issue and look into it further. We weren't able to put anything too substantive together, you know, in immediate turnaround so certainly we want to make sure we give the time that it certainly deserves.

MR. CLAWSON: Okay, I think that will take care of, was it number seven?

DR. BEHLING: Well, number seven of Finding 1.

MR. CLAWSON: Yeah, number seven of Finding 1.

Now, earlier today we didn't want to get sidetracked or anything, but we kind of sidestepped the thorium issue. And did we want to try to address that?

MR. GRIFFON: Well, I think it comes up in a later finding.

FINDING 4.1-2

MR. CLAWSON: Okay, so if we want to move on, Hans?

DR. BEHLING: Yeah, Finding 2, again, I'll summarize it. It's described in our review report on page 26, and the title of the Finding is "The Questionable Integrity of Fluorophotometric Urinalysis Data". And I referenced this whole thing with the statement that there's reason to believe or concern about the integrity of reported results that reflect the perceived role.

And the word I want to focus on is the perceived role of the urinalysis program by the Health and Safety personnel at Trent*. I think it's very important to look at that. I'm not questioning the validity of the fluorophotometric method as a diagnostic tool or a bioassay tool for assessing internal

exposure. But some of the things that disturbed me when I read some of the documents which are enclosed herein as exhibits.

And I will just read to you from one of the statements that was among all the people who would make that statement and was Director of Health and Safety himself who stated that we use urinary uranium excretion information along with air survey information to be sure that we're controlling airborne exposures to the amounts that will not be harmful. And then he goes on to say we do not consider the urinary uranium excretion measurement as an accurate measurement of estimating either body burden or exposure.

And, of course, that flies in conflict with the way NIOSH is currently using the data. We're saying the uranium urinalysis bioassay data is our principal way of doing dose reconstruction, and air monitoring may be a supplementary way of looking at that data and saying is there a consistency here. And again, I don't want to necessarily tend to discredit the concept of fluorophotometric measurements, but when I see or read a

statement of this nature, my question that I have to raise is to what extent that they really take this issue seriously.

To what extent were procedures necessarily followed when the Director of Health and Safety makes such disparaging comments? And this was not the first and only time. There are multiple documents that I read through that says it's basically almost a waste of time to even pursue urinalysis.

MR. ROLFES: We addressed this at the last discussion. This is because the biokinetic models that we have today were not available at the time to do a detailed assessment. They collected the data, and the data is good and sound. And there's nothing that prevents us from using those data with current biokinetic models to accurately assess an individual's radiation exposure from those uranium urinalyses results. ^ previous discussions.

DR. BEHLING: I know that. And as I said, I don't want to discredit the concept of using the data, but I do have to raise some questions about how the Director viewed the data and to what extent that filtered down to

people who were running the laboratory. Did they really take it seriously; did they use the standards that they were supposed to? Did they calibrate the instruments?

Did they do all those things if the perceptions were -- but we're wasting our time because we have no use for the data. And you're right. On the other hand I will even take exception to that because ICRP 2 came out in 1959, and some of these documents I'm looking at, this first one I'm quoting, was 1963. So they could have had at least some reference point as to how to use the urine excretion data and using ICRP 2 models which they chose not to do.

MR. ROLFES: Mutty, I heard you say something. Is there --

MR. SHARFI: Well, ICRP 2 models are still very limited in their ^. At that point their workplace monitoring probably would have been a better indication because trying to go from urinary in a single compartment model that ICRP 2 uses, trying to go from urinary excretion all the way to intake is, there's a lot more variability obviously because the

biokinetic models aren't as accurate as they are, as we have today.

So they probably would rely more on the field measurements because trying to use the current models that they had at the time wouldn't be probably as reliable given the variability of this model. So I can understand their point of view that they didn't, that he felt they put more reliance on their field measurements than they would on the bioassay model.

With all of that said, I think also in the NIOSH response they quote that even in '53 when they did a QA analysis, the QA results were very consistent. So there's no indication from QA, for the Quality Assurance Program that their process in analyzing the urinalysis results had any lack of enthusiasm to do a quality job.

MR. ROLFES: There were also some concerns about the amount of uranium that was, in fact, in people's bodies, being retained in people's bodies. And it is discussed in documents. And there were mobile in vivo results that were brought on. So the mobile in vivo system

was brought on to ensure that previous exposures were not accumulating, you know, significant amounts of radioactive material were not accumulating in individuals' bodies.

Bryce.

MR. RICH: And the point is I think that the fact that they were religious, and it was important to them from an industrial hygiene standpoint to collect samples, which they did. The samples were taken. They were analyzed in order to provide toxicological assurance that they weren't exceeding the limits. So the samples were taken, and now we're using the samples for a radiological standpoint which is legitimate.

DR. BEHLING: But as I said, the quotation I gave you was in 1963. But if you go to page 26, the bottom, and then continue on page 27, there are multiple other quotations that you can look at that reflect time periods of '69, '73, '79, '84 and '88. So it seemed to have gone far beyond the point where urinary data should have been used as a way of assessing body burdens and lung burdens when, in fact, they were not used.

And, of course, at that time ICRP 30 had been issued and more refined models. And to me it's somewhat mind boggling to think that they had this view that urinalysis data was nothing more than a way of confirming that air monitoring data was the best approach to safeguard worker exposures.

And I'm not saying anything can be done at this point. Obviously, it would be at least it's my opinion and the working group can make a different statement. But it's my opinion that, yeah, urine data should be used. In fact, I have a very, very questionable attitude about air monitoring data that we'll get on later. So at this point it's the lesser of two evils to rely on urine data. So I'm afraid we're left with this, and based on our finding under number one, let's try to use that as best as we know how.

MS. BALDRIDGE: I have a question for Mark. In the records, the artifact records, that you went through, did you go through any artifact records?

MR. ROLFES: Artifact? I'm not sure what you're referring to.

MS. BALDRIDGE: Well, those would have been for, I assume they matched from the time the plant opened, the ‘50s and so forth, for the workers. Did you, checking back on those records, did you ever see any notations made on the records that they were, that they couldn’t be used or why they couldn’t be used?

Because there’s a document in the petition where it states that they never used results for estimates to confirm exposures referring to the uranium urinalysis. And that if artifacts are discovered, a notation that the count results are unreliable is made in the worker’s record. Did you come across any of those?

MR. ROLFES: I really would have to take a look at the context of what you’re referring to. I’m not sure that I’ve seen a notation.

MS. BALDRIDGE: I think it was a response to a questionnaire that was submitted about the records at National Lab of Ohio.

MR. ROLFES: There are some indications, for example, for the mobile in vivo unit. There were some reported indications that there were some bad runs that were conducted in the in

vivo unit. And I've certainly seen notations of those bad runs associated with anomalous results. And the individual was, in fact, re-counted after that anomaly.

MR. GRIFFON: I guess my concern on this finding is more of the question of the data integrity rather than, I mean, these memos, we've seen memos like this before, and I tend to, from what I've reviewed anyway at other sites, too, I tend to agree with what Mutty said, that that was sort of what they were suggesting in their memo. But I think in looking at our actions, one of the other sub-pieces, and I've probably interjected this because it looks like something I might have done.

But the question on the database and the actual urinalysis data, and again, I go back to our Board procedures, that we have to review the data integrity. So we're looking at both the data integrity for individual claimants as well as in the database where it would be for the coworker model. And I guess in those two actions, number two and three, if you clearly provided HIS-20, I have that.

I've at least looked at it a little bit.

I don't know how much of it you all have had a chance to, in number three I must admit, I'm sure you posted it in there, but can you just maybe outline for us, Mark, what you were able to find with regard to the urinalysis logs or documents?

MR. ROLFES: Let me see if I --

MR. GRIFFON: And then I think the obvious next step is we've got to marry those two somehow. And I think we have to ask SC&A to look at that.

MR. ROLFES: I believe that Gene Potter had a little bit to –- some of what had been done initially. We used the data that was existing on our Site Research database at the time. We have been in the process of making a request to go back and look for additional urinalysis records, urine cards, urine sample request cards. And as soon as we receive those back, we'll be able to compare the data between the urine cards and HIS-20.

Based on what we've done so far, for example, you know, for the other radionuclide issues that typically are identified by the

Advisory Board, I can say that the results that we have cross-checked between HIS-20 and the urine sample cards were very, very well correlated.

So even for something that was not routine at the site, they did document things very well. So we're still in process with this, and we'll be pursuing additional urinalysis results in comparison so that we get a representative sample over the histories.

MR. GRIFFON: I mean, on your follow-up number three can I just ask that you, it doesn't have to be now, but can you include when we edit this response, the reference ID? It says Ref. IDs for some urinalysis logs. Just make it easier for us to track so we have the document numbers. If you can parenthetically --

MR. ROLFES: Sure, sure.

MR. GRIFFON: -- put the numbers in there, then we can keep track of that.

MR. ROLFES: I have a partial list of some of the urine cards here. If you'd like me to read those into the record, I can.

MR. GRIFFON: Yeah, maybe you shouldn't for Privacy Act, but if you can add them to the matrix we can go from there.

And then the -- go ahead.

DR. ZIEMER: Are you talking about these --

MR. GRIFFON: SRDB Reference IDs for some urinalysis logs. Yeah, those are okay. Those aren't ^.

DR. ZIEMER: In the HIS-20 database, which --

MR. GRIFFON: I'm on NIOSH response number [identifying information redacted] under Finding 41-2.

DR. ZIEMER: Oh, oh, the logs. Are those logs separate? Are they on the O drive?

MR. ROLFES: There are urinalysis results that are separate from HIS-20 urinalysis results which we were asked to inter-compare.

MR. GRIFFON: This is sort of the raw data comparing to the electronic database. And I just asked just for simplicity to put the reference numbers in there so we can find them easier. Make it a lot easier to --

DR. MAKHIJANI: Mark, were you assigning us something or --

MR. GRIFFON: That was my next question is I would think -- and this is a work group decision -- but I would think we can either wait for NIOSH to produce a report or we can have SC&A do an analysis of this in parallel. And I don't know what, you know, I guess that's for us to discuss and decide. But if we want to be timely about this, we might want to consider having SC&A, if there's enough logbooks, I mean, I guess the question gets back to you're still looking for urine cards so there could be this kind of, I don't want to double work.

Like if SC&A looks and says we only found urine cards covering these years, and NIOSH says, well, we told you we were coming back with more, you know, and here they are. I don't want to make double work on this. So does it make sense to do this in parallel, or do we have to wait until NIOSH, I think we might have to wait at least until NIOSH posts all the logs they could find in their source --

MR. ROLFES: All the logs that we can find?

MR. GRIFFON: No, no, all the logs that

you're using to support, all the logs that you're using for --

MR. CLAWSON: To support this.

MR. GRIFFON: Right.

MR. ROLFES: Right, we just are going to be requesting a sampling of the logs just so that we have --

MR. GRIFFON: That's what I said.

MR. ROLFES: That would be quite an undertaking to get nearly half a million results.

MR. GRIFFON: So what do people think on that?

MR. CLAWSON: I guess I'd ask the question of what does SC&A feel about this?

DR. ZIEMER: What's the magnitude of that, Mark?

MR. ROLFES: We have formulated a request with the Department of Energy Legacy Management, and we are in the process of sorting out what would be helpful to address this issue. So I can't speak for anyone outside of our agency. I really don't know how far or how long this might take so I'm hesitant to give any kind of commitment.

MR. GRIFFON: I think what we should do just to, I think we can put an action in here for SC&A but also make it very clear that, I guess I don't want to wait until we have another official meeting necessarily, but I also want to move things along. So if we said that once NIOSH, upon completion, SC&A will review or we'll do an assessment of this as well, you know, upon NIOSH's completion of the above action items, SC&A will conduct an assessment of the validity of the urine data within the HIS-20 database and within individual records, something like that.

DR. MAKHIJANI: One of the things just to ask Mark Rolfes, some of the raw data are already posted, right?

MR. ROLFES: Yes, yes, that is true.

DR. MAKHIJANI: So without, you know, again, since more data are going to be posted, obviously we can't be conclusory in any sense, but it may be possible depending on how much is posted, and Mark Rolfes could just eliminate this a little bit, to do some preliminary verification and give you some preliminary idea. I don't know what Hans

thinks, but I'm thinking that having gone through this before, if everything matches, then, you know --

DR. ZIEMER: Do we need to do 100 percent?

MR. GRIFFON: No, we certainly don't want to do 100 percent.

MR. ROLFES: Like I said, what we've focused on right now, what we have readily available were primarily related to the plutonium specification for urine samples that were collected in the '80s.

DR. MAKHIJANI: Well, that's highly selective.

MR. GRIFFON: Right. I think you have to at least wait until more information is up there.

MR. ROLFES: As I mentioned, those matched up very well.

MR. GRIFFON: I guess I'm hesitant to, thinking of our recent past where we had, you know, Rocky Flats started with the one Kittinger log, and everybody seemed like, oh, this matches up very well, but then we found many more logs that we had to go through. So I think it might be worthwhile at least getting more information posted that covered

the timeframes of interest, you know, a good sampling that covered the time period from some interest, operations of interest, and then you can do your sampling after that.

DR. MAKHIJANI: Well, to go from experience at other sites, it seems that this electronic database has seemed to be more, they seem to have gaps in the early years because of the way they were compiled. The HIS-20 database, you know, started in the ‘70s with computerization, and then it was done for people who were employed at that time. And then so a lot of people fell into that net.

And we did this in the TIB-0052 review when Steve Marschke and I, well, Steve Marschke really looked at it, looked at the data more than I did, but this came up. This is a kind of a little bit of a systemic problem but perhaps not at all sites. It may not apply to Fernald. I don’t know. But it seems that people who stopped working before the mid-‘70s may not be there in HIS-20. Is that true at Fernald?

MR. GRIFFON: I don’t know if that was unique to Rocky or, because they were pulled

out, right?

DR. MAKHIJANI: No, it's not unique to Rocky actually. I think that problem is more so if we're going to identify issues, then I think it might be useful to have the logs that relate to the '50s and '60s. If those could be posted, then we could actually begin to ^.

MR. ROLFES: Certainly. I haven't done the analysis to determine whether the people that worked in the earlier time period were, in fact, entered into HIS-20. We'd have to do the analysis and certainly link that to earlier time periods there might be more data uncertainty.

DR. MAKHIJANI: I think it's simply my understanding, and I think it's in our TIB-0052 review, that it's my understanding that typically when the records were computerized, they computerized them for the people who were working, for understandable reasons.

MR. GRIFFON: If they retired before a certain point, they weren't in there, yeah.

DR. MAKHIJANI: They weren't in there.

MR. GRIFFON: Unless, and in Rocky Flats we had it confounded by some people who were put

back in later when they came to the medical screening program.

MR. ROLFES: An example you used, Arjun, when you reviewed OTIB-0052 was not from the HIS-20, but it was from the HPAREH from Savannah River.

DR. MAKHIJANI: Yes, that's right. I was remembering another database, but it was a similar database. It was called something else, but it was a similar electronic database that was compiled in the mid-'70s. And then there happened to be another, the Fairweather database that had been compiled in the '50s that had a lot of the data that was missing in the HPAREH database.

MR. ROLFES: But we have to work it through ^.

DR. MAKHIJANI: Right, we did.

MR. GRIFFON: So I guess I would suggest maybe we put an action item that SC&A doesn't act until NIOSH completes the above action items. Does that make sense?

DR. MAKHIJANI: Yeah, if Mark and Hans and me need to know --

MR. GRIFFON: The only reason I want to do

that is because if in three weeks you have most of the logbooks posted, there's no sense waiting until this work group meets again. And then we assign SC&A, and then we're another --

MR. ROLFES: Sure.

MR. GRIFFON: If we can try to keep this moving that would be good. So, okay, I'll put a --

DR. ZIEMER: Well, does SC&A have in mind some sampling protocol so you don't do the whole thing?

DR. MAKHIJANI: We've not in the past developed a sampling protocol for HIS-20, a more ad hoc --

DR. ZIEMER: It's going to depend on --

DR. MAKHIJANI: -- what we did at Rocky Flats.

DR. ZIEMER: -- this database is developed. I mean, it may be if it's small you can do 100 percent. But if it's like --

MR. GRIFFON: No, it's a big database.

DR. ZIEMER: -- if it's a big one, then you're going to have to have some, we need to give some guidance on how much either percent

wise or a certain number not to exceed something or what are we talking about?

MR. ROLFES: Five hundred thousand.

MR. GRIFFON: Why don't we ask, as an interim action we can ask SC&A to give us the methodology.

DR. ZIEMER: Well, I want to keep it down to at least 100,000.

MR. GRIFFON: I think that's fair. I think we ask --

DR. MAKHIJANI: We can do what we did at Rocky Flats when we examined individual cases. We really wanted to limit it, and we only did 52 actually. And from the random it's just 32 cases. And then there were 20 sort of symmetric from the high exposure group. In that case what we did is we asked our statistician, Harry Chmelynski, to develop a protocol. And maybe as soon as the data are posted, the first thing we could do is to have Harry develop a sampling protocol.

MR. GRIFFON: Yeah, we'll do it in two steps. Have SC&A submit a protocol, and then after that we'll discuss that --

DR. ZIEMER: Then maybe they can come to the

work group and say here's what we propose.

DR. MAKHIJANI: And will that be done by e-mail preferably or --

DR. ZIEMER: I would think so.

MR. GRIFFON: Yeah.

DR. ZIEMER: What do you think?

MR. CLAWSON: That's what I was going to ask.

Mark, are you going to have any problems with that? I guess I'm looking at more timeliness and not so much data that --

MR. ROLFES: There's quite a large amount of data, and it's the Advisory Board's, you know, it's your, whatever you would like to do. We're here to do what you ask us to do. If you feel that the data integrity issue is something that we should focus on, we'll be happy to spend as much time as necessary, but keeping in mind that we're trying to make a timely decision on this.

DR. ZIEMER: It seems to me if the statistician comes back and says something like, well, if you look at 30 or 40 of these and you don't see any discrepancies, that's fine. But if they come back and say, you

know, you need to look at 586 samples, and we need to think twice about the time and resources.

MR. MORRIS: Well, keep in mind that we're doing that now as NIOSH's work. So if you want to duplicate it, that's a different topic than just checking that we're doing it.

DR. ZIEMER: Yeah, it's actually kind of an independent, yeah, you have to do the same thing. It's kind of the issue of --

MR. CLAWSON: The independence.

DR. ZIEMER: -- of independence and --

DR. MAKHIJANI: In this piece though the checking is not of the same type of the completeness investigation at Rocky Flats. It's quite different. Actually also that one did not take a whole lot of time. We spent a lot of time discussing it, but it didn't take a lot of time.

MR. GRIFFON: The data completeness is another thing.

DR. MAKHIJANI: In this case you're trying to match individual samples, so doing a few hundred is not going to be --

MR. GRIFFON: You're just looking at a raw

record versus a --

DR. MAKHIJANI: You're not actually trying to compile everything for a claimant.

DR. ZIEMER: You can do that very rapidly.

DR. MAKHIJANI: Yes, I think even if we had to do a few hundred, I do not believe that matching up a few hundred individual bioassay points would, electronically with the logbooks, I think it could be done relatively rapidly. It also would be done by a more junior staff person also.

MR. CLAWSON: But we need to get the data from NIOSH, correct?

DR. MAKHIJANI: Right.

MR. CLAWSON: So I guess my question is, is as this comes available, could you make it available to SC&A so we can do this check and be able to take care of this?

MR. ROLFES: Yeah, the two reference IDs, I believe, have been put on the O drive, and as additional ones, I'll make sure I notify everyone on the Advisory Board, everyone in the working group.

DR. MAKHIJANI: My tentative thing would be to focus initially after the mid-'70s and then

from the mid-‘70s on as an initial parsing of this.

MR. GRIFFON: As we usually would.

DR. MAKHIJANI: That might be a more convenient way to do it and let the statistician handle the numbers.

DR. ZIEMER: Actually, if the only thing we’re looking at is making sure the names match, I’m not sure why we even have to sample that.

MR. GRIFFON: Excuse me? I don’t understand what you’re saying.

DR. ZIEMER: If we’re not validating anything calculationally, if they come to us and say everything matched up, I don’t know --

MR. CHEW: I think you’re asking the question what are we really looking for, right?

MR. GRIFFON: We’re looking for what we found at Rocky Flats because we had uranium urine logs which there were values that were not even in the HIS-20 database. And it ended up that probably the reason for that was that a lot of the early workers were removed. There were explanations. I’m not saying that,

you know, but at least it raised that question especially when you're using the database for coworker models. That's where it really comes into play is the coworker model stuff. So if you're missing, I mean, worst case is you go through and you, I mean, I wouldn't even do a random selection of values although it's SC&A's protocol. But I would go through and see raw records and highlight high values. If NIOSH is missing a lot of high values, then --

DR. ZIEMER: NIOSH will already have that information at that point, will they not?

MR. GRIFFON: Well, NIOSH doesn't validate any of this stuff. That's where we're at.

DR. ZIEMER: Yeah, but I thought they're saying they'll be doing that as they go.

MR. ROLFES: Yes, we're internally doing that already.

MR. GRIFFON: It's just another sampling of the independence.

MR. CHEW: But I just want to make sure we say it clearly. We're looking at individual records here to assure that those sample results are adequately put into HIS-20 correctly. Is that the two matching?

MR. GRIFFON: That there's a match between raw records and HIS-20 records.

MR. CHEW: The raw records would be the individual urine sample results that were in the individual person's records. Does that sound right?

MR. GRIFFON: Or the raw records, well, you've got logbooks, too.

DR. MAKHIJANI: Oh, logbooks. I mean, one would actually ideally look at both.

MR. GRIFFON: Although because I know, Mel, sometimes, as you know, the individual records are printouts of the database so I hesitate there. That's why we go to these raw.

MR. CHEW: When you're talking about logbooks, are you talking about the logbooks of the person who actually did the analysis and transcribed it? We got into this discussion before with Y-12; I want to make sure we know what we're looking for. I want to make sure you're looking, we're looking for the same thing here.

DR. MAKHIJANI: But there are a number of issues. I mean, there's the issue that Mark mentioned. From the mid-'70s onward usually

the individual records are just a printout of the database that were computerized.

MR. GRIFFON: So we know they're going to match.

DR. MAKHIJANI: Yeah, so they will match. But sometimes there are also raw records, and I imagine the practices were different at different sites. So I don't know enough to be able to generalize. I've looked at the data in detail only from a few ^.

MR. GRIFFON: Right, I'm calling them, I've been calling them urinalysis logbooks, but I don't know if they had a logbook in the laboratory where they recorded down each reading or how they --

MR. CHEW: Remember back in the days we did Y-12, the actual card and making sure that that particular number got transcribed into the database.

MR. GRIFFON: Right, and some of the cards I think had ^ on them, too. And it could get complicated, but you only need, like I said, I think you look for, because remember what we're trying to demonstrate for this purpose anyway, this is not the data completeness

evaluation to show that all the individual DRs you're doing have a complete enough set of records that you can do a dose reconstruction.

This is a question of if we have to rely on a coworker model, we know they're all derived from the HIS-20. So we want to make sure that you have at least enough of the high values because you're always going to use the 95th or 50th, so you want to probably bias your sampling toward higher numbers in the logbooks. If most of them are there or all of them are there, then you're fine.

DR. ZIEMER: I want to ask my question in a slightly different way. NIOSH is doing a statistical verification of this very thing. Is that correct?

MR. ROLFES: Correct.

DR. ZIEMER: Are we asking that we verify NIOSH's statistical sample, or do a separate statistical --

MR. GRIFFON: I'm asking for an independent, I would prefer independent.

DR. ZIEMER: Okay, that wasn't clear to me.

DR. MAKHIJANI: The purpose of it is to ensure than in every period the coworker model

makes sense.

MR. GRIFFON: Is going to be, is bounding. It makes sense, correct. It makes sense.

MR. ROLFES: I think you clarified it, Mark. You want to assure that the high results are adequately portrayed in the HIS-20 because they will now bias the coworker study. I mean, that's been the --

MR. GRIFFON: I think that's kind of a bottom line issue because you're saying, I mean, I don't want to go too far ahead because I haven't seen the coworker model. I mean you said it's almost ready, but I'm assuming that generally you use the 95th for operational people. So if it ends up looking like that, I don't want to, maybe I should, but I don't want to assume on internal.

MR. SHARFI: The standard model would be the 50th percentile with a distribution. We didn't use the 95th at Rocky, but that was a special situation because of other issues. The internal we would assign the 50th with a lognormal distribution.

MR. GRIFFON: So I guess still I don't think it changes what you are going to look at

because I think you would tend to want to look at the higher values because that's going to probably shift the annual average and --

MR. MORRIS: The NIOSH approach is going to be to use the middle standard sampling protocol.

MR. GRIFFON: Okay, and I'll leave it up to SC&A --

DR. ZIEMER: Give equal weight to everything. You're not going to selectively look at high values.

MR. MORRIS: No, we will not selectively look at high values. We'll look at acceptance criteria like making widgets. If you get the first hundred widgets right, then you don't sample the next hundred widgets with the same vigor.

MR. CHEW: Does that answer Mark's question though? I want to make sure that we --

MR. MORRIS: We're not going to bias. We're going to take a random sampling.

DR. ZIEMER: A random sample.

Do you know at this point how many samples you will be taking?

MR. ROLFES: Gene, are you available? Gene,

are you there?

MR. POTTER (by Telephone): Yes, sir.

MR. ROLFES: Paul Ziemer asked how many samples we might be taking, and could you relay some of the Mill Speck (ph) Sampling Procedures that we're using to define the acceptable quality level for the dataset?

MR. POTTER (by Telephone): Yes, we're just adopting the protocol that has been used by the ORAU team before in doing similar sorts of things when records have been transcribed into spreadsheets, for example. And this is generally the old, old data. And basically, you would define up front what an acceptable quality level is.

In other words, for the Pu sampling data that we talked about, Mark and I discussed and decided that a one percent acceptable quality level would be a value to use. And that would say that 99 out of 100 results were correctly transcribed. And then based on your batch size, and what these Pu sample results were, were data sheets that were transmitted to the site from offsite labs. And that's why folks found them

convenient to capture the data in reference IDs when they went out to the site.

So based on how many are in that batch, you have look-up tables -- actually, it's on the web -- for that acceptable quality level. And then you, I won't go into all the details, but there are different inspection levels that you can define depending on what you think the quality of your data is.

In other words, after you've done several batches and the data appears to be of a high quality, then you can reduce your sample size. But this is all subject to very strict rules. Anyway, from your acceptable quality level, the batch size and you start out with a normal sampling procedure that tells you how big of a sample to draw. From using that number I drew a random sample and compared those results one by one to HIS-20. Was the person there? Was the result there? Was it correct? And if all that fell into line, that was called an acceptable sample.

A couple of other observations since I've been listening here. You all are very correct that this is something that needs to

be checked because like most sites, HIS-20 is at least the third generation of databases that were used at Fernald. There's always the possibility of things getting hosed up as data is transferred from database to database. A lot of the data was hand entered, the old stuff, so there's a possibility of error there. So that's another good thought to check on all this stuff.

But I can tell you from what I've looked at so far, there are many, many people from the '50s that have urine results from the '50s. And what I was suggesting that we go on a decade-by-decade basis maybe. And at this point we may not be able to pull all of the samples from, say, like the 1960s and then pick a random sample based on that batch size.

So probably what we're going to do is pull a box or something of urine request cards. This seems to be the record that's identifiable in the site records as being something close to like a logbook. In other words, a lab person would enter the result on this card, and this would be the reduced data from, you know how photofluoric ramitry (ph)

usually works. They do three trials, and if they're within a certain acceptable range of each other, then they record the result of the average of the three.

So this is reduced data already, but there's not a lot of stuff that I saw in the site records that identifies itself as a logbook. So urine request cards are a possibility. And what I suggest is a, you know, from each decade we pull a box or so, and then we pull a random sample from there.

DR. MAKHIJANI: May I ask Gene a question since he's looked at '50s' data?

Did you find that there were, that HIS-20 was complete in the '50s? Or did you find all matches or did you find that there were things in HIS-20 that didn't match up with the cards?

MR. POTTER (by Telephone): I only have some very preliminary results from the New York Operations office samples that were done for Fernald. And so I would like to see more of a sample before I draw any conclusions on the '50s' data. But a lot of it is there, definitely.

MR. GRIFFON: Gene, this protocol you described, you said it's on the web? Or is it on our AB doc?

MR. POTTER (by Telephone): I did not see a procedure; however, I've been involved in doing some of the sampling a couple of times in my previous career, and then once with the ORAU team. And so I wrote down a little procedure for myself which I certainly can provide to Mark for --

MR. GRIFFON: That would be great if you can provide that if that's okay, Mark.

MR. ROLFES: Sure.

MR. GRIFFON: And was this the same approach you used for Rocky Flats? I'm just trying to get a sense.

MR. POTTER (by Telephone): No, for Rocky Flats we did not use a statistical method. There it was kind of an agreement as I understood it between yourself and Brant Ulsh as to how many we would look at.

MR. GRIFFON: Okay, I think that gives us a sense of where to go though.

MR. CLAWSON: Well, we've got a clear line of direction, clear as mud. I was going to

ask that technical term of hosed up. That sounds like something I'd say. But we've got a clear line on this right now. I'll be right honest. I'm lost.

MR. GRIFFON: I'm going to ask if we can go back through the last, the four responses on the Finding because I think we have a clearer line for the database stuff. But I think it's worth stepping back to number one.

Number one, we asked for QA reports, and it looks like one from 1953 was identified. But we asked for QA reports from the early time period, '54 through '80. I notice that the one we found was from '53. I don't know. Now there's interviews. I guess the statement here is a little concerning to me, interviews with former FEMP workers revealed an informal QC program exists. I'm not sure what exactly that means.

MR. ROLFES: I can elaborate a little bit.

MR. GRIFFON: I guess you're also going to provide these interviews so we --

MR. ROLFES: Yes, certainly. Yeah, there were indications that prepared samples essentially, samples that were spiked urine

samples that were put through as blind samples to determine, you know, they would put a known quantity of uranium into the sample without giving any of the technicians who are involved in doing the analysis on that urine, fake urine sample, they would put that through as a blind sample in every manner identical to a regular urine sample to determine what the results were.

MR. GRIFFON: Well, we haven't seen any --

MR. ROLFES: The interview transcripts will be made available.

MR. GRIFFON: But did you find that in the, it's not like you don't have any lab data that you've seen?

MR. ROLFES: Well, we did provide the data that we had record of, the formal record in 1953.

MR. GRIFFON: 'Fifty-three is the one that was.

MR. ROLFES: Yes. However, we are aware that this individual didn't start until about I believe mid-to-late '50s. I could take a look back at the transcripts and see. I don't believe it was documented. I know there were

certainly much more documentation of it in more recent years, but it does appear that it was done, in fact, in 1953.

MR. GRIFFON: So in 1953 in the interviews they're saying that it continued beyond that?

MR. ROLFES: Yes.

MR. GRIFFON: And do you have any of the, we asked about procedures, too, laboratory procedures?

MR. ROLFES: Yes, those have been made available to the Advisory Board.

MR. GRIFFON: Oh, they are available.

DR. BEHLING: The ones that I've looked at, the one was 1984, and the other one was '88. It's obvious as time went by how things start to get into more controlled and certainly much more documented. But I guess as Mark was saying --

MR. GRIFFON: Well, we said from the earlier time period, too.

DR. BEHLING: But my focus would be in the '50s and early '60s to see --

MR. ROLFES: If I recall, I believe there were some from the '60s that we provided as well. I can take a look back.

MR. GRIFFON: I didn't see that in your response, so I'm not sure.

MR. ROLFES: Let me take a look through here. I mean, there is quite a large number of reports that were provided.

MR. GRIFFON: Yeah, I know. I'm just trying to make sure we don't miss anything here as we go through the actions.

I'll move on to number four. And I was trying to refresh my memory on this myself. NIOSH to complete or to compare selective cases with lung count data and urinalysis data. And it says in progress. And I know that somewhere cases were identified with elevated lung counts.

MR. MORRIS: Well, I think this was Paul's suggestion that, and I volunteered that we do have the in vivo lung count data. And in there there are obvious cases of people who were sampled seven or 12 or 15 times during the year. We could potentially pull out a few of those people and compare their urinalysis data. I'm not sure what it gets us, but it's ^.

MR. GRIFFON: Yeah, I was trying to remember

exactly why we wanted to do this, but it says it's in progress, so I guess you're doing it.

MR. MORRIS: Yeah, it's on my to-do list so it's going to get done eventually unless you call us off.

DR. BEHLING: But as you mentioned, the question is what does the --

MR. GRIFFON: This is the reality check.

DR. BEHLING: Yeah, but does it really reveal anything? If you are exposed to UF-6, you're going to see a lot of it in the urine. If you're exposed to uranium oxide, you're gong to see it in the lung. And the two may not have any relationship to each other. So I'm not sure I know what to advise you and what the point of that effort is.

MR. MORRIS: Sure, that's probably why it's not complete.

MR. CHEW: We agree with you. It was your Board action.

DR. ZIEMER: I don't actually recall what we were trying to do there other than the fact that you have some exceptions, but in fact, there should be correlation in general on these things.

MR. MORRIS: In fact, there should be some correlation. I agree with you. How to quantify that correlation is a hard question. And we can record it, but whether we draw conclusions from it is another question.

DR. ZIEMER: Well, for example, if you have fluorometry data, you infer what's in the body if that's all you have. If you have lung data, you also infer what's in the body. So both are used for that purpose. Do they correlate? Well, maybe, maybe not. But, in fact, what would you do if you have, as a claimant, someone with both pieces of data? What do you do?

MR. ROLFES: For example, in a dose reconstruction what we would start off with would be looking at the urinalysis data to estimate their intake. And then if we were doing, it certainly depends on the specifics of the case, whether we're doing an underestimate or an overestimate or a best estimate.

And, for example, if we had an overestimate case that we needed to complete, what we would do is assign intakes based on

the urinalysis data and look at the mobile in vivo data to determine whether the dose could have been any higher than what we've assigned. And if it is not, then that would be sufficient for the uranium intake estimation.

On the other hand if we had urinalysis data and we were doing an underestimate for a claim, we would use those urinalysis data to assign an intake, and then we would also potentially look at the mobile in vivo data to confirm that we haven't assigned too much uranium intakes. So we might use the mobile in vivo data to refine our intake estimate.

For a best estimate, that would be the number of best estimate claims we have completed for Fernald is very low. I don't have a specific number or percentage of these claims, but I would say it's certainly less than five percent of the claims. But it's those cases where every piece of data for that claim is considered very detailed, very thoroughly, and in those cases we still are claimant favorable in our assumptions for those best estimates.

DR. ZIEMER: Well, if you had case where the

urine data, say it's a lung cancer case. The urine data gave you one value for lung dose and the whole body or lung counter data gave you a different value. I'm assuming you would use the highest values.

MR. ROLFES: Well, if it's an underestimate, we would actually use the lowest value and that would result in compensation.

DR. ZIEMER: Whichever way you're going. You would use the value that was necessary for you to make the correct --

MR. ROLFES: The one -- if it's a non-compensable claim -- yes, exactly.

DR. ZIEMER: I think this rose in the context of the finding. The finding had to do with whether or not you could depend on this type of urinalysis data, and --

MR. GRIFFON: So this was a kind of reality check. I think --

DR. ZIEMER: -- the question was --

MR. GRIFFON: -- we need to know enough in these selective cases because we need to know enough to understand what types of uranium --

DR. ZIEMER: Could you still make the right decision. I think it was in that context.

You weren't way out in left field with the urine analysis that you wouldn't end up with a completely different answer than if you had lung data.

DR. BEHLING: I asked that question earlier in the day. What do you do when you have two sets of data, one urine, one lung count? And which one dominates the decision to use for settling a claim?

MR. SHARFI: The sample DR we did six and a half percent does look at a situation where you do have both urine and it might be once you look at that you can decide if you have additional questions and try to debate it right here. We have now provided an example where we did do an assessment of a scenario where we had both urine and chest count data and the case with a low ^. And you can look at, we do look at a best estimate scenario versus an overestimate scenario, just the urine versus --

MR. GRIFFON: Yeah, we could probably start with that one. I mean, the idea of selective was that we --

DR. ZIEMER: But I think the point is if you

looked at a number though, and you found out that the urine analysis always gave you a different answer than the lung, that would be very troubling. Right?

MR. SHARFI: It depends on what you're always assuming. If I'm always assuming Type S, then that might be the case. But it's hard to say because every intake scenario you can, if you look at both sets of data, there are a lot of cases and ways that you can refine your adjustment scenario to actually fit both sets of data.

DR. ZIEMER: But the context of the issue is can you use the urinalysis data to reach the correct decision? That's the context. And insofar as you can independently, say I can still get the correct decision because I have these other cases where if I'd have made the decision based on the lung data, I'd have come out with the same decision.

That's why I'm saying if they were always in the opposite direction, that would be very troubling. You can think of some weird scenario where they might be, but in general, if you're making the right decision

with the urine data, then, because it's an issue of the reliability, the urine data that's in question in the finding.

DR. BEHLING: But let me pose a question to Mutty again here, and that is I keep hearing that the issue of claimant favorability usually involves taking something that is most claimant favorable in a dose reconstruction. But I think sometimes there's a caveat thrown in there. And when we, for instance, as you mentioned earlier this morning, the issue of solubility class, the statement was we will always go to that solubility which favors the potential dose to that particular organ of interest. And is that something that will be used across the board, or is that something that again is only used in instances where you tend to overestimate and the claim you know up front?

MR. SHARFI: You're always looking for the most claimant favorable scenario that fits the available data. So in case you only had urine, you might assume that a very insoluble material that if they had had lung counts would grossly overestimate them. But because

you don't, you might then still, even as your best estimate, start to get a little more insoluble material.

DR. BEHLING: And let me refocus the question. Is it influenced by whether or not the claimant's going to be compensated or not? For instance, where you have different criteria for, let's say in selecting a bioassay date and if it's a routine bioassay, you don't know when the intake is.

There are many approaches that have been used in dose reconstruction that I've experienced in auditing them, and that some say, oh, well, that, even though it's a routine bioassay, that exposure must have taken place a day or two before the bioassay. The other alternative is to use a mid-point between that day of assay and the previous one or extremely claimant favorable, use the day after the most recent one. The question of which one you use is always driven by whether or not you intend to compensate.

And so again going back to the question of using always the most claimant favorable solubility class may very well be

driven by your decision or preconceived notion whether or not this is going to be a compensated case or not. And my question is, is the claimant favorability of selecting always the solubility class that's most favorable to the tissue in question use independent of whether or not the claimant's going to be compensated or not. That's my question.

MR. ELLIOTT: Yes, the answer is yes. Of course, we use our efficiency process to the best of our ability to get an answer, a correct answer, for the claim. We do not, when we're doing best estimates, we do not presuppose that a solubility class that gives us a non-compensable decision is the right over a solubility class that would give us a compensation decision. We would take the compensation decision and that solubility class.

DR. BEHLING: Okay, because I've seen it in other instances where when you realize, okay, based on that assumption that's claimant favorable, you're going to reach a 50 percent or greater, then oftentimes the situation

changes. We go back and say, well, let's go back and see where did this individual work. Well, he worked in a facility that had uranium tetrafluoride or uranium oxide. And the good will of assuming that the most claimant favorable solubility is withdrawn because empirical data would allow you to do that. And I'm asking that question. Is it a given that --

MR. ELLIOTT: We don't have --

Help me out here, guys, if you will, but my understanding is if we don't have data otherwise, we don't have the information to say here's the specific solubility class that should be used, we would look at each solubility class and pick the one that is most claimant favorable.

DR. BEHLING: There is a back door, and that's what I'm saying is that --

DR. ZIEMER: If you don't have the information.

DR. BEHLING: -- in a case of, let's say I'm reviewing the Portsmouth. And there are individual locations in Portsmouth where all the radionuclides are listed, and there is a

segregation based on what the best estimate is regarding the solubility class. And you would not necessarily default to one that is most claimant favorable if the empirical data would suggest that there's a solubility that is perhaps less favorable in those instances.

And I guess I just want to separate so that when we see an audit that involves a real case, and the assumption, the default assumption, of the most claimant favorable solubility class does not exist I understand why. Because there's empirical data to justify selecting another solubility that will reduce the dose.

MR. ELLIOTT: And I would expect that to be articulated in the report.

MR. GRIFFON: And that's what Jim Neton would call sharpening the pencil. So we've seen that.

MR. ROLFES: And this leads to considering all pieces of scientific data that are associated with the claim.

MR. GRIFFON: Well, I'm leaving number four as in progress because I think we might want to see a couple of these in addition to the

one you've already provided, Mutty, if that's okay. I think let's just leave that in progress, get a couple more of those pieces. And I say selected cases because I want you to select cases where you know, because I agree, you're not sure. If it's an unknown solubility case, you want to pick the case that you know --

MR. MORRIS: So you want two more example dose reconstructions or two more just comparisons of datasets?

MR. GRIFFON: Two more just comparisons of datasets I think, a couple more comparisons of datasets.

MR. SHARFI: Just for clarification. How do you want us to, when we take comparing data without doing a dose reconstruction, I don't know how you compare the data.

MR. GRIFFON: Well, you do have to compare the internal dose. I'm not asking for a full DR.

MR. SHARFI: Oh, and you're talking about just the assessment of the bioassay.

MR. GRIFFON: Of the bioassay, right, bioassay and lung, selecting a case that you

have enough knowledge of what types of material they were working with I guess would be the way I'd narrow it.

MR. PRESLEY: We talking about one case? How many cases are we talking about doing it to?

DR. ZIEMER: Sounds like two or three, right?

MR. GRIFFON: Right, a couple or three, yeah.

MR. CHEW: We actually want the thought processes, the logic.

MR. GRIFFON: Right, that's what you want, right, just to demonstrate that logic.

DR. ZIEMER: And then we're trying to demonstrate that the urine analysis is a valid piece of data to use or set of data to use.

MR. GRIFFON: Yeah, remember, it comes from the finding of a concern over the urinalysis data in general, so we're trying to show these cases should demonstrate that --

DR. ZIEMER: In fact, you want a case where you know something about what its form was, not one that --

MR. GRIFFON: We don't want an ambiguous one

because then we'll get an ambiguous result.

MR. CLAWSON: And also in the same sense we're evaluating the lung count, too, though, aren't we?

DR. ZIEMER: Yeah, but the point is do you get correct body burden or the correct organ burden by both methods. That would serve to validate the issue of the urine data being reliable.

MR. GRIFFON: Yeah, but I think Brad's right. If you, at the other end of the spectrum if you have some things that are totally out of whack, then you say one or one or the other is wrong.

DR. ZIEMER: But the point is you're using urine analysis and showing it's --

MR. ROLFES: I think we've already completed this request with our sample dose reconstruction 14, internal 14, because we did, in fact, compare urinalysis data. We estimated the intakes based on urinalysis data then compared the projected intakes to the actual measured mobile in vivo results. So I think that it's already been completed. So I think it would be important for the Advisory

Board to review what we have --

DR. ZIEMER: Where is that?

MR. ROLFES: That's internal number 14 that's made available on the O drive. And this was also the same sample dose reconstruction that considered potential exposures and Hallam reactor elements.

MR. GRIFFON: Then I think as an action we should have SC&A review that DR, internal 14. So in progress was not, we'll delete in progress, right?

MR. ROLFES: Well, I guess I would ask that you take a look at that first, and then if we'd like to do some more specific things, we'd be happy to. We don't want to repeat something that we've already done.

MR. CLAWSON: Mark, what was the name of that again because I'm looking at that.

MR. ROLFES: The sample dose reconstruction was internal number 14.

DR. ZIEMER: That's the name of the file?

MR. ROLFES: That's correct. It's under the sample dose reconstruction folder. I believe the folder's actually titled working drafts of Fernald sample --

DR. ZIEMER: I got it.

MR. CLAWSON: Let's take a short break real quick.

(Whereupon, the working group took a break from 2:43 p.m. until 2:55 p.m.)

DR. ZIEMER: I just wanted to mention I've reviewed this case during the break which is the determination of POCs from the urine data and from the chest count data. This was done for colon, kidney, lung and prostate based on cancers in a real case, although they've modified a few things so we couldn't identify the person. But the compensation decisions would have been the same for both methods in this case. The lung burden --

MR. GRIFFON: This is a dose reconstruction.

DR. ZIEMER: A dose reconstruction, the example.

MR. GRIFFON: Right.

DR. ZIEMER: Well, it's all right. It's all right. I mean ultimately the question still is, okay, we can argue that whole Labor thing but it comes down to that. They calculated the doses to the lung. But the interesting thing is the lung values came out 92 percent

and 99 percent for the two methods.

DR. BEHLING: Can you tell us which one's higher?

DR. ZIEMER: The urine data gave a slightly higher value.

DR. BEHLING: To the lung?

DR. ZIEMER: To the lung. Well, actually, for everything. The ones that were the furthest apart that didn't affect the compensation decision was kidney. The urine data gave it at 44 percent. The lung data only at 21 percent, but any --

MR. RICH: Well, wouldn't you expect that because of the configuration of the counter itself. It was intended to be a --

DR. ZIEMER: Intended to be a chest counter, but presumably from the body burden you can still in modeling you can estimate organ dose.

MR. RICH: But only to have an estimate that ten to 20 percent ^.

DR. ZIEMER: In any event I'm kind of satisfied that they've done what we've asked. I'm not sure what we'll gain by doing a couple more cases.

MR. GRIFFON: I think we've conceded that.

We said we'd look at this on first, right?

MR. ROLFES: There are other examples internal dose reconstruction, like the default two percent enrichment that we're using as well. So within a comparisons of the probability of causation for a selection of organs. So once again if you'd like to take a look at that, and if you have any additional questions or clarifications, then we can proceed.

MR. ELLIOTT: Brad, I'd like to say something for the record here. I really applaud Mark's efforts at trying to keep this working group informed of things that we have developed in response. I know that the working group Board members have had a lot on their plate in the last couple of weeks with the Board meeting and all of that. And I guess I just feel I need to say this because it's somewhat apparent to me that you all haven't had a chance to avail yourselves of the examples that we've given and some of the other answers and responses that we tried to put on the O drive for you. Is there something that we could do better in that

regard? I know you're all busy. I know you all have got a lot of things going on especially with the Board meeting the week before last, but if you think of things that, you know, I know that Mark was very diligent in sending out his e-mails and reiterating what he's already said before in previous, what he'd given up before he identified again, and what was new being added he identified for you. So if you think of things that we can do to improve in that just so that we can alert you that there is information for your benefit before you come to a meeting, if you can check it out that's great. If not, you might --

DR. ZIEMER: No, I agree that Mark is very diligent, and I think one of the real limitations is the volume of stuff that comes to us and trying to digest it all.

MR. GRIFFON: And it's not only for Fernald obviously.

DR. ZIEMER: No, I mean, it's Fernald, and it's Hanford, and --

MR. ROLFES: Multiple sites, there's a lot on everyone's plate here.

DR. WADE: And that's why it's so valuable

for the work group meetings because as Mark was telling you earlier to touch everything when you come here so you can know what's out there and know if there are other things that you need. You just need to keep working.

DR. MAKHIJANI: Mark, was there any review item in here for us other than 14 which you assigned earlier?

MR. GRIFFON: Just to review DR number internal 14. We're not going to do any additional ones unless we have some questions, unless that raises questions I guess, but that probably will satisfy our request.

DR. MAKHIJANI: So overall or not any radon breath things or --

MR. GRIFFON: We haven't gotten to the radon breath. That's another issue in Finding 3.

MR. ELLIOTT: Still trying to get us ahead here.

MR. GRIFFON: Call us back at ten p.m. tonight.

MR. CLAWSON: But if I would ask, Mark, when we get done with this today, there's just a couple on this internal 14 that I want to go over with you. It's just to try to help me

figure out --

MR. ROLFES: Sure, certainly.

MR. CLAWSON: -- and we'll go from there. And I'll just get with you after we go. I need to call you. It's just some questions that I was trying to figure out what --

MR. ROLFES: Certainly, please, I'm always available.

MR. CLAWSON: My boss doesn't seem to think I'm not very available.

Anyway, let's go back to the matrix.

FINDING 4.1-3

DR. BEHLING: This one, I think, is one that we are likely to discuss in context with the cohort dose models. The finding that was identified as Finding 4.1-3, the failure to monitor all personnel with potential internal exposure to uranium, was triggered by a document that was part of the petition that Sandra submitted wherein you'll see the actual exhibit or attachment on page 29 of my report that identified a total of four workers who had, in words of the document, had unexpected urinary excretion rates that were unexplainable especially for case number

[identifying information redacted]. That this individual had an excretion volume in excess of -- I won't give you exact numbers -- in excess of five milligrams per liter. And the statement was --

MR. ROLFES: That's inaccurate. I believe that should be maybe 500 micrograms or --

DR. BEHLING: I'm sorry, it's 0.5, and that's all. I'm going to give it just one number, 0.5 milligrams. I'm sorry if I said 500, but that's a significant number when you view it in context with 0.025 and 0.04 action lines. People would be followed up, in fact, as I've stated in my write up, you know, this unexpected value is 13 times higher the value of 0.04 milligrams per liter action level. And I guess if this was a chemical operator, I would say, well, okay, that speaks to have a high value, but what was surprising here is that this case was regarded as an exposure that wasn't expected.

And the question is why wasn't it, and who were these four people who were monitored? And I think it's part of the things that you submitted on the O drive. I did come across

something that may explain it. I don't know. But I looked at a whole bunch of records where the document was termed breakdown of personnel by control group.

Now I don't know, and there's a heading called control group. Now I'm looking at that and wondering if these people were selected as baseline values or what the term control group is in reference to. Were these people who were selected from worker population groups that weren't expected to have any exposure? And were nevertheless monitored for whatever reasons?

And I think we were asking you if you could identify these four individuals and somehow specify what was the justification for monitoring them.

MR. ROLFES: We did look into HIS-20 data. We identified the four individuals. These high results are, in fact, in HIS-20. I believe these four high results are all the first results for each of these individuals in the record of HIS-20. So we've identified them. One of the four, in fact, had a follow-up within the month, yet there's three did not

have follow ups. So we've identified the individuals, and we have this investigation report that basically was asking us, you know, what potentially happened to these individuals for them to have a high urinalysis result.

This is also during the time that it is very possible because of where urine sample bottles were stored in the earlier time periods, it's very possible that these urine sample bottles could have been contaminated with processed material, uranium. So these would, the measured concentrations of uranium in urine based on cross-contamination would essentially result in a higher dose estimate for these individuals than what was actually received.

MR. GRIFFON: Do you have, I know you provided a write up for this. Do you know what the document name is?

MR. ROLFES: It's an Excel spreadsheet. I believe it's reference 29-13.

MR. GRIFFON: Okay, I've got it.

DR. BEHLING: This is a question that I have, and I'm not sure you answered it just now. But why were these people monitored?

Was it standard protocol to take people who were not expected to have any exposure to uranium, nevertheless subjected to urinalysis that in this case surprisingly showed up with high values?

MR. ROLFES: Everyone gave a urinalysis sample, and by everyone I say, you know, the great majority of individuals, more than 93 percent of individuals at least gave one annual sample at Fernald. So this was not the only urine sample that these individuals provided. So if you take a look at their records within the analysis that NIOSH made available to the Advisory Board, it indicates that there are additional urine samples in the subsequent years after this.

DR. BEHLING: And I think my concern in writing up this issue as a finding comes in concert with Arjun’s concern about fugitive missions that may have exposed people who were certainly not candidates for an internal exposure. And so that’s the reason why this issue was raised. But if you say that people were as a matter of fact monitored at least once a year, that would certainly perhaps

provide us with some insight as to people's exposure that at least were monitored on some routine basis and not ignored so that you don't have people for whom there's no monitoring data. And then you're sort of stuck with what do we do for these people if they're claimants.

MR. ROLFES: We spoke with an industrial hygienist regarding these fugitive emissions, and he indicated that if you expected that a person was not going to be exposed, if you looked at the entire dataset that the dataset would be indicative that these personnel were not exposed personnel.

These are unusual occurrences, and because it was an unusual occurrence because this bioassay data was elevated, they did, in fact, investigate it as indicated by this report that was provided. So once again, those urinalysis data would be used in a dose reconstruction as is for estimating a person's intake.

DR. BEHLING: Now the issue of the coworker data model, can you elaborate as to who they may apply to?

MR. ROLFES: The coworker data model would be, well, I guess I'll let Bob Morris speak to that a little bit more about the application of uranium intakes to unmonitored personnel.

MR. MORRIS: I understand we've got on the order of ten dose reconstructions that are pending coworker study completion. So the great majority of dose reconstructions at Fernald do not depend on coworker models. We've got a few waiting for a signature on this report that's coming out soon.

MR. SHARFI: Actually, internal I think there's only about one or two. For the coworker in general if you include external, there's about ten or fifteen. But the internal there are only I think one or two, and these are usually subcontractors who worked there like three months ^ and then that's the limit of their exposure. They were very short periods of time, usually not prime. They fall into the construction trade worker category.

MR. GRIFFON: Does it include D&D era?

MR. MORRIS: The coworker model?

MR. GRIFFON: Yeah.

MR. MORRIS: Yes.

MR. GRIFFON: Well, I mean, does your assessment of one person for internal include after the D&D era?

MR. MORRIS: All that's outstanding.

MR. SHARFI: Active claimants.

MR. GRIFFON: Because I know I'm just reflecting back on Rocky and in that case though the coworker model was truncated before the D&D period. So I think you have it all laid out, right?

MR. ROLFES: Does that answer your question?

MR. GRIFFON: Yes.

DR. BEHLING: Do you have anything?

MR. GRIFFON: Only a follow up on this spreadsheet. I guess the question I have was if these were investigated. And I'm assuming that all the values are in there, but there's one individual that the follow-up sample has been 13 months later?

DR. ZIEMER: More than that.

MR. ROLFES: Only one of the four gave a follow-up sample within the first month.

DR. ZIEMER: I thought that was very strange.

MR. GRIFFON: And all of them are their first urine sample that they ever had.

DR. BEHLING: And they exceeded the 0.04 milligrams value which should have triggered something else --

MR. ROLFES: Which triggered --

DR. BEHLING: -- you're coming down again.

DR. ZIEMER: This one has a gap from February '66 to December '67 for the next follow up. And that seems awfully strange after an incident. I mean I don't know if we can speak to that, but it just looks strange.

MR. ROLFES: If we take a look at the code associated with the urinalysis result, that might give us a better indicator of why the sample was collected. If it was for an annual physical, if it was for an annual physical, if there wasn't a follow up, there may be additional documentation which we haven't located at this time.

DR. ZIEMER: Well, there's three here that are part of the incident, then this lapse of 18, actually 22 months before the annual physical which is -- anyway his annual samples are two years apart.

MR. GRIFFON: What did the investigation conclude? Did the investigation find anything, any problems?

MR. ROLFES: The investigation --

MR. GRIFFON: The report?

DR. BEHLING: I didn't follow it through because I had not looked at what you ended up doing on behalf of these four individuals that are cited in this memo. So I am not sure I know what the outcome of the investigations, but as Paul just mentioned, there are some inconsistencies here. Because I quoted in my statement that 0.025 milligram and 0.04 milligram are two action levels that should have triggered a subsequent urinalysis as a minimum for all four of them.

I mean, one of them exceeded by a factor of 13. The other one exceeded by a factor of ten the higher action item. And you sort of say again going back to the issue, did the people take the urinalysis all that seriously?

MR. ROLFES: Well, I see what you're saying. In this case it does indicate that there was an investigation. You know, it's clearly

documented that this individual was working in this area, and they discussed, it appears in this document, that they were discussing the individual's work history. Where were they? What was being done?

There may be other documents associated with this that we haven't located to date. That's very possible. But if as a result of this investigation they determined that these results were false positives for cross-contaminated samples, it may be that they didn't request a follow-up bioassay because they had made the determination that the individual had not entered a radiologically controlled area.

DR. BEHLING: Well, it seems like from the document -- I'm looking at the document in question here that's identified as Attachment 4.1-3 on page 29 of the report. And the statement is the investigation failed to show why these urinalysis samples were high in uranium, meaning that they had conducted the investigation and they never understood why. There was no reference here to a contamination of laboratory or anything else. It was just

an unanswered question.

MR. MORRIS: I recall that we discussed this with an informed person during one of our interviews. And he said that they stored sample bottles at that time co-located with their laboratory which was in an operating facility. And that they were never surprised when they got elevated contamination on these cross-contaminations because of the way they were stored.

His point was that for this group of people that were normally never exposed to the plant conditions but were in the administrative buildings that we needed to look at that in the context of that small coworker population of administrative workers. And he said you look at them as a group, and you'll never see evidence that there was a large exposure in a building, in an administrative building. There was not a cloud wafting into the building from a processing facility.

MR. GRIFFON: The investigation at the time it was inconclusive.

MR. MORRIS: I can't talk to the specifics

of that. All he said was we would never be surprised at a cross-contamination of a sample bottle.

DR. MAKHIJANI: I think that would have been written down.

DR. BEHLING: Yeah, I would have expected them to at least suggest that as the explanation.

MR. RICH: The wording on the memo would imply we couldn't find the source or any reason why the individual, in other words, they had gone through the full process of defining where he was, and where he worked. And they couldn't, the language -- at least I would interpret it saying we simply could not identify any source of contamination.

DR. BEHLING: That's not what it says. It says we don't, the investigation failed to show why these urinary samples were high in uranium.

MR. RICH: That's exactly what I'm saying.

DR. BEHLING: No, that doesn't talk about source term. It talks about why. If, for instance, cross-contamination would have been one of the options, they should have maybe

made reference to that.

MR. MORRIS: I doubt that we're going to get any more data on this. This stands as the end of the track for this string as we've pulled it.

DR. ZIEMER: Well, if these individuals had a claim at this point, you would assume that that was a real exposure. Is that correct?

MR. ROLFES: Certainly.

DR. ZIEMER: So under the rules they would get assigned dose and so --

DR. BEHLING: But Paul that was not, the question, I mean other people were exposed but were never monitored. Was this --

DR. ZIEMER: The issue is failure to monitor.

DR. BEHLING: Yeah, well, was this a serendipitous finding or were you looking for a baseline and you found fairly high excretion rates. And if that's the case, how many other people who were not monitored might have also had high excretion rates; and therefore, their data are never part of the record?

MR. MORRIS: I think that's what this ^ exactly told us. He said to look at the whole

body of administrative workers. As a group you will find that they have a routine annual physical bioassay system imposed on them. And that in that group of people you'll find diminishingly small numbers for their sample results as a whole.

DR. BEHLING: But disturbing is what Paul just said that when followed up, some of these people weren't monitored again for 22 months, and they should have been monitored within the next few days and weeks.

MR. SHARFI: But that only leads to a larger dose assigned when you have a follow up that's so far out, you basically result and all that you can do is a very large one.

DR. ZIEMER: So it gives a bigger dose.

MR. GRIFFON: It's part of the quality of the program.

DR. ZIEMER: I understand.

DR. BEHLING: I mean, in one of their statements, Paul, it says that when there's levels of 0.04 micrograms per liter that you do a follow up. And here you have 13 times that volume with no follow up. And yet no explanation was given that says, well, this

was all an artifact; and therefore, there's no need for a follow up. If that had been in the record, I'd say well, they looked at it, there's a justification for no follow up, and no need to concern yourself. But that document does not give you that warm feeling.

MR. ROLFES: I'd like to ask for a clarification. You said a follow up was conducted after 0.004 milligrams per liter?

DR. BEHLING: That was the criteria for action.

MR. ROLFES: That was 40 micrograms per liter.

DR. BEHLING: Well, 40 micrograms is 0.04 milligrams.

MR. ROLFES: Zero point zero four, yes, correct. I thought you said 004. I apologize.

DR. MAKHIJANI: Hans mentioned it in passing, but I think this is a more than passing problem at Fernald. There are very clear documents that show the importance of fugitive emissions and unmeasured emissions to the atmosphere. They're well documented in many cases and there are also documents that

show that the losses that were not measured were often bigger than the losses that were measured.

And the thorium memo that's cited in the site profile review that we gained that uranium conditions were the same, and I think that a possible explanation certainly -- I don't know more than what these folks wrote, but I do know that at that time they weren't looking very carefully at the contamination of the general air in the plant around the working building. And it's quite possible that somebody might be perpetuated with going at lunchtime from one building to another to meet somebody.

And they might get exposed to quite significant amounts of uranium that had nothing to do with stack emissions which is how environmental doses have been approached. I think at Fernald from whatever I've seen of the data, the stack emissions would be not the most important part of the onsite environmental dose. There would be fugitive emissions. I don't have a very good handle on that.

MR. CLAWSON: ^ bring up in that though where we had administrative people in there, and they were getting a tremendous amount just from the paperwork that was coming back from going across the road.

MR. ROLFES: It would have been difficult to compare a plutonium facility --

DR. MAKHIJANI: ^ highly enriched uranium.

MR. ROLFES: -- yes, and a highly enriched uranium as well. To address what this discussion, we had this discussion at the last Advisory Board working group meeting, and NIOSH consulted with a former industrial hygienist that had worked at Fernald. And we asked his opinion on what the conditions outside of the operating plants were. And he indicated that this was absolutely not routine at Fernald. He indicated that outside of the buildings was certainly much safer than inside.

DR. MAKHIJANI: Well, you know, I think it's all well and good to consult people who worked there, and we all do it routinely and document it. But you do have to compare that to the documentation from the time. You have

documentation before you that thorium was being dried in open doorways and that was blowing liberally about. We supplied you that documentation. You have it. I believe it might even been in the petition. And that you're dealing with air concentrations that are dozens or hundreds of times of MAC. I don't remember the exact numbers, but I can dig them up for you. So I'm not bringing this up lightly. I think this is a point that has to be technically addressed by trying to estimate fugitive emission doses based on documentation that you already have about fugitive emissions that were measured at the time. I don't see how fugitive emissions that were measured at the time and numbers were put down on paper can be ignored in favor of somebody saying that the outside air was pretty clean, trust me. I can't see the logic of that response.

MR. MORRIS: We have in one of the interviews that you'll be soon getting an interview with a person who was in a position of authority and knowledge of this time. And Bryce was interviewing them. And he said a

secretary who never got into a production area who had a high result in an annual physical, that's an indication to the lab that the lab was in a uranium production facility. Bottles were stored there prior to being sent to Medical. We fully expected occasional bottle contamination. I don't think anyone ever assumed it was anything but a contaminated sample. Bryce says the conclusion being drawn by reviewers is that this indicated high fugitive dusts in the plant area, and a lot of people were routinely exposed and not routinely monitored. He says go to IH air monitoring reports, 1950s ending in 1968. There are many results listed for walkway, roads and offices in the production areas. You get a very good picture on if there were any of these spooky high air dust clouds floating and zapping some secretary. To get a secretary they would have gotten everyone in the area, and there was no plant where that occurred. The data for these areas is what you would expect. Nothing that would be considered high.

MR. ROLFES: Thank you, Bob.

MR. SCHOFIELD: I don't think you can rule out the fact that somebody tracked contamination into a building or into an office. It happens at every facility.

MR. ROLFES: Certainly, of course it does, or not at all. But we are simply demonstrating that the airborne concentrations inside of the production facilities or associated with that production are much greater than the fugitive dust emissions that are, you know, the uncertainty is being cast on these fugitive emissions which are not a significant potential exposure source term for individuals at the site.

MR. GRIFFON: I'm back more to this narrow issue than the broad question. I mean, the issue to me that this raises here is there any more of this investigation that we can find? If not, it raises more questions in my mind about the quality of the program.

I mean, here's a case where you have an investigation report, and yet you can't find follow ups that they say, you know, so the question, we had before about procedures from the '50s through '80s, which we still

don’t have any of in QA reports for that period, is heightened for me now, I guess. Because you’re looking at a case right here where you say these are baselines.

If I had these people coming in to work here, and this is actually a, I don’t know if it’s a baseline because I don’t know when the hire date was. But if it was a baseline, I’d want to know where the heck they worked before or if they, you know, and if it was an annual, certainly I would have done a follow up sooner than 22 months based on these initial levels.

So back to Hans’ point. What’s the, how well can we trust this urinalysis data, and what was the quality for that early time period? I guess that’s what it raises in my mind.

MR. ROLFES: I apologize. I’m just looking through my notes, and I’m trying to recover --

MR. GRIFFON: Sandra has a comment.

MS. BALDRIDGE: They really weren’t required to monitor ^ people on an annual basis. A lot depended on where they worked. And if the plant had determined in their mind that the

exposure potential was low. So those areas, they weren't required to monitor.

MR. GRIFFON: Well, I guess my point is here's four people, they probably anticipated being low. And they had elevated samples. They investigated it, but they didn't do follow up to see if it was a real or if it was a contaminated bottle. Or at least the data we have doesn't indicate that they followed up. Maybe, the only other question is, this is from HIS-20, this data. Maybe specials were not included in HIS-20. Maybe there were follow ups that were done that aren't even part of the dataset in HIS-20. I don't know. But it certainly raises that question in my mind.

MR. MORRIS: We do have a one-month follow up for one of the four.

MR. GRIFFON: Yeah, that's right, so one of them had, yeah. One of them was followed up.

DR. BEHLING: Of the four, which one was it?

MR. GRIFFON: But you can't say the name.

DR. BEHLING: No, I'm just saying they're numbered one through four there, and the names have been deleted.

MR. SHARFI: Number three.

DR. BEHLING: Number three?

MR. GRIFFON: Right.

DR. BEHLING: That was also the highest one.

MR. GRIFFON: And the follow up was elevated, so then that would make me, if they just did it because it was the highest I think if I saw an elevated sample, I'd say, oh, I better follow up on the other people, too.

DR. MAKHIJANI: If the follow-up sample was elevated, that would discount the explanation that --

DR. BEHLING: Yes.

DR. MAKHIJANI: -- this was a cross-contamination.

MR. ROLFES: Or if you take a look at the case history, it's possible that this individual worked at another site prior to coming to Fernald as well.

MR. SHARFI: Also, on the report number three is the only person they say there's a possible almost exposure potential. The rest of them they say it's unlikely given their work scenario that they, that they would result in a dose or an intake that would

result in this bioassay. Number three they do say that there is a possibility, and you might, one of the reasons why --

MR. GRIFFON: Is this for a Fernald exposure or for previous --

MR. SHARFI: They worked in the radio chemistry lab. So that might be the reason why that person actually did a follow up; whereas, the rest of them their job title and work location didn't indicate a potential so they saw no need. And once again we've talked about the reliance on the bioassay from the sense of back then. They look at the bioassay more as because the modeling situation wasn't as reliable.

So they might have focused more on the field indicators saying that these three people, three of the people didn't really have potential; whereas, the one person had potential. So let's go ahead and get a follow up on that one person.

MR. GRIFFON: So they might have bypassed their own protocols then?

MR. SHARFI: Well, I don't know all the, didn't get any of the details, but they might

have investigated it, but decided follow-up bioassay wasn't necessary for that situation.

DR. BEHLING: Well, let me read you what the requirements were, and I'm quoting directly from a document that the head of the Health and Safety was in charge of and said urine results. "Persistent results of 0.025 milligram per liter indicates moderate exposure and results over 0.04 milligrams per liter are considered due to excessive exposure which require follow up."

MR. SHARFI: When was that?

DR. BEHLING: That was in April 19th, 1972.

MR. SHARFI: Yeah, that's '72. These samples were in '55. So I mean, I'm not saying that that follow-up procedure was ^ was present during the time that these samples were resulted. So I hate to draw conclusions what they would mean in the '70s versus --

MR. GRIFFON: Right. I thought that was protocol at the time. I didn't realize that. I mean, it goes back to the question of some procedures from the time.

MR. SHARFI: My understanding is that that was protocol since early days of that 0.40

micrograms is how it was.

DR. BEHLING: Yeah, I think it was if I recall, too. That was an early requirement.

MR. GRIFFON: I don't know that we're going to come to any conclusion here, but I just, so I guess the only follow up I would have -- and it may be a dead end like you said, but if there's any way to pull the string on this follow up to this memo, if there's anymore investigation documents.

MR. MORRIS: We'll try and revisit it and see what we find.

MR. GRIFFON: And then the only other thing I would maybe go back to is the previous finding where we had your response number one was the QA report in 1953. Your response was that we found one from 1953 but nothing else, but we have interviews. And I guess I'm asking again, I mean, I don't know what this means, but I don't know that I'd stop turning over rocks. If you can find any more QA reports or procedures from that time period.

MR. MORRIS: In fact, this pointer that you pointed to, IH reports from that era, we haven't found them yet.

MR. GRIFFON: Oh, you haven't found those.

MR. ROLFES: We do have some, but it's probably not a high --

MR. GRIFFON: ^ the IH reports because they may include a QA section, a ^ section.

MR. MORRIS: In fact, there's some suggestion that they did.

MR. ROLFES: We do have thousands of documents that are on the site research database.

MR. GRIFFON: I just want to make sure that I wasn't, by skipping that that I wasn't saying that action was off the table. If you keep looking, that's fine.

MR. ROLFES: Every time we go back and look for something, we can find documents that we didn't realize we had there. And so certainly we've been spending a lot of time to make sure that we are, in fact, providing everything of relevance to the Advisory Board for our discussions. They may be there, so I'd have to take a look through those. And also, if we realize that we don't have them, we could also make a request, a supplemental request, to get those.

MR. GRIFFON: That's fine. So for that I just said NIOSH will do additional follow up on the investigation report.

MR. CLAWSON: Okay, moving on.

FINDING 4.1-4

DR. BEHLING: Finding 4.1-4 on page 30 of the report, the use of claimant unfavorable assumptions and default values regarding the level of uranium enrichment. I think we had discussed that sufficiently, so skip that one?

MR. GRIFFON: Yep.

DR. BEHLING: Everyone's agreed.

FINDING 4.1-5

I'm not sure if the next one isn't yours, Arjun, recycled uranium? It's Finding 4.1-5, and the finding states there are several radionuclide contaminants in RU that are not adequately considered for internal dose estimates. Most relevant to this concern are impacts of these contaminants in RU raffinate waste streams. And I guess we'll talk about raffinate waste streams.

DR. MAKHIJANI: I guess we're awaiting your white paper on that.

MR. GRIFFON: Yeah, I think the follow up is

you haven't completed that yet.

On the second action though, I just want to understand, when we're moving into thorium stuff, you posted some thorium data, air sampling data, but I thought that was more in response to the other thorium processing rather than this.

MR. ROLFES: The great majority of the data that we posted for the Advisory Board, at least two separate Excel spreadsheets that are available, the great majority of the information in the larger of the two is Thorium-232. Now there are some contributions also in there from raffinates as well, air samples. So we have separate research database documents that have raffinate air monitoring data, and those have not been reduced into an Excel spreadsheet at this time. We have provided the Thorium-232 data.

MR. GRIFFON: Can I add that in your response then for number two? Instead of saying done, can I add that, what you just said that you have additional site research documents with raffinate data that are being put into Excel spreadsheets at this point?

MR. ROLFES: Yeah, that is correct. I do believe we're working on reducing that information into spreadsheets, or we will be doing so.

MR. RICH: And also there's a white paper on RU specifically.

DR. MAKHIJANI: Can I ask a question about this thorium data, Fernald thorium data air samples combined? Some of these samples where it talks about the location actually says at plant nine thorium. And then other stuff is just plant nine. Is that all relating to thorium? I mean, I don't know how these samples have been identified as relating to thorium.

MR. ROLFES: They're identified as thorium gross alpha air samples.

DR. MAKHIJANI: In the original datasheets?

MR. ROLFES: Correct.

DR. MAKHIJANI: And are the original datasheets posted somewhere?

MR. ROLFES: They're certainly in the site research database.

DR. MAKHIJANI: And they're in the site research database?

MR. ROLFES: Yes.

DR. MAKHIJANI: And is that toward the end of the site -- I'm just trying to make my life a little easier.

MR. ROLFES: It's in the middle, Arjun.

DR. MAKHIJANI: So that was my only question.

MR. ROLFES: Bob, do you recall if when we entered all those air monitoring data if we cited the source, like reference ID number of the --

MR. MORRIS: We probably did because we were aware of needing some kind of QC on our transcription. But to be honest, the details of --

MR. ROLFES: Yeah, we did this quite a long time ago, and I do remember that there is actually, now that you mention it, a QC report that we put together based on --

MR. MORRIS: I think I wrote a QC report on that.

MR. ROLFES: Yes.

DR. MAKHIJANI: Yes, there is a document number and a page number I see here. But these document numbers wouldn't correspond, I

think, with the site research database number. They're quite different.

MR. ROLFES: Could you provide that --

DR. MAKHIJANI: For example, it says 15, 001, 36, 001, 003, and then it gives a page number, 001 parentheses 85, a parenthetical number for the page number.

MR. MORRIS: Yeah, I almost certainly have a decoder some place for that.

MR. CLAWSON: One of them little rings?

Any more questions on that?

MR. GRIFFON: No, I think we're on to the next.

DR. MAKHIJANI: Is there anything you want done with this?

MR. GRIFFON: Well, we're waiting on a white paper, and we're waiting on data to be put up, right? So I don't know if there's any action right now.

DR. MAKHIJANI: No, I meant on the thorium air sampling data where it says done.

MR. GRIFFON: No, I crossed out done. Because maybe I'm wrong, but --

DR. BEHLING: Well, they did ^ on the O drive. BZ sampling data and GA sampling data

and --

MR. GRIFFON: I guess I want to ask if any of that's Thorium-230 related, or is it all Thorium-232 related?

DR. BEHLING: Two thirty-two.

MR. RICH: The one that's done is thorium data.

MR. GRIFFON: What?

MR. RICH: The air sampling data, I think, Mark, that you list as done is thorium data.

MR. ROLFES: That's correct.

MR. RICH: And the one that we're saying is yet to be done is the raffinate one.

MR. GRIFFON: Or the Thorium-230, right. So I changed that from done to is in progress, being translated.

So we'll get to the other one coming up, Arjun.

DR. MAKHIJANI: But for the moment with the Thorium-232 data you don't want anything done with it.

MR. GRIFFON: As I said, we haven't gotten to that.

DR. BEHLING: We haven't gotten to that. It's part of another finding, Arjun.

DR. MAKHIJANI: Oh, okay, sorry.

FINDING 4.1-6

DR. BEHLING: I think the next finding is yours, too, Arjun, 4.1-6.

MR. GRIFFON: That's the same I think, yeah, 4.1-6, Arjun?

DR. BEHLING: It's on page 34 of the report.

DR. MAKHIJANI: So that's the same response that the white paper in preparation is.

MR. GRIFFON: And the white paper is going to discuss that derivation of the assumptions on percentages, et cetera, right?

MR. ROLFES: Sure, and I did want to remind everyone that we do have urinalysis data available for individuals that were exposed to the plutonium specification materials.

DR. MAKHIJANI: For the '80s?

MR. ROLFES: Certainly, yes.

DR. MAKHIJANI: Not for the early ^.

MR. ROLFES: Yes, but it was during the '80s that the highest concentrations of plutonium came in the site.

DR. MAKHIJANI: Well, we don't have measurements of the early years.

MR. ROLFES: Oh, we know exactly how much

came into the site based on the recycled uranium research that was done by DOE.

DR. MAKHIJANI: Do we have partial ^ measurements for plutonium?

MR. ROLFES: We sure do. It's in the recycled uranium DOE data.

FINDING 4.2-1

MR. GRIFFON: On to the next one. I think that's the same resolution, same action.

DR. BEHLING: Are we on 4.2-1?

MR. GRIFFON: Yes.

DR. BEHLING: I don't think you're on that. We haven't resolved that one. That's the K-65 default model. And I guess I have a whole series of questions here. The original TBD identified a methodology on page 27 of the TBD.

The approach for assessing exposures and this is an internal exposure obviously to materials contained in the transfer of these 13,000 drums from the drums received from among other places Mallinckrodt ^ silos one and two. And you have to be very, very studious to really go through and understand what was done to estimate the potential

internal exposure.

And I took strong exceptions to the whole methodology because for the most part it says, well, we have a few air concentration data, sampling data, and then we now have to figure out, well, what was the duration of exposure. And there's a whole series of assumptions that were made regarding external dosimetry of 23 people which the highest 11 people were selected.

And then there was this whole cascade of assumptions that says, well, if this was the average for the 11 highest people who were exposed at the K-65 silos, then how long could they have worked there in order not to exceed an administrative dose limit of four rem a year. And they ratcheted down to ten weeks. And then they finally ratcheted down to six weeks. And if you go through the methodology, you sort of say this is not science here.

I mean, you're basically trying to define the internal exposure, duration of internal exposure. You have a couple of air samples, and now you're just going to say, well, based on inhalation rates, how much did

this individual take in. And to answer that question you have to know how long was that person exposed.

In other words, to get a time integrated internal exposure, you have to know not only air concentration, but the exposure time. And apparently, in this particular exercise, they defaulted to external dosimetry data. And says, well, here are 23 people assigned to the K-65 silos. We'll select the highest 11. That sounds claimant favorable.

What you're selecting is the highest exposed individual and then impose over that the issue of a four rem yearly dose limit. And saying, well, on that basis, how many weeks could they have worked on the assumption that these highest 11 individuals were exposed on a weekly basis. And the assumption was then, well, they couldn't have worked more than ten weeks.

And then in another statement -- and I'm not sure how to explain that -- they were ratcheted down to six weeks. Well, the truth is the administrative dosimeter program did not exist because during the '50s it was 15

rem a year. And there was also the assumption that there were a three-shift rotation, and the conclusion was that in any given year, six weeks was the bounding duration for any one individual to be exposed.

Well, I kind of looked at that and said, well, this doesn't make sense. It's just based on assumptions that have no scientific merit. First of all, the dose limit of four rem is inappropriate. And the issue of 80 drums, I know there's one document that says they transferred the contents of 80 drums in one day. But that was one day, and how do you apply that to 13,000 drums is another issue.

And the whole issue of modeling internal exposures based on external dosimetry data that were restricted to the highest levels, and then impose on that the issue of a four rem annual dose limit as an admin limit is something that I won't accept as a legitimate approach to modeling this data.

MR. ROLFES: What we're doing to reconstruct people's internal exposures for this operation is the radon breath data.

DR. BEHLING: That's exactly what I was going to ask next. It's clear to me from what I gather now in this dose reconstruction case that you provided me with, case internal dose reconstruction sample number two, and that was my exact question. Are we abandoning this model? Because I can't possibly accept this model as legitimate.

MR. ROLFES: I would have to take a look at what you're referring to. That doesn't ring a bell to me. It may have been something that we had just, you know, it might have been some descriptive information that, I mean, the people, there were a couple of people that exceeded administrative limits at the site of five rem in the very early time period. And they were associated with this operation working with the radium-bearing materials. That was just another piece of information that would allow us to identify who was potentially involved in this operation. I don't in any way --

DR. BEHLING: During this time period -- and I have the documents here. These are the official documents, there is a continuous

reference to 300 millirem per week, and there's another one that talks about 15 rem per year. And that has a date of 1959. That's about the timeframe when we switched from 15 to five as a regulatory limit.

So as I said, I cannot buy in on the four rem admin dose limit because there's clearly no reference to that in the internal documents that such a dose standard was exercised. And as I said, the issue was taken where you had 21 workers, and then you took 13 workers who had the highest dose and took the average of that and saying based on the four rem yearly limit, they couldn't have worked for more than ten weeks without exceeding the limit. And then it was further ratcheted down to six weeks, and the whole issue that basically said no worker could be exposed to the K-65 material internally for more than six weeks. And then, as I said, I can't buy into this --

MR. GRIFFON: This was mentioned on the site profile apparently.

DR. BEHLING: That was in the site profile.

MR. RICH: It's in the technical basis

document for internal dosimetry. It was used as an example to define that the external dose would limit the workers to less than looking at a full year based on the external dosimetry records. And in that case then we defaulted for some number above that as a maximum exposure level short of a year. In other words, we did not default to a full year of exposure as a maximum air sampling data, air sampling concentration rate that had been determined from other sources.

DR. BEHLING: Well, I'll read you the exact statement that's contained in the TBD: "From the information derived in the external dose data sheets and the air monitoring sampling sheets, it appears that the transfer could have been limited to a period of about six weeks per year with no individual working more than a period of six weeks in the year."

MR. RICH: And, Hans, we're not using this approach any more.

DR. BEHLING: I realize that. I just want to be sure that we can walk away from this.

MR. RICH: We're walking away from this. This won't be in the next technical basis

document.

DR. BEHLING: Yeah, it wasn't clear whether or not the radon breath data was a supplement or an alternative or a complete replacement with this being taken out.

MR. RICH: It's a replacement.

DR. BEHLING: On that issue and having said what I just did, I do go want to go through the issue of the radon dose reconstruction protocol that you provided us in sample number two. And again here the issue is one of the plant one labor work 1952 through 1958 and was exposed to radon, et cetera. And let's see here, oh, this is not the one. It's the internal dose reconstruction number three. I'm sorry. I got the wrong one that involves the radon breath sample.

And this case again the laborer worked from '52 to '58 and was part of the K-65 raffinate handling. So he was one of the guys who was unloading the 13,000 drums from the material in the drums into the silos, too. In this case it was silo number two. And the statements at the bottom of that dose reconstruction sample is that radon breath

monitoring taken at the end of the six-week job loading pitchblende into the K-65 silo number two.

Now again, I'm focusing on the six weeks because it happens to be coincidental value that was incorporated in the previous model. And, of course, if you're looking at an assessment of radon breath data, you would like to do it at the end of an exposure time period because, obviously based on your TIB-0025, you have to assume, in order to get an accurate body burden, you'd have to assume that this is not taken on the first day, the first week or midway in between.

If there is a finite duration during which this person was exposed to this K-65 material, you would like that analysis done sometime after he completes his tour of duty with the K-65 transfer. Now the question -- and I looked at the data, and you provided data for the years '52, '53 and '54.

And I assume that these people were more than just the K-65 workers because they clearly took weekly samples starting in January for each year through the end of the

year. Meaning that this whole issue of, oh, they worked around the clock, three shifts for six weeks, certainly won't hold water in context with the actual radon breath data because I looked at the '52 and '53 and '54, and they have weekly sampling from January through the end of the year which means that the transfer took place basically year round.

And it would make no sense to assume that you assign people in the middle of the night from 11 to seven in the morning in darkness transferring stuff into the silos. I'd have a tough time understanding the urgency behind that effort. If you took from '52 to '58, why would you confine it in any given year to six weeks?

But anyway, the question now I have is regarding the radon breath samples. When were these samples taken, and to what extent can you conclude that the breath data that's available on behalf of these individuals, and I have no question that these people were monitored, were, in fact, taken at the time when you can conclude that the breath analysis really reflects the body burden that should be

done at the end of that tour of exposure?

MR. ROLFES: Well, we would have to take a look at the specifics of the case to make that determination. For example, we would take a look at the information for that specific person to see when he, in fact, started working at the site or when he, in fact, started working at the silos, slurrying the materials into the K-65 silos.

We would then take a look to see when the bioassay result is to make sure that the bioassay result was, in fact, after the initial exposure could have started. We would have to take a look at a specific claim in order to make some sort of determination about --

DR. BEHLING: But certainly, one would have to be reasonably cautious about how these radon breath samples are used in order to assure that we're not talking about a guy who's on the job the first week then given a radon breath analysis. And according to this example that we were given, the statement was that this was at the end of a six-week engagement. I mean, one has to be sure that

we're not making assumptions that are simply not supported by the facts. Or if you don't know, what do we do about it?

MR. ROLFES: That is an important point because if you take a radon breath sample, whether it's still material of significant amounts within the lungs, the radon recorded in these breath samples would be a higher amount than if we took the sample down the road much further because the radium-containing materials would have had the opportunity of passing the lungs, and --

DR. BEHLING: Yeah, yeah, I'm familiar with it, but on the other hand, your total burden would be considerably less if on the first day versus at the end of a three month period. And your model according to OTIB-0025 says that we assume -- the model assumes -- that 33 percent of the radium inhaled remains in the lungs, 39 percent in cortical bone, 14 percent in trabecular bone and 14 percent in other soft tissue. Those are the parameters of the OTIB-0025 model. And so you recognize, and of course, the emanation rate is 100 percent for lung, 100 percent for soft tissue, 33 percent

for cortical bone and 14 percent for trabecular bone. I think those are the numbers that I recall.

And so it does take that into consideration. But I believe in all instances these models were based probably on animal data, and then I would assume they were probably beagles that they exposed to radium for long-term studies. And subsequent data involving obviously our friends, the ^ probably had different values because there the long-term residence they use probably is in the cortical bone and the trabecular bone meaning that the release fraction is considerably smaller which does affect the dose calculation, too.

DR. ZIEMER: Well, and they were taking it in by swallowing.

DR. BEHLING: Yes, ingestion.

MR. ELLIOTT: Basically, your caution here is, Hans, that we use radon breath data appropriately. That we don’t pick a data point that is very early in the campaign or the exposure experience.

DR. BEHLING: Yes.

MR. ELLIOTT: That we look at the breath at the end of the exposure. I think we understand that. We accept that.

DR. BEHLING: And because there's, I mean, this is a very, very insensitive test. And according to OTIB-0025, the multiplier is one picocurie per liter in breath, exhaled breath, converts to 250,000 picocuries in the body using the model I just described. So you don't have to be off by much, you know. If it goes from one picocurie to two, you multiply the source term in the body. So it's a very insensitive protocol to begin with.

And then you also realize that that's just your starting point. Now you have to go back to the core sampling in silo one and two to extract the secondary data it says in addition to the Radium-226 that I'm measuring by means of a surrogate measurement in radon breath, you have to now assess for thorium and all the other decay products that are concurrent in silos one and two. So you realize there's a tremendous amount of extrapolation, extrapolation.

MR. ROLFES: I agree. It's highly

uncertain, and the net result is that all those compounded uncertainties are to the benefit of the claimant.

DR. MAKHIJANI: I have a specific question about radon breath data. I took a look at the data, and there's only data for '52 to '54, and '52 and '53 are very incomplete. All the years of ^ are lost data. There's quite a bit of indication of mishandling of data because the flasks weren't properly sealed.

And so a considerable amount of data was not only lost, but there's a question in my mind as to how much that was in the original flask was actually in the lab when the radon was analyzed. And then a number of questions in regard to the completeness of the data even for the years that are there. And I noted there's nothing after 1954. And the K-65 Mallinckrodt residues are really the ones that we're talking about most that are at issue in terms of exposure and transfer and so on were brought there in 1955, at least according to the TBD.

Now that date may change. I didn't go back and check the original documents or

verify with Mallinckrodt. It was just a brief preparation for this meeting. So that really reinforces Hans' question in a very specific way is that there are no data for the period in which you would assume there was the greatest exposure, at least none that have been posted.

MR. ROLFES: I would have to take a look in our site research database. There may be additional documents.

DR. MAKHIJANI: Yeah, no, I'm just talking the current status. The current status, I looked at all the data. I looked at every single data sheet. That's the only really careful thing I did in going through what's new on the O drive because I was very curious about how much radon breath data there is. And for two out of three years the data are pretty skimpy.

For '52 there's very little, lots of missing data, and the sample sheets are quite clear, and there are quite a few concerns about things. And the most important thing perhaps is that data, there are no data after 1954, and you had continuing exposures along

these lines into the 1950s. I don't know the last year that the high radium-content ores were done, but certainly Mallinckrodt was transferred in 1955.

So is there ongoing research or do you have some data?

MR. ROLFES: I'm thinking back to what we had. I recall seeing some memoranda regarding measuring beta activity in urine from radium during this period. Or, excuse me, they were trying to quantify, in addition, there was a memorandum, I don't recall if I have it with me or not, but actually during February of 1955, this memorandum indicated that they were looking into monitoring radium exposures via urinalysis in addition to the radon breath sampling. We have seen some employees in the early time period, roughly corresponding with this time period, who have beta activity results reported in their DOE dosimetry files.

DR. MAKHIJANI: Radium-226 or beta?

MR. ROLFES: I'm sorry?

DR. MAKHIJANI: Beta activity?

MR. ROLFES: Yes, beta, beta activity, yes.

DR. MAKHIJANI: How did that relate to

Radium-226?

MR. ROLFES: I do not know if they were trying to quantify other radionuclides that they were potentially exposed to, but it was listed as something associated with the radon breath testing. So it's, I agree, it's something that we need to take a look into. We'll certainly take another look at the data that are available and see if we can request additional records regarding radon breath testing.

DR. ZIEMER: Do we know what happened after those dates in terms of bioassay even? Were they looking at radium body burdens by another method after that date? What was the final date that you mentioned?

DR. MAKHIJANI: Well the date on the O drive was December 1954. And there are no data that I saw. They start in March 1952. There's one sample seen from '51, but I think that might be a --

MR. ROLFES: I'm going to ask Bryce or Bob to add a little bit to this discussion because we did ask the individuals who we spoke with, former employees from Fernald, about the

personnel who were potentially exposed to this operation as well as the types of materials that were coming in so that we made sure that we were aware of some of the types of source terms that were coming in, either the radium-bearing materials that were brought in or the ore concentrates that did not have the radium associated with it. There are additional details in our transcripts of these interviews which we will make sure that we're making available as soon as they're reviewed by the interviewee.

DR. ZIEMER: So the radium may no longer have been an important source term at that point?

MR. ROLFES: That may be the case. I'd have to take a look.

DR. ZIEMER: That's a possibility?

MR. MORRIS: I think the Belgian Congo ores are really some of focus.

DR. ZIEMER: Pitchblende was --

MR. MORRIS: That's right, and by then -- I can't speak to the exact date off the top of my head right now, but in the middle-to-late '50s the Belgian Congo ores were completely

finished. There was no more raffinates left that were moving through the system based on that input stream. So it could be that their perceived need ^ by that time.

MR. RICH: There were two plant sites, the hot raffinate site which was a shielded facility, and it's hot because it had a lot of radionuclides. It was radiologically high levels of external radiation. They also did the transfer of the Mallinckrodt waste and the Niagara waste that came to the site, some 13,000 barrels of waste that were then transferred over a, about a -- I forgot now, three or four year period --

DR. BEHLING: I have here according to what I remember from the TBD, '52 through '58 was the transfer of those 13,000 drums.

MR. RICH: And that was done in a slurry transfer station out near the silos. So it was not specifically in plant two and three. It was dumped, slurried and then pumped to the silo.

DR. MAKHIJANI: And the pitchblende was, according to the site profile, revision zero, pitchblende was, from '53 to '55 ^ pitchblende

ore so you have ’55 in there. And they said the ’53 data are pretty, less than, maybe less than 50 percent of the data are there, and there are none from ’55 onward.

DR. ZIEMER: But it sounds like a process change.

MR. RICH: It shifted then from processing high uranium-bearing ores to the U.S. supply that came directly from mill sites. They had already been, the daughter product had already been removed there. And so it then came into the sites and they used both the hot and the cold sites then for the processing in plant two and three. And those raffinates were much lower.

DR. ZIEMER: I just wanted to make sure that the creation of the radium bioassays coincides with what, our continuing need for uranium bioassay. I think it was too early for them to have switched to whole body counting.

DR. BEHLING: No, that didn’t occur until ^.

MR. RICH: I don’t know very many ^ that did a lot of radon breath sampling ^ anyway. It was a somewhat empirical analytical technique that we do have a significant database at

Fernald because of the fact that they were handling so much of the higher raffinates or the high radium process stream material. That gives the, an insight into the level of intake or deposition during that highest potential exposure period. And as a consequence and they used that to develop a bounding intake.

MR. ELLIOTT: How many workers are we talking about? How labor intensive was this?

MR. RICH: The process plants two and three for the high process periods were upwards of 100 people, and we've been told that that workforce was both from the head end to the back end and all of those areas. The average workforce was much lower than that. That 100 is their estimate of the workforce at the highest process period where they were running all sections of the plant, but that's 100 ^. And typically, they anticipate that the ^ and the raffinate would be in the 25 workforce level.

MR. CLAWSON: Did this go on 24 hours a day or is this --

MR. RICH: Yes, yes.

DR. BEHLING: Why was there such an urgency

when it was expected to run for a few weeks in any given year? Why would you subject people to be in the middle of the night out in the cold?

MR. RICH: Part of the problem there and one of the reasons why, you know, these drums setting around on the pad for long periods of time were reading, a general background was in the range of about 300 millirem per hour in those storage areas.

And so when they were working the drums, you can't burn out your people, burn them out by, you know, they approach their radiological, external radiological dose levels relatively fast. So they either did it, and we don't know. We don't know whether they did it in a short period of time or rotated people in and that, based on the analytical external dose data, it appears that there were a crew of -- I forget -- five to six people that did the drum transfer operation.

And so a larger standpoint if they were operating, if they're transferring at a certain rate over a period of time and doing,

you know, we played that game. And it all comes out the same anyway because but it's probably external dose limited on small teams of people.

DR. BEHLING: Well, I guess what I couldn't grasp was if they worked a three-shift rotation year around, I'd say they were looking to expedite the removal of this material into the silos. On the other hand --

MR. RICH: They would have finished in much less of a time period.

DR. BEHLING: Yes, of course, I mean, 80 drums a day as was suggested in the TBD if you move it by times 250 days out of the year for working, it doesn't take you six, seven years.

MR. RICH: It was done in a year and a half.

DR. BEHLING: And so the question I had all along was, was this something of an assumption that had no basis. In other words, I would understand three-shift rotation year round if the intent was to expedite this, but not a three-shift rotation and then do it six weeks and then stop. That doesn't make sense.

MR. RICH: It looked like from the data sheets that they had four shifts. I know four

groups of five people that they were working in. So that led us to the conclusion initially that they were operating on a, at least on a two or three shift --

DR. BEHLING: I remember looking at those data, and my feeling was that they may have been workers who were basically dealing with raffinate waste that was being produced around the clock rather than the transfer of 13,000 drums. And my gut feeling was that the three-shift rotation may involve personnel who were involved in transferring the liquid raffinates that were being produced as part of the process there.

MR. RICH: It's been a number of years since I looked at that data sheet, but I think as I recall, they were identified as the drum transfer operation.

DR. BEHLING: I don't remember getting that information from the data sheets.

MR. GRIFFON: Can I go back to the actions and ask, I think the follow up I have is NIOSH will further assess the current lack of radon breath data after 1954. Is ^ '55 question?

DR. BEHLING: Arjun, do you have breath data

for ’54? I only have ’52, ’53 and ’54.

DR. MAKHIJANI: There are some data for ’54.

DR. BEHLING: There are data for ’54?

DR. MAKHIJANI: And not, every year is incomplete.

DR. BEHLING: I didn’t look at data for ’54.

MR. ROLFES: I believe there’s three data sheets that have ’52, ’53 and ’54.

MR. GRIFFON: And then I also had an SC&A action item here, possibly. Can SC&A provide a written review of the white paper? The white paper’s available. You made some comments on it. I think it might be useful to write that out.

DR. MAKHIJANI: White paper?

MR. GRIFFON: The white paper is referenced in this response and provided. I don’t know. Is the white paper the same as TIB-0025 or is it in addition to?

MR. SHARFI: I think it’s what we used for the sample DR.

DR. BEHLING: Is there a white paper? I think --

MR. MORRIS: I think all we did, it’s been awhile since I wrote it. I think it just

summarizes the data that you got and puts the distribution around it.

MR. GRIFFON: Well, I mean, Arjun made some, at least raised some questions about the completeness and stuff like that. I guess I want to formalize SC&A's response to this. Is this complete enough for dose reconstruction? I think we need a formal response on the table.

DR. MAKHIJANI: Right. If the dose reconstruction relates to the years for which there are data, then obviously --

MR. GRIFFON: Well, one action is that NIOSH is going to look beyond '54, but given the set you have now, I think you need to give us a written assessment of that as well.

DR. ZIEMER: Is there a white paper or not a white paper?

MR. GRIFFON: Apparently, there is.

MR. ROLFES: Yeah, there is.

DR. ZIEMER: And it's called?

MR. ROLFES: It should be in, if you take a look at the internal dose reconstruction folders, what sample number?

DR. BEHLING: That was sample number three,

I believe.

MR. ROLFES: You take a look in number three. It should be located in with that.

MR. SHARFI: ^ post-’54 we have seen claimant files with radium urinalysis data post-’54, and we have done assessments for those claimants where they had actually urinalysis data like in ‘57 where it looked like they were working on that job. And they did have high external records in the same time, deep doses are in the same time period they had these radium urinalysis. So they may have switched over to a urinalysis program.

MR. GRIFFON: That could be a follow up, yeah. If you find that out, that’s great.

MR. SHARFI: I can only speak for a few claims where we’ve actually seen this data in.

MR. ROLFES: Yeah, we’ve seen those results in a very limited number of cases, and we’ve been tracking this down. We’ve been asking about this for a long time.

So I had asked an interviewee who came on right after these urine samples were collected during the time period that these urine samples were collected. He wasn’t able

to provide any additional information, but we're certainly, you know, it's certainly something that's out there that we currently have no method to interpret right now. There's data there, but we're not sure exactly what it's for.

MR. GRIFFON: Also, for response number one I edited, and I'm keeping these in red line form, so I'll circulate them, Mark, for your review and make sure that they're accurate. But I changed "provided radon breath", I think it said, "and thorium air monitoring data". I said, "provided radon breath data. Raffinate air data is being assembled into a spreadsheet as we discussed in Finding 4.1-5." So this again is the raffinate data. It's not the Thorium-232 air data, right?

(no response)

MR. GRIFFON: You see I'm looking at response number one, so I crossed out "provided thorium air monitoring data" because you really haven't provided that related to the raffinate. That's being assembled, right? And I want to distinguish between the two.

MR. MORRIS: We're pulling it together.

MR. GRIFFON: I want to distinguish those two sets of thorium data.

MR. MORRIS: I think they are two separate bioassays.

MR. GRIFFON: And then the final question I have is the last sentence in that, “NIOSH response says the ratios are unchanged.” How do you know that if you haven’t even assembled this data yet?

MR. MORRIS: Because these will be gross air sample data.

MR. GRIFFON: Oh, so they’re gross air. So they’re not going --

MR. MORRIS: We haven’t changed any of the underlying or pending assumptions about the three.

MR. GRIFFON: Okay.

MR. ROLFES: -- that is the TIB that allows us to interpret the radon breath data. We may not have put the white paper in there because I know for the radon breath data -- I’m trying to recall if the white paper that we had initially put together was placed into the folder for the Advisory Board to review.

I know that TIB-0025 was essentially

the same methodology, and so I don't recall if we just decided that TIB-0025 essentially had all the data, and instead of citing the white paper, we already went to an approved document. So that may have been the case that we used an approved document rather than the white paper.

DR. MAKHIJANI: Mark, can I ask a question about the Thorium-230? What matrix are you using for calculating the Thorium-230 exposure after the Belgian Congo ore stopped? Because at that point the radium became much less of a concern because the radium was already taken out at the mill. And then you've got basically the silo three material, the ^ metal oxide stuff.

MR. ROLFES: That's a good point.

DR. MAKHIJANI: Mostly Thorium-230. What are we doing with that?

MR. ROLFES: We spoke with individuals that had first-hand knowledge of what was going on at the site. And it was the same individuals that were working on both the radium-bearing materials on the hot side of the refinery and the same people would work on the cold side of

the refinery as well. So they were both potentially exposed to the same materials.

If you take a look, the silo three material only has, well, not only, but silo three material does not contain the radium. However, if you take a look at the silo one and two concentrations of Thorium-230, those concentrations exceed the concentrations in silo three. So we feel that a radon breath bioassay data would be representative of all people exposed potentially to these raffinates because it was the same work population, same worker population.

And we feel that the intakes based on the isotopic ratios from silos one and two would account for exposures to silo three material because the Thorium-230 concentrations in silos one and two, in fact, exceed those in silo three.

DR. MAKHIJANI: Is that in your white paper? I'm wondering if it's documented somewhere.

MR. ROLFES: We weren't able to locate the white paper so this may not be there, but it is documented in our drafts of our interviews that we conducted with old Fernald employees.

And as soon as those are finally approved, or approved in a final version by the interviewees, we'll be sure to make those available.

We discussed many of these issues with former Fernald employees. We felt that that was the best source of information that we had at our hands in addition to the records. And I believe we probably got probably 75 pages roughly of documentation from these individuals. So we're working as fast as we can to get everything to make that available.

MS. BALDRIDGE: Mark, ^ here. When I was preparing this petition that you've gone to one of the meetings for the former Fernald workers, I was told that I was wrong about the thorium in plant six, that I was going to make a fool of myself because the person who was talking to me had worked at six, and he knew thorium had never been there despite the fact of the documentation. So my point is many of the people who have worked there who have given you information may be 100 percent correct, but there are others who think they are more of an expert than they are. And

that's my personal experience.

MR. ROLFES: Sure, you also have to consider that the things that are being recalled are going back 50 years and some of the people that we're speaking with vary in, you know, I mean, there's certainly a distribution of ages in this room, and by no means do I mean that as an insult at all.

So anyway, we have to consider information from all sources, and we do our best because we're not always going to have a 100 percent agreeing, not everything's always going to agree. We just need to make the best available information, excuse me, the best sense of the available information from all sources. We don't rely on solely one person's input.

We consider input from a variety of sources. We have very open public comments that we receive. We receive comments from professionals from other sites. We receive information from a variety of information sources including technical documents, including just a wide variety of sources that we consider. We're not looking to, we want to

make sure that we consider any potential issues.

MR. RICH: Mark, can I just add a note being one of the older ones here? We have recently retrieved a number of very good historical documents dealing with a number of different processes and plants. And in addition to that, and in concert with those histories and plant documented histories, we've interviewed a number of very experienced -- I won't say old -- but experienced people that hearken back to the era when those documents were written. It fills in, those interviews give a feeling and an understanding, a better understanding, of the documents themselves. I'll just leave it at that.

MR. GRIFFON: These documents you're talking about, have they been posted or --

MR. RICH: I think most of them are on the O drive.

MR. ROLFES: They're certainly on the site research database. There is --

MR. RICH: There may be some that are not; however, they're recent additions.

MR. ROLFES: I don't want to, you know, when

we get up to the volume of records that we're placing on the O drive, we're essentially going to be providing a copy of the site research database. I mean, we're dealing with, you know, these are not a small number of documents that we're dealing with. As I mentioned before, we are referring to thousands of documents that we have in the database for Fernald. I mean --

MR. RICH: In fact, I was just reading a recent document that addressed plant six, and which is a recently recovered document that is a historical document in addition to plant nine and some of the others on the way on the plane.

MR. GRIFFON: When I said the O drive, I meant the site research database.

MR. ROLFES: Yes, yes, they are on the site research database. So everything that we recover for a site is typically put on this.

MR. CLAWSON: We kept hitting around this white paper, and I'm, so where is this white paper at?

DR. ZIEMER: It doesn't exist.

MR. ROLFES: I don't believe it exists

because we determined --

MR. RICH: Which one?

MR. ROLFES: The white paper that we're referring to is for the interpretation of the radon breath data.

DR. WADE: It's a virtual white paper.

MR. ROLFES: I believe we had proceeded with putting a white paper together; however, I'd have to take a look back. This was done probably six months ago or more, and what I believe we ended up doing is just, rather than putting a white paper out for the interpretation of radon breath data, we used an approved document, OTIB-0025.

MR. RICH: I might just say that the section in the technical basis document which is under much revision, there is a revised K-65 radium breath analysis in that section. Consider pulling that out as a white paper to make it; we have not done that yet. However, several other of the sections have been pulled out as white papers for interim use.

MR. GRIFFON: So has SC&A reviewed TIB-0025?

DR. BEHLING: I didn't review it. I don't know who within SC&A did. I probably would

have had a few questions about it, but we approved it, and I guess that's final.

DR. ZIEMER: Well, a comment here says an example dose reconstruction was provided, and I think we have that.

MR. ROLFES: Yes, that's correct.

DR. ZIEMER: This is internal three.

MR. GRIFFON: Also, we can't really review this TIB because it's in a technical basis document, and it's still not released.

MR. RICH: It's in a reasonably complete form at this time. It might be, we would need to talk about that whether we need to make a white paper out of that or not.

MR. CLAWSON: So what are we doing?

MR. GRIFFON: Yeah, what's --

MR. CLAWSON: Which way are we going?

MR. GRIFFON: Instead I think I'm going to rephrase that to say SC&A will review that example DR.

DR. BEHLING: I've already done that.

MR. GRIFFON: You've done that? Okay.

DR. BEHLING: There's not much to review.

MR. GRIFFON: SC&A has reviewed --

DR. BEHLING: If you apply OTIB-0025 and you

applied the radiation ^ of your neutron mix of silo two, you come up with a value, and there's not much --

MR. GRIFFON: So we don't have anything to do except if we get the section from the technical basis --

DR. BEHLING: My concern here was strictly one of when was this radon breath analysis done relative to the completion of the work in transferring this material because that's obviously the critical uncertainty parameter that has to be looked at in doing dose reconstruction.

MR. ROLFES: And I think we'll expand our discussion of that certainly within our white paper or in --

MR. RICH: The transfer of the 13,000 barrels or drums and the process of the Congo ore was done simultaneously. And so even though they were different places, the radon breath sampling was done early in that period.

MR. GRIFFON: So I'm just going to leave a NIOSH action at this point, further assessment of their lack of data after '54.

MR. CLAWSON: In this white paper you were

talking about, Paul, could we put in a possible white paper?

MR. ELLIOTT: I guess it depends on how close we are to producing an approved technical basis document.

MR. GRIFFON: Right.

MR. ELLIOTT: And if we're real close to that it makes more sense to me to put that on the table for you to look at than it does a white paper. As we're working on finalizing, then these things start passing in the night, and we don't know where we're at in our position.

MR. RICH: The only justification for a white paper is that it takes less review, less time. It's more readily available. However, the longer you go --

MR. ELLIOTT: A white paper gives the working group a sense of the direction that we think we're going, and are we okay in that direction in their view. So I think we're far enough down the way here on radon breath that we ought to be able to produce a technical basis document in an approved status I believe.

DR. BEHLING: Well, some issues you addressed regarding the absence of breath data for people who may have been there. And I'm looking through some of the data sheets, and that week's sample comes back, and it's lost and there's no data. Whether or not those people were re-sampled is another question I haven't figured out.

But there may be obviously people who were never monitored or were not monitored throughout this period. What will be done on their behalf to assess their exposure when the data simply isn't there, or you don't trust the data? Will there be a coworker model or a 50th percentile of all the data that you have available or something we said about what do you do when you don't have the data for a worker who you know was assigned to the K-65 operation?

MR. RICH: As we've indicated, there's some additional data also, general air sampling data, that's becoming available that can be used to validate that sampling, and also to extend that radon breath analysis period into the succeeding years, the post years. And

functionally, that's the way we're going to need to go if the air sampling data is there primarily because the character of the raffinates also changed and the characterization, the isotopic characterization --

DR. BEHLING: Yeah, I didn't want to get into that, but obviously the first few drums that were transferred, the profile and from the core sampling we have average values for each of the nuclides that essentially covered the full duration and full ^ of the silos; however, that's likely to change obviously. Early material that was transferred may have been different from latter periods --

MR. RICH: Except that even the Mallinckrodt raffinates were also pitchblende ores raffinates. So the character is consistent from Mallinckrodt to Fernald. And anything that went in the silos was from that source.

DR. MAKHIJANI: Well, silo one.

MR. RICH: Silo one and two.

DR. MAKHIJANI: Two is a little bit different than one.

MR. RICH: It's a little different, but the

^.

DR. BEHLING: Well, it may be a minor point that can't be resolved.

MR. ROLFES: Just one point, Mutty identified that we do have Radium-226 bioassay in some files for Fernald.

MR. CHEW: Nineteen fifty-seven period, right, Mutty?

MR. SHARFI: This particular claimant had actually urinalysis data for Radium-226 in their claimant file.

MR. GRIFFON: You can discuss that when you look beyond '54 if you have bioassay ^.

MR. RICH: As it turned out there's a variety of sources of information that we try to put together in the ^ analysis, and do the best you can.

MR. CHEW: I think the more difficult question is what Hans asked is what of the people that should have been monitored and wasn't monitored for those early periods?

MR. GRIFFON: Or how do you deal with how you monitored people were in that area?

MR. CHEW: How do you monitor people that were at that area?

DR. MAKHIJANI: I mean Hans raised this briefly, but what concerns me was an earlier point I raised in terms of whether there's anything to do which is the qualities of the overall, not the protocol of measuring radon breath, but the quality of the overall procedure that was actually carried out because a lot of samples were lost, and we don't know, and there isn't much data. So for some years, for two of the four years, there isn't much data. Two of four years there are about 50 percent of the ^ data for people identified. And for the third year there's much less than 50 percent.

MR. MORRIS: In '52 there were 84 valid samples, 140 samples were shipped. In '53 there were 238 samples shipped, and 183 of them came back with valid data. And in '54 231 samples shipped and 182 came back with valid data.

DR. MAKHIJANI: When I say 50 percent and less than 50 percent, I'm just telling you the weeks for which there are reported data, even in any reported date in the data sheet. There are weeks that have no, they were doing this

weekly, and there are a lot of sample data sheets that are simply not there. And the notations and some letters that are there in the files that are on the O drive indicate that they were having some problems in the transfer of these flasks and closing them properly, and some indication they didn't handle these things right to make sure that it's done properly and so on. A few.

MR. GRIFFON: This is why I was asking you to review the white paper, but I guess we've got to kind of wait and see if it comes out on a tech basis, and you know, more specifically.

DR. MAKHIJANI: Yeah, there is a question on the quality of the data as to whether what we read in the flask actually wound up in the lab.

DR. BEHLING: And these were all one minute samples assuming that they basically monitored the equivalent of 20 liters worth of exhaled air?

MR. RICH: This is an analytical procedure that's not used much any more. They were trying it out at that time.

MR. CLAWSON: Ad nauseum comment.

MR. GRIFFON: Ready for the next one.

MR. CLAWSON: Well, let's talk about something first. It's 4:35 right now. We've made through seven pages of the 22 pages that are here. My question is, is if we have one that we really need to be working on or so forth, my issue is we're not going to get through this paper today. I know that's a, that was a pipe dream to be able to do, but it also brings up a question of when we can get back together again to be able to continue on through this, be able to get all the issues out on the table and start being able to work on them. And I wanted to, because I know there's going to be a lot of discussion about it, is throw out a time that would best suit the people to be able to get together and be able to do this. I know Ray's got some stuff coming up and so forth, but I think it's very vital that we get, we're able to return back to this and make this through this paper.

DR. WADE: Well, the Procedures work -- to give you food for thought -- the Procedures work group will meet in Cincinnati on the 11th of December. There's lots of overlap between

the two groups. That's the next face-to-face meeting that I'm aware of of the work group, any element of the Board, I'm sorry. So it doesn't mean you have to be given by that, but it gives you a --

MR. GRIFFON: When is that again?

DR. WADE: The 11th of December, the Procedures work group. Now you might want to meet before then, that's fine. I'm just giving you a moment in time when, for example, Ziemer, Mark, who else at Procedures?

MR. CLAWSON: And I want to throw something else out, too. Possibly being able to schedule maybe two days for this. If we can't, it's not, because we've got a lot of issues in this, and we're plugging along, and we're doing really good, but we still have an awful lot to still be able to go over. If we can't do it, then that's the way it goes, but I'd like to be able to get through this matrix and be able to proceed forward.

DR. WADE: Can you wait 'til the middle of December or do you want to go earlier? You have to leave time for things to be done by the people --

MR. GRIFFON: Well, we haven't even gotten through the --

DR. BEHLING: We're not reviewing the stuff that we have action items. We're just trying to get through what we have today.

MR. GRIFFON: Yeah, right.

MR. CLAWSON: Well, my question --

DR. BEHLING: We can do it anytime soon. It doesn't matter. We're not waiting for anything.

MR. CLAWSON: So November --

DR. BEHLING: Schedule the day before Thanksgiving. We'll get it all done in one hour.

MR. CLAWSON: I'm afraid, you know, being out there with this rousing conversation, I can just picture when a lot of Health Physicists get together what they talk about because it was pretty good.

MR. GRIFFON: How about November 1st? This is probably impossible for people to schedule this this soon.

DR. WADE: Well, we have a mini-call of the Procedures work group on November 1st.

MR. PRESLEY: I can't be here. I've got

2:00 p.m. eastern standard time written down.

DR. WADE: And we have a Blockson call on the second.

MR. GRIFFON: Well then, we're into the next week I guess.

DR. WADE: So the next week is what, the fifth, sixth?

MR. GRIFFON: Seventh, we have a work group call for Procedures.

DR. WADE: The sixth is Election Day. The eighth, do you want to try a phone call?

MR. CLAWSON: I think until about the first time we get through this matrix I really think face-to-face would be the best.

DR. WADE: Do you want to try the eighth?

MR. CLAWSON: What's that?

MR. PRESLEY: I can't be here on the eighth.

DR. WADE: Twelfth?

MR. PRESLEY: That whole week I'm free.

DR. WADE: How about the 13th? I heard you say you possibly could --

DR. MAKHIJANI: I possibly could be on the 12th.

MS. HOWELL: The 12th is a federal holiday.

DR. WADE: The 12th is a federal holiday.

The 13th?

MR. GRIFFON: The 13th?

MR. CLAWSON: How about maybe the 13th and the 14th? Okay, let's try the 13th then.

MR. GRIFFON: I think the 13th. We can get through half a matrix in one day.

DR. WADE: So the 13th, do you want to start at nine? This hotel, if possible?

MR. CLAWSON: Good.

DR. WADE: It shall be so.

MR. GRIFFON: So does that mean we're adjourning for today?

DR. BEHLING: We can at least clean up 4.2-2 because that's Arjun's. I don't want to end, to run away from this thing.

DR. MAKHIJANI: Which page are we on?

DR. BEHLING: We're on page 46 and on the matrix --

MR. CLAWSON: Matrix it's page 7, 4.2.

We need to take a real short break.

(Whereupon, the working group took a break from 4:45 p.m. until 4:52 p.m.)

DR. WADE: We're back in session.

FINDING 4.2-2

MR. CLAWSON: We're going to proceed on in

the matrix with 4.2-2.

DR. MAKHIJANI: I think that's an item where that's the same as the earlier one where NIOSH provides the analysis, right?

MR. SHARFI: It relates back to 4.1-5.

MR. GRIFFON: Yeah, it's in draft form.

DR. MAKHIJANI: I think that was their response. White paper is in preparation. We didn't ask earlier if the white paper's prepared, do you want us to look at it or wait until the next meeting or --

MR. ELLIOTT: Again, it may not be a white paper. It may be a technical basis document.

MR. CLAWSON: Okay, so we could put under the comments on that that whichever, white paper, technical data --

MR. ELLIOTT: This is a different one?

MR. GRIFFON: It's not the radon breath issue.

DR. MAKHIJANI: RU.

MR. GRIFFON: It's the RU. Does the same thing apply? Is it rolled into that tech basis or is this a separate, because we've got white paper here again.

MR. RICH: The RU one is in preparation. It

should be finished shortly.

MR. GRIFFON: Okay, so that's a white paper. So that's different.

MR. MORRIS: Our newest interview transcripts have a lot of data on this topic.

MR. GRIFFON: Right, and it says and interview information.

MR. MORRIS: So we're referring back to 4.1-5.

MR. GRIFFON: I mean, we didn't ask should we add in there when made available, SC&A should review. I mean I think we want that to happen, so I think we need to state it. I'll put it under 4.1-5.

FINDING 4.2-3

DR. MAKHIJANI: The next one is yours, Hans.

DR. BEHLING: Yeah, the next one involves radon, and radon emanating from silos one and two. And the original TBD made some reference to the RAC 1995 study that estimated on average somewhere around five to six thousand curies per year that was being released. And that was based on some information that involved emanation through the walls because by that time there had been a dome cap put on

silos.

And I looked at the data, and I said, well, that's kind of a questionable model for using diurnal variations in atmospheric pressure that would then force the radon out in the head space, et cetera, et cetera. So I simply looked at the actual data from the core sample in silos one and two and looked at just the disequilibrium between Radium-226 and Polonium-210 and Lead-210.

And I realized, well, this is an obvious no brainer. If you have 477 nanocuries per gram of Radium-226, but you only have 202 nanograms (sic) per gram of Lead-210, there's obviously a discrepancy here that has to be accounted for by the loss of radon as the intermediate radionuclide.

And on that basis I calculated that you would probably lose not five or six thousand but 60 or even up to 90 depending on which radionuclide you would select in terms of the disequilibrium. And so that was the basis for my original finding that was identified as Finding 4.2-3.

In the meantime I guess you guys did

something else here. And this is a white paper I take it that was issued here. And I can conclude that your revised estimates, and it's really defined mostly for environmental onsite ambient exposure to radon. But I wonder also to what extent it might just apply to the K-65 workers themselves. Are we in a position to even apply some of that data to them?

I realize obviously it would come out from the top and perhaps not necessarily expose those workers who are in close proximity to the silos. That's a question you may want to look at at some other time. But anyway, your white paper, I assume it's white paper, a revised assessment, estimates, doses or quantities, radon releases for 1988 or '89. You have obviously very, very substantial increase in number of curies that were, certainly increased the number of curies released from the original RAC 1995 data about the 6,000 per year. So I'll let you respond to what was done here.

MR. ROLFES: The radon model that we are using now was based on research completed by

Susan Penny of the University of Cincinnati. That took into consideration in addition to the K-65 silos other potential source terms of radon. And those included some of those specific bins outside of the refinery, I believe, in which the Q-11 ore was contained. And I'd have to take a look back. It's been awhile since I've looked at it, and it is a large report. I believe much of this information --

Mel, am I correct in saying that?

MR. CHEW: Uh-huh.

MR. ROLFES: Much of this information was information that was used to revise the environmental technical basis document.

MR. CHEW: Correct, uh-huh.

MR. ROLFES: Could you give us, you know, we have updated our approach for environmental intakes and provided a draft copy to the Advisory Board for their review. This is not a final approved version, and we did want to provide this just to show that we have made progress in this area to basically demonstrate our progress on this issue. Once again, this hasn't been finalized, and we will be

finalizing it.

MR. CHEW: Based on what you just said about the, from your calculations the difference between the Radium-226 and the Lead-210, obviously looking at the emission data, we probably need to go back and look at that TBD and see if we can recalculate and address your question here.

DR. BEHLING: Yeah --

MR. CHEW: Because right now with the way we have it still in this draft form, was still the information from the RAC data.

MR. MORRIS: Isn’t it from the Penny data that we’ve got in the ^?

MR. CHEW: Yeah.

MR. MORRIS: I think the report right now reflects the Penny data.

DR. BEHLING: To me it would seem more logical to go to first principles that says what are we left with. What can we reasonably conclude? It may be conservative. Obviously, somebody had made a comment that you could potentially lose Radon-222 in the walls as it’s seeping through, but gas follows the path of least resistance.

And I would expect during the period of time when there was no dome cap, then the radon simply left through the top. And the discrepancy between the Radium-226 and its decayed daughter products would probably be a more rational approach to saying the difference is one of radon escaping into the environment. And that requires very little speculation and modeling or anything else.

It's a simple issue of defining the disequilibrium between the Radium-226 that you have empirical measurements for as well as empirical measurements for the Lead-210 and Polonium-210, and simply calculate it on the basis of disequilibrium and assess what the potential annual releases might have been.

MR. RICH: There was a period of time when the cap was more secure than it was initially which would, the radon would be contained more and then the decay, then the Lead-210 in the raffinate or in the solid could be less because of the radon in Lead-210--

DR. BEHLING: It's like radon in your house. People have always said if I could put a good coat of paint on my floor, I should be able to

99 percent of radon. No, that's not the way it works. A few cracks and that's all you've got left.

MR. RICH: And I know we built an underground whole body counter in Livermore and surrounded it with about eight feet of asbestos, low background fill. And the radon in low pressure times went right through it, but it doesn't take a lot to give you a lot of activity.

DR. BEHLING: But what I'm saying is the cap does not have to be an hermetically sealed cap in order to preclude its escape. If it's even moderately leaky, it's going to go out one way or the other whether or not the cap is there or it isn't. And so my gut feeling is --

MR. RICH: But there is a lot that decays in place when there's a barrier of any kind so when you say that the deficiency in Lead-210 is accounted for and everything escaping, there is some that decays in --

DR. BEHLING: Oh, there's no doubt. And I'm saying give the benefit of the doubt here and use a conservative assumption that the discrepancy is due to the escape. I realize

that. I realize that.

MR. RICH: But the principle's true. I admit that you don't expect to come within ten percent or so.

DR. BEHLING: And so I would just like to see, mine was, you know, while I'm sitting at my desk doing the back-of-the-envelope calculations saying what's disequilibrium, what should I expect to release on the basis of the two radionuclides and the difference between them. I think one was 60,000, and the other one was 90,000 curies on an annual basis as a rough estimate, you know, back-of-the-envelope calculation.

MR. CHEW: There's an upper theoretical bound.

MR. GRIFFON: So is there an action item?

MR. ELLIOTT: I think it's food for thought as you develop the new draft here.

MR. CHEW: Okay, we'll take a look in consideration of what your theoretical calculation you're showing. But we're focusing on the Penny data, right, Bob?

MR. MORRIS: That's my understanding.

DR. BEHLING: And that might be important

with regard to people who are onsite or near the boundary for environmental, obviously, her data, and I'm not going to dispute her, the credibility of her research.

RECAP OF ACTION ITEMS

MR. CLAWSON: Well, we went ten minutes over, but before we leave, Mark, if we could, we need to have a review of what action items we do have.

MR. GRIFFON: Going back to the first finding, it comes under Finding 4.1-1. I have a follow-up action. Here it is right now. SC&A to review sample case along with default of p^ (paren) one percent prior to 1964 and two percent after '64 (closed paren). NIOSH to provide documentation to support the statement that most of the enriched material was very slightly enriched (paren) slightly greater then 0.71 percent U-235 (closed paren).

I think there's more on that page. And one more follow-up action on that same finding. NIOSH will provide -- this is the one we discussed right after lunch. NIOSH will provide a response outlining their

approach for evaluating internal dose in cases where uranium exposure may have caused sufficient renal damage to affect the biokinetic model.

And moving on to the next Finding 4.1-2, SC&A to develop a protocol for validation of HIS-20 urine data (paren) against the raw records (closed paren). And we stopped at developing the protocol because a lot of the urine records aren't up there yet.

DR. MAKHIJANI: And by raw records you would include the cards that we were talking about?

MR. GRIFFON: Yeah, these -- I forget the exact name, but the, what are they called? Not urine cards, there's some other term. Anyway --

DR. MAKHIJANI: Bryce mentioned it.

MR. RICH: No, I think Mark did.

MR. GRIFFON: Oh, urine request cards I think they were called.

Also, I think, I didn't write this one down, but NIOSH will post additional urine request cards --

MR. ROLFES: As they become available.

MR. GRIFFON: -- as available.

DR. MAKHIJANI: ^.

MR. CLAWSON: What?

DR. MAKHIJANI: ^ 50, 60 because that's how we're going to proceed with them.

MR. ROLFES: Yeah, correct.

MR. CHEW: Didn't we discuss about putting an upper bound on the number to look at them, looking at part of the ^, a few hundred or something like that?

MR. GRIFFON: Well, I think we, as far as how many to sample, I mean, we said certainly not 100 percent, but as long as you have a representative number of logs. We're leaving that up to you to define.

DR. MAKHIJANI: And I will talk to Harry to see if he can develop it in the abstract or whether he needs --

MR. GRIFFON: Right.

Then I have SC&A to review DR number internal 14.

DR. MAKHIJANI: Isn't that the same as in item one? I think, Mark, that's the same one.

DR. BEHLING: This is the dual thorium and uranium bioassay.

MR. GRIFFON: You know, the reason I put

that in there was because we decided instead of in progress, I'll just reference back to 4.1-1 because number four, NIOSH's response said in progress, when actually we decided we're not going to do any additional cases. We're also going to review that one that's already provided. I'm just going to put, see 4.1-1.

4.1-3, I have just NIOSH will do additional follow up on this investigation report that's related to those cases.

4.1-5, SC&A will review the white paper -- and I think it is a white paper in this case -- and supporting interview information when available. And the second part of that for 4.1-5, NIOSH has additional raffinate air sampling data that is being put into a spreadsheet format and will be provided to the work group when completed. Stop me if I did something incorrect there.

4.2-1, I did some editing of the NIOSH responses, but I don't have to go through those. Just that it wasn't really a white paper but a section of the internal TKBS, et cetera. The only action for 4.2-1 is that

NIOSH will further assess the apparent lack of radon breath data after ’54. And I left that kind of open-ended. You can include the urinalysis data or whatever.

4.2-3, the last --

DR. MAKHIJANI: Mark, is there something on the question of the quality of the ’52-to-’54 data that you want? Do you want to punt on that and address it later or not an issue?

MR. GRIFFON: Well, I have this, since we don’t have the write up, I don’t have anything for you to review. I originally had it in there, but I took it out because we don’t have that white paper. It’s part of the overall tech basis document, right? It’s not a separate paper.

DR. MAKHIJANI: Okay.

MR. GRIFFON: That’s what I’m understanding.

MR. MORRIS: Don’t you mean a TIB? I don’t think it’s a --

MR. GRIFFON: Oh, I thought it was a site profile basis.

MR. SHARFI: It is a site profile.

MR. GRIFFON: OTIB-0025, yeah.

DR. MAKHIJANI: So that will be out sooner

than this. That will presumably address this issue?

MR. GRIFFON: Hopefully, if I'm understanding Bryce correctly, you're going to either release the entire site profile section or, if not, maybe pull that part out and provide it to us, right?

MR. RICH: Yeah.

MR. GRIFFON: You guys can --

MR. RICH: We need to talk about it.

MR. GRIFFON: So right now, Arjun, you know.

DR. MAKHIJANI: We'll hold off on that.

MR. GRIFFON: 4.2-3, NIOSH will consider SC&A comments in updating the draft. That's all I have for that, and that's regarding the disequilibrium calculations.

And that's it. That's all I have. Anybody have –

MR. ROLFES: Thank you, everyone.

MR. PRESLEY: Thank you, Mark.

MR. CLAWSON: We appreciate it.

DR. ZIEMER: Move adjournment.

MR. CLAWSON: Move we adjourn, moved and seconded. Let's go.

(Whereupon, the work group meeting adjourned

1 at 5:15 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 October 24, 2007; 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 3rd day of May, 2008.

_____

STEVEN RAY GREEN, CCR, CVR-CM, PNSC

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