

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

convenes the

WORKING GROUP MEETING

ADVISORY BOARD ON
RADIATION AND WORKER HEALTH

DAY TWO

The verbatim transcript of the Meeting of the
Advisory Board on Radiation and Worker Health held
at the NIOSH, Cincinnati, Ohio, on June 1, 2005.

C O N T E N T S

June 1, 2005

TASK 1: MALLINCKRODT SITE PROFILE REVIEW
MARK GRIFFON
NIOSH/ORAU
SC&A, ARJUN MAKHIJANI

TRANSCRIPT LEGEND

The following transcript contains quoted material. Such material is reproduced as read or spoken.

In the following transcript: a dash (--) indicates an unintentional or purposeful interruption of a sentence. An ellipsis (. . .) indicates halting speech or an unfinished sentence in dialogue or omission(s) of word(s) when reading written material.

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

-- (phonetically) indicates a phonetic spelling of the word if no confirmation of the correct spelling is available.

-- "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.

In the following transcript (off microphone) refers to microphone malfunction or speaker's neglect to depress "on" button.

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

ABRWH MEMBERS:

CHAIR

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

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

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

OTHER ATTENDEES:

MR. DAVID ALLEN, NIOSH
DR. HANS BEHLING, SC&A
MS. KATHY BEHLING, SC&A
MS. CINDY BLOOM, ORAU
MS. NANCY JOHNSON, SC&A
DR. ARJUN MAKHIJANI, SC&A
DR. JIM NETON, NIOSH

STAFF/VENDORS

STEVEN RAY GREEN, Certified Merit Court Reporter

P R O C E E D I N G S

(11:15 a.m.)

1
2
3 **DR. NETON:** Okay. We're ready to start I think,
4 the recorded session on Mallinckrodt on -- on --
5 the session on Mallinckrodt with SC&A related to
6 the site profile. Ray, you've got the list of --
7 of who are in attendance, so we can -- we can
8 just get started. I don't know how we want to
9 proceed. I think Arjun has some questions that
10 he's -- he's come to the table with and we're --
11 if anyone has no objections, I guess we can start
12 --

13 **DR. ZIEMER:** Could I -- could I just ask
14 procedurally, we have the SC&A document that has
15 the -- the summary table arguments. Was it your
16 intent to go through those item by item, or is --
17 are there other issues that --

18 **MR. GRIFFON:** He e-mailed them, correct?

19 **DR. NETON:** Right. There -- there was a -- a --

20 **DR. MAKHIJANI:** Yeah, Dr. Ziemer, yeah, there
21 were -- I'd tried to sharpen some of that list to
22 start the discussion by sending a set of
23 questions, which you have, I believe --

24 **DR. ZIEMER:** Which I may not have brought.

25 **DR. MAKHIJANI:** -- and just so we could have

1 questions that were more specific than what you
2 asked us to do. And then I intend to go back to
3 the reviews and see whether -- there's some
4 duplication between what's in the review and the
5 questions. And then what I intended to do was go
6 back to the review and make sure that I've
7 covered what I need to cover, because not
8 everything is in these questions.

9 **DR. ZIEMER:** Right.

10 **DR. ROESSLER:** I don't have the questions,
11 either. Would it be possible to get copies for me
12 and Paul?

13 **DR. NETON:** Yeah. Would you go ask Helen -- or
14 do you have the e-mail of the questions?

15 **MR. ALLEN:** I don't think so --

16 **DR. ROESSLER:** You sent that to us.

17 **MR. ALLEN:** The recent one, that one?

18 **DR. NETON:** Yeah, yeah.

19 **DR. ZIEMER:** Was this a recent e-mail, or the
20 original --

21 **DR. NETON:** May 20th.

22 **DR. ZIEMER:** -- early -- what was the date?

23 **DR. NETON:** May 20th was the date of this letter.

24 **MR. ALLEN:** The date on the letter is the 20th.

25 **DR. ZIEMER:** Okay.

1 **DR. ROESSLER:** (unintelligible)

2 **DR. NETON:** Could you get just that letter with
3 the questions? Dave's gone out -- going to get
4 it. It's short. There are two pages of
5 questions.

6 **DR. MAKHIJANI:** Could I just read the question
7 maybe and get started that way?

8 **DR. ZIEMER:** Go ahead, go ahead and --

9 **MR. GRIFFON:** Yeah.

10 **DR. ZIEMER:** -- start. He'll -- he'll bring you
11 --

12 **DR. MAKHIJANI:** The -- the first set of questions
13 was just about can we see these types of claims,
14 and we've done -- we've done most of that, I
15 think, so we can -- maybe we can just go to the
16 substantive portion.

17 **DR. NETON:** Sure. Yeah, I think that's fine.
18 Yeah, again, the history behind this meeting was
19 that Arjun wanted to have this this week and we
20 were not as fully prepared as we -- we could have
21 been, but we decided to move forward just to get
22 the issues on the table, and we're not completely
23 prepared to answer all of the questions today.

24 **DR. MAKHIJANI:** And I really appreciate Jim
25 accommodating us, because I couldn't be here next

1 week and I thought the week after that will be
2 just too difficult to meet the meeting schedule
3 and write it up and produce drafts and have them
4 reviewed and everything. So I really appreciate
5 -- and I told Jim that if there's some clean-up
6 follow-up I'm ready to come back, but just so I
7 can get the process of drafting things started.

8 **DR. NETON:** Right.

9 **DR. MAKHIJANI:** So the first question is --
10 relates to the integrity of the data question
11 that has come up numerous times. Is there a
12 possibility that urinalysis values were adjusted
13 downward after the discovery of contaminated
14 blanks. I think Mark --

15 **DR. NETON:** Mark --

16 **DR. MAKHIJANI:** -- also has raised this question
17 at the last Board meeting.

18 **MR. GRIFFON:** Right.

19 **DR. NETON:** Right. And Mark asked for --

20 **MR. GRIFFON:** No, you sent one --

21 **DR. NETON:** -- copy of the reference that was
22 listed as an undated reference in the
23 Mallinckrodt profile, and actually it turns out
24 it's a dated reference that's in there that
25 refers to the issue. I don't know how to address

1 it other than there is just this one instance. I
2 asked Janet Westbrook if there were any other
3 indications of adjusting data downward and she
4 said she's not aware of any such -- such
5 practice. Now the way I read this -- this note -
6 -

7 **MR. GRIFFON:** Yeah.

8 **DR. NETON:** -- is thank you for your note of
9 January 19th. This is -- the subject is
10 urinalysis procedure for Plant 6. It says
11 (reading) The problem you raise is not a new one.
12 It goes by the name of contamination. Any and
13 all measurements material used in the plant can
14 be performed in the plant area only if the
15 laboratory performing these analyses remain
16 uncontaminated.

17 I think the issue here is that AEC operations was
18 assuming that the -- the analyses were being done
19 at Barnes Hospital, when in fact they were being
20 done I believe at Mallinckrodt at the time.
21 That's the -- my take on this. The general
22 experience is that the whole problem becomes
23 simpler if these measurements can be made at some
24 distance from the plant. Well, I -- I looked at
25 some of the original data cards following this in

1 -- in the -- in the captured data and it does not
2 appear that these values were subtracted from the
3 original data. What I haven't had the chance to
4 go back and look at was to see how those values
5 poured over to the data we have in the database.
6 I haven't made that last -- you know, my -- my
7 thought was let's look at some of the data where
8 they allege that the blanks were high, go back
9 and look what was actually recorded in the data
10 for the worker. I haven't -- I haven't matched
11 those yet, but I think we could do that. So, you
12 know...

13 **MR. GRIFFON:** And -- and I guess I would have --
14 I mean where I started this question was in the
15 test, actually.

16 **DR. NETON:** Right, right.

17 **MR. GRIFFON:** And I probably would have never
18 even ventured down this path too much if it
19 wasn't for, you know, the -- the language
20 suggesting that -- that -- that a lot of this
21 data may not be very reliable. I think I'm
22 looking for the words -- use caution when
23 applying these samples.

24 **DR. NETON:** What page?

25 **MR. GRIFFON:** I'm on page 76, 77 in Rev. 1 of the

1 site profile.

2 **DR. NETON:** Right.

3 **MR. GRIFFON:** Yeah, it's actually on the top of
4 page 78 where -- where the -- that paragraph is.
5 It sort of raised a flag with me, you know,
6 because of the questions regarding the validity
7 of samples, the apparent variations in the sample
8 analysis methods, and even who was doing the
9 analysis. The Mallinckrodt urinalysis data
10 should be used with caution and -- and especially
11 -- I think it says at least when the data were
12 taken by Barnes prior to '51. But from the prior
13 pages, she raised some concerns about '51 to '55
14 also I think, maybe not as --

15 **DR. MAKHIJANI:** Four.

16 **MR. GRIFFON:** To '54 was it? Okay.

17 **DR. MAKHIJANI:** I believe '54.

18 **MR. GRIFFON:** But, you know, I -- I guess to me
19 that said well, okay, how do I -- how do I use it
20 with caution? What -- what exactly --

21 **DR. NETON:** Well --

22 **MR. GRIFFON:** -- does that mean --

23 **DR. NETON:** Yeah.

24 **MR. GRIFFON:** -- and how -- is this data reliable
25 at all?

1 **DR. NETON:** Right. Which -- I've spoken to Janet
2 about this and the idea was that the data would
3 be biased high, if anything. If they were
4 contaminated blanks, they were done in -- in --
5 some at the plant where I know from working at
6 Fernald in the early days before I got there, if
7 they did the -- the analysis with the windows
8 open you got a much higher number than if the
9 windows were closed. And in fact, I think if you
10 look some of the data that follows this, here's a
11 -- here's a chart that shows the quality control
12 samples they ran, and they have the room air
13 bottle open reading .14 millirems uranium per
14 liter, and then a bottle closed reading .07. The
15 inference here is that the air actually
16 concentrations were affecting the blanks. And
17 the table I have here that's -- that's in -- it's
18 in the book -- it's in the data capture effort.
19 It says (reading) Each sample contains sufficient
20 uranium to ensure a reliable analysis. Since
21 significant quantities of uranium were found in
22 the closed blank sample bottle as well as the
23 open bottle, it seems reasonable to assume that
24 these four bottles at least were contaminated.
25 There's two open blanks and two closed blanks.

1 Sample 9 blank is obviously grossly contaminated.
2 The possibility must also exist that the urine
3 samples are similarly contaminated.

4 So they did have a contamination control problem
5 in the laboratory, but I've seen no indication
6 where they said let's subtract those to get the
7 real result. Now again, I could take -- I have a
8 number of a person here and the date of urine --
9 my intent, I haven't done this yet --

10 **DR. ZIEMER:** Crosswalk it --

11 **DR. NETON:** -- to crosswalk that over to see --

12 **DR. ZIEMER:** Yeah.

13 **DR. NETON:** -- that that value actually appears
14 in the bioassay records which, in my mind, would
15 give us some comfort that they weren't
16 subtracting contaminated blanks.

17 **DR. ZIEMER:** But the practice would -- if you ask
18 how -- what people do in practice, don't they
19 actually do the subtraction?

20 **DR. NETON:** No. No, these are method-drawn*
21 blanks. I think --

22 **DR. ZIEMER:** Oh, they are?

23 **DR. NETON:** When you run blanks through your
24 process, it's -- it's a method blank, you know,
25 with a full bottle running through and it -- it's

1 normal quality control. It's just to see do you
2 have a problem with your samples at all.

3 **MR. GRIFFON:** It's not an environmental blank
4 that you would --

5 **DR. NETON:** Right. It's not -- it's not like a
6 (unintelligible) background blank, you know, that
7 you'd subtract the signal.

8 **MR. GRIFFON:** Right.

9 **DR. NETON:** It's just a method blank that you'd
10 run through and in fact it's a good quality
11 control practice I think, to do that. So I need
12 to run this -- we need to run this --

13 **MR. GRIFFON:** I guess -- I guess the, you know,
14 the -- the larger question here is, you know, I
15 can -- I can take that explanation for this one
16 given circumstance, but the question is, where
17 everything over that time period is so vague, you
18 don't know what labs even did the data, you have
19 these questions of contamination. We -- we
20 weren't -- they might have handled it this way
21 and they might be biased high. At least for this
22 circumstance, they seem to be.

23 **DR. NETON:** Right.

24 **MR. GRIFFON:** But to me it also raises the
25 question of well, what -- what kind of

1 reliability on that whole dataset do we have. I
2 mean is it useful data? Is it always a way --
3 just from this one memo, you would say let's
4 assume it's all -- if it's biased at all, it's
5 biased high. I mean I don't know that six months
6 from then they didn't run some spikes and they
7 were all low, you know. I -- I just -- you're
8 hanging a lot on this one memo, in my opinion.

9 **DR. NETON:** Well, this is the only indication
10 that we have and -- according to Janet Westbrook,
11 at least -- there were these contamination
12 issues. I mean we don't have anything else to
13 indicate that there were problems. Now we can
14 speculate all we want that the laboratory had
15 poor practices, but we have no evidence that
16 indicates that. In fact, these are pretty
17 standard fluorometric methods which I believe
18 after '49 was -- you know, you even had the
19 health physics program in place and you've got
20 the AEC HASL laboratory involved in mentoring
21 these folks and -- yeah, I don't know. I --

22 **MR. GRIFFON:** Yeah. Well, you have no evidence,
23 but on the other hand you don't have the original
24 records --

25 **DR. NETON:** I'm not sure that --

1 **MR. GRIFFON:** -- from the labs.

2 **DR. NETON:** -- we don't, actually.

3 **MR. GRIFFON:** Or you might.

4 **DR. NETON:** I don't. I don't know that but, you
5 know, short of looking at every single analysis,
6 though, and the calibration records, I'm not sure
7 how you would give -- you know, what comfort
8 level would you need, though, I guess to validate
9 the -- the entire program. I don't know.

10 **DR. MAKHIJANI:** Well, Jim, one -- one way to
11 think about comfort level is, is there any paper
12 trail regarding the quality control of urinalyses
13 that were actually done? Was there like a split
14 sample occasionally that was sent to HASL and
15 they verified it? Because if you had something
16 like that, then you could say well, okay, HASL at
17 some point actually looked over their
18 measurements and said yeah, good -- or bad, or
19 something.

20 **MR. GRIFFON:** Uh-huh.

21 **DR. MAKHIJANI:** But I haven't actually seen --

22 **MR. GRIFFON:** Right.

23 **DR. MAKHIJANI:** -- any reference to a record like
24 that.

25 **DR. NETON:** Okay.

1 **MR. GRIFFON:** And I don't know if they exist, but
2 that -- that's -- I guess that's kind of what I
3 was looking for, just some sort of...

4 **DR. NETON:** I don't know that we have any
5 evidence of -- well, there must be procedures out
6 there somewhere that I don't know -- but, you
7 know, I have not looked through this entire data
8 sample so...

9 **DR. MAKHIJANI:** Yeah, because like at Bethlehem
10 Steel, you know, when we raised questions about
11 air concentration data, you had, you know,
12 somebody from the time come and give us some
13 evidence about what was done then and, you know,
14 at least some -- the intensity of the questions
15 got diminished when there was some level of
16 comfort that somebody was doing what they were
17 talking about --

18 **MR. GRIFFON:** I mean I am --

19 **DR. MAKHIJANI:** -- and tell us something
20 (unintelligible).

21 **MR. GRIFFON:** I'll turn that off because you
22 can't hear.

23 **THE COURT REPORTER:** It's like a big -- it's
24 like the ocean. If y'all aren't using it.
25 You're not using it at all?

1 **MR. GRIFFON:** It doesn't feel like you're at the
2 beach.

3 **UNIDENTIFIED:** It's also hot.

4 **THE COURT REPORTER:** Thank you.

5 **DR. NETON:** It'll take a few minutes to go off.

6 **THE COURT REPORTER:** Thank you.

7 **DR. NETON:** Well, we obviously can't point to any
8 right now, but it -- you raise a point that we're
9 going to have to go back and see what we can find
10 in that area.

11 **MR. GRIFFON:** But I -- I think part of it is -- I
12 just lost my train of thought. The -- you know,
13 the -- the site profile, the -- that summary
14 statement there sort of points to the fact that -
15 - you know, when you read that -- I mean because
16 of questions regarding the validity of the
17 samples, the apparent variations in the sample
18 analysis methods and even who was doing the
19 analysis, it doesn't give me, as a member of the
20 public, very much confidence that they know what
21 the -- how good or bad this data was. I mean
22 that's -- that's -- you know, she goes on --

23 **DR. NETON:** Yeah.

24 **MS. BLOOM:** I hate to put words in Janet's mouth,
25 but knowing Janet, the way she wrote that is she

1 wants these to be scientifically defensible --

2 **MR. GRIFFON:** Yeah.

3 **MS. BLOOM:** -- site profiles, and her thought was
4 not that everybody was going to think she meant
5 that the results were low and that you should be
6 careful not to account for enough dose. You
7 should be aware that these are going to be high
8 numbers and so beware -- you know, these are
9 probably overestimates.

10 **DR. NETON:** I think it even states that
11 somewhere.

12 **MR. GRIFFON:** Yeah, it does. It says however --

13 **MS. BLOOM:** I think early on.

14 **MR. GRIFFON:** -- it appears that errors, if any,
15 are -- are in the conservative high direction.

16 **DR. NETON:** Right, right.

17 **MR. GRIFFON:** And that they're claimant-
18 favorable, but -- and that's -- you know, for me
19 that's the red flag to ask you guys what's your
20 basis for that final statement? How do, you know
21 -- and then when I come back with one memo
22 defending it --

23 **DR. NETON:** Right.

24 **MR. GRIFFON:** -- I'm like, you know, isn't there
25 a little bit more to say, you know, we -- we

1 checked this out. And I'm not saying -- like I
2 said, a hundred percent checks but, you know,
3 didn't -- did HASL -- like Arjun suggested, did
4 HASL do some sort of summary report looking at
5 that -- that issue for that time period or -- and
6 I don't know if it exists, but that's all I was
7 asking with that.

8 **DR. NETON:** Right.

9 **DR. MAKHIJANI:** (Unintelligible)

10 **UNIDENTIFIED:** Sure.

11 **DR. MAKHIJANI:** The next question, I think it's
12 related, are there documents beyond the
13 discussion of contaminated blanks in the TBD that
14 would allow some conclusion that bioassay data
15 were consistently biased high in the 1949 to '54
16 period, so we've covered that.

17 **DR. NETON:** I think we covered that.

18 **DR. MAKHIJANI:** Then Mallinckrodt urinalysis only
19 measured uranium. Does this mean that air
20 concentration and job data are the only input for
21 dose estimation in area where -- areas where
22 uranium isotopes were not the main radionuclides.
23 So it is a question of how -- how and when are
24 you factoring in the non-equilibrium radium,
25 thorium, protactinium radionuclides. What --

1 what are the criteria for that?

2 **DR. NETON:** Well, it's true that if you don't
3 have -- if -- if it's a non-equilibrium, I think
4 a uranium urine sample is not going to be useful
5 for -- for bracketing the dose. So you would
6 need to rely on air sample data.

7 **MS. BLOOM:** Air sample and source term data.

8 **DR. NETON:** And source term, what was there. And
9 so yes, it would be air sample data. And how we
10 would go about doing that, I think the profile is
11 not as prescriptive as it needs to be. I think,
12 Cindy, you mentioned that you think this is
13 related -- it's related to job title, you know,
14 where for some work during the time period, which
15 plant and what job title they had, whether or not
16 they were a raffinate worker or maybe worked with
17 the Sperry cake --

18 **MS. BLOOM:** Uh-huh.

19 **DR. NETON:** -- that sort of thing.

20 **MR. GRIFFON:** And do -- do we -- I mean I guess -
21 - I guess it references what Jim had sent for the
22 last meeting, I just didn't have a chance at that
23 meeting really to -- to understand them. But it
24 -- it -- to me, again, that -- that is the extent
25 of the knowledge on the various concentrations,

1 and are those -- I -- I'm not even familiar with
2 these references myself, I got to be honest. I
3 didn't have a chance to pull all those documents.
4 But do those involve like the -- the worst case
5 raffinate concentrations, the average raffinate
6 concentrations? How are those numbers compiled
7 for the various applicable operations? And
8 again, what -- are -- are these Plant 6, Plant 7,
9 I'm not -- you guys know Mallinckrodt much better
10 than I do so...

11 **DR. NETON:** I don't know. Maybe, you know, Janet
12 is available on the phone to talk.

13 (Unintelligible)

14 **MS. BLOOM:** About two hours in the afternoon
15 she'll be available --

16 **DR. NETON:** I wonder if she's available.

17 **MS. BLOOM:** -- and we might be able to reach --

18 **DR. NETON:** -- we have some questions that really
19 -- Janet, of course, couldn't make it here --

20 **MR. GRIFFON:** Yeah. No, that's --

21 **DR. NETON:** -- because of conflicts but --

22 **MS. BLOOM:** Uh-huh.

23 **DR. MAKHIJANI:** There are lots of follow-up
24 questions, because they came out, you know, off
25 and running as to -- since what's missing in a

1 way -- well, one of the things that's missing in
2 the -- in -- in the TBD is a -- is a clear idea,
3 and it's not faulting the TBD. As I told you
4 sort of informally, I think the TBD is actually a
5 very good historical document.

6 **MR. GRIFFON:** Yeah.

7 **DR. MAKHIJANI:** And -- but what's missing is a
8 kind of time line. This is the period when the
9 SLAPS waste were being brought back for
10 reprocessing, so you apply -- and it was here and
11 this is what -- just like we have that for the
12 thorium refining. We have a very discrete period
13 from '55 and --

14 **MR. GRIFFON:** Or it might be this --

15 **DR. MAKHIJANI:** -- '56, but we don't have that
16 for the other residues.

17 **MR. GRIFFON:** Or it might be this -- this -- like
18 Jim said, maybe some sort of dose reconstructors
19 user guide that interfaces -- but, you know --
20 and maybe the -- the -- I mean sometimes in some
21 sites, I think those workbooks end up doing that,
22 but they're sort of the user's guide that tells
23 you about certain time periods what --

24 **MS. BLOOM:** Takes it to the next step.

25 **MR. GRIFFON:** Right.

1 **MS. BLOOM:** And I think at some point we do want
2 to go back and do that with Mallinckrodt and some
3 of these other documents. They're very big and
4 we've got a very ambitious schedule for other
5 site profiles. But what we're trying to do is
6 take those generic assumptions for claims where
7 we don't have data and say okay, this is what we
8 know about when people worked. You know, if it
9 says they started in '59, we're going to assume
10 that means January 1st, 1959 because we don't
11 have any better information. We have this
12 information that they were using this raffinate
13 waste here. There's no start and end date, so
14 does it make sense to -- to expand it to the
15 whole period, or can we bound it somehow. And we
16 have been trying to do that and we'll continue to
17 try to do that. This -- we're having a hard time
18 being able to move backwards so we can move --
19 because we're having to move forward at the same
20 time.

21 **MR. GRIFFON:** Right. I guess -- I guess what I'm
22 -- you know, what I'm understanding from Jim on
23 this -- on the raffinate/Sperry cake question is
24 that, you know, you can't rely on the urinalysis
25 data so you're going to rely on air and source

1 term information. Then the question -- you know,
2 I have two questions on that. Number one, how
3 well can we define average or max air source term
4 information. And number two -- and I think this
5 is a critical one -- can we place these potential
6 claimants into the various environments or -- or
7 -- or are there maximizing situations you would
8 use instead where you don't know where they
9 worked. You sort of use a maximizing case.

10 **DR. NETON:** I think that's -- that's the case. I
11 mean that's the easier to answer is -- is if we
12 have representative data for those periods and if
13 you don't know where they worked, we're going to
14 default assume that they were -- they were
15 working in those areas I think. You know, that's
16 sort of the standard way we do business with our
17 dose reconstructions. As to whether or -- you
18 know, we have air data for many areas of the
19 plant that are in the TBD and if one -- You got
20 it?

21 **UNIDENTIFIED:** Yeah.

22 **DR. NETON:** Great. So if -- if you assume that
23 all of the air concentration was related, and I
24 wouldn't want to go to this extreme, but one of
25 the extremes would be, for instance, to possibly

1 assume that it were all actinium 227, which is
2 probably one of the --

3 **MR. GRIFFON:** Or whatever gives you the highest -
4 -

5 **DR. NETON:** -- highest, the highest dose per unit
6 intake. And Cindy, you and I discussed this, it
7 may be actually organ specific --

8 **MR. GRIFFON:** Right.

9 **DR. NETON:** -- (unintelligible) model this.

10 **MR. GRIFFON:** Yeah.

11 **DR. NETON:** But if you do have air concentration
12 data you can hang your hat on, then it is not
13 that hard a stretch to come up with some -- some
14 dose from a disequilibrium situation using
15 maximizing radionuclides.

16 **MR. GRIFFON:** I guess the --

17 **DR. NETON:** (Unintelligible) representative of
18 the data.

19 **MR. GRIFFON:** Excuse me. Then the other question
20 I guess you get into is the maximum plausible --
21 that's not a site profile discussion, but in my
22 mind we're grappling with that, too.

23 **DR. NETON:** Well, I think -- I think it's a
24 little different when -- when you have actual
25 monitoring data versus when you source term. The

1 source term is where you get on the edge a bit of
2 these plausible scenarios, much like happened in
3 Iowa where people thought that the doses were not
4 plausible. And -- and then you get in the
5 situation of discomfort. If you have an air
6 sample date itself, I think that at least becomes
7 closer -- more closely tied to the work
8 situation. This amount of alpha activity was in
9 the air at this time and, you know, whether the
10 worker was there or not, you know, we could
11 debate. But, you know, we would default to that.
12 So I -- I think plausible, when it's tied to air
13 data -- plant monitoring data I think is -- it's
14 probably not that big a stretch.

15 Now if we were to take source term and say there
16 was no air data and we -- we would model some
17 mechanical process where they would agitate this
18 and throw it into the air, then you start pushing
19 the bounds of plausibility because to -- to
20 document the dose could be no higher than X,
21 you're going to have to throw in some pretty
22 generous assumptions whenever you enter the sort
23 of shakier calculations.

24 **MR. GRIFFON:** But -- but when you -- when you
25 deal with this raffinate question, you are really

1 getting into -- into source term questions, too.
2 I mean you have air data --

3 **DR. NETON:** You have air data, you have bounding
4 air data that --

5 **MR. GRIFFON:** -- that's how (unintelligible) did
6 it, yeah.

7 **DR. NETON:** -- can say, you know, ten to the
8 seventh, whatever, picocurie per year intake or
9 something to that effect.

10 **MR. GRIFFON:** But you have to make some --

11 **DR. NETON:** And you're going to have to make some
12 -- some assumptions, although the original
13 question you had was how well -- we have the
14 characterization data, and I'll be honest, I
15 don't know them like Janet does. But given that
16 we have characterization data of the Sperry cake
17 and some of the other raffinate streams, I think
18 that would allow us to do some sort of bounding
19 estimates based on even the air sample and using
20 those ratios and applying it to the air.

21 The other unknown factor here that I had not
22 really intended that we would rely on
23 necessarily, is these radon breath measurements.

24 **MS. BLOOM:** Uh-huh.

25 **DR. NETON:** A lot of people don't necessarily

1 have a lot of confidence in those things, but
2 they do, again, allow for some bounding values
3 (a) if a worker has a radon breath measurement --
4 I think there's about 2400 of them over the
5 course of time that we're talking about here. If
6 you have a radon breath measurement, then, in my
7 mind, at least there was a potential for exposure
8 to the ore. I mean you weren't working only
9 after the -- after the daughters had been
10 extracted. And then if -- if the data are
11 reliable then, you know, one can infer what the
12 radium body burden maximum would have been, given
13 the exhalation of radon. That, again, has some
14 limitations, but one could -- let's say for
15 example one did some bounding and now just came
16 up with this huge intake and then you look at the
17 radon breath data and say well, that -- you know,
18 much like you do with whole body count, you could
19 say well, the worst case assumption is this, but
20 the whole body count indicates that it had to be
21 much lower than that, so you can (unintelligible)
22 bracket. That's not addressed in the -- in the
23 profile.

24 **MR. GRIFFON:** I was going to say, is that
25 documented how you -- how you --

1 **DR. NETON:** There is a procedure --

2 **MR. GRIFFON:** -- use the radon breath to -- to --

3 **DR. NETON:** Yeah, uh-huh. There's a procedure
4 that was just -- I just signed a week or two ago,
5 I think.

6 **MR. ALLEN:** TIB.

7 **DR. NETON:** It's a TIB, not a procedure, and it's
8 based on, you know, the Argonne experience.
9 They've done a lot of radium -- radium dial
10 painters.

11 **MS. BLOOM:** (Unintelligible)

12 **DR. NETON:** Yeah. (Unintelligible) and then went
13 to Argonne later on. I think they used like a 60
14 percent emanation fraction and there are
15 differences whether you take that measurement
16 shortly after you ate or not. And of course if
17 you haven't been off work, you know, then you're
18 -- you're really just ventilating radon that's
19 naturally dissolved in the body fluids. There
20 are -- there are some uncertainties in that
21 sense.

22 **DR. BEHLING:** Can you give me just a ballpark
23 number what a picocurie per liter of exhaled air
24 would correspond to in terms of body burden of
25 radium?

1 **DR. NETON:** Yeah. It's pretty high. The
2 detection limit is pretty high. I think it's
3 somewhere around 250 nanocuries, maybe.

4 **DR. BEHLING:** Per picocurie of liter?

5 **DR. NETON:** But the sensitivity of this technique
6 goes down well below that I believe, so I think
7 it's in the -- it's in the TIB somewhere.

8 **MR. GRIFFON:** You don't know the TIB number?
9 It's coming out soon or --

10 **DR. NETON:** No, it's out. It's out --

11 **MR. GRIFFON:** I can look it up.

12 **DR. NETON:** -- it's issued -- 30-something. I
13 don't know, 20-something?

14 **MS. BLOOM:** 24 or 25.

15 **MR. ALLEN:** I can go --

16 **DR. NETON:** Yeah, Dave can look it up --

17 **MR. ALLEN:** -- print off a copy.

18 **DR. BEHLING:** How do you -- how do you
19 differentiate? You were talking earlier about 19
20 picocuries per liter as being an ambient dose --
21 concentration level. Would these measurements
22 have been taken obviously in a low background
23 area outside the facility?

24 **MS. BLOOM:** They definitely should be. There
25 were concerns in some of breath analyses that

1 they were in areas where the concentrations were
2 a little bit higher than they wanted them to be,
3 so there was more work in later years moving the
4 worker to a different area.

5 **DR. BEHLING:** I think one picocurie per liter is
6 what ambient levels are in average homes.

7 **MS. BLOOM:** Uh-huh.

8 **DR. BEHLING:** And so if that corresponds to that
9 kind of a body burden, you'd have a problem
10 basically identifying what is a real value and
11 what's not a real value.

12 **DR. NETON:** Yeah. I think actually these people
13 would -- well, I don't know. I may be speaking
14 without looking too much, but later on I know at
15 Argonne, they had these people breathe aged air
16 that, you know, you sort of ventilate the -- the
17 environmental radon out of your system and you'd
18 -- you'd not want to take their measurement
19 unless you were off work for a while, 'cause if
20 you were in a high work area, there is a
21 saturation or equilibrium of radon gas, being a
22 noble gas, with the body tissues. That said, I
23 mean any of these factors would again bias the
24 results high, so you're not going to -- I don't
25 think, going to have a low -- low analysis.

1 **DR. MAKHIJANI:** Right. I think that in this case
2 that is correct, but if you use -- if you use the
3 radon breath at face value --

4 **DR. NETON:** Yeah.

5 **DR. MAKHIJANI:** -- you would bias the results
6 high.

7 **DR. NETON:** And -- and you know, I --

8 **DR. MAKHIJANI:** If the measure -- if there are no
9 measurement problem at those low levels, which
10 would be my question --

11 **DR. NETON:** Yeah.

12 **DR. MAKHIJANI:** -- this is how -- how well in
13 those days can you rely on a picocurie per liter
14 recording.

15 **DR. NETON:** Right. And that would need to be --
16 be fleshed out. I think these are scintillation
17 cells that are the Lucas flask type -- type
18 things. Yeah, I -- I'm speaking out of school
19 here because I haven't really looked through
20 this, but that is one technique that would be
21 available to help -- I'm talking about the
22 universal techniques available to bracket doses
23 to raffinate workers, and I think we have some
24 tools here.

25 **MR. ALLEN:** Is Janet --

1 **DR. ZIEMER:** I would think the uncertainty would
2 be much greater in the model itself than in the
3 data, so you can make those measurements pretty
4 well. but what do they mean in terms of body
5 burden is --

6 **DR. NETON:** Yeah, I think it's like any -- any
7 bioassay measurement, interpretation is -- I'm
8 going to see if I can get ahold of Janet real
9 quick here.

10 **MR. ALLEN:** That -- that radon breath TIB was TIB
11 number 25. Here's a copy if you want it. It's -
12 - basically just develops the conversion factor.

13 **MR. GRIFFON:** Okay.

14 **DR. NETON:** Yeah, it's very simple.

15 **MR. GRIFFON:** Screening her calls.

16 **MS. WESTBROOK:** (By telephone) Hello, Janet
17 Westbrook.

18 **DR. NETON:** Hello, Janet.

19 **MS. WESTBROOK:** Yes.

20 **DR. NETON:** This is Jim Neton. How are you
21 doing?

22 **MS. WESTBROOK:** Uh-huh. Fine, you?

23 **DR. NETON:** Good. I was actually going to say I
24 was Regis Philbin, but I didn't think you'd
25 believe me, Who Wants To Be a Millionaire. We're

1 phoning a friend, taking one of our -- never
2 mind. Janet, are you available to chat for a few
3 minutes?

4 **MS. WESTBROOK:** Yes.

5 **DR. NETON:** Okay. I've got a -- a host of people
6 here. We're meeting, as you know, related to a
7 discussion on the Mallinckrodt profile. And the
8 question came up related to the -- the -- sort of
9 the depth and the representativeness of the -- of
10 the data for the raffinate materials. I think
11 you indicated in a previous discussion that we
12 did have some information on the isotopic
13 composition of the raffinate.

14 **MS. WESTBROOK:** Depends which raffinate you're
15 talking about.

16 **DR. NETON:** Okay. I wonder if you could maybe
17 just in general give us a -- give us a sort of a
18 overview of what we -- what we may have in this
19 area, if you can do that.

20 **MS. WESTBROOK:** Well, let me just pull my
21 Electronet notes out. It seems to me that I sent
22 somebody something about the Sperry cake.

23 **DR. NETON:** Yes. That was -- I think Mark
24 Griffon and I asked for something on that, and
25 Arjun, and --

1 **MS. WESTBROOK:** Okay. Well, first of all,
2 there's the K-65 raffinate, and that was the
3 raffinate from basically the first step where
4 they took out the radium. So the K-65 was
5 barreled up and shipped out to a -- it was either
6 put in a storage area until there got to, I
7 assume, be so many barrels, and AEC had it sent
8 out to the airport site --

9 **DR. NETON:** Right.

10 **MS. WESTBROOK:** -- where, once somebody dumped
11 it, it was then no more dose-producing until
12 somebody brought more barrels.

13 **DR. NETON:** Right.

14 **MS. WESTBROOK:** Okay. So only when people were
15 out at the airport was it dose-producing and so
16 forth. Now they did do some airborne
17 measurements, once, of different areas where they
18 counted the -- they were trying to distinguish
19 between uranium in the air and thus they didn't
20 do just gross alpha measurements. They actually
21 isotopically counted for uranium, I guess U-238
22 or whatever, and radium. And they found the
23 results that you might expect, which was that the
24 radium was in near equilibrium in the regular
25 uranium areas. But in that raffinate area where

1 the dust was mainly the raffinate dust, the
2 radium was about a hundred times the uranium,
3 which was consistent with uranium left over in
4 the raffinate being just like less than a percent
5 --

6 **DR. NETON:** Right.

7 **MS. WESTBROOK:** -- of the -- so that I think we
8 can assume that the big actor in the K-65 was in
9 fact the radium and any radium daughters. And of
10 course then there was the radon emanation from
11 that. Okay.

12 **DR. NETON:** Right. So --

13 **MS. WESTBROOK:** Now that was that.

14 **DR. NETON:** Well, do we know like what time frame
15 and what areas this would apply to?

16 **MS. WESTBROOK:** Yes. I think that's pretty clear
17 from the time they started using the pitchblende
18 to the time they stopped using the pitchblende.
19 That -- those were the years in which they
20 produced the K-65.

21 **DR. NETON:** Right. And which -- which areas
22 would this be? Like Plant 6 or --

23 **MS. WESTBROOK:** Yes. And actually before Plant 6
24 was built, there was time in like 1945 when they
25 were doing it on the lab level and maybe the

1 pilot level, but that I believe was relatively
2 brief compared to, of course, at the Plant 6
3 time. They -- they built Plant 6 specifically
4 because they anticipated having to process larger
5 quantities, and thus they would -- knew they
6 would have a dose problem if they tried to do it
7 in the smaller spaces that they had back in the
8 K1E and all those Plant 1 buildings.

9 **DR. NETON:** So in your mind, though, then anybody
10 working in Plant 6 in this pitchblende era could
11 potentially have been exposed to this
12 disequilibrium.

13 **MS. WESTBROOK:** No, I think it was pretty much
14 restricted to just the areas where the K-65 was.
15 Reason being, remember it was separated in a wet
16 process in tanks, okay, and that precipitate was
17 then collected -- I guess on a filter -- and that
18 filter was scraped off into the barrels and then
19 the barrels were closed, sealed, and -- and taken
20 off. Now there was some like spillage on the
21 floor and so forth, but I think it -- it's very
22 reasonable to assume that didn't get tracked
23 around much because it was just in limited areas
24 that that was done. There were many more stages
25 in the process and then there were all the other

1 operations that were done. So I think most of
2 the building was pretty far removed from the --
3 just those little spots. And then these -- these
4 guys who were the cloth operators who would have
5 dealt with the -- the powdery form and -- and
6 replacing the cloth, opening the full filters,
7 taking the stuff off and barreling it, those
8 people were kind of dedicated guys. You'd see
9 them month after month, year after year, they're
10 the same guys. So I tend to think that we don't
11 really have a whole lot of turnover and a whole
12 lot of people going back and forth. And I think
13 that was partly because AEC recognized -- and
14 Mallinckrodt, pre-Plant 6 -- that it might be a
15 problem and therefore, although Plant 6 wasn't
16 that well designed from many points of view,
17 nevertheless they did make that a kind of a -- a
18 limited area process.

19 **DR. NETON:** Right.

20 **MR. GRIFFON:** Were those people changing the
21 cloth, Janet, were those -- did they have a
22 particular job title or you said they --

23 **MS. WESTBROOK:** Yeah, they were -- they were the
24 cloth operators and --

25 **MR. GRIFFON:** Oh, cloth operators, I thought I

1 saw --

2 **MS. WESTBROOK:** -- and usually it'll be pretty
3 clear, from the name of the filter or the name of
4 the guy, who it was.

5 **DR. MAKHIJANI:** Janet, when I -- I was in St.
6 Louis -- this is Arjun. When I was in St. Louis
7 last week and I talked with some people who
8 worked in Plant 6, and they were like maintenance
9 workers who, you know, were all over the
10 radiological operations who worked around these
11 filters, who kind of cleaned up, fixed things,
12 transport workers -- including some who said they
13 transported this stuff back and forth from the
14 airport in their private vehicles. And so it
15 seems a little more fuzzy to me, so I agree that,
16 you know, there were -- there were some job
17 titles of people who would be there, the
18 operators. This -- also seemed to be other
19 people who would have been there, and from what I
20 understand, these kind of roving job titles are
21 electricians, maintenance people, cleanup people,
22 sheet metal workers -- they have a whole set of
23 them. One guesstimate, and the person did say it
24 was a guesstimate, was that it -- it was as many
25 as 25 percent of the workers were not stationed

1 at a particular location. Would that -- does
2 that correspond to your research, or do you have
3 a different view of that or...

4 **MS. WESTBROOK:** I don't -- I don't know, but I --
5 I tend to think that -- well, full filter --
6 filter like this, it didn't -- I'm trying to
7 remember which of the filters were the more
8 problematic ones and might require some
9 maintenance folks to visit them. I think you
10 could certainly assume that these filters did
11 have some maintenance, but there might have been
12 roving plant guys, but how many of them -- like
13 an electrician might not be -- have much to do
14 around a filter like this. Okay? It would be
15 maybe the more mechanical guys, you know, the
16 millwrights or whatever, who might be doing
17 something with a filter like this. And so that
18 might limit the number right there. I don't
19 think clerks would have any occasion to go in
20 this area and so forth. Now -- however, once
21 this stuff was barreled, there -- there was for a
22 -- for a time, a storage area where they put this
23 stuff, so there might have been a clerk that went
24 over there and marked the names of the -- you
25 know, wrote down the numbers of the barrels. But

1 again, that would be like a few minutes and then
2 he's off to doing something else. I -- I think
3 the warehouse workers where the pitchblende came
4 in and so on and so forth, if -- some of these
5 people may be -- and then there were those other
6 two kinds of raffinate, some of these people may
7 not be remembering this particular raffinate.
8 They may just be saying oh, I transported some
9 waste. And in their private cars, I find that a
10 bit incredible, you know, unless the truck was
11 really broken down and somebody volunteered. But
12 I think that that would have been a very, very
13 infrequent thing if it indeed ever happened. But
14 I don't think they would have transported a drum
15 of K-65 in their private cars. I just -- you
16 know, because they had these trucks and these
17 dedicated spaces and AEC went out to the airport
18 and measured this and that and the other and so
19 did the Mallinckrodt guys, I just feel that they
20 treated the K-65 in a kind of a special way.
21 And so I -- I do believe yes, there were
22 infrequent access by other than the raffinate
23 workers, but I think the general population of
24 Plant 6 had only a very distant exposure to the
25 gamma rays. I don't think that they were really

1 in the area of the dust. I don't think, for the
2 most part, that they were really likely to have
3 picked up much dose from that just because of
4 that special treatment. I could be wrong.

5 **DR. NETON:** Okay, Janet. That's -- that's good.
6 I didn't -- I forgot to let you know that we are
7 on the record here in this session, not that you
8 would change what you say, but you need to know
9 that Ray Green is here and we're preparing a
10 transcript of this session, so...

11 **MS. WESTBROOK:** I have no idea who Ray Green is.

12 **DR. NETON:** Ray Green is a court recorder who --
13 who attends many of our meetings and --

14 **MS. WESTBROOK:** Ah, okay.

15 **DR. NETON:** -- and prepares a transcript. So
16 just so you know that. It's only fair that, you
17 know, you be aware of that fact. So as far as
18 you know, we only have an air sample or so of
19 isotopic analysis of the K-65 raffinate area. Is
20 that what you were saying?

21 **MS. WESTBROOK:** Well, there were -- there were
22 other measurements --

23 **DR. NETON:** Other measurements.

24 **MS. WESTBROOK:** -- but they were the gross alpha
25 measurements that were taken everywhere.

1 **DR. NETON:** Right, right.

2 **MS. WESTBROOK:** Okay? But we can assume those
3 gross measurements, as far as the isotope goes,
4 that the dominant contributors to that alpha
5 thing would be the radium and its daughters.

6 **DR. NETON:** Understood and --

7 **MS. WESTBROOK:** Okay.

8 **MR. GRIFFON:** Can you give the reference for that
9 one isotopic survey or air sampling effort that
10 was done?

11 **MS. WESTBROOK:** It's in the TBD.

12 **MR. GRIFFON:** You might have given it to me
13 already but --

14 **MS. WESTBROOK:** It's in the TBD.

15 **MR. GRIFFON:** It's in the TBD.

16 **MS. WESTBROOK:** Yeah, and I think I mentioned it
17 in something I sent to somebody, so it could have
18 been, you know, whatever was sent to you.

19 **DR. NETON:** Frankly, I haven't had a chance to
20 look at what you sent us, Janet, so I apologize
21 that I'm not up to speed on those.

22 One thing that crossed my mind is that we do know
23 this ratio of 100 -- what's that Mark?

24 **MR. GRIFFON:** (Unintelligible)

25 **DR. NETON:** It's 100 to 1.

1 **MS. WESTBROOK:** Something like that, yeah.

2 **DR. NETON:** Then, in a sense then, if we had
3 urine samples on the person, we're not -- we're
4 not confined to using the air monitoring data.
5 If --

6 **MS. WESTBROOK:** That is correct.

7 **DR. NETON:** If we know that the ratio of the
8 isotopic airborne is 100 to 1 uranium -- radium
9 to radium -- radium to uranium, then we can take
10 a urine sample and just take any intake from the
11 uranium urinary output and assume that it's 100
12 times the uranium intake. So in a sense -- my
13 original point was that if we don't know, we're
14 going to have use airborne is not correct if we
15 do know the isotopic mix in the air -- in the air
16 samples themselves. So that -- that's good, in a
17 way. That helps us.

18 **DR. MAKHIJANI:** I have a question, another
19 question about the K-65 isotopic composition. I
20 know that at Fernald in silos 1 and 2 where some
21 of the stuff went, they had thorium 230, also.
22 Now I know thorium 230 was not -- and this is
23 from memory now -- not in equilibrium with -- not
24 all the thorium 230 went along with the radium.
25 Do we have a thorium 230 measurement of these K-

1 65 samples in that -- in that one measurement
2 that you refer to, or are we assuming only radium
3 here?

4 **MS. WESTBROOK:** No.

5 **DR. NETON:** We do not?

6 **MS. WESTBROOK:** No. They discounted those two
7 elements.

8 **DR. MAKHIJANI:** That might be an area where --

9 **DR. NETON:** Something, yeah, that's worth
10 pursuing. I don't know. Thorium 230 -- yeah, we
11 need to look at that. That was one of my
12 original thoughts was we have the residue in the
13 K-65 silos and there's virtually hundreds of
14 measurements made on that. Whether its on the
15 same exact equilibrium state as when it was
16 processed, I don't know, but -- and -- and in
17 fact I think -- well, we need to look, but it
18 depends on the organ, of course. But radium 226,
19 being a somewhat soluble radioisotope, is going
20 to deliver a pretty high dose -- relatively high
21 dose per unit intake to systemic organs compared
22 to something like thorium 230, other than the
23 deliverer and the skeleton. So here you have a
24 situation where radium would be predominant in
25 the dose delivered to the systemic organs. It's

1 something to look at.

2 Okay. Now Janet, you mentioned there's a couple
3 other raffinate streams where we have data.

4 **MS. WESTBROOK:** Yes.

5 **DR. NETON:** Could you just briefly describe what
6 those are?

7 **MS. WESTBROOK:** Well, there's the barium sulfate
8 which, by volume, I think was about the biggest
9 one. And I'm sitting here trying to look through
10 my notes here. I have all the -- most of my
11 notes in one file which is an Excel file which
12 about -- with about a zillion little tabs and I'm
13 trying to find the right one here where I have
14 the stuff listed. Dang, I can't seem to find it
15 and I'm just drawing a blank, you know, like --
16 I'm thinking oh, my gosh, what is the third one.
17 But anyway, let's see. Airport --

18 **DR. BEHLING:** (Unintelligible)

19 **MS. WESTBROOK:** I absolutely at this moment --
20 I'm sorry, I'm drawing a blank. I can't remember
21 what number three is, but there are three main
22 ones. And as I pointed out, I believe the Sperry
23 cake was treated as a subset of the -- I know,
24 I'll go to my materials table, my basic table
25 over here -- subset of the -- I can't remember.

1 Okay. Let's see. First of all we have the K-65,
2 the pitchblende raffinate. Oh -- oh, the airport
3 cake, that was the Am-7. That was the third one.
4 Okay. So you've got your barium sulfate, your K-
5 65, and your -- what -- what they generically
6 called "the raffinate" was Am-7 and that was --

7 **MR. GRIFFON:** Airport.

8 **MS. WESTBROOK:** -- like the last one after the K-
9 65 and the barium sulfate. First they took out
10 the radium, then they precipitated the barium, so
11 that produced those first two cakes, and then the
12 leftovers then were kind of a -- I think
13 sometimes they kind of mixed a few cakes together
14 to get the pitchblende raffinate, the Am-7 and
15 it's nickname was airport cake.

16 **MR. GRIFFON:** Where does the Sperry cake fit into
17 those?

18 **DR. NETON:** I think it's a subset of the barium
19 sulfate raffinate?

20 **MR. GRIFFON:** Is it --

21 **MS. WESTBROOK:** Now the Am-7, we do have some
22 references for what it contained in terms of the
23 thorium 232 and the thorium 230, because that was
24 analyzed -- well, the reference is Figgins 1962
25 and that's in the TBD and it's discussed in the

1 under-the-table and everything. But they say so
2 many parts per million -- they found so many
3 parts per million thorium 232; so many parts per
4 million thorium 230. Okay?

5 **DR. NETON:** Okay.

6 **MR. GRIFFON:** Yeah.

7 **MS. WESTBROOK:** And anyway, on -- on that -- in
8 that vein, okay?

9 **DR. NETON:** Okay.

10 **MS. WESTBROOK:** But we don't seem to have any
11 thorium content for either the K-65 or the barium
12 sulfate. I'm looking at this table here. They
13 did say so much uranium. If there's a reasonable
14 -- I mean a carryover of the thorium, like
15 uranium, we could estimate it from that.
16 Otherwise, I don't know. I -- I have tried for a
17 long time to figure this out and track down what
18 -- what the other isotopes were and I hoped that
19 they had at some time done an isotopic breakdown
20 of all these different cakes, but I don't think
21 they did it except when they wanted to sell off
22 the cakes at the airport, but they didn't do that
23 with the K-65 because of course, it had moved on
24 elsewhere and they weren't selling it.

25 **DR. NETON:** Right.

1 **MS. WESTBROOK:** But this Am-7, we did have some
2 more information about it.

3 **DR. NETON:** So you do have some isotopic on the
4 Am-7?

5 **MS. WESTBROOK:** Not -- not a total isotopic, but
6 we have some more information about the thorium
7 and that.

8 **MR. GRIFFON:** Is the Sperry cake -- again, I'm
9 not sure where the Sperry cake fits into this --

10 **MS. WESTBROOK:** The Sperry cake seems to be a
11 subset of the Am-7, the last one, and I think the
12 reason was, there's a -- the Am-7 was produced
13 with every single batch, whereas they drew the
14 Sperry cake off only -- off the column only
15 intermittently, you know, once in a while. Like
16 maybe when it got -- it kind of precipitated to
17 the bottom of the column but the column was still
18 usable. So from the description and -- and this
19 is somewhat inferred from the way they put it,
20 but I -- I believe the Sperry cake was a much
21 smaller volume than any of these others by far,
22 and that when they dumped it at the airport, it
23 was lumped in with the Am-7 like they might have
24 -- just drum it in and then take it out there and
25 -- or wherever they put it, and then dump it out.

1 **MR. GRIFFON:** And the Sperry cake, the focus was
2 the protactinium. Is that right?

3 **MS. WESTBROOK:** Yes.

4 **MS. BLOOM:** Janet, a question on the Am-7. This
5 is Cindy, by the way. Did you look at any of the
6 Mound documentation?

7 **MS. WESTBROOK:** Yes.

8 **MS. BLOOM:** And you didn't find anything in
9 there?

10 **MS. WESTBROOK:** Well, what I did, I -- I milked
11 out of there -- and it's in the TBD -- everything
12 that I could find. Every -- every detail about
13 isotopic content, experience with it or whatever,
14 is in the TBD.

15 **MS. BLOOM:** Okay.

16 **MS. WESTBROOK:** If it isn't there, I -- I don't
17 have it. I didn't leave anything out.

18 **MS. BLOOM:** Okay. Thank you.

19 **DR. MAKHIJANI:** Questions about their timing, if
20 we're done with isotopic --

21 **DR. NETON:** Yes.

22 **DR. MAKHIJANI:** Janet, this is Arjun again. In -
23 - in the TBD, I don't -- I don't have a date
24 number in front of me, but you mentioned that --
25 that raffinates were brought back, I think

1 starting 1950, or '49, for extraction of uranium,
2 and then from time to time this seems to have
3 happened. But there doesn't seem to be -- so at
4 that time the whole of Plant 6 presumably in
5 those periods, the workers would have been
6 exposed to this disequilibrium. Would -- am I
7 understanding your write-up correctly?

8 **MS. WESTBROOK:** I -- I'm sorry. I'm having
9 trouble hearing you. Now -- now --

10 **DR. MAKHIJANI:** Sorry.

11 **MS. WESTBROOK:** -- what -- when the workers were
12 exposed to disequilibrium, they would have been -
13 - some workers, the raffinate workers, would have
14 been exposed to the disequilibrium, or let's just
15 say the raffinate dust, during the whole time
16 because it was -- it was like a manual removal or
17 -- or at least a semi-manual removal from -- of
18 the cake into the drum and the replacement of the
19 cloth in the filter. And, you know, there's
20 always a little bit left over in the filter, you
21 know, that can dry out and get in the air, and
22 then there was some that would fall on the floor.
23 Little bits would get on the floor and would be
24 swept up periodically, but might sit around and
25 dry out. They pointed that out in the memo.

1 Okay. So some workers would have been exposed to
2 that during the whole time of (unintelligible)
3 processing. Okay? But most of the workers would
4 have not been exposed to it directly, like they
5 weren't in the room or the core filter room or
6 wherever where it was, or even in the corridor
7 outside, let's say. But then there would have
8 been the guys who were transporting the drums out
9 to the -- like to maybe a temporary staging area
10 and then out to the airport. Those guys, though,
11 would have been exposed to it only to what might
12 have been on the outside of the drum, and then --
13 I have no information as to whether they cleaned
14 the outside or not. I think they were supposed
15 to, but who knows. Anyway, so there might have
16 been a little on the outside of the drum. But
17 other than that, see, that seems to me -- they
18 put the used cloth into a drum, I believe,
19 because they actually took some measurements of
20 one drum, and in it fit three cloths. And so
21 they took some measurements on the outside to see
22 how hot the cloths were because apparently they
23 thought maybe the radium might soak into the
24 material more than it would -- you know, might
25 concentrate there for whatever reason. And I

1 don't think they found that, but anyway, just --
2 just so you know that -- so we have all these --
3 the filter itself, the cloth, and the material --
4 I mean and the cake, and the cloths and the cake
5 would have been drummed at the place where it was
6 removed from the filter. This is my
7 understanding. Okay?

8 So then once it was sealed in the drum, then it
9 would be transported. So those -- you can kind
10 of see the spectrum of workers that might be
11 exposed in all that operation, those tasks.

12 **DR. MAKHIJANI:** Sorry. I think -- I think maybe
13 I didn't speak loudly enough. You mention in the
14 TBD that waste -- after it was taken to the
15 airport some of the raffinate, I think the K-65,
16 was still high enough in uranium that they were
17 brought back for uranium extraction.

18 **MS. WESTBROOK:** No, not the K-65.

19 **DR. MAKHIJANI:** Were some raffinates brought back
20 for uranium extraction? I'm pretty sure you
21 mentioned that in the -- I wish I'd tabbed the
22 page.

23 **MS. WESTBROOK:** Well, just remind me. Remind me.

24 **DR. MAKHIJANI:** I'll have to do a search here.
25 In 1949 or 1950 -- I'm wondering what to search

1 for. If you don't remember, it's in these.

2 **DR. NETON:** Well, it says here, in -- most or all
3 the K-65 was brought back in drums from SLAPS and
4 reprocessed starting in early 1948.

5 **MS. WESTBROOK:** Oh, well. Ah, there you go --

6 **DR. MAKHIJANI:** What page?

7 **DR. NETON:** Forty-seven.

8 **DR. MAKHIJANI:** Thank you.

9 **MS. WESTBROOK:** Oh, okay. I may be mis-
10 remembering here. Let me -- let me get back.

11 **DR. MAKHIJANI:** And then it indicates, it's --
12 there's a sort of fair amount of vagueness as to
13 the time, and that's what's puzzling me is --

14 **MS. WESTBROOK:** Hang on a minute.

15 **DR. BEHLING:** -- how do we place people in time
16 with this reprocessing, and what happens to Plant
17 6 dose calculations during those times.

18 **MS. WESTBROOK:** Just -- just a second here. Let
19 me --

20 **DR. MAKHIJANI:** Sure.

21 **MS. WESTBROOK:** Okay. Now page what?

22 **DR. NETON:** Forty-seven.

23 **DR. MAKHIJANI:** Forty-seven.

24 **DR. NETON:** Third paragraph or second --

25 **MS. WESTBROOK:** Forty-seven, third paragraph. I

1 hate Word. Why it doesn't clear your search when
2 you open a new file, I don't know, but it
3 doesn't. Anyway, okay, let's see. Where do --
4 where do -- see, I don't know that I have the
5 same copy that you do. Sometimes stuff is sent
6 over to NIOSH and I don't get a copy of it and --

7 **DR. NETON:** This is Rev 1. It's the same --

8 **MS. WESTBROOK:** Okay. Rev 1?

9 **DR. NETON:** Yeah.

10 **MS. WESTBROOK:** Well, see, I'm opening my working
11 copy which is the last that I had -- now, I may
12 have it --

13 **MS. BLOOM:** She'll have the Word file rather than
14 the Adobe copy that we have --

15 **DR. NETON:** Oh, this is a -- this a PDF file, so
16 it might be on a different page.

17 **MS. BLOOM:** -- because those are harder to work
18 with for --

19 **MS. WESTBROOK:** Okay. Well, just tell me three -
20 -

21 **UNIDENTIFIED:** Section 542.3, would that help?

22 **DR. BEHLING:** Yes.

23 **MS. WESTBROOK:** Tell me three consecutive words
24 to search for.

25 **DR. BEHLING:** As noted in Section 4.7.

1 **MS. WESTBROOK:** As noted in Section 4.7. Okay.
2 That's good. That's good. Thank you. Let me
3 remind myself here, I'm -- oh, oh, oh. Let me go
4 back to Section 4.7. This is good. I didn't --
5 I completely forgot about that. Ah, residues and
6 effluents. Here we go. Let's see. Let's see.
7 Yeah, right, right, right. Let's see. Ah, some
8 reprocessing of residues is also done to recover
9 uranium. All right. Let's see here.
10 Oh, yes. Okay. Following the development and
11 installation of the sodium carbonate -- thank
12 you, I had forgotten this -- the sodium
13 carbonate/sodium bicarbonate leach process in
14 1948 to '49 to recover more of the uranium, the
15 K-65 produced up to that point was brought out of
16 storage in lots and reprocessed -- reprocessed in
17 about 1949, resulting in a final uranium content
18 in the residue of .05 percent. So that was
19 apparently done in the same vessels and in the
20 same general manner as ore would be processed,
21 including heating the K-65 drums in the thawing
22 oven used to thaw ore drums. Just consequent
23 rate on emanation, right?
24 Okay. And then they sent that residue to Lake
25 Ontario. Okay?

1 **DR. NETON:** Yeah.

2 **MS. WESTBROOK:** All right. So there -- you're
3 right about that. I forgot about that. But what
4 they did was they -- they opened the drums and
5 dumped the stuff in, but they heated the barrels.
6 They loosen them and then they'd heat them to
7 drive off the radon so when they were dumping
8 them, presumably it was reasonably dry,
9 relatively dry. I think they packed it kind of
10 wet but when they heated it, maybe at least some
11 of the moisture would be driven off. So I don't
12 know -- I believe at that time they had an
13 automatic ore dumper, like it would hold -- it
14 would -- they put the barrel on it and it would
15 do the dumping. The person wouldn't actually
16 physically have to dump it. I'm -- I'm not sure.
17 I'd have to double check that, because they did
18 get an automatic ore dumper at some point in the
19 '40s. Anyway, so yeah. But -- but once they
20 dumped it in, it would then be treated just -- it
21 would go through the process just like regular --
22 it would come out in the next step, again as the
23 K-65, only this time there would be less uranium
24 in it.

25 **DR. NETON:** See, it's listed as starting in early

1 '48. We don't know, I guess, when it ended.

2 **MS. WESTBROOK:** Well, a couple of the -- it was
3 all done in 19-- by the end of 1949 because we
4 have two separate references that -- one of them
5 says that it started in late '48 and ended -- but
6 they both say it ended in '49, like it was done
7 over a period of months. But the leach process
8 was researched and installed in '48 to '49, so
9 that may be why one of them thought it started in
10 '48 but the other one said it was done in '48.

11 **DR. NETON:** Okay.

12 **MS. WESTBROOK:** Okay? So they probably used some
13 K-65 they had not taken out to the airport yet to
14 test the process the first few times, and once
15 that was established -- maybe in '48 or early '49
16 -- then in '49 they brought back the barrels and
17 reprocessed them. That's my best -- but you can
18 go back to the original --

19 **DR. NETON:** Well, let me ask you this.

20 **MS. WESTBROOK:** -- memos and read them yourself.

21 **DR. NETON:** When was this K-65 stopped processing
22 then? I mean if this was all prior to '49, it's
23 really not relevant for our discussion.

24 **MS. WESTBROOK:** Well, they reprocessed the K-65
25 that they had already processed.

1 **DR. NETON:** But they -- oh, but they were
2 continuing to run it through.

3 **MS. WESTBROOK:** But after that then they had the
4 higher recovery so --

5 **DR. NETON:** Yeah, I got you.

6 **MS. WESTBROOK:** -- didn't have to reprocess it.

7 **DR. NETON:** All right. Okay.

8 **DR. MAKHIJANI:** Do -- do we have an ending date
9 for the raffinate processing for uranium
10 extraction? I mean was this the only -- since
11 they developed the process and the early
12 extraction -- you know, they had some Canadian
13 ores, ten percent and all that. And I don't have
14 all the words in front of me, just a little bit
15 of an impression in my mind from reading your
16 write-up, Janet, that there is some -- that this
17 may have been done sort of in lots from time to
18 time after this big one-time thing in 1949 when
19 they did the K-65 silos, but maybe I'm not
20 reading it right.

21 **MS. WESTBROOK:** Where -- where would it say that,
22 or where would you take that from --

23 **DR. MAKHIJANI:** I don't remember. See, that's
24 why I wished I'd made the page references. Which
25 paragraph in 4.7 were you at?

1 **MS. WESTBROOK:** Okay. This would be one, two,
2 three, four -- four paragraphs from the end of
3 4.7. It's the fourth paragraph.

4 **DR. MAKHIJANI:** How do the paragraphs -- oh, some
5 reprocessing.

6 **MS. WESTBROOK:** Yes, that's right.

7 **DR. MAKHIJANI:** That paragraph? Yeah, I -- I
8 don't know why I have that impression. Maybe --
9 maybe -- I'd have to go back and check. Maybe
10 not a correct remembering.

11 **MS. WESTBROOK:** Well, I already made my memory
12 mistake for the day, so you're entitled to have
13 yours.

14 **DR. MAKHIJANI:** Okay. So so far, you know the
15 other -- there wasn't -- other than the thorium
16 Sperry cake thing, there wasn't more bringing
17 back of raffinates after '49?

18 **MS. WESTBROOK:** Well, this paragraph also says at
19 least some of the barium sulfate cake was
20 reprocessed similarly, and I think that was after
21 that.

22 **DR. MAKHIJANI:** That must have been why I
23 remembered that. Thank you.

24 **MS. WESTBROOK:** Yeah, yeah.

25 **DR. MAKHIJANI:** So that's the time question that

1 I have, is if you have the barium sulfate residue
2 -- which was the bulk of the residue, right?

3 **MS. WESTBROOK:** I'm sorry. What?

4 **DR. MAKHIJANI:** The barium sulfate residue was
5 the bulk of the residue, right?

6 **MS. WESTBROOK:** I don't -- I -- I -- I'm not able
7 to remember that, but my -- my memory is that the
8 Am-7 was the biggest --

9 **DR. MAKHIJANI:** Okay.

10 **MS. WESTBROOK:** -- amount, but -- but I could be
11 wrong there.

12 **DR. MAKHIJANI:** Yeah. Yeah, I think you might be
13 right about that. The -- but anyway, they had --
14 barium sulfate had a fair amount of radium in it,
15 and certainly in disequilibrium, if I remember
16 correctly, and so if the -- the problem here
17 would be to put some kind of time bound on -- you
18 know, time limits starting and stopping dates for
19 this barium sulfate reprocessing. Is there any
20 evidence of that?

21 **MS. WESTBROOK:** Well, I -- I -- they -- they
22 noted that they reprocessed the barium cake and
23 one of the references is 1951 and one of them is
24 '48. And the '51 I think referred to it as
25 having been done, if I'm remembering correctly.

1 So therefore that means it must have been done --
2 I think either maybe prior to the K-65 or just
3 after it, which I think is a little more likely.
4 But anyway, the 1948 reference may have been
5 prospective, you know, we're going to do it. But
6 anyway, I -- so I think they had finished it all
7 probably in the like '49 to '50 time frame, but -
8 - but you'd have to look at the references for
9 that.

10 **DR. MAKHIJANI:** I'll do that. Thank you. I will
11 do that.

12 **DR. NETON:** Okay. Any other questions on the
13 raffinates as far as --

14 **DR. ZIEMER:** There is a paragraph that states
15 that in '55 thorium-bearing raffinate residue was
16 brought back from storage of SLAPS for plant 6.

17 **DR. NETON:** Where is that, Paul?

18 **DR. ZIEMER:** Top of page 33, the second paragraph
19 (reading) conveyed by dumpster from Plant 6 to
20 Plant 7 as needed. Processing done on a crash
21 basis in early '55.

22 But that looks like it's a small scale lab
23 operation.

24 **MS. WESTBROOK:** Oh, that was the thorium
25 processing.

1 **DR. MAKHIJANI:** Yeah, this is -- this is the
2 Sperry cake, right, Janet?

3 **MS. WESTBROOK:** Yes. No.

4 **DR. ZIEMER:** It says it's Am-7 raffinate.

5 **DR. MAKHIJANI:** Am-7. Yeah, okay.

6 **MS. WESTBROOK:** The Am-7, that was the -- the --
7 the airport cake basically, the bulk residue that
8 I -- I think is the bulk residue, anyway -- hedge
9 my bets there -- the Am-7. And they took it back
10 because it was -- it was where -- it was the one
11 we had the thorium content of and the reason was,
12 they did it -- somebody did a thorium assay on it
13 and of course it was known to be somewhat
14 concentrated in thorium, so they processed it to
15 make the concentrate that was then sent to Mound
16 for further concentration of the thorium.

17 **DR. NETON:** Uh-huh. Right.

18 **MS. WESTBROOK:** Okay. So that's what that was.
19 So let's see, they reprocessed some K-65, some
20 barium sulfate, and I think all of the -- pretty
21 much all of the Am-7 -- no, some of the Am-7, but
22 -- but it turned out to be I think most of it.
23 But anyway, quite a lot of it.

24 **DR. MAKHIJANI:** Now didn't we just say Am-7 was
25 most of the residues?

1 **MS. WESTBROOK:** Yeah, but I -- I -- I think I
2 hedged my bets in writing this. The purpose of
3 that was to process -- reprocess some of the Am-7
4 because it wasn't clear to me how much there was
5 out there at the time. I know how much they
6 reprocessed, but I don't know how much had been
7 sent to the airport at that time.

8 **DR. MAKHIJANI:** And the Am-7 would have had
9 highly variable ratios of uranium to radium,
10 radium to uranium I'm thinking, because they had
11 -- it wasn't all -- I mean it was -- it was
12 various grades of ore. It wasn't all
13 pitchblende. There were all different kinds of
14 residues from different ores, right?

15 **MS. WESTBROOK:** Well, actually, the Am-7 was
16 pitchblende residue --

17 **DR. MAKHIJANI:** Okay.

18 **MS. WESTBROOK:** And we do have the -- the AM-10
19 was the carnotite residues.

20 **DR. MAKHIJANI:** Oh, I see.

21 **MS. WESTBROOK:** And -- and we do have a thorium
22 ratio for them. I mean we have some thorium
23 information, anyway, for them. So that the -- it
24 was also called -- their Am-7, the carnotite
25 residue, raffinate, was also called airport cake.

1 But it -- it definitely had its own code name,
2 the Am-7 -- I mean AM-10. Okay. So they --
3 they did distinguish between those two. Now
4 mostly what I'm reading off to you I'm taking
5 from the materials table, and I forget whether
6 it's Table 4 or whatever, but it's one of the
7 first five tables. It's that one that goes on
8 for pages and pages in landscape mode, but it's
9 got -- there's some information there in the --
10 that -- and in mostly some references. So in
11 case you want to track down where I got any of
12 these numbers, I believe you can just find it
13 there. You'll find more information and -- and
14 adjust it in your own time there.

15 **DR. MAKHIJANI:** Okay. Thank you. Thank you.

16 **DR. NETON:** Okay. Any other issues with
17 raffinates while we've got Janet on the phone? I
18 know, Janet, you've got an appointment or
19 something coming up soon so we don't want to keep
20 you too much longer.

21 **MS. WESTBROOK:** Oh, no. That's -- that's okay.
22 I still have some time.

23 **DR. NETON:** Okay.

24 **DR. MAKHIJANI:** Were there -- were there area
25 dose -- were there area dose -- external dose

1 measurements made in the areas where raffinates
2 were particularly concentrated?

3 **MS. WESTBROOK:** Well, they had some detector
4 measurements, and they -- I think they took a lot
5 that they either, you know, said oh, this is
6 consistent with what we measured before and so
7 they didn't record it, or else -- as I suspect --
8 it was written down like internally in
9 Mallinckrodt and -- and we don't have those
10 records anymore. We just have maybe the AEC's
11 measurements or what is recorded in memos that
12 have been recovered. Now it's known that they
13 did use film badges, spares and controls and
14 things like that. They -- they used some of the
15 extra film badges as area monitors and in fact I
16 think it had some kind of a program for placing
17 them, like to -- to have -- I think Mallinckrodt
18 pioneered some of this stuff because they were so
19 big and did so many things, and they were
20 cooperative in stuff like that. So I know they
21 did do a lot of -- especially in like the '50s.
22 Yeah, they used the film badges as area monitors.
23 Now we mostly don't have that -- the data for
24 that. I think it's out there somewhere, but who
25 knows. Anyway, so those are the two -- two

1 things they did. Apart from the human film
2 badges they -- they did those detector and film
3 badge measurements.

4 **MR. GRIFFON:** Is there going to be any survey
5 data you ran across during any of the
6 decommissioning activities for these sites?
7 Isotopic survey data. Janet?

8 **MS. WESTBROOK:** Yes.

9 **MR. GRIFFON:** I'm sorry. I was too far away from
10 the mike. Are there any survey data you ran
11 across for -- during the decommissioning period
12 for this site?

13 **MS. WESTBROOK:** What that I -- we ran across?

14 **MR. GRIFFON:** Survey data.

15 **MS. WESTBROOK:** Please?

16 **MR. GRIFFON:** Survey data, like isotopic
17 particularly, survey data.

18 **MS. WESTBROOK:** Well, not isotopic, but they --
19 they did of course have a -- years-later survey.
20 Let's see, was that by Oak Ridge, ORNL, and they
21 said oh, we found uranium here, or we found
22 radium, we found some thorium there. They did do
23 it to that extent, but during the time of
24 decommissioning they mostly were just looking to
25 get it down to below their limits of beta, gamma,

1 and alpha --

2 **MR. GRIFFON:** Right.

3 **MS. WESTBROOK:** -- by smear and by direct
4 measurements, so they didn't really care about
5 the isotopic stuff and so I think they never -- I
6 do not think there is any data for that.

7 **MR. GRIFFON:** And that characterization report,
8 does that -- that does have some uranium, radium,
9 and thorium data? Is it -- is it mainly soil
10 sampling? Is it also building survey stuff, or
11 is it mainly soils?

12 **MS. WESTBROOK:** No, it was -- they did a thorough
13 -- let me -- let me look at -- yeah, it was ORNL
14 and they surveyed both the airport site, and they
15 surveyed -- I think they surveyed Mallinckrodt
16 itself, if I'm not mis-remembering here, although
17 somehow I seem to have just hit on the -- can
18 only find the airport thing at the moment. Ah,
19 here we go. Radiological Survey of the
20 Mallinckrodt Chemicals, et cetera. They measured
21 all these buildings. They checked for uranium,
22 radium, actinium, and thorium concentrations in
23 the soil, and they again seem to have done some
24 observations of what -- where they were in the
25 buildings if they found the -- not the actinium

1 but the other three, they -- they noted that here
2 and there. So that's about all I can tell you
3 about what they did.

4 **DR. MAKHIJANI:** This is the 1981 Oak Ridge
5 survey?

6 **MS. WESTBROOK:** Yeah.

7 **DR. MAKHIJANI:** Is it on the -- on the database
8 there on the -- on your database?

9 **MS. WESTBROOK:** On the O drive in the library?
10 Yes.

11 **DR. MAKHIJANI:** Thanks.

12 **MS. WESTBROOK:** They also measured radon. Of
13 course remember, this was like -- oh, you know,
14 more than -- about 20 years, 22 years later,
15 something like that. They -- they also measured
16 radon, which of course will give you some idea of
17 what was going on, but anyway -- they did smears,
18 indirect measurements, plus the soil business.

19 **DR. MAKHIJANI:** I -- I have nothing more on
20 raffinates.

21 **MS. WESTBROOK:** Okay.

22 **DR. NETON:** Let's just -- I guess if there's no
23 more questions -- I -- I hate to let you go,
24 Janet, because you're a loss of knowledge here,
25 but I don't want to hold you up all day. So

1 that's it. I guess -- I guess you're off the
2 hook for now. Are you going to be available
3 later on in the afternoon?

4 **MS. WESTBROOK:** Yes.

5 **MR. GRIFFON:** Why don't -- can we -- I mean while
6 she's on the phone, I'm just curious about the --
7 we were talking earlier about the laboratory data
8 in general.

9 **DR. NETON:** Oh, okay.

10 **MS. WESTBROOK:** Yeah.

11 **MR. GRIFFON:** And there's that one memo that Jim
12 has showed us, and it referenced on page 77, 78,
13 something like that about the blank -- the sealed
14 blanks and the urine data tending to be -- if --
15 if it was biased, it was probably biased high.
16 Have you run across any other -- any other sort
17 of quality control documents or -- or --

18 **MS. WESTBROOK:** Whatever I ran into I thought --
19 along those lines, I thought was important for
20 the dose reconstructors to know, so everything I
21 knew about that is in there. Now a knowledgeable
22 person reading the references, looking at the
23 references, might be able to deduce something
24 more than I have been able to do, like somebody
25 who's really, you know, knows the meanings behind

1 the words or whatever. But everything that I
2 thought was of a quality control or how they did
3 it or what the limitations were, that's all in
4 the TBD.

5 **DR. NETON:** Okay. So -- this is Jim. Have you
6 not run across anything like split samples that
7 were run maybe at HASL, or any procedures related
8 to what they were doing, or things of that
9 nature?

10 **MS. WESTBROOK:** Only -- only that interview that
11 John Harley* gave to ORAU way back when they were
12 starting their four-plant study and one of those
13 four plants, of course was Mallinckrodt --

14 **DR. NETON:** Right.

15 **MS. WESTBROOK:** -- and he talked about how HASL
16 did their things and aliquots and so forth, and I
17 think there was one other thing in there, but
18 again it's this kind of retrospective thing
19 rather than what we did in real time but --

20 **DR. NETON:** Right.

21 **MS. WESTBROOK:** -- I -- I think that was probably
22 their usual method. And I -- I think in order to
23 do the urinalyses themselves, Mallinckrodt had to
24 satisfy AEC that they were using approved AEC
25 methods, or -- or that Barnes Hospital would --

1 who --

2 **DR. NETON:** Right.

3 **MS. WESTBROOK:** -- was supposed to be doing the
4 urinalyses, would be doing that. So -- so I
5 think we can assume that, on paper at least, what
6 AEC did was what they did.

7 **DR. NETON:** Right. It would just be nice if we
8 had some memos to that effect, you know, that --

9 **MS. WESTBROOK:** Well, I -- I don't know what to
10 tell you.

11 **DR. NETON:** I -- no, I'm not asking you to make
12 up anything, I just -- I'm just pointing out, you
13 know, where -- if you run across something, it'd
14 certainly be nice. And maybe we need to take a
15 little closer look at some of that stuff
16 ourselves --

17 **MS. WESTBROOK:** Well, you're the kind of guy who
18 at Christmas says oh, is this all the presents.

19 **DR. NETON:** You know, I may be. I think if you
20 ask my wife...

21 **DR. ZIEMER:** How much more can I get.

22 **DR. NETON:** Okay. All right. I think that
23 answers that question. Is there anything else
24 that we have for Janet --

25 **MR. GRIFFON:** Good place to stop.

1 **DR. NETON:** -- that's -- that's relevant at this
2 time? Okay. Janet, is it safe that we have
3 some issues later, like say -- I don't know what
4 time, 2:00-ish or so, we could call you back or -
5 -

6 **MS. WESTBROOK:** Oh, of course. Of course.

7 **DR. NETON:** All right. Well, we'll do that. I
8 think we're going to hopefully be breaking for
9 lunch fairly shortly and --

10 **MS. WESTBROOK:** Oh, my gosh. I should hope so.

11 **DR. NETON:** Well, food's not here yet, but it may
12 get here shortly. All right. Well, thanks,
13 Janet, and we'll be in touch.

14 **MS. WESTBROOK:** Okay.

15 **DR. NETON:** Okay. Bye.

16 **MS. WESTBROOK:** Bye, everybody.

17 **MR. GRIFFON:** Thanks.

18 **MS. BLOOM:** Bye.

19 **DR. NETON:** It might be good just to take a
20 little break now.

21 (Whereupon, a recess was taken from 12:35
22 p.m. to 1:40 p.m.)

23 **DR. NETON:** Okay. We're ready to start the
24 afternoon session, and I guess I'll just leave it
25 up to SC&A and Arjun to bring forth whatever

1 issues you care to.

2 **DR. MAKHIJANI:** Yeah. We still have some
3 questions along the same lines in the same set
4 that we were doing right before lunch, so I'll
5 just go to the next question, which is just a --
6 sort of a -- if you have an idea, what proportion
7 of claims have no bioassay data, like where
8 you're going to rely on air concentration --
9 rough idea?

10 **DR. NETON:** You know, I can't give you a -- a
11 handle. I tried -- I started to go through this.
12 I don't have the data yet, but I will -- I will
13 get that. My -- my feeling is the majority of
14 claims have bioassay data of some sort. Now that
15 may mean that you have some bioassay data that
16 are from the Weldon Springs era. Say -- say the
17 person works and started -- you know, maybe you
18 have nothing at Mallinckrodt. All of a sudden
19 you have a 1957 Weldon Springs bioassay or
20 something. That is information that one can use
21 to try to bracket some of these exposures. So in
22 going through roughly, I found bioassay data for
23 most of the cases, but I can't give you any
24 better answer than that, short of going through
25 each individual file. It's hard to say.

1 **DR. MAKHIJANI:** I -- I didn't understand your --
2 your comment, though, how you would use Weldon
3 Spring data to bracket the Destrehan Street
4 doses. I didn't get that.

5 **DR. NETON:** Well, let's say we -- and this is
6 just a technique, an example of a technique. In
7 1957 you have a -- a sample on the first day of
8 employment and it -- it's essentially
9 nondetectable and measures 10 micrograms uranium
10 per liter. One could put together, using that
11 data point, a bioassay scenario that would
12 predict what could be the maximum exposure of
13 that person in their Mallinckrodt time frame at
14 Destrehan Street, yet still have a .010 urine
15 sample in 1957. That may or may not be useful.
16 I'm saying to the extent possible, we would use
17 it.

18 Say, for example, if this were a -- a -- just a
19 systemic cancer, didn't concentrate uranium, you
20 could make some assumptions about solubility
21 class and do a bracketing estimate of the dose.
22 I saw there's --there's several cases like that
23 that I noticed where there were no bioassay data,
24 at least found or -- or observed in the
25 Mallinckrodt Destrehan Street era, and some for

1 Weldon Springs.

2 **DR. MAKHIJANI:** Yeah. I came across a couple --

3 **DR. NETON:** It's -- it's -- I just raise that as
4 a possibility that we -- we -- we, you know, we
5 may end up being able to use some of those data
6 points. But I -- I -- I'm sorry. I just can't
7 give you a better --

8 **DR. MAKHIJANI:** Yeah.

9 **DR. NETON:** -- feel.

10 **DR. MAKHIJANI:** It's -- it's just on the off
11 chance that you had an idea. Okay. Now at the
12 Board meeting you had this hypothetical example
13 of how you were going to address this sort of
14 data gaps, data integrity question, by using
15 urine data, air concentration data, and -- radon
16 breath data, was it? Something like that?

17 **MR. GRIFFON:** Source term.

18 **DR. MAKHIJANI:** Source term, I'm sorry --

19 **DR. NETON:** Source term to (unintelligible) --
20 right.

21 **DR. MAKHIJANI:** Is there a real-world example
22 that you --

23 **DR. NETON:** No, I don't have that yet. I'll be
24 working on it. That was one of reasons I was
25 hoping to do this a little later, but --

1 **DR. MAKHIJANI:** Yeah.

2 **DR. NETON:** -- we're going through the dataset.
3 I'm -- I'm going to try to approach it from
4 several levels. One is to look at the -- at the
5 individual datasets themselves and show that the
6 are somewhat consistent in their -- their ranges
7 and spreads. For example, if you plot -- if you
8 have a cumulative probability plot for the urine
9 data, and then you do a cumulative probability
10 plot for the dust data for a given year, and the
11 lines are quite parallel and move along, it gives
12 you some sense that low air concentrations have
13 low air samples; high concentration you have
14 higher samples, and -- and it gives you some
15 feeling there. And then to take it to the next
16 step and -- and take a few cases and try to
17 compare where that would stand using the air
18 data, the urine data, and the source term data,
19 it will give you some comfort that the -- the
20 numbers are internally consistent, given that
21 these type of comparisons rarely correlate
22 perfectly or even greatly. I mean we've got to
23 acknowledge that -- you know, there are a number
24 of reasons why air samples would -- would
25 possibly show higher exposures than urine

1 samples. Particularly if particle size selection
2 wasn't done and you're just sampling the entire
3 spectrum, much of the -- the dust may be
4 nonrespirable, you know, that kind of thing. We
5 take -- we take no credit for respiratory
6 protection in any of these dose reconstructions,
7 even though there's some indication that people
8 did wear respirators. So somehow -- it's a
9 difficult task to have to do this, but -- so
10 that's why it's taking a little longer than I
11 thought. But we are moving -- moving forward.

12 **DR. MAKHIJANI:** You will -- you'll have some of
13 this in the next -- in the --

14 **DR. NETON:** The next four --

15 **DR. MAKHIJANI:** -- couple weeks?

16 **DR. NETON:** Yeah, I'd like to -- I'm hoping by
17 the 13th to have some type of analysis that we
18 can sit down and discuss.

19 **DR. MAKHIJANI:** I'm making my own notes, but I
20 don't anticipate I'm going to get grades --

21 **DR. NETON:** No, not --

22 **DR. MAKHIJANI:** -- making summary notes.

23 **UNIDENTIFIED:** I figured that's what you were
24 doing.

25 **DR. NETON:** That's fine.

1 **DR. MAKHIJANI:** So I can rely on them and then
2 verify later on. Okay. So this is sort of the
3 big methodological question in actually applying
4 a lot of the TBD data. And here -- part of the
5 thing, you know, in the last review that we did
6 that kind of -- when I -- when I was doing the
7 analysis that's in the -- in the review, there's
8 this problem of, you know, two and three
9 measurements and with considerable scatter. It's
10 very important in some cases -- in some cases it
11 doesn't matter, you know, if you've got two
12 measurements in the lunchroom and the lunchroom
13 doesn't really contribute anything, that -- that
14 doesn't amount to anything. But in some cases
15 that I showed, that the uncertainty from a single
16 -- single operation in a set of measurements can
17 triple your -- triple your dose estimate if
18 you're going to 95 percentile. And so I'm just
19 wondering -- and I personally found it, just in
20 that short amount of time, I wasn't quite able to
21 come up with a good suggestion as to what method
22 you would use when you had uniformly very few
23 measurements as to how to aggregate all the
24 uncertainties. It just -- it wasn't obvious. So
25 I'm wondering where you are with that.

1 **DR. NETON:** I thought, when you're talking about
2 those individual measurements, you're talking
3 about a very specific function, right, like some
4 job description or some function. My thought on
5 this was more broad-based than that, and it would
6 be to use the facility distribution at that
7 point. So, you know, if you don't have any
8 confidence at all, or much confidence in the --
9 the very specific job that you were looking at, I
10 don't know why -- you know, we might be able to
11 use the facility distribution at that point which
12 encompasses, you know, the range of values. It's
13 just a thought. I mean, you know, but we've got
14 a plant by year and you know the range of the
15 concentrations. But -- but then you take a 95th
16 percentile of facility distribution.

17 **DR. MAKHIJANI:** But how does that help you with
18 the individual? Like you have Plant 4 and you
19 have a lot of different things going on, you have
20 different -- distinct things going on in Plant 4.
21 You have the UO-2 becoming UF-4, so that's a
22 discrete operation. And I think, if I remember
23 correctly, that's done in Plant 4.

24 **DR. NETON:** Uh-huh.

25 **DR. MAKHIJANI:** And then they take it next door

1 and they load the bombs and they put them in the
2 furnaces and that's -- even in a separate room,
3 that's all in Plant 4.

4 **DR. NETON:** Right.

5 **DR. MAKHIJANI:** And so you've got different --
6 first of all, you've got different solubilities.

7 **DR. NETON:** Well, the solubility is taken care of
8 by the bracketing, you know, whether -- we're
9 going to pick a solubility that is the most
10 claimant-favorable.

11 **DR. MAKHIJANI:** Okay. But if you have different
12 -- different operations all together --

13 **DR. NETON:** Right.

14 **DR. MAKHIJANI:** -- and it seems to me -- the
15 difficulty -- the difficulty I -- when I looked
16 at the data sort of carefully and tried to come
17 up with a set of calculations, it seemed to me
18 that the calculation of measurements for each
19 operation is actually different and so, because
20 different things are happening, you probably
21 construct a different distribution for each
22 operation.

23 **DR. NETON:** But within those family of
24 distributions, I think you -- you will find a
25 lognormal distribution of air samples. Cure the

1 probability plot, you know, it's got to be a
2 straight line if you do it in a lognormal
3 distribution and you pick the 95th percentile.
4 I'm -- I'm just, you know, throwing out ideas
5 here.

6 **DR. MAKHIJANI:** Yeah, yeah.

7 **DR. NETON:** I think that, you know, if -- if your
8 argument is that we have almost no data for that
9 facility-specific job, then the only thing we can
10 offer is that we would take the facility
11 distribution and use that value and apply it to
12 that class of workers.

13 **DR. MAKHIJANI:** I'm not saying there's --

14 **DR. NETON:** Yeah.

15 **DR. MAKHIJANI:** -- there's no -- no usable data.
16 I think the data for air concentration do appear
17 to be usable. I think since our discussions at
18 Bethlehem Steel -- I mean there are still some
19 questions to be settled, but as I think you may
20 have noted --

21 **DR. NETON:** Yeah. Right.

22 **DR. MAKHIJANI:** -- we're not kind of putting a
23 lot of weight where we did initially about how
24 were these samples taken and how do we know the
25 result.

1 **DR. NETON:** Right.

2 **DR. MAKHIJANI:** I mean that's still in the
3 footnotes and the fine print, but it's not --
4 it's not -- I don't imagine it as vague because I
5 think you presented some evidence that this can
6 be used for -- you know, at least as a first cut
7 -- to go ahead and think what (unintelligible).
8 But in -- in looking at this data, it's not that
9 you can't do anything with three measurements.

10 **DR. NETON:** Well --

11 **DR. MAKHIJANI:** It's that the uncertainties --
12 I'll give you a -- the uncertainties are actually
13 bigger than what I represented in -- the last
14 time because I just -- we didn't have any
15 information. So one of the things I asked people
16 who worked in Plant 4 in St. Louis last week is -
17 - and show them the AEC information -- is how
18 long did it take to load up one of these bombs,
19 mix the -- and he said, you know, by the time you
20 got started loading up -- preparing the bomb,
21 loading the uranium, mixing it, jolting it so it
22 was all properly tamped down, closing it and
23 loading it, it was half an hour. And when I
24 showed them that the AEC estimate was six and a
25 half minutes, they all laughed. And so you've

1 got -- now, I don't -- the AEC doesn't actually
2 have a jolting thing in that list, but it clearly
3 is part of a set of operations, so maybe somebody
4 missed something. Also, the number of operations
5 doesn't match, so there are a number of furnaces,
6 so I don't know how it was all added up. So
7 actually now I have more uncertainties --

8 **DR. NETON:** Uh-huh.

9 **DR. MAKHIJANI:** -- than -- because I don't know
10 what is the uncertainty in the time, and you're
11 talking about the uncertainties in the most
12 sensitive part of the operation where your air
13 concentration is the biggest. I mean I've only
14 looked at one as an example because -- I don't
15 know why I picked that one. I think I had the
16 data at hand, so -- and it was relatively
17 straightforward to do it, so I picked it. And by
18 chance there happened to be at least two people
19 who were very -- very familiar with -- with --
20 sorry -- Plant 4 and the bomb chargers and they
21 actually did that work who showed up in St.
22 Louis, so I was able to ask them in detail. So
23 it's -- I'm -- I'm just -- I'm -- if we're going
24 to use -- if there are no bioassay data, so I
25 agree with you on that. If you have bioassay

1 data, you don't have a problem. But if you're
2 going to use the air concentration data in the
3 TBD, I think -- it seems to me not a simple
4 exercise to actually convert that into
5 demonstrably claimant-favorable reasonable dose
6 estimate. I haven't been able to
7 (unintelligible).

8 **DR. NETON:** I don't know. I -- I'm not sure, you
9 know, what we can say. If it's -- there's
10 certainly uncertainties you can put about the
11 values, I mean how certain are you, and it's --
12 it's, you know, you can use some statistics, too.
13 But two measurements, three measurements with T-
14 distributions, wherever you can add -- you know,
15 add things on there.

16 **DR. MAKHIJANI:** Well, I guess the most
17 straightforward question in this regard is -- I
18 mean in the next -- since we have to present
19 something to the Board in terms of our review, my
20 question is are you going to show us how this is
21 to be done, because it seems not -- to me it
22 seems not an easy problem. Maybe you have a
23 solution to it and then we can all agree that it
24 is a solution. But right now I -- I can't. I
25 don't -- I don't have one in my head or I'd offer

1 it to you and --

2 **DR. NETON:** Well, you know, I mean not -- there's
3 not one answer for all your questions. You know,
4 there's not one answer for everybody. I mean you
5 can see what we've done in the example I showed
6 early on where they -- they took the highest air
7 concentration -- they attempted to take the
8 highest air concentration measured in any
9 facility in that year and apply it to the worker.
10 I mean I think that is a pretty demonstrably
11 claimant-favorable approach. I'm not unconvinced
12 that that wouldn't work for most systemic cancers
13 that don't concentrate uranium. So, you know,
14 it's sort of -- you know, you have to try these
15 approaches. But you know, that one would -- in
16 my mind would be the most claimant-favorable
17 approach.

18 **MR. GRIFFON:** Barring the --

19 **DR. NETON:** Barring, you know --

20 **MR. GRIFFON:** -- the raffinate questions.

21 **DR. NETON:** -- raffinate, the raffinate
22 questions, right. We're talking now just about
23 uranium --

24 **UNIDENTIFIED:** Multiply that --

25 **DR. NETON:** -- and then you multiply that times a

1 hundred and you've got your --

2 **UNIDENTIFIED:** You're done.

3 **DR. NETON:** -- your K-65 raffinate. But that --
4 that's possible. Now I guess at the end of the
5 day, you know, you need to refine it. And our
6 approach is if you can't refine it any better
7 than what you've got, you're going to go with the
8 unrefined estimate, which would be the maximum
9 air concentra-- I'm not suggesting that we will
10 do that, but that would be the fallback approach.
11 That's that. I mean we -- we certainly probably
12 need -- we need to think about this some more but
13 --

14 **MR. GRIFFON:** Yeah.

15 **DR. NETON:** -- I don't know. Dave, you got any
16 ideas?

17 **MR. ALLEN:** Like you said, it depends very much
18 on the dataset you're dealing --

19 **DR. NETON:** Yeah.

20 **MR. ALLEN:** -- with, et cetera, the case of -- I
21 mean you're talking about some additional
22 uncertainties in time-weighted averages and in a
23 situation where you only have three -- I mean
24 three data points isn't a lot to work with any
25 way you look at it.

1 **DR. MAKHIJANI:** Sometimes there's only one.

2 **MS. BLOOM:** And if it's all you have --

3 **DR. MAKHIJANI:** And then you really...

4 **DR. NETON:** Right. That's -- I'm suggesting the
5 facility distribution makes no sense to me,
6 whether it's the highest value ever measured in
7 the facility --

8 **MR. ALLEN:** Yeah, as far as how far to break it
9 down --

10 **DR. NETON:** Yeah.

11 **MR. ALLEN:** -- it's usually how far are we going
12 to be able to break down where that claimant was
13 --

14 **DR. NETON:** Right, and then what's your comfort
15 level with that as a bracketing value.

16 **MR. GRIFFON:** I guess that's why my line of
17 questioning on the -- can we narrow it down, this
18 population, whoever worked with or around the
19 raffinates, you know, and --

20 **DR. NETON:** Yeah.

21 **MR. GRIFFON:** -- separate that off because
22 otherwise, if you go maximizing all the way,
23 you're going to get into this almost default SEC
24 question. I mean -- I don't know potential --

25 **DR. NETON:** Yeah.

1 **MR. GRIFFON:** -- I'm not sure.

2 **DR. NETON:** Yeah.

3 **DR. MAKHIJANI:** Well, I just -- I just have a
4 request -- and there are three Board members here
5 so, you know, please advise us, SC&A, in that you
6 asked us to, you know, evaluate how the TBD might
7 be used in dose reconstruction. And the air
8 concentration distributions and tables are
9 obviously a very big part of the TBD and they are
10 intended to be applied when urinalysis data are
11 not there or deficient in some serious way. And
12 -- and we've agreed on that. So my request would
13 be that, you know, in the next two weeks or so
14 that NIOSH should propose something, otherwise it
15 would be -- I mean otherwise we'd be
16 disconstrained to say that we're still in the
17 same place, that it seems difficult to do this
18 and we don't have a proposed method to apply it,
19 which would -- so it would be nice to have
20 something from NIOSH as a proposed method --

21 **DR. NETON:** Well --

22 **DR. MAKHIJANI:** -- whether it is this what you've
23 been saying, or something that's applied to some
24 case, or maybe two or three different approaches
25 --

1 **DR. NETON:** Right.

2 **DR. MAKHIJANI:** -- for different cases, as you've
3 been saying.

4 **DR. NETON:** I think you're right because, you
5 know, you -- you -- a lot of this is dependent
6 upon what the answer to your first question was,
7 which is how many cases don't we have any
8 bioassay samples. If the answer is, let's say
9 theoretically ten -- which I think it's probably
10 more than that but let's say it's -- then this
11 question becomes less of an issue. I mean okay,
12 we're going to have to --

13 **MR. GRIFFON:** Yeah, that's a good starting point
14 --

15 **DR. NETON:** Well, that's what I'm saying. That's
16 a good starting point and then you say okay, of
17 those ten who have no bioassay samples -- because
18 we have statements that say virtually everybody
19 that needed to be bioassayed was. Now whether
20 you believe that or not -- but let's start there
21 and then look at the job title, and it's a
22 secretary, the question is a lot different, you
23 know, so what do we use then. And -- and should
24 we not go back and use the coworker urine data
25 and -- and, you know, instead of the air

1 monitoring data because there's so many different
2 angles that one could take on this. So just
3 because there are tables of air data does not
4 mean we're constrained to use them if you don't
5 have bioassay data, so --

6 **DR. MAKHIJANI:** Yeah. Well, I'm not --

7 **DR. NETON:** But you're right. You've raised an
8 issue --

9 **DR. MAKHIJANI:** -- suggesting that. I'm just
10 saying that just from my -- you know, I've been
11 made the point person to give our team --

12 **DR. NETON:** I understand.

13 **DR. MAKHIJANI:** -- the draft of this and I
14 promised them that I'd do that, you know, in the
15 --

16 **DR. NETON:** Right.

17 **DR. MAKHIJANI:** -- next coup-- two -- 10, 15 or
18 20 days I'm going to give them a solid draft, and
19 I -- whatever the proposed methods are, I need to
20 be able to say something about that.

21 **DR. NETON:** But part of that is what Dave and I
22 were just saying, though, is it's -- it's almost
23 not a fair question to say exactly what method
24 you're going to use for -- for all cases because
25 --

1 **DR. MAKHIJANI:** Yeah.

2 **DR. NETON:** -- it doesn't apply. There is no
3 fixed answer to these question.

4 **MR. GRIFFON:** Yeah. I guess -- I guess that's
5 not fair, you're right --

6 **DR. NETON:** Yeah.

7 **MR. GRIFFON:** -- and I think -- I think --

8 **DR. NETON:** NIOSH does not have a standard method
9 to apply when there's no bioassay data. Well,
10 guilty, but I think for good reason. There are -
11 - there is no standard approach that should be
12 used. I don't think I'd want to constrain
13 ourselves to say every time you have no bio-- you
14 know --

15 **MR. GRIFFON:** Right.

16 **DR. NETON:** -- so that's my point is --

17 **MR. GRIFFON:** Right.

18 **DR. NETON:** So you need to be careful in how this
19 question is raised and --

20 **MR. GRIFFON:** But I think you can present it in
21 such a way -- I mean, you got to be -- maybe be
22 careful presenting --

23 **DR. NETON:** Yeah, I think --

24 **MR. GRIFFON:** -- another theoretical model
25 because that --

1 **DR. NETON:** Well, no. It won't be a theoretical
2 model, either.

3 **MR. GRIFFON:** No more theoretical models but --

4 **DR. NETON:** But I think a listing --

5 **MR. GRIFFON:** Right.

6 **DR. NETON:** -- of approaches.

7 **MR. GRIFFON:** But also, and I think most
8 important to me, is -- is just some assurance
9 that each one of those tools in your toolbox can
10 be used. They're not so rusted that they -- you
11 know. For instance, the air sampling -- just to
12 go back to the raffinate issue, you know, we're
13 going to use this approach for people who were
14 likely exposed to, you know, the Air Force -- or
15 the airport cake -- Air Force -- airport cake,
16 you know, type raffinate. Well, can you tell me,
17 you know, at the Board meeting, do you have a way
18 -- if you're going to use that option, do you
19 have a way of identifying who was and was not
20 exposed? Because otherwise, how do we define
21 this class? I mean I guess that's -- that's --

22 **DR. NETON:** Right.

23 **MR. GRIFFON:** -- you know, one thing that -- you
24 can say you've got all these tools, but if -- if
25 they don't function in the reality of information

1 you have about your claimants -- so -- so I guess
2 that's what we're looking for is some assurance
3 that -- that --

4 **DR. NETON:** Right.

5 **MR. GRIFFON:** -- you know, some of those ifs you
6 can --

7 **DR. ZIEMER:** Jim, let me also ask this question.
8 Can you characterize raw job descriptions for
9 most of the Mallinckrodt people? The example we
10 had earlier today, we didn't know where that
11 woman -- I think it was a woman --

12 **DR. NETON:** Right. Yeah, I think we have job --

13 **DR. ZIEMER:** Does that tend to be the exception
14 on Mallinckrodt? Are there job descriptions of -
15 -

16 **DR. NETON:** Yeah, most of workers we have some
17 type of job description -- or job title, let's
18 put it that way.

19 **DR. ZIEMER:** Or title, so you could distinguish
20 between a Plant 6 production line versus a
21 secretary type of thing?

22 **DR. NETON:** We have a lot of that information,
23 and in general I think -- yes, I agree. I think
24 we know by plant and even more specifically by,
25 you know, operator, chemical operators --

1 **DR. ZIEMER:** Right.

2 **DR. NETON:** -- maintenance workers, that sort of
3 thing, you know. We always have some trouble
4 binning people in the plant once you get there
5 between -- as Arjun pointed out correctly,
6 electrical -- electrical workers tend to be maybe
7 less exposed as chemical operators in some cases
8 so -- but yeah, we -- we could do that. We could
9 identify who was where, to a large degree. This
10 raffinate issue though, is going to be sticky. I
11 mean I -- I think at the end of the day if we
12 can't -- if we could identify that the person was
13 in the plant and exposed, and I don't know that
14 there's -- you know, you mentioned this SEC
15 territory. I'm not comfortable saying that just
16 because we would have to say that all people
17 maybe were raffinate workers, that would
18 necessarily move it down that path. I mean --

19 **DR. ZIEMER:** Right.

20 **DR. NETON:** -- that's, you know --

21 **MR. GRIFFON:** It may not be --

22 **DR. NETON:** Yeah.

23 **DR. ROESSLER:** Looking toward the future of other
24 potential SEC petitions, is this raffinate
25 something -- this will set a precedent, whatever

1 is decided here, for future cases? I'm looking
2 across the board at the consistency situation.

3 **DR. NETON:** There -- there's a finite number of
4 -- of sites, I think that -- that processed raw
5 ore. I mean Harshaw comes to mind I guess --

6 **UNIDENTIFIED:** Fernald.

7 **DR. NETON:** -- Harshaw Chemical, Fernald to a
8 certain extent, but there aren't many of the DOE
9 sites that -- that did this, you know, they
10 started with raw. Now uranium mills, that's a
11 different story. But I think there may be one
12 uranium mill in covered facilities, I think. I
13 think -- but there aren't that many compared to
14 the people who actually took the finished product
15 that these folks made, the uranium metal, and
16 then started rolling it and machining it and
17 what-not so...

18 **DR. MAKHIJANI:** So here -- here the problem is I
19 think much more complicated than in most places
20 because of this raffinate being brought back.
21 Because the pitchblende was so rich that the
22 raffinates themselves were comparable to a lot of
23 uranium ore. You know, they had one -- one
24 percent uranium in them. And so they were
25 processing one percent uranium, so it was -- you

1 know, they had essentially ore sitting out at the
2 airport except it had a hundred times more radium
3 than ore. And so I think Mallinckrodt and maybe
4 one or two other places may be kind of unique in
5 that -- even at Fernald they did not have -- so
6 there you have equilibrium, which at least in
7 principle is -- is sort of simpler to handle. So
8 you have uranium in the urine and then you go
9 back and you can do your isotopic ratios. Here,
10 it's -- it's sort of much more complicated
11 because you have the disequilibrium from the
12 reprocessing of raffinate. I don't know. I'm --
13 I'm not aware that there were a lot of sites that
14 --

15 **DR. NETON:** No, I don't think so.

16 **MS. BLOOM:** I think the --

17 **DR. MAKHIJANI:** I mean this is the only one that
18 I know --

19 **MS. BLOOM:** -- reprocessing of it would be
20 unusual.

21 **DR. MAKHIJANI:** I think maybe Cotter*. Did
22 Cotter* do some of that, maybe?

23 **MR. ALLEN:** I'm not sure.

24 **DR. ROESSLER:** (Unintelligible)

25 **DR. NETON:** That sounds good. It's not going to

1 be a large number of sites. I mean I don't know
2 anybody that did complete isotopic measurements,
3 especially back in these days, for these -- these
4 type of --

5 **DR. ROESSLER:** What my bottom line I guess is, in
6 fairness to all sites, is that they're all
7 treated scientifically the same, not -- not
8 treated differently because of particular
9 advocacy groups or anything like that. I think
10 that's where we have to make sure that it's
11 scientifically solid. And if the sites are a lot
12 different then it's hard to do that.

13 **MS. BLOOM:** I think one other thing that plays
14 into it is sometimes you have much better
15 information. Mallinckrodt was so well-studied
16 that you have much more confidence in the job
17 titles for that site than you do at most other
18 sites where job titles are based on memories 50
19 years later by either the -- the Energy employee
20 or the claimant, and so there's much less
21 certainty and not as much confidence in
22 stratifying the exposures there. I think there's
23 -- you know, the process needs to be fair. Does
24 it result in the same exposures everywhere? No.
25 Does that seem equitable? It depends on your

1 point of view.

2 **DR. NETON:** Well, the trick is to nail down the
3 isotopic composition of the raffinates, and Janet
4 has given us some hints as to what those are.
5 And it actually may end up being that one of the
6 raffinate streams will -- will overbound the
7 others. I mean, you know, we're worried about
8 thorium 230. Thorium 230 for -- for systemic
9 organs is -- nonmetabolic organs is not an issue.

10 **MR. GRIFFON:** Probably not that big of one.

11 **DR. NETON:** You know, so if one assumes that
12 we're working in a -- in a stream with a hundred
13 to one radium to uranium, you're going to -- my
14 guess is, to really be claimant-favorable to
15 those systemic organs and -- and yeah, we need to
16 develop a coaching approach that you guys can all
17 understand and -- and demonstrate that, you know,
18 this is the path we're going to go down with
19 that.

20 **MR. GRIFFON:** Great. Thanks.

21 **DR. MAKHIJANI:** Okay. Radon data. Now we have
22 this -- that document from Mason, you know, in
23 which he said that radon data were not really
24 suitable for dose estimations. He said -- I
25 think he said something that --

1 **DR. NETON:** I looked. I tried to find that,
2 Arjun. I can't -- is it -- is it in the profile,
3 or is it another document?

4 **DR. MAKHIJANI:** It's not in the profile.

5 **DR. NETON:** That's why I couldn't find it.

6 **DR. MAKHIJANI:** It's -- it's a Mason document --

7 **DR. NETON:** I remember talking about this.

8 **DR. MAKHIJANI:** -- and I believe I have it in my
9 computer, but --

10 **MS. BLOOM:** Is that the one that says that the
11 average -- they don't know how to apply the
12 average radon data to a worker. My understanding
13 was he wasn't saying that the data were no good,
14 they just didn't feel that they -- that they had
15 sufficient time and motion studies to apply that
16 data to the workers for, you know, providing the
17 epidemiological kind of data that they were
18 looking for.

19 **DR. MAKHIJANI:** Yeah, I don't think it was a
20 wholesale condemnation of the data as invalid or
21 anything.

22 **DR. NETON:** Right.

23 **DR. MAKHIJANI:** I agree --

24 **DR. NETON:** And I think that's where --

25 **DR. MAKHIJANI:** -- let me try to --

1 **DR. NETON:** All right. My recollection is -- is
2 what Cindy's saying is -- and I think I may have
3 seen this.

4 **MS. BLOOM:** But I think that makes it -- not that
5 the data is not usable for dose estimation, it's
6 probably not usable for risk estimation in terms
7 of developing epidemiological studies. In terms
8 of a compensation program I think that the data
9 is --

10 **DR. ROESSLER:** Makes a big difference.

11 **MS. BLOOM:** -- is probably very reliable -- you
12 know, not very reliable, but --

13 **DR. NETON:** Can be used for compensation
14 purposes, I think. And he certainly was not
15 speaking from a compensation program
16 perspective.

17 I believe we have somewhere in the vicinity of
18 2300 radon measurements. Is that right?

19 **MS. BLOOM:** And those are the breath analyses.

20 **DR. NETON:** Oh, no. Those were -- but I think
21 there's also a few --

22 **MS. BLOOM:** Oh, right.

23 **DR. NETON:** -- thousand just area radon
24 measurements.

25 **MS. BLOOM:** I think you're right.

1 **DR. ZIEMER:** Do -- do you know what Mason meant
2 by dose estimates in that time frame?

3 **DR. NETON:** I think when they went back and they
4 tried to reconstruct the doses to the workers in
5 --

6 **DR. ZIEMER:** Actual --

7 **DR. NETON:** -- time frames --

8 **DR. ZIEMER:** - organ doses? Because --

9 **DR. NETON:** Oh, yeah. I believe so.

10 **MS. BLOOM:** Yes.

11 **DR. NETON:** Yeah. They were coming up with --

12 **DR. ZIEMER:** Because really the -- the legal
13 limits were working-level months. They weren't
14 dose limits.

15 **DR. NETON:** Right. Well, effectively they were.
16 I mean there were some exposure limit, some
17 exposure value --

18 **DR. ZIEMER:** More like an exposure limit, yeah.
19 But I mean --

20 **DR. NETON:** Right.

21 **MS. BLOOM:** They weren't looking at the limits
22 whether -- they -- they were doing dose.

23 **DR. ZIEMER:** Dose in what kind of use?

24 **MS. BLOOM:** Lung doses.

25 **DR. ZIEMER:** Lung doses?

1 **DR. NETON:** Radon though? I don't know that I
2 saw that they were doing radon lung doses.

3 **MS. BLOOM:** Well, the radon they decided not to
4 do because of the question -- but they were doing
5 the uranium --

6 **DR. NETON:** See, those were sort of independent -
7 -

8 **MS. BLOOM:** -- I think they had radium in there
9 as well.

10 **DR. NETON:** You know, there's a certain --
11 there's a maximum permissible body burden or lung
12 burden for uranium, then you've got a maximum
13 permissible exposure for radon. And in my mind,
14 back in those days they were independent source
15 terms, not additive.

16 **MS. BLOOM:** Uh-huh.

17 **DR. NETON:** In fact, I think even at DOE sites
18 today, there's (unintelligible) question as to
19 how that works, but -- so I think -- I think what
20 he was saying, though, is we could not go back
21 and do an accurate reconstruction of an
22 individual worker's working level month dose --
23 or working level month exposure.

24 **DR. ZIEMER:** Level month --

25 **DR. NETON:** Exposure.

1 **DR. ZIEMER:** Okay.

2 **DR. NETON:** And that's probably true, you know,
3 you -- you couple it with a few thousand
4 measurements with -- with, you know, no time and
5 motion studies that they recorded. But I think
6 for our purposes, using these radon data, it --
7 we can use them in a compensation program and use
8 claimant-favorable values where necessary, pick
9 the highest radon concentration in the plant that
10 we need be, or in some cases -- as I talked about
11 earlier -- just using the outdoor radon
12 concentration of somewhere in the vicinity of 19
13 picocuries per liter is sufficient to demonstrate
14 the lung cancers over 50 percent. If it's not,
15 it doesn't take a lot of radon to -- to move
16 these into the 50 percent-plus range.

17 **MR. ALLEN:** The radon would apply to people
18 working with pitchblende or with the raffinates
19 with lung cancer and I can't --

20 **DR. NETON:** Well, see, yeah. You take --

21 **MR. ALLEN:** -- the real -- the real data there is
22 generally enough to compensate them.

23 **MR. GRIFFON:** Right.

24 **DR. NETON:** The trickier part then is the people
25 who were not process-type operators, in general

1 occupants of the site. Then you have these
2 outdoor radon concentrations which I'm assuming
3 we would assign. I think in that one year there
4 was 30 measurements made in that one year that I
5 looked at. We would assign that value for their
6 -- for their exposure. And I don't know -- I
7 mean it may be a moot issue. It may not be
8 relevant in some ways because we may have already
9 done all the lung cancer. I don't know. I have
10 to look through the database. We've done 66 dose
11 reconstructions, most of which were lung cancers.
12 And outside of lung cancer, I don't view the
13 radon as being a contributor to (unintelligible).
14 **DR. MAKHIJANI:** (Unintelligible) it's in the
15 review that we did, and the document is notes and
16 summary by M. Mason, August 1975. And what it
17 says here, (reading) There are fragmentary
18 measurements of air radon beginning about 1946
19 and continuing through about 1955. I view them
20 as having little if any use as a measure of
21 magnitude of individual exposure. These data can
22 be used to show that certain jobs or job
23 categories did entail possible exposure to radon
24 within a mini -- max/mini range. Any
25 interpretation beyond that would be erroneous, in

1 my opinion.

2 **DR. NETON:** Okay.

3 **DR. MAKHIJANI:** So --

4 **DR. NETON:** That speaks to compensation program -
5 -

6 **DR. MAKHIJANI:** Yeah.

7 **DR. NETON:** -- usage, though.

8 **DR. MAKHIJANI:** So -- so that's what you're
9 saying is that the only way -- so radon data --
10 the way you would resolve this comment is that
11 you would use radon data for the maximum --

12 **DR. NETON:** Right.

13 **DR. MAKHIJANI:** -- of -- in order to put an upper
14 bound but not to --

15 **DR. NETON:** Right.

16 **DR. MAKHIJANI:** -- we couldn't use it in any more
17 refined way.

18 **DR. NETON:** We wouldn't be doing time weighted
19 average values or anything of that nature, just
20 no way we could do that.

21 **DR. MAKHIJANI:** So that will resolve that
22 question. I had --

23 **DR. NETON:** There was some pretty high values
24 too, in there. I mean it was --

25 **MS. BLOOM:** What were some of the values?

1 **DR. NETON:** Oh, I think there was some that were
2 -- I want to say 1000 picocuries per liter or
3 something like that.

4 **DR. ROESSLER:** (Unintelligible) say 600.

5 **DR. MAKHIJANI:** (Unintelligible) pretty nasty
6 stuff.

7 **DR. NETON:** But since you get these in a confined
8 space at all --

9 **DR. ROESSLER:** Of course that will be on the
10 record. Holy cow.

11 **DR. MAKHIJANI:** That's my line, isn't it? Where
12 I come from -- sorry.

13 **DR. NETON:** I just read something about that,
14 they're consolidating all (unintelligible) Okay.
15 All right. Now that -- that takes us through --

16 **DR. MAKHIJANI:** Yeah. I think the external dose
17 question we're going to leave till tomorrow when
18 Hans is here.

19 **DR. NETON:** I appreciate that. I just will have
20 better intelligence here tomorrow to speak to
21 that.

22 **DR. MAKHIJANI:** But --

23 **DR. NETON:** Yeah, let's get to --

24 **DR. MAKHIJANI:** -- (unintelligible) question
25 about ABC or if -- if -- Dr. Ziemer, did you ask

1 whether we're going to go through the summary of
2 the -- the table that we have? We could do that
3 --

4 **DR. ZIEMER:** Well, I was -- I was really --

5 **DR. MAKHIJANI:** Are you going to be here
6 tomorrow?

7 **DR. ZIEMER:** -- just asking where SC&A and NIOSH
8 were with respect to the issues raised in your
9 report.

10 **DR. MAKHIJANI:** Yeah, right.

11 **DR. ZIEMER:** And I -- I think what you told me
12 was that, based on this information, you would be
13 in a position to revise this table appropriately
14 and maybe identify if there are any outstanding
15 issues; is that correct?

16 **DR. MAKHIJANI:** Yeah. It -- it may be that we
17 should go to this table and see what the internal
18 dose questions are remaining and take them up so
19 that we can deal with them.

20 **MS. BLOOM:** Do we have this table?

21 **DR. MAKHIJANI:** Yeah. I think a review of --

22 **DR. ZIEMER:** It's in their actual review --

23 **MS. BLOOM:** Okay.

24 **DR. ZIEMER:** -- SC&A review of Rev. 1.

25 **DR. NETON:** We don't have it with us but --

1 Mallinckrodt. And I -- I can tell you right now
2 we're -- we have not been able to find any real
3 definitive evidence of constant heavy breathing
4 at any public -- published reports of the
5 constant heavy breathing at places like steel
6 mills or even Mallinckrodt. The heavy breathing
7 rate, if -- this will be in our analysis --
8 speaks to some pretty demanding tasks such as,
9 you know, sledge hammering, pushing a wheelbarrow
10 around with 75 pounds of weight on a continuous
11 basis, that kind of stuff. And so this will be
12 addressed in a -- under separate cover and be
13 referenced in here. But right now we're not
14 inclined to say that Mallinckrodt should be 1.7
15 cubic meters per hour on a constant basis.

16 **DR. MAKHIJANI:** Well, we didn't actually -- you
17 know, we actually modified -- after the
18 discussion on Bethlehem Steel I went back a
19 little bit. Bethlehem Steel was, you know,
20 imaginably hard work a lot of the time, but I
21 actually went back and we discussed this. And
22 this is written somewhat differently and in the
23 time weighting discussion this comes up in a more
24 elaborated way in that there's some tasks that
25 may last at least 15 minutes or, you know, when

1 they're really tamping these bombs and they're
2 loading the uranium and they're shoveling stuff,
3 it may be, you know, five minutes or ten minutes
4 half a dozen times a day. But those happen to be
5 the operations where there's heavy dust. For
6 instance, they may -- may happen to be -- so you
7 have a kind of a combination of -- that workers
8 are breathing more hard at times when they're
9 doing work that's more dusty. And so I think
10 we've -- at least in this review -- refined our
11 own thinking a little bit along in the sense that
12 heavy breathing should actually -- in the context
13 of time-weighted data -- be considered, you know,
14 in a job-specific way or even in a time-specific
15 way, or both.

16 **DR. NETON:** Right.

17 **MS. BLOOM:** I think we'd be hard-pressed to do
18 that, just in terms of modeling things. I think
19 we also tend to pick the more soluble or the type
20 -- absorption type that's going to result in a
21 larger dose. We pick times when we apply these
22 over -- when we apply things for 2000 hours for a
23 standard work year when we know workers weren't
24 in those areas for that period of time. So I
25 think there's lots of things that weight that --

1 those little spikes. We also take -- we have
2 uncertainty in the metabolic models that we
3 account for when we get to the dose
4 reconstructions.

5 **DR. NETON:** Yeah. I -- I think -- I'm going to
6 try to get my terminology straight here, but the
7 heavy exercise model assumes heavy breathing for
8 one hour out of the eight-hour work shift.
9 That's my recollection, or -- and the terminology
10 might be --

11 **DR. NETON:** -- wrong.

12 **MR. ALLEN:** (Unintelligible) workers in these --

13 **DR. NETON:** Heavy worker -- heavy worker, heavy
14 exercise for one hour --

15 **MR. ALLEN:** That's right.

16 **DR. NETON:** -- which would be at -- at the high
17 rate. And I don't think we're fundamentally
18 opposed to using that where it might make some
19 sense. I think -- I -- I thought early on -- the
20 original comment was that SC&A's position that we
21 should go beyond the highest exposure category in
22 the ICRP models and concoct some new model that
23 would be heavy breathing for more than one hour
24 per work shift, and we have been hard-pressed to
25 come up with any indication that that's the case

1 in -- in the literature. I mean I guess finding
2 -- not finding information does not prove this,
3 but there's certainly nothing out there and in --
4 in a pretty detailed review of the ICRP
5 publications, some of the heavy breathing was
6 really developed in uranium -- I mean in -- in
7 mining. Uranium mining I believe is what it
8 referred to. Anyway, we're going to have this
9 written up in more detail.

10 **MR. GRIFFON:** Okay. Was there -- was there --
11 also I thought more of the outstanding issue was
12 the -- the nasal versus oral breathing.

13 **DR. NETON:** That's another issue, right, oro-
14 nasal versus --

15 **DR. ZIEMER:** You know, in general --

16 **MR. GRIFFON:** I thought that was the bigger
17 outstan-- I thought we resolved that --

18 **DR. ZIEMER:** -- (unintelligible) deposition it
19 seems like you'd get more swallowed stuff --

20 **DR. NETON:** You mean the heavy breathing?

21 **DR. ZIEMER:** -- with the oral -- with the oral.
22 What happens --

23 **DR. NETON:** The oro-nasal breathing -- if you
24 breath through your mouth preferentially you'll
25 increase the dose. It's -- it's --

1 **DR. ZIEMER:** To the lung?

2 **DR. NETON:** What happens is you end up not
3 filtering out the stuff through the nasal
4 passages as much and so it's a direct deposition
5 into the lungs.

6 **DR. ZIEMER:** Still goes down through --

7 **DR. NETON:** Right. The -- the ET-1, as they call
8 it, acts as a pretty efficient filter.

9 **DR. ZIEMER:** Right, right.

10 **MR. GRIFFON:** And there's a default in ICRP for a
11 certain fraction going through -- through the
12 mouth, right -- I think.

13 **DR. NETON:** Well, it assume-- once you get the
14 heavy breathing then it switches to a certain --
15 50 percent I think oral breathing. So even most
16 people switch to oral breathing 50 percent of the
17 time when you have a heavy breathing rate. On
18 the other side of the coin, there are people that
19 are preferential nose breathers who only breath
20 through their nose --

21 **MR. GRIFFON:** Right.

22 **DR. NETON:** I mean I know more about this than I
23 ever really cared to.

24 **MR. ALLEN:** Me, too.

25 **DR. NETON:** So I think -- first of all, I think

1 this is not really very relevant when we have
2 urine data. Right, Dave? I mean the urine data
3 would --

4 **MR. ALLEN:** Right --

5 **DR. NETON:** Bioassay --

6 **MR. ALLEN:** -- systemic --

7 **DR. NETON:** If you have bioassay data and you're
8 talking about systemic organs, it's -- it's not --
9 -- not an issue because we're just modeling the --
10 you know, the deposition directly. But we -- we
11 have not been able to convince ourselves that
12 oro-nasal breathing is any different than what
13 the ICRP models predict. We've done some
14 analyses where you can look at -- say where you
15 do have urine data -- help me out here, Dave. I
16 thought -- with the type M material there's no
17 indication that the people were more mouth-
18 breathers -- or no, is that -- what did we do --

19 **MR. ALLEN:** I'm not sure where you're heading.

20 **DR. NETON:** We've looked at the oro-nasal
21 breathing issue for Bethlehem Steel. I mean
22 that's one thing that we're getting ready to put
23 out.

24 **MR. ALLEN:** Yeah. And Bert-- Simonds -- using
25 some Simonds data --

1 **DR. NETON:** Using some Simonds data --

2 **MR. ALLEN:** -- and (unintelligible) all followed

3 --

4 **DR. NETON:** It looks like the standard ICRP
5 default models are not inconsistent or
6 inappropriate to be used. If you take the urine
7 data, compare it to the air concentration data,
8 the air concentr-- well --

9 **MR. GRIFFON:** Yeah.

10 **DR. NETON:** -- the air concentration is much,
11 much higher --

12 **MR. GRIFFON:** Right.

13 **DR. NETON:** -- than what the predicted urinary
14 output is so -- there's some empirical evidence
15 of this.

16 **MR. GRIFFON:** But there's a lot of other factors
17 in -- combining those two things --

18 **MS. BLOOM:** Well, I would think that the
19 solubility is what really --

20 **MR. ALLEN:** Well, I think if you take the Simonds
21 Saw, if you take that time-weighted average, use
22 a 1.2 and not a 1.7 and use the type M solubility
23 for U-308, 'cause it's more like 140 days, then
24 you'll hit the mean of the urinalysis pretty
25 close with the average -- time-weighted average

1 and you'll hit the high urinalysis with the
2 highest time-weighted average. It -- it fits
3 pretty well.

4 **DR. NETON:** So yeah, I'm getting into the
5 Bethlehem Steel issues, but --

6 **MR. ALLEN:** Oh, yeah, you know.

7 **DR. NETON:** Right now we're not -- I'm not --
8 fundamentally I'm not opposed to adjusting the
9 heavy breathing for certain positions as long as
10 it's consistent with the default -- the highest
11 default ICRP model. To go beyond that, we just
12 really have no evidence to -- to hang our hat on
13 that that's the case.

14 **MR. ALLEN:** Right.

15 **DR. MAKHIJANI:** So -- but we won't expect this
16 before -- in the next few -- couple of weeks.

17 **DR. NETON:** No, probably not.

18 **DR. MAKHIJANI:** But it's not a thing that, in
19 principle, can't be addressed. This is --

20 **DR. NETON:** Yeah, well --

21 **DR. MAKHIJANI:** -- this is something that we can
22 address. It's not a --

23 **DR. NETON:** No, this is --

24 **DR. MAKHIJANI:** -- question or modeling question
25 like raffinates that we have -- it's not that

1 kind of a question.

2 **DR. NETON:** This is an approach.

3 **DR. MAKHIJANI:** Right.

4 **DR. NETON:** This is an approach issue.

5 **MS. BLOOM:** Would this be -- I guess I sort of
6 see it as you have to identify who you're
7 applying this to --

8 **DR. NETON:** If at all.

9 **MS. BLOOM:** -- and that gets back to the -- to
10 everyone.

11 **DR. NETON:** Well, then you get in a situation
12 where you have a job category. Let's say for
13 instance we would make whoever the bomb operators
14 were heavy breathing. Then if they -- if it were
15 known that they were a bomb operator, you would
16 apply that. But then -- then you get in a
17 situation where I don't know what the person did
18 and then you apply it. The more special cases
19 you have, the harder it is to --

20 **MS. BLOOM:** Yeah.

21 **DR. NETON:** -- to apply.

22 **MS. BLOOM:** And I think it gets tough and I think
23 -- well, I guess I'm concerned about having two
24 choices out there because I think --

25 **DR. NETON:** I agree. It makes it -- makes --

1 there's some --

2 **MS. BLOOM:** There are other ways --

3 **DR. NETON:** -- there's some rationale --

4 **MS. BLOOM:** -- to capture it.

5 **DR. NETON:** There's some rationale for making
6 just one choice. And if we do, it would be the
7 conservative one. For instance, I noticed here
8 we moved down to 1.2 cubic meters per hour. I'm
9 not sure what happened there. I mean --

10 **MS. BLOOM:** From the 1.4?

11 **DR. NETON:** Right.

12 **MS. BLOOM:** Because that's not an option in IMBA.
13 You can't model doses with 1.4.

14 **DR. NETON:** Right.

15 **MS. BLOOM:** You can model intakes but --

16 **DR. NETON:** Right.

17 **MS. BLOOM:** -- not doses.

18 **DR. NETON:** Okay. We -- yeah. Okay. We'll talk
19 about that.

20 **DR. MAKHIJANI:** Okay. The -- the incidence
21 question. Now --

22 **DR. ZIEMER:** Which page are you on?

23 **DR. MAKHIJANI:** I'm in -- I skipped the
24 raffinates under -- because we already covered
25 that, and then under that on page 7 --

1 **UNIDENTIFIED:** (Unintelligible) page 7?

2 **DR. MAKHIJANI:** -- on top of page 7, incidents,
3 high risk jobs, intakes (unintelligible). So
4 let's take incidents. I mean we -- you had an
5 approach to incidents. We did some -- Mike Thorn
6 ran some quick numbers that, you know, haven't
7 been kind of checked. I just told him to do some
8 normalized -- going backward from one microgram
9 per liter into intake and dose at various times.
10 You know, if you had an impulse intake after an
11 accident just after the last urinalysis, you get
12 pretty big numbers and quite -- well, depending
13 on the organ. But you get -- you know, you get --
14 -- especially if you have annual -- if you have an
15 annual bioassay, you're going to wind up with
16 very huge numbers. In any case, I -- I don't
17 know if you've -- and then when you apply that --
18 because in all the cases that we've looked at,
19 normally you consider a chronic intake. You
20 don't consider an impulse intake or a one-time
21 intake. So my question about this is obviously
22 there's going to be -- there's going to be a huge
23 difference in -- in estimated dose depending on
24 whether you assume a chronic intake or impulse
25 intake.

1 **MR. ALLEN:** When you say there's huge numbers,
2 are you talking intake or are you talking dose?

3 **DR. MAKHIJANI:** Both, you -- because --

4 **MR. ALLEN:** Because --

5 **DR. MAKHIJANI:** Yeah.

6 **MR. ALLEN:** -- because the only way you can
7 assume --

8 **MR. GRIFFON:** Depends on --

9 **MR. ALLEN:** -- an acute intake from that
10 urinalysis that occurred like a year before is to
11 assume that he was not exposed for the rest of
12 that year.

13 **DR. MAKHIJANI:** Well, that's the model that you
14 have proposed.

15 **MR. ALLEN:** And if you do that, the doses usually
16 aren't that much different than a chronic intake.

17 **DR. NETON:** Yeah, that's true.

18 **MR. GRIFFON:** Plus the numbers (unintelligible) -
19 -

20 **MR. ALLEN:** You get a lot of intake --

21 **MR. GRIFFON:** -- what I've done just --

22 **DR. NETON:** You either come down like this or you
23 go like this (indicating).

24 **MR. GRIFFON:** Right.

25 **DR. NETON:** They -- they intersect at some point.

1 **MR. ALLEN:** They're not that different.

2 **DR. MAKHIJANI:** (Unintelligible) not that
3 different.

4 **MR. ALLEN:** (Unintelligible) a million scenarios
5 and then you can't --

6 **MR. GRIFFON:** Right. Lots of scenarios.

7 **DR. MAKHIJANI:** Okay, you come up with big
8 numbers anyway because I didn't do a comparison.

9 **MR. ALLEN:** You see it typically from what we've
10 seen, you know, playing with incidents in between
11 all the chronic intakes, is that the -- the big
12 doses come from the long-term low -- low intake
13 rate that's just continuously going day after day
14 after day. It seems to be where the big doses
15 come from, and an acute intake every now and then
16 just doesn't seem to add that much to it.

17 **MR. GRIFFON:** I would agree -- generally agree
18 with that.

19 **MR. ALLEN:** Let me ask Jim (unintelligible) --

20 **MR. GRIFFON:** -- I've done some --

21 **DR. NETON:** Spikes just --

22 **MR. GRIFFON:** I've modeled it with all different
23 acute intakes over all these spikes or just
24 averaged it and you get almost the same --

25 **DR. NETON:** We've been pretty -- we've been not

1 real good about verbalizing that and convincing
2 people but that's --

3 **MR. ALLEN:** Yeah.

4 **MR. GRIFFON:** Yeah.

5 **MR. ALLEN:** When working with the datasets a lot,
6 that's what you end up seeing.

7 **DR. MAKHIJANI:** We actually have not gone and --
8 and done this comparison. I just -- we just ran
9 some numbers for assuming an acute intake and --
10 but I didn't actually -- I assumed they would be
11 bigger but I didn't (unintelligible).

12 **DR. NETON:** But you've looked at some of the
13 values on that air sample table. We're talking
14 about ten to the seventh picocuries per year
15 intakes. I mean --

16 **MR. ALLEN:** They're huge -- huge intakes. These
17 people --

18 **DR. NETON:** That's why these, you know, lung
19 cancers are by and large, you know, well over 50
20 percent.

21 **DR. MAKHIJANI:** Okay. So are we saying that --
22 that this -- that the chron-- that the intake
23 from incidents specially -- I mean blow-outs were
24 very frequent. I mean that's -- that's very
25 clear. And then you had -- you had these

1 maintenance people and electricians and the
2 clean-out people that went into these furnaces,
3 and they had very frequent blow-outs throughout -
4 - until '57, actually. I came across a document
5 in the file of Mr. B. there, who was -- who --
6 you know, which indicates very frequent blow-outs
7 as recently as -- as 1957.

8 **DR. NETON:** Yeah.

9 **DR. MAKHIJANI:** And it's the DOE file, and I can
10 give you -- it's a huge file so I can give you
11 the page number. It'll take you a long time to
12 find it.

13 **DR. NETON:** Right.

14 **MR. ALLEN:** (Unintelligible) occurred at Fernald
15 (unintelligible).

16 **DR. MAKHIJANI:** So if it's not an issue then --

17 **DR. NETON:** It occurred at Fernald pretty
18 frequently, as well. Dave worked there when --
19 when they happened. But, you know, generally the
20 approach is that they clear the area when a blow-
21 out occurs.

22 **DR. MAKHIJANI:** Yes.

23 **DR. NETON:** You're not going to be standing there
24 --

25 **DR. MAKHIJANI:** I confirmed that.

1 **DR. NETON:** -- breathing all this. So you clear
2 the area so, you know, you're exposed to a small
3 -- a large mass of -- of radium in the air for a
4 fairly short period of time. So these things,
5 you know, would have to had occurred very, very
6 frequently in order for the collective -- and
7 then essentially you end up with a chronic
8 exposure.

9 **MR. ALLEN:** I was going to say --

10 **DR. NETON:** I mean there's always a trade off
11 between --

12 **MR. ALLEN:** To answer the question how many
13 acutes make a chronic?

14 **DR. NETON:** How many acutes in a chronic and
15 then, you know --

16 **DR. MAKHIJANI:** Actually that may be the more
17 convincing point because we -- all evidence is
18 that blow-outs were frequent. And my -- and so
19 we discussed this and, you know, summarized -- my
20 notes are not in shape to be distributed. All
21 the typos even haven't been taken out of it but -
22 -

23 **MR. GRIFFON:** But I think this might be a good
24 thing for you to demonstrate in a public meeting
25 -- for instance, in St. Louis -- that you've

1 looked at certain cases, not hypothetical, and
2 you've -- you know, since you're -- you're --
3 there's some concern about accidents and
4 incidents, in some cases you assume that it was
5 an accidental exposure from the beginning of the
6 year because you only have yearly urine samples
7 on some of the people or whatever, and you model
8 it with the chronic intakes and -- you know, I
9 mean -- you know, demonstrate just what we've
10 been talking about. I think it's worthwhile.

11 **DR. NETON:** Well, see, you could model it with a
12 chronic like we would, and then demonstrate how
13 many blow-outs or --

14 **MR. GRIFFON:** Right.

15 **DR. NETON:** -- these incidents could have been
16 versus, you know, and what the potential exposure
17 could have been in a blow-out. Of course, you
18 know, putting a cap on the air concentration
19 would be a little bit difficult I think, but --
20 but what could -- what could have been the
21 maximum amount in air, given these incidents, and
22 still have that urine sample --

23 **MR. GRIFFON:** Right.

24 **DR. NETON:** Yeah.

25 **DR. MAKHIJANI:** That -- you know, it would --

1 that would help my life. It would really
2 simplify --

3 **MR. GRIFFON:** Yeah.

4 **DR. MAKHIJANI:** -- my write-up a great deal
5 because this is a very significant issue as we
6 have raised it. And if we can have a calculation
7 that says, you know, with once every two weeks
8 and you have a bioassay once in three months or
9 six months and you assume a chronic intake, they
10 look pretty much the same.

11 **MR. GRIFFON:** And the other reason this -- this
12 is important is --

13 **DR. MAKHIJANI:** And I -- I agree, they probably
14 will.

15 **MR. GRIFFON:** The other reason that's important I
16 think is 'cause, you know, part of the CATI
17 interview process is were you involved in any
18 incidents or accidents. These people remember
19 these kind of blow-out things.

20 **DR. NETON:** Sure, yeah.

21 **MR. GRIFFON:** They tell you about them and then
22 they say well, you didn't account for that, you
23 know --

24 **DR. NETON:** Well, right.

25 **MR. GRIFFON:** -- so --

1 **DR. NETON:** I think there's a blanket statement
2 in all the dose reconstructions to say we
3 evaluated those and our model is --

4 **MR. GRIFFON:** Yeah.

5 **DR. NETON:** -- more generous but --

6 **MR. GRIFFON:** But it's -- yeah. They see that as
7 boilerplate language that's like yeah, they
8 didn't really -- yeah. So --

9 **DR. NETON:** So -- okay. You've got a fair handle
10 on that, Dave? 'Cause Dave's going to have to
11 help me with this.

12 **MR. ALLEN:** Do you want some sort of hypothetical
13 type of --

14 **DR. MAKHIJANI:** Well, with some-- somebody that
15 worked in Plant 4 --

16 **DR. NETON:** I would take a case.

17 **MR. GRIFFON:** Just take a case. Yeah.

18 **DR. NETON:** Let's take a guy who we modeled and
19 did his integrated chronic exposure for four or
20 five years and say okay, let's assume that he had
21 some blow-outs -- that was involved in incidents
22 and show how --

23 **MR. ALLEN:** Use his urinalysis and model it
24 chronic and then model it chronic with a number
25 of --

1 **DR. NETON:** Of acutes to --

2 **MR. ALLEN:** -- acutes --

3 **DR. NETON:** -- show what happened --

4 **MR. ALLEN:** -- (unintelligible) with it?

5 **DR. NETON:** Right. And that would effectively
6 drop the chronic down over those periods because
7 you can't --

8 **MR. ALLEN:** Right.

9 **DR. MAKHIJANI:** Right.

10 **MR. ALLEN:** Yeah, we can --

11 **DR. NETON:** Yeah.

12 **MR. ALLEN:** I'm trying to think whether I already
13 have that.

14 **DR. NETON:** Yeah.

15 **MR. ALLEN:** Okay.

16 **DR. NETON:** But that would be a -- I think that
17 would be a very compelling example to show that -
18 - because we've been saying this repeatedly for a
19 while now, and I've always felt that we -- we've
20 done a good job saying that it's in there. You
21 know, it's -- it's actually covered.

22 **DR. MAKHIJANI:** But I agree that the frequency of
23 the blow-outs actually, in the case of blow-outs,
24 it makes -- makes the -- would make the
25 difference very small in any case.

1 **DR. NETON:** Right. Yeah, I mean --

2 **DR. MAKHIJANI:** But they're more -- much more
3 frequent than the bioassay.

4 **DR. NETON:** Right. Right, but you know, if there
5 are -- if there are 365 blow-outs in a year, then
6 you've got -- the chronic covers blow-outs
7 because every year -- every day you've got 365
8 acute intakes that are covered.

9 **DR. MAKHIJANI:** All right. This large particle
10 ingestion business, you said that you are
11 evaluating that or not evaluating? I don't
12 remember. That's the item that's under
13 incidents.

14 **DR. NETON:** Yeah. This is -- this has -- this is
15 - has more to do generically with the ingestion
16 model that we're using. This is not just a
17 Mallinckrodt issue, I believe.

18 **DR. MAKHIJANI:** Yes.

19 **DR. NETON:** I'm going to need to get back to you
20 on this. I think -- you know, our statement is
21 that if you're using urine samples, it's --

22 **DR. MAKHIJANI:** Yes.

23 **DR. NETON:** -- it's somewhat covered. But I
24 don't know. Dave, unless you can answer this, I
25 -- we've gone through this for the Bethlehem

1 Steel analysis, as well, and I just don't
2 remember exactly where we ended up on the logic
3 path on this.

4 **DR. MAKHIJANI:** Now, in regard to the urine
5 samples, how do you partition between the
6 ingestion and the inhalation because you've got,
7 you know, one -- one datapoint (unintelligible)
8 notes with different metabolic implications.

9 **MR. ALLEN:** We almost always assume it's
10 inhalation, which gives you a higher dose than
11 the ingestion --

12 **DR. MAKHIJANI:** Is that -- is that generally
13 true, because I haven't done that.

14 **DR. NETON:** I think inhalations always in general
15 are going to give you a higher dose.

16 **MR. ALLEN:** For uranium definitely, and I think -
17 -

18 **DR. MAKHIJANI:** For all organs --

19 **MR. ALLEN:** Yeah, because the --

20 **DR. MAKHIJANI:** -- including colon and so on?

21 **MR. GRIFFON:** And then you'd say -- yeah. And
22 then my understanding, from what you've done on
23 other cases, is that you take the most
24 conservative class going backwards and going
25 forwards, right? So it could -- you could switch

1 classes.

2 **MR. ALLEN:** No, we don't do that --

3 **MR. GRIFFON:** Never do that?

4 **DR. NETON:** We -- we try to at least be
5 scientifically consistent.

6 **MR. GRIFFON:** Oh, okay. I thought -- I thought
7 in some cases you were saying that you --

8 **DR. NETON:** No, we tried both -- you know, we try
9 the most conservative approach. But once we pick
10 a pathway --

11 **MR. GRIFFON:** Okay.

12 **DR. NETON:** The only place we really diverge from
13 that is -- is an external exposure when we assume
14 a chronic exposure for neutrons and an acute
15 exposure for photons, even though they were in
16 the same batch, but that's because of the DDREF -
17 - or the -- yeah, the DDREF.

18 **MR. GRIFFON:** DDREF.

19 **DR. MAKHIJANI:** Okay. So this -- this ingestion
20 dose, as it is ingestion of large particles,
21 comes in only when you're using air data for
22 inhalation because then you've got a separate
23 item to account for, rather than when you're
24 using bioassay data.

25 **DR. NETON:** Right.

1 **DR. MAKHIJANI:** When assuming just one pathway
2 for --

3 **DR. NETON:** Bioassay data is an integration of
4 all your -- your ingestions and we pick the most
5 conservative pathway.

6 **DR. MAKHIJANI:** Okay. So that -- that kind of
7 limits the impact of this comment for
8 Mallinckrodt as opposed to say Bethlehem Steel.

9 **DR. NETON:** Right.

10 **DR. MAKHIJANI:** Okay. Internal dose we'll skip
11 for today. Surrogate worker data I think we've
12 dealt with. It was corrected.

13 **DR. NETON:** Right.

14 **DR. MAKHIJANI:** Surrogate worker data -- yeah, so
15 this -- I think a lot of this next page, page 8,
16 really deals with the use of air concentration
17 data --

18 **DR. NETON:** Right.

19 **DR. MAKHIJANI:** -- which we've dealt with and
20 kind of bumped and you're going to send us a
21 little explanation of various categories. And if
22 there are very, very few cases maybe you'll just
23 say that and outline some approaches for us.

24 **DR. NETON:** That would be my hope. Yeah. And
25 the solubility thing I think was a

1 misunderstanding of -- of the table, in a way. I
2 think there's a table that talks about type M,
3 and it wasn't our intent that those be type M.
4 They were examples. If it were type M, here's
5 what it would be. That needs to be clearer in the -
6 - the profile.

7 **DR. MAKHIJANI:** How will I know all that had been
8 cleared up?

9 **MS. BLOOM:** This is on the type M and type S
10 issues?

11 **DR. NETON:** Right.

12 **MS. BLOOM:** That's actually -- happens in Task 5.

13 **DR. NETON:** Well, no, but there -- there is a
14 statement -- there's a table that -- that
15 generated this comment that is a table of
16 potential intakes. I think it's all Table 29.
17 No, that's Table 29 -- there's a table that has -
18 - that used bioassay data in limited degree to
19 come up with intakes. And they were -- they
20 assumed type M and it says at the bottom. The
21 footnote -- the footnote on the bottom of the
22 table says use type M and -- and Janet --
23 discussing it with Janet, it was her -- her
24 attitude that well, if the dose reconstructor
25 knows it's type M this is what you've got.

1 Clearly it's not applicable if you're doing a
2 type class Y -- a type S. So we just need to
3 make that clearer because there are other
4 sections of the TBD that clearly state that you
5 use the most claimant-favorable approach.

6 **MR. GRIFFON:** It's Table 28.

7 **DR. NETON:** Table 28, that makes sense. And so
8 that table was generated all based on -- on type
9 M.

10 **DR. MAKHIJANI:** Okay. So that -- that
11 explanatory correction then --

12 **DR. NETON:** Right. It will -- it will be --

13 **DR. MAKHIJANI:** -- that's on the --

14 **DR. NETON:** -- yeah, explanatory correction is in
15 the profile.

16 **DR. MAKHIJANI:** So normally you are going -- you
17 -- in IMBA you use the most claimant-favorable
18 solubility.

19 **DR. NETON:** Unless you really --

20 **MS. BLOOM:** Of the choices.

21 **DR. NETON:** Of the choices. Unless you know
22 pretty definitively what the person --

23 **DR. MAKHIJANI:** Yeah.

24 **DR. NETON:** -- was working with and then we would
25 use the actual case. Although in practice we

1 rarely end up doing that, I think.

2 **MR. ALLEN:** We can generally narrow down credible
3 cases (unintelligible) but --

4 **DR. NETON:** Yeah, but, you know, in some way --

5 **MR. ALLEN:** Sometimes it's (unintelligible).

6 **DR. NETON:** Yeah, it's hard enough to know where
7 a person worked let alone know exactly what the
8 soluble material was.

9 **DR. MAKHIJANI:** In -- in many of the cases it's
10 actually remarkable how -- in Mallinckrodt it's
11 remarkable how detailed a record does exist about
12 -- about --

13 **DR. NETON:** Yeah. Some of these --

14 **DR. MAKHIJANI:** -- jobs. I mean I think it is
15 quite remarkable.

16 **MS. BLOOM:** Uh-huh.

17 **DR. MAKHIJANI:** Some of the long DOE files have a
18 lot of information in them.

19 **MR. GRIFFON:** Can I ask -- stopping at Table 28
20 for a second -- because I -- and I -- we've been
21 through this table many -- I've got all the marks
22 on this table. But there's a number of cases by
23 each one of these. Is that the number of case --
24 number of -- what is that, number of cases?

25 **DR. NETON:** That's the number of cases that were

1 evaluated given those numbers. That's not the
2 total number. I mean those were selected cases -
3 -

4 **MR. GRIFFON:** Right. Okay.

5 **DR. NETON:** -- so those are not --

6 **MR. GRIFFON:** Those are the ones that had good
7 urinal-- or -- or, as you described it before,
8 fairly uniform or -- a good set of urinalysis
9 data, right?

10 **DR. NETON:** Yeah, and that's what -- Janet picked
11 those and she could speak better to what those
12 were.

13 **MS. BLOOM:** I would guess that they probably
14 worked for a long enough period and had enough
15 data that you could indeed think you were
16 modeling them.

17 **DR. NETON:** But see, my -- my -- my opinion is
18 that that table is going to be of limited use in
19 the profile -- in the reconstructions because I
20 would go with more of a co-worker data, you know,
21 of the sample set looking at the urine data. We
22 haven't done that yet necessarily.

23 **MS. BLOOM:** No, that's on the schedule
24 (unintelligible) get there.

25 **MR. GRIFFON:** Co-worker meaning -- rather than

1 surrogate, you would -- you would select people
2 that --

3 **DR. NETON:** Right.

4 **MR. GRIFFON:** -- you knew had the same job title
5 or worked in the same area or --

6 **DR. NETON:** Groups of people or something like
7 that, yeah, and say okay here's -- that's what
8 that kind of is, I suppose --

9 **MR. GRIFFON:** Yeah, so it makes sense.

10 **DR. NETON:** -- but it needs to be fleshed out. I
11 think there are more -- there are more data there
12 than what -- what is in there.

13 **MR. GRIFFON:** 'Cause that's the way I saw this
14 was -- was co-worker -- surrogate.

15 **DR. MAKHIJANI:** After -- after this correction --
16 I mean are you going to calculate it in different
17 solubilities, type M and type S, or are you going
18 to just leave it as it is or -- I don't
19 understand how --

20 **MS. BLOOM:** For the co-worker data --

21 **DR. MAKHIJANI:** -- this will be used -- actually
22 be used.

23 **MS. BLOOM:** -- when we actually do the whole co-
24 worker data analysis, we take the urine data. We
25 do fits to that using M or S and come up with

1 intakes for each of those situations, and then
2 the intakes are available for dose reconstructors
3 to assign. And so they would choose either M or
4 S based on the fit and based on their organ of
5 concern. But you'll have a different intake for
6 M than you would for S.

7 **DR. MAKHIJANI:** And so this particular table is
8 not going to be used or will need another -- like
9 a 28-A and 28-B that will actually be used -- I'm
10 not understanding.

11 **MS. BLOOM:** My sense is that this will be
12 replaced.

13 **DR. MAKHIJANI:** Okay. With?

14 **MS. BLOOM:** Unless I -- unless there's something
15 I don't know about this table, my sense is that
16 it -- it will be replaced when we do the full-
17 blown analysis.

18 **DR. NETON:** But again a lot -- how much work we
19 put in this depends on how many people we don't
20 have bioassay records for (unintelligible).

21 **DR. MAKHIJANI:** Yeah.

22 **MR. GRIFFON:** Right, so that is the starting
23 point. I think this flows --

24 **DR. NETON:** It's all flowing from these -- these
25 --

1 **MR. GRIFFON:** -- these sites or these steps for
2 you to outline, though, is going to be critical
3 for us because, you know, the --

4 **DR. NETON:** Right.

5 **MR. GRIFFON:** -- we can't leave St. Louis saying
6 well, we're waiting to see this other piece --

7 **DR. NETON:** No.

8 **MR. GRIFFON:** -- you know, fleshed out. We need
9 to know at least generally -- you know, not that
10 you would do it on -- which cases you would use
11 certain techniques, but that these are the
12 techniques and here's how we -- and -- and like
13 for this kind of thing, and we're -- we're -- you
14 know, and you can demonstrate that I can identify
15 who a Plant 6 generic worker is. And to take --
16 to take that a little further, and I can identify
17 what kind of raffinate -- potential raffinate
18 exposures that group of people, you know
19 (unintelligible).

20 **DR. MAKHIJANI:** I think the fact that -- that air
21 data are -- you know, that so -- so many workers
22 have bioassay data. Now I've actually looked at
23 many records myself, you know, I have much more
24 practical input.

25 Okay. So this question of survivor claimants --

1 you know, there are survivor claimants. Here
2 they are, no job data and so on, so in those
3 cases I -- I guess you would apply the default
4 procedures at that --

5 **DR. NETON:** Pretty much like that one we did for
6 the uterine cancer. There was no job title,
7 although we knew the person worked there and we
8 took -- at least in this case, it was
9 noncompensable. We took the average at a highest
10 10 TLD film badge measurements for those years
11 and then took the highest air concentration
12 measurement in the plant and applied it. That
13 was not compensable. It -- it may be a little
14 different at this -- if it put it over 50
15 percent, but we would probably refine it to a
16 certain extent but, you know, you get to a
17 certain point where you can't refine it any more.
18 And if it's over 50 percent, it's over 50
19 percent. It just -- it's a -- it's an artifact
20 of this program, the way it's set up, that the
21 people with the poorest monitoring records end up
22 getting some pretty high doses because we can't
23 defend doing otherwise. That's just the way it
24 works out. I mean that's the way the program was
25 -- was set up.

1 **DR. MAKHIJANI:** There are a couple other things I
2 know that are in the fine print of this, and then
3 I have a question from I think Mr. B.

4 **DR. NETON:** Okay.

5 **DR. MAKHIJANI:** They -- the TBD mentions that
6 there was uranyl fluoride that was produced
7 there, so -- but there are no dates and there are
8 no -- there's a little bit that was done there
9 and then there's no more information. And we
10 also know that recovered uranium from -- well,
11 the document that we have, we don't know -- that
12 said recovered uranium from Hanford went to
13 Mallinckrodt or Oak Ridge. Now I don't know how
14 to interpret that, but -- or what period or how
15 many workers it might apply to, and so we know
16 these two -- there's this recycled uranium -- and
17 this isn't like the tank that -- the U Plant
18 recycling that the big reports are about after
19 the recycling started at -- at Hanford with the
20 tank wastes. This is before the tank wastes
21 started to be recycled through U Plant. This is
22 1950 when I guess it must have been the redocs*
23 plant that they were recovering uranium from and
24 the orange oxide was sent to Oak Ridge -- or
25 uranyl nitrate was sent to Oak Ridge and

1 Mallinckrodt. I don't know. So how do we -- how
2 do we nail down these things, because I think
3 that -- that you -- you did look at this.

4 There's no documentation. We have indication
5 that these materials went to Mallinckrodt or were
6 produced there, so how are we going to address
7 that? 'Cause now you've got different solubility
8 questions, too. You've got type F and you've got
9 -- yeah, you've got type F with uranyl fluoride.

10 **DR. NETON:** I don't know. I -- I am not aware of
11 the document that, you know, you're referring to.

12 **DR. MAKHIJANI:** Well, it says so here in the TBD.
13 I can give you the page. I can show you the
14 (unintelligible).

15 **MS. BLOOM:** For the uranium, the (unintelligible)
16 uranium that they're processing, we're assuming
17 things are in equilibrium, that they're being --
18 getting the thorium 230, the radium 226, the
19 actinium, and the protactinium. If you've got
20 recycled uranium, the radionuclides that you
21 would be adding onto that, my sense is that if it
22 sat for any time, you're going to be worried
23 about neptunium 237, plutonium 239, and
24 technetium 99. And those are going to be
25 insignificant in terms of dose compared to

1 assigning the equilibrium radionuclides instead.
2 You know, you're not -- because you're going to
3 assign an equal amount of thorium 230.

4 **DR. MAKHIJANI:** That -- that might be right. In
5 this case, the way it's set up, it may not
6 matter.

7 **MS. BLOOM:** Yeah.

8 **MR. GRIFFON:** Right.

9 **MS. BLOOM:** But I -- I think saying --

10 **MR. GRIFFON:** -- so why bother with the other --

11 **MS. BLOOM:** -- that that's a bounding...

12 **DR. MAKHIJANI:** I think you're right about that
13 because normally we don't think of adding the
14 radium and the thorium when you're processing UO-
15 3. I think you're right about that. Mark, would
16 you agree as a neptunium expert?

17 **MR. GRIFFON:** That's a pretty good --

18 **DR. MAKHIJANI:** Okay.

19 **MR. GRIFFON:** -- I think that's --

20 **DR. MAKHIJANI:** All right. So -- and then
21 there's the -- on the page --

22 **UNIDENTIFIED:** (Unintelligible)

23 **DR. NETON:** Very good.

24 **DR. MAKHIJANI:** Well, you know, the less issues
25 there are hanging there -- and some of these

1 issues are kind of -- probably small in terms of
2 time frame and workers, but then if you have to
3 say you don't know, then -- then you don't know
4 what to do with it. But I think I agree with the
5 answer.

6 Page 18, page 29, so now we have UO₂F₂, the
7 recycled uranium is gone away. So it produced
8 apparently UO₂F₂ to add to the bomb to slow down
9 the process thermally, resulting in a better
10 separation of slag (unintelligible). And then
11 there's a table in Section 6.1 that actually has
12 UO₂F₂, says it has to be assumed as type F
13 material and I agree with that. But the question
14 is when do you ever assume that and what do you
15 do with it?

16 **DR. NETON:** You're on page 18 you're talking
17 about?

18 **DR. MAKHIJANI:** Yeah, the first out of four
19 references to UO₂F₂. One is on --

20 **DR. NETON:** (Unintelligible) graph on page 18.

21 **DR. MAKHIJANI:** -- page 18. I also found another
22 one. There are actually two. There's another
23 reference in our review. And then on page --
24 page 9 in the bottom there, they say there's no
25 information about production of the UO₂F₂ at the

1 -- last paragraph, first line of the last
2 paragraph. The supplied uranyl nitrate can be
3 ignored, but it said what UO₂F₂ was. And then
4 the last reference is on page 103 where it simply
5 lists the solubilities of the various kinds of
6 uranium to be assumed. I don't know what -- how
7 we propose to handle that. I don't know where it
8 was produced.

9 **DR. NETON:** They were adding --

10 **DR. MAKHIJANI:** (Unintelligible) not in large
11 quantities.

12 **DR. NETON:** Right. They were adding it to the
13 bomb --

14 **DR. MAKHIJANI:** Yeah.

15 **DR. NETON:** -- to slow down the process.

16 **DR. MAKHIJANI:** You know, there may be technical
17 literature from the time on the subject, but I
18 haven't kept that.

19 **DR. NETON:** I don't know.

20 **MR. ALLEN:** If they're adding it to the bomb,
21 they're adding to -- it just said -- I lost it
22 already, but it said something about small
23 amounts.

24 **DR. MAKHIJANI:** Yes, it did say small amounts.

25 **MR. ALLEN:** You're talking about a small amount

1 of type F in and amongst a lot of type M. I'm
2 not sure how much difference that's going to
3 make.

4 **DR. MAKHIJANI:** Can we address that in some way
5 by assuming a few percent or something?

6 **MR. ALLEN:** Yeah. The bomb I think would
7 generally -- I'm not sure what size they're
8 talking --

9 **DR. MAKHIJANI:** Well, didn't they make a
10 difference?

11 **MR. ALLEN:** -- it may be several hundred pounds
12 of UF-4.

13 **DR. MAKHIJANI:** Dave, wouldn't it make a
14 difference to some organs?

15 **MR. ALLEN:** Depending on the mode of the intake.
16 From urinalysis, very little for a systemic
17 organ.

18 **DR. MAKHIJANI:** Yes, I agree with that.

19 **MR. ALLEN:** And lower for lung. Or from an
20 intake it would be -- the F would give you a
21 higher dose for systemic organs.

22 **DR. MAKHIJANI:** Right.

23 **MR. ALLEN:** But again, it's going to be a
24 percentage --

25 **DR. NETON:** How much higher? Because once it's

1 systemic, it's exactly the same. All you're
2 talking about is the different --

3 **MR. ALLEN:** From an airborne intake. From
4 urinalysis it's not going to make much
5 difference.

6 **DR. NETON:** So but even from an airborne intake
7 if you inhale it and so it clears from the lung
8 more rapidly than type M, you get the incremental
9 dose based on the differential and the clearance
10 rates. Is that -- am I missing something?

11 **MR. ALLEN:** Yeah. There's some amount of type M
12 that ends up being coughed up and swallowed,
13 whereas type F is almost an injection.

14 **DR. NETON:** Okay. So there's a -- there's that
15 deposition --

16 **MR. ALLEN:** Yeah.

17 **DR. NETON:** Okay.

18 **DR. MAKHIJANI:** Yeah, so this is -- again this --
19 we're in the same kind of thing that if you're
20 going back on bioassay you're okay, but if you
21 are -- if you're using air data, then you have
22 more issues. So how many (unintelligible) you
23 are using, et cetera, et cetera so it may be put
24 into that same bin.

25 **DR. NETON:** Right, but it --

1 **MR. ALLEN:** Type F? I'm looking real quick here.
2 The default model for type F is a 100-day lung
3 removal rate.

4 **DR. MAKHIJANI:** Hundred days?

5 **MR. ALLEN:** I'm sorry. A hundred per day is the
6 rate. The type M you have the same removal rate
7 for the rapid fraction, which is ten percent. So
8 if this -- basically if we assume it was all UF-4
9 and ten percent of it's going to be removed at
10 the type F rate, so unless it's getting into the
11 higher -- you know, into the high single digits,
12 it's probably not going to make any difference at
13 all. It's just lost in the round-off,
14 essentially.

15 **DR. NETON:** That's good -- that's good
16 information. So ten percent assumes it's almost
17 -- it's like type F anyway, so --

18 **MR. GRIFFON:** Right. Yeah. I didn't know that.

19 **DR. NETON:** -- so if you add a couple percent on
20 top of that, it's really lost in the -- That's
21 built into the GSD of 3.

22 **MR. ALLEN:** (Unintelligible) virtually the same
23 model dose.

24 **DR. MAKHIJANI:** Those are two kind of don't-know
25 issues that were bothering me and so -- good.

1 **MR. ALLEN:** Does that answer that or do you still
2 want something --

3 **DR. MAKHIJANI:** Well, I think -- I think if
4 that's --

5 **MR. GRIFFON:** I'm okay with that ten percent --

6 **DR. NETON:** Yeah.

7 **MR. GRIFFON:** -- explanation. Yeah.

8 **DR. MAKHIJANI:** I think that that ten percent
9 does resolve it, so if you're adding a few -- if
10 you've got a significant percentage of type F
11 that we modeled anyway then -- yeah. You want to
12 take a break?

13 **DR. NETON:** Yeah. Our court recorder would like
14 a comfort break and I know I would, as well.

15 **MR. GRIFFON:** So would I.

16 (Whereupon, a recess was taken from 3:00
17 p.m. to 3:25 p.m.)

18 **DR. NETON:** I think we're ready to -- to
19 reconvene after our -- our break, and I think
20 Mark had a few questions that he wanted to raise.
21 So Mark, the floor is yours.

22 **MR. GRIFFON:** Thanks. All right. Yeah, just a -
23 - a few points. Hey, somebody stole my notes.
24 No. Yeah, really I just wanted to follow up on
25 M. I think we discussed we discussed this some

1 this morning -- on the record and off the record
2 I think we've discussed this. But a lot of these
3 cases -- well, let's see. I guess the question I
4 had was on the -- and this involves the
5 urinalysis data and the external data for the
6 cases that we looked at. There's -- there's one
7 question we had when we were at our last meeting
8 in Iowa was what fraction of these do you have
9 the raw records for, the urine cards or the --
10 you know, that sort of thing and -- and -- as
11 opposed to using the CER database data. And the
12 -- and I think -- well, maybe I can ask that,
13 Jim, just --

14 **DR. NETON:** Right.

15 **MR. GRIFFON:** -- you know, what -- what fraction
16 of these cases have you got the original data as
17 opposed to a -- a query out of a database.

18 **DR. NETON:** Right. We talked about that. My
19 impression -- I have to verify this so I can't
20 say this with 100 percent certainty -- is that
21 the database itself was coded from the original
22 data -- the cards. Now I believe those do exist.
23 They'd be in ORAU's possession. I need to verify
24 that, though, and I think part of what you were
25 addressing this morning was are we going to go

1 back and do some sort of validation of the CER
2 database against the cards -- you know, the
3 original data to --

4 **MR. GRIFFON:** Right.

5 **DR. NETON:** -- to verify that there was a -- I
6 guess an adequate job done in transcribing those
7 records. So that's -- my sense is what we're
8 talking about, so the short answer is I'll have
9 to get back to you.

10 **MR. GRIFFON:** Right.

11 **DR. NETON:** But -- but I do think that we -- we
12 have access to the original cards.

13 **MR. GRIFFON:** Okay.

14 **DR. MAKHIJANI:** Jim, will you confirm that, just
15 that fact, for me in the next two weeks, that the
16 cards exist? Not -- not every last one, you
17 know, but that the bulk of the original records
18 exist and can be verified?

19 **DR. NETON:** Right. I will do that.

20 **MR. GRIFFON:** And have you -- have you tried to -
21 - for the unusual cases where you do have stand-
22 in copies of the cards, have the dose
23 reconstructors cross-walked the raw data or do
24 they just tend to use the CER output data?

25 **MS. BLOOM:** They should be using all the data.

1 **DR. NETON:** Right.

2 **MS. BLOOM:** I looked at one thing -- it wasn't
3 one that was done, but I did notice as I went
4 through the cards and the CER data that -- that
5 it is important to look at it all so you're sure
6 what you're reading.

7 **DR. NETON:** Right. And I -- I think that's true.
8 I went and looked at selected cases, certainly
9 not a representative sample but four or five, and
10 where there was a DOE submittal, it did match
11 what was on the CER database, but the dose
12 reconstructors are supposed to use all the
13 records that are available and they shouldn't a
14 priori assume that the CER database is the -- is
15 it, because there honestly could be more data in
16 there than in the CER. Or conversely, there's
17 data that might not match. I mean I --

18 **MR. GRIFFON:** Right.

19 **DR. NETON:** -- I don't know they're going to that
20 extent, though. I mean I think preferentially
21 they should use the data that's in the DOE
22 submittal because that's why we go to the extent
23 to ask the DOE. You know, every case that we
24 ever got, if it's a DOE facility we'll say --
25 we'll ask them to submit the original record that

1 they have on the person. I was pretty insistent
2 on that early on because I thought the DOE had an
3 obligation to provide us what they have and not
4 just rely on these certain epi databases but...

5 **MR. GRIFFON:** Okay.

6 **DR. ROESSLER:** When Arjun writes his report after
7 you give him this information, will we be able to
8 get a copy of that before the Board meeting?

9 **DR. MAKHIJANI:** Yeah. (Unintelligible) schedule,
10 as I've discussed it with John Mauro, is
11 somewhere I guess around the 20th -- or 18th I
12 will have a draft for internal review and check,
13 around the 20th, and we hope to have a -- a
14 version for the Board meeting to you latest by
15 the first of July, so it would be before the
16 Board meeting --

17 **DR. ROESSLER:** Before we go.

18 **DR. MAKHIJANI:** -- but not much before. I --
19 I'll try to get it done as soon as I -- as much
20 as I can before that but given (unintelligible) -
21 -

22 **DR. ROESSLER:** Well, I've kind of interrupted
23 Mark's train of thought, then I have a question
24 probably for Paul. What is the plan for the
25 Board meeting -- not so much whether we travel on

1 the 4th of July or not but once we get there what
2 is the agenda and how -- how are we going to
3 address --

4 **DR. ZIEMER:** Well -- and -- and actually I've not
5 had a chance to -- I've got to discuss this with
6 Lew and look at the time frame. I only learned,
7 as you did, that the time frame was finalized for
8 St. Louis just -- I guess yesterday.

9 **DR. ROESSLER:** But we are going to obviously take
10 up the Mallinckrodt question.

11 **DR. ZIEMER:** Oh, yes. Oh, yeah.

12
13 **DR. ROESSLER:** -- and then will there be other
14 things -- what -- on what day will that be and --

15 **DR. ZIEMER:** I don't --

16 **DR. ROESSLER:** You don't know that yet.

17 **DR. ZIEMER:** I -- I do not know the answer to
18 that.

19 **MR. GRIFFON:** I think we --

20 **DR. ZIEMER:** The -- the Mallinckrodt thing has
21 got to be -- we -- we're going --

22 **DR. ROESSLER:** That's why we're going to be in
23 St. --

24 **DR. ZIEMER:** We're going to have to have time to
25 hear from the petitioners again, and from the

1 public again. All of those things have to
2 happen. We're -- I'm sure we're going to hear
3 from Congressional delegation folks that'll be
4 there again, so --

5 **MR. GRIFFON:** I think we do need a -- a chance
6 for subcommittee -- we were talking about this
7 earlier --

8 **DR. ZIEMER:** (Unintelligible) Mark and I were
9 talking --

10 **MR. GRIFFON:** -- meeting.

11 **DR. ZIEMER:** -- about the subcommittee and if --
12 if we can work it out in terms of the schedule,
13 we probably would -- if we need a subcommittee
14 meeting, we'll probably do that the first
15 afternoon and then use the next two days for the
16 --

17 **DR. ROESSLER:** Okay. But it wouldn't be before
18 the first afternoon, the subcommittee meeting?
19 It would be, at the earliest, the --

20 **DR. ZIEMER:** Because of the holiday it's very
21 difficult for -- I can't get there before middle
22 of -- before noon. I don't think Mark will be
23 able to, or not too much before noon. I know
24 others are not going to be --

25 **DR. ROESSLER:** Because we're being asked to make

1 our travel arrangements and I just --

2 **MR. GRIFFON:** Yeah.

3 **DR. ZIEMER:** Right.

4 **DR. ROESSLER:** -- wondered what to -- okay.

5 **DR. ZIEMER:** So I'm -- I'm being somewhat vague,
6 but it -- it remains to be fleshed out and --

7 **DR. ROESSLER:** I think you've answered --

8 **DR. ROESSLER:** Yeah.

9 **DR. ROESSLER:** -- the question I had on it.

10 **DR. MAKHIJANI:** Dr. Ziemer, since I'm the only
11 one here from SC&A -- Joe is not here -- I -- I
12 should ask on his behalf if -- do you plan to
13 have Y-12 on the agenda? Because I know Joe is,
14 you know, working pretty hard --

15 **DR. ZIEMER:** I -- I think --

16 **DR. MAKHIJANI:** -- on that.

17 **DR. ZIEMER:** I think we're going to determine --
18 we need to make sure that we are able to do
19 closure on Mallinckrodt. We have to do closure
20 on the first 20 cases. They've been carried
21 along for a while. I think we would like to get
22 the first round of the next 18 on the agenda. We
23 have the issue of addressing the -- the
24 procedures review. I suspect that -- I -- I'm
25 not sure where we'll be on Y-12. I'm -- I'm sure

1 NIOSH would like to push that forward and --

2 **DR. NETON:** We're proceeding as if we would --

3 **DR. ZIEMER:** Yeah.

4 **DR. NETON:** -- we will do the evaluation of Y-12
5 at the next meeting but --

6 **DR. ZIEMER:** Right.

7 **DR. NETON:** -- I don't set the agenda, but I know
8 from my perspective, the technical end, we are
9 moving forward with the Y-12 evaluation.

10 **MR. GRIFFON:** And I think we asked SC&A to
11 expedite that for that reason because we thought
12 we --

13 **DR. NETON:** Right.

14 **MR. GRIFFON:** -- yeah, be an overage.

15 **DR. MAKHIJANI:** People are kind of going flat-out
16 and maybe they don't need to, and if they don't
17 need to actually, it would be nice if they knew
18 or if they -- but I -- I -- I know that -- that --
19 - I just got an e-mail from Joe this morning or
20 last night, both planning a schedule review,
21 production --

22 **DR. NETON:** Part -- part of the issue was that --
23 and we had talked about this in another setting,
24 I forget where, that the Y-12 evaluation report
25 covers a very early period only of Y-12. So if

1 the profile review is being conducted for
2 information related to the evaluation for it,
3 then it's a very finite, specific time period
4 and, you know, if SC&A is really having trouble
5 because they're trying to do the entire document,
6 then maybe they need to --

7 **MR. GRIFFON:** Do part of that --

8 **DR. NETON:** Yeah.

9 **MR. GRIFFON:** -- do that part first.

10 **DR. NETON:** I think there may have been some
11 communications to that effect. I don't know, I'm
12 not --

13 **DR. MAKHIJANI:** I don't know if SC&A is having
14 trouble or not, I'm just saying that I'm not
15 involved intimately at this stage. I'm not
16 involved at this stage.

17 **DR. ZIEMER:** I think Lew's been coordinating that
18 with John --

19 **DR. NETON:** Yeah, I think so.

20 **DR. ZIEMER:** -- but insofar as we can have --
21 what -- what we don't want to have is a situation
22 similar to what developed in Iowa where we think
23 we're ready to go and there's something else out
24 there that needs to be addressed. And if -- I
25 think if NIOSH believes we're ready to go and

1 SC&A -- SC&A has had a chance to do a review and
2 -- and also that in that review there are not
3 major issues hanging out there that would prevent
4 us from coming to closure, because that could --
5 that --

6 **MR. GRIFFON:** Yeah.

7 **DR. ZIEMER:** -- also becomes an issue. So we'd
8 have -- we'd have to have a -- hopefully you
9 would have a chance to -- to get feedback again
10 before you came to the Board with that, and I
11 know -- I don't know how that's going as far as
12 Joe is concerned.

13 **DR. NETON:** Well, I -- I just spoke to Stu
14 earlier this afternoon, and -- and Joe was
15 actively trying to put together a conference call
16 with us. And I believe --

17 **DR. ZIEMER:** So you could in fact do that.

18 **DR. NETON:** -- I left Stu with the impression
19 that we could accommodate that call next week
20 sometime --

21 **DR. ZIEMER:** Then it sounds like --

22 **DR. NETON:** -- probably early next week.

23 **DR. ZIEMER:** -- we'll be ready to go
24 (unintelligible).

25 **DR. MAKHIJANI:** Well, Dr. Ziemer, actually the --

1 this conference call is to answer the questions.
2 It's not to look at a draft.

3 **DR. NETON:** Right.

4 **DR. MAKHIJANI:** So we are --

5 **DR. ZIEMER:** We're not that --

6 **DR. MAKHIJANI:** -- we're not at the draft stage
7 yet.

8 **DR. NETON:** All right. Thank you.

9 **DR. ZIEMER:** So part -- part of the answer to
10 that may depend on where SC&A ends up, also.

11 **DR. MAKHIJANI:** No, I think -- I think Joe was
12 planning to --

13 **DR. ZIEMER:** Yeah.

14 **DR. MAKHIJANI:** -- submit something. I just
15 wanted to clarify, in view of what you said,
16 whether Y-12 was going to be discussed.

17 **MR. GRIFFON:** Yeah. I think our intent is to
18 have it on there as long as we're -- we're --
19 everybody is --

20 **DR. NETON:** My understanding is that the portion
21 or the years that the petition is being
22 evaluated, there is nothing in the profile, so it
23 should be a pretty simple review.

24 **DR. ZIEMER:** It would be pretty straightforward
25 then.

1 **DR. NETON:** I -- I would think. The profile is
2 essentially silent because there is no
3 information in that time period. So one could
4 conclude from that what they want but --

5 **DR. ZIEMER:** Yeah. I understand what you're
6 saying.

7 **MR. GRIFFON:** Can I -- just a couple more things
8 on the database question. I mean I think you
9 have -- I guess it would be useful for me at the
10 meeting to -- I mean obviously at this point you
11 can't do a sampling and val-- you know, any kind
12 of sampling validation method, but you have some
13 cases or claims in your hand that have these
14 records and, you know, you're saying that that's
15 the procedure, that you would normally go to
16 those records. You also have the database
17 printout. Maybe -- maybe you can report back to
18 us on were there any discrepancies when that was
19 done. You know, you looked at this many cases
20 and -- I don't know if the DR people would keep
21 that kind of information necessarily, but even if
22 you did it for a handful of those --

23 **DR. NETON:** Well, I mean what you're saying is if
24 we go through and look where we have some pretty
25 voluminous DOE submittals and -- and pore through

1 those things and then go look at the CER reports
2 and -- and determine are there inconsistencies or
3 not.

4 **MR. GRIFFON:** Yeah.

5 **DR. NETON:** I think that's -- that's doable.

6 **MR. GRIFFON:** And I think Arjun and -- and I, to
7 a lesser extent, but I think Arjun's done some of
8 that, so --

9 **DR. MAKHIJANI:** Very little, but --

10 **MR. GRIFFON:** Yeah.

11 **DR. MAKHIJANI:** -- what little I have --

12 **MR. GRIFFON:** I don't have as much access to raw
13 data.

14 **DR. NETON:** It looked to be -- and -- and maybe -
15 -

16 **MR. GRIFFON:** It looks okay, what I've seen so
17 far, you know.

18 **DR. NETON:** Maybe some of that description that I
19 -- I just forwarded you guys also might -- might
20 help in the --

21 **MR. GRIFFON:** Yeah, that would be good, too.

22 **DR. NETON:** -- mechanics. It's -- it's --
23 essentially addresses the mechanics of how they
24 went about --

25 **MR. GRIFFON:** Assembling the data.

1 **DR. NETON:** -- they inherited this dataset and
2 then they went about assembling it, and much of
3 it speaks to how they came up I think with job
4 titles and such.

5 **DR. MAKHIJANI:** Actually -- actually there was
6 one -- one discrepancy that I found. I checked
7 two files. One was with Mark yesterday when I
8 was sitting in Stu's office. And I didn't find
9 any discrepancy in numbers but I found an issue
10 with the dates. The original --

11 **MR. GRIFFON:** Yeah.

12 **DR. MAKHIJANI:** -- record had lots of dates
13 crossed out. It was quite a messy record. And
14 then we see -- our record had this person in lots
15 of different locations but with the same set of
16 dates, which didn't correspond to the original
17 record and I don't know what happened there,
18 whether the original record was written over by
19 whoever compiled a -- I don't know what happened
20 to that piece --

21 **DR. NETON:** (Unintelligible)

22 **DR. MAKHIJANI:** -- of data. I'll tell you that
23 case number.

24 **MR. GRIFFON:** Is that case (unintelligible)?

25 **DR. MAKHIJANI:** No, that's not --

1 **MR. GRIFFON:** Don't tell us the number, but if
2 you could write it up there --

3 **DR. NETON:** Yeah, you can just provide me that
4 number, I'd love -- I'd like to check it out.

5 **DR. MAKHIJANI:** I -- I will provide you that
6 number.

7 **DR. NETON:** Okay.

8 **MR. GRIFFON:** And then there -- there's -- you
9 know -- in -- in looking at this, the database
10 data that I've seen so far, there's just a couple
11 outstanding questions which I think you -- you
12 raised the one, which was the airborne
13 concentrations being zeroes from '53 to '55.
14 Almost -- maybe not all of them but a lot of that
15 --

16 **DR. NETON:** Many, most --

17 **MR. GRIFFON:** Yeah.

18 **DR. NETON:** -- if not all of them.

19 **MR. GRIFFON:** Right. And what happened -- you
20 know, what happened there. And there's another
21 question I had. Maybe there's a good reason for
22 this, but I -- I don't know it. In the film
23 data, 19-- there's -- there's a bunch of entries
24 for 1976 and many of them are -- are real high
25 data points -- 22, 23, 19, 18 rem penetrating. A

1 lot of them also have monitoring months in excess
2 of 52. I don't understand that.

3 **MS. BLOOM:** Monitoring weeks.

4 **MR. GRIFFON:** Monitoring weeks. I'm sorry,
5 monitoring weeks in excess of 52 and --

6 **DR. NETON:** (Unintelligible)

7 **MR. GRIFFON:** -- and there's a gap between '66
8 and '76 and I -- I -- I was -- I don't know if
9 there -- if there was some kind of clean-up
10 process in '76 or if this was -- I -- I guess I
11 just --

12 **DR. NETON:** Yeah --

13 **MR. GRIFFON:** -- would ask you --

14 **DR. NETON:** -- I need -- I need -- I'll look into
15 that.

16 **MR. GRIFFON:** -- is there any explanation to
17 that.

18 **DR. NETON:** I really don't know.

19 **MR. GRIFFON:** And then the last thing I really
20 had, and you can look at those cases probably, is
21 this -- the laboratory validation question and
22 whether we -- you know, because this is an
23 outstanding question that was raised at the last
24 meeting, and I'm wondering if we're going to have
25 any more information. I think you asked Janet to

1 go look under the Christmas tree a little more or
2 whatever, but --

3 **DR. NETON:** Right. I --

4 **MR. GRIFFON:** Yeah.

5 **DR. NETON:** -- I'm hopeful we're going to find
6 something. I mean Janet says that she didn't
7 find anything but I -- I don't -- I'm not sure
8 she was looking from that exact perspective. And
9 maybe she was, but we're going -- we're going to
10 go back and --

11 **MR. GRIFFON:** Maybe there's something in --

12 **DR. NETON:** -- look at these dates --

13 **MR. GRIFFON:** -- some of the more generic HASL
14 audit records or something that might --

15 **DR. NETON:** -- right, exactly. There may --

16 **MR. GRIFFON:** -- the case or --

17 **DR. NETON:** -- be something in the EML
18 documentation --

19 **MR. GRIFFON:** Yeah.

20 **DR. NETON:** -- I don't know, but --

21 **MR. GRIFFON:** Right.

22 **DR. NETON:** -- we will look wherever we can
23 because I mean it sounds like it's -- it's going
24 to be an important issue.

25 **MR. GRIFFON:** I'm not -- I'm not trying to add

1 work, but these are some -- I mean part -- part
2 of my harping on this is this, this question for
3 the public of the independence of this. And, you
4 know, it's -- it doesn't go without notice to
5 many -- many people in the public that ORAU did
6 the epi study as well as -- as they're doing the
7 dose reconstruction. So this question of -- or
8 need to sort of independently -- independently
9 validate against raw data I think is even more
10 important for that reason.

11 **DR. NETON:** That's fair.

12 **MR. GRIFFON:** Yeah.

13 **DR. NETON:** We -- we'll look at it. I think part
14 of the reason ORAU was a strong contender when
15 they got the contract was because they had access
16 to this data.

17 **MR. GRIFFON:** I know.

18 **DR. NETON:** But I do understand what you're
19 saying that --

20 **MR. GRIFFON:** Yeah, it's a double-edged --

21 **DR. ZIEMER:** Jim, I'd like to raise a few
22 questions, looking forward. I won't be here
23 tomorrow. You'll be discussing external dose,
24 and I don't want the answer the questions but I
25 would like to know if you had the answers to the

1 questions. It seemed to me that most of these on
2 the list of eight -- a lot of them are simply
3 straightforward do you have this or have you
4 found this or that.

5 **DR. NETON:** Right.

6 **DR. ZIEMER:** But have you had a chance to look at
7 these and --

8 **DR. NETON:** Right.

9 **DR. ZIEMER:** -- and you do have answers -- one
10 way or the other. I'm not asking you what the
11 answers are, but have you -- have you been able
12 to address all of these issues or are there some
13 that you have found it difficult to wrap your
14 hands around?

15 **DR. NETON:** Most of these we have some answer to
16 --

17 **DR. ZIEMER:** Okay.

18 **DR. NETON:** I think with the exception of maybe
19 number 3, which is -- is in process. Now we're
20 not -- I don't know that we're going to have the
21 exact answer and --

22 **DR. ZIEMER:** But you're --

23 **DR. NETON:** -- we won't have an answer tomorrow.

24 **DR. ZIEMER:** -- but you're addressing it.

25 **DR. NETON:** But the approach would be available

1 to be discussed and -- and what-not. Otherwise I
2 -- we have answers for most of these. A couple
3 of them we have questions on because the
4 questions don't appear consistent with the logic
5 of, you know, the nonlinearity issue and optical
6 density. I mean we have calibration curves that
7 account for that. We're not clear on -- on the
8 exact issue.

9 **DR. ZIEMER:** Yeah, I would have assumed that,
10 too, but --

11 **DR. NETON:** Yeah, when Hans is here --

12 **DR. ZIEMER:** -- we need to resolve that because -
13 -

14 **MR. GRIFFON:** That's Hans's specialty.

15 **DR. NETON:** Right, uh-huh.

16 **DR. ZIEMER:** -- optical density curves in fact
17 are nonlinear --

18 **DR. NETON:** Yeah. I mean that's the reason
19 they're called curves.

20 **DR. ZIEMER:** Right, right.

21 **DR. NETON:** You know, I'm not -- I'm not sure why
22 -- why that issue is -- is there, and the same
23 issue with the high -- highly variable response
24 to energies less than 100 keV. It's well-
25 documented film over-responds --

1 **DR. ZIEMER:** Right.

2 **DR. NETON:** -- at very low energies and that's
3 accounted for with the calibration.

4 **DR. ZIEMER:** So you'll have --

5 **DR. NETON:** Yeah, so we're going to discuss those
6 issues. I just wanted to have someone with a
7 little more knowledge of it (unintelligible)
8 myself.

9 **DR. MAKHIJANI:** Jim, to the extent that I know --
10 I've discussed this with Hans obviously, to some
11 extent. To the extent that I know, the
12 nonlinearity question is that we only -- we don't
13 have original, you know, optical density data.
14 We just have the reading. And the other question
15 of whether the reading was properly done making
16 the nonlinearity occult because apparently in his
17 -- in his view that they -- they may not have
18 done it properly (unintelligible).

19 **DR. NETON:** And -- Greg Macievic, who -- who is --
20 --got his Ph.D. in external dosimetry -- did his
21 dissertation on external dosimetry issues and
22 worked at Landauer for a number of years is
23 really, really good with this stuff and I -- I'd
24 be better -- it'd be better if he were to address
25 --

1 **DR. MAKHIJANI:** Yes.

2 **DR. ROESSLER:** What's his last name?

3 **DR. NETON:** Macievic, M-a-c-i-e-v-i-c. At least
4 I think he did his Ph.D. in external dosimetry.
5 I know he's -- he's very well versed --

6 **DR. ROESSLER:** (Unintelligible)

7 **DR. NETON:** -- and he and Tim Taulbee are two
8 people that we rely on for external dosimetry
9 issues and both Greg and Tim are out today.
10 That's unfortunate, but Greg will be here
11 tomorrow. And he's -- he's pretty well versed in
12 these issues so -- but I think the answer then, I
13 think we can provide some -- some discussion for
14 all of these.

15 **DR. MAKHIJANI:** Okay.

16 **MR. GRIFFON:** Can -- can I ask you one thing
17 before, because I'm -- I'm heading out --

18 **DR. NETON:** Yeah, sure.

19 **MR. GRIFFON:** -- in a few minutes. But -- but
20 the database you gave me, I appreciate that, but
21 could I get the same database with names on it?
22 Just in the next month I'm -- I want to do some -
23 -

24 **DR. NETON:** I think so. Well --

25 **MR. GRIFFON:** I mean it's privacy. I understand

1 that, but we --

2 **DR. NETON:** Yeah, it's privacy.

3 **MR. GRIFFON:** -- have access --

4 **DR. NETON:** Yeah, right. You guys have access to
5 that. Yeah, I think -- do you want a cross-link?
6 I mean I'm having a guy work on cross-linking it
7 anyways, so I can give you another database that
8 you'd have to -- you know, I've got Social
9 Security numbers -- how does this work. You've
10 got to go to two different databases to match
11 them all --

12 **MR. GRIFFON:** (Unintelligible) databases, oh,
13 it's not...

14 **MS. BLOOM:** It doesn't exist as one yet.

15 **MR. GRIFFON:** Doesn't have the name and
16 (unintelligible).

17 **DR. NETON:** I can tell you who we have claims for
18 and then Socials, but then it's got to be cross-
19 linked. I can -- I'll get you something.

20 **MR. GRIFFON:** Okay. All right.

21 **DR. NETON:** And I don't know if it's better for
22 you, but I'm having our guy convert it into a
23 Excel -- Excel format, as well, because I -- you
24 can't do much with Axy's as far as the -- at least
25 I can't. I'm not good with that so --

1 **MS. BLOOM:** Is it small enough to go into Excel?

2 **DR. NETON:** Oh, yeah. Excel -- Excel has 40,000
3 lines.

4 **MR. GRIFFON:** 40,000 lines or 65 --

5 **DR. NETON:** Sixty-five or something like that,
6 yeah -- some octal number. It's probably 64.

7 **MR. GRIFFON:** I usually use SAS over top of Axys
8 so really I --

9 **DR. NETON:** Well, actually -- and that's --
10 matter of fact, the guy I've got working on this
11 is a SAS guy so he's doing it all in SAS but --
12 so I can at least do something and feel good
13 about it, I'm having it put into Excel for me.
14 Some of these Z-score plots and stuff are very
15 easy to do in Excel. SAS would do it, but it
16 takes some manipulation.

17 **MR. GRIFFON:** Right. If he -- if he --

18 **DR. NETON:** I'll see --

19 **MR. GRIFFON:** -- have them link quickly I mean if
20 it's --

21 **DR. NETON:** Well, no. This will be a week or --

22 **MR. GRIFFON:** Okay.

23 **DR. NETON:** -- matter of fact, it should be here
24 now.

25 **MR. GRIFFON:** Okay.

1 **DR. NETON:** That's sad. He only works three days
2 a week -- well, two days -- two days something.
3 I'm trying to get him to be here more time.

4 **MR. GRIFFON:** All right. If it looks like it's
5 not going to be in -- you know, very timely, just
6 send me --

7 **DR. NETON:** I'll just send you the whole thing.
8 Right.

9 **MR. GRIFFON:** Okay. Now did you have --

10 **DR. MAKHIJANI:** Yeah, I have --

11 **MR. GRIFFON:** -- those cases yet --

12 **DR. MAKHIJANI:** Yeah. Let me -- let me start
13 with Mr. B.

14 **DR. NETON:** Okay.

15 **DR. MAKHIJANI:** He worked at Mallinckrodt and
16 then went to Weldon Spring.

17 **DR. NETON:** Uh-huh.

18 **DR. MAKHIJANI:** And he was at first a -- you
19 know, in the production, electrician, and so on.
20 He had one of these roving job descriptions and
21 he was monitored. He had film badge data and so
22 on. And then he became an office
23 (unintelligible) and -- at Weldon Spring. He --
24 he worked in the office building there and did
25 not actually go into the production areas other

1 than once in a while, walking through the
2 production areas or something like that. And I
3 verified this with him very carefully, and his --
4 the time he stopped -- and you know, the -- the
5 Weldon -- as I understand it, the Weldon Spring
6 office building was fairly separated from the --
7 from the production areas, much more so than --
8 than in -- in downtown. And I've seen a picture
9 of the downtown site from the period
10 (unintelligible) and he -- his urine data --
11 urinalysis data from the time he was in the
12 office are pretty remarkable because not only
13 does he have significant urine concentrations,
14 but they also go up for a period, as much as a
15 year after. I think the highest urine sample is
16 (unintelligible). So this -- the question of
17 environmental doses kind of came up in an
18 indirect way. I can't now lay my hands on
19 another example of this. I had but I don't think
20 I made notes at the time. I must have been just
21 kind of going through stuff and I noticed
22 something and I didn't stop to make notes. But
23 there was a worker who was also one of these
24 roving workers who was assigned to office work
25 for a period in the middle of his work at the

1 downtown site and also had nonzero -- you know,
2 significant urine data, but I don't remember the
3 numbers on that. And so the question came to
4 mind is, you know, there's an assumption that
5 people who worked in the offices and who were not
6 -- who were generally not monitored and who were
7 nonproduction workers have low doses. And that
8 kind of -- it threw that -- you know, raised
9 questions in my mind about environment doses at
10 both sites.

11 **DR. NETON:** Well, this guy has 711 pages of DOE -
12 -

13 **DR. MAKHIJANI:** Yes. It's the hugest DOE file,
14 and I think you will find --

15 **DR. NETON:** You would pick this one for me to
16 look at.

17 **DR. MAKHIJANI:** No, but I think he has the other
18 file. He has the other -- I went through it. I
19 didn't go through it all. It's -- it's actually
20 at the end.

21 **DR. NETON:** I didn't see -- I didn't see the PER
22 file. See the only one here is a DOE response.
23 There's no (unintelligible).

24 **DR. MAKHIJANI:** Then it -- then it must be toward
25 -- it must be toward the end.

1 **DR. NETON:** I've got everything that should be in
2 here.

3 **DR. MAKHIJANI:** No, no. On that 711-page file --

4 **DR. NETON:** Oh, I see.

5 **DR. MAKHIJANI:** -- it's toward the end. And I
6 maybe can pull the page number for you.

7 **DR. ZIEMER:** Well, in any event in a case like
8 that, that dose still gets accounted for even if
9 he's working in the office. Right?

10 **DR. MAKHIJANI:** Oh, yeah. Dr. Ziemer, his -- his
11 dose calculation is not at issue. The thing that
12 kind of -- and he had no idea why I was asking
13 him these question at -- so -- so that his
14 response would not be biased by that. I met him
15 when I went to St. Louis and then I -- this was
16 just a follow-up call after I looked at his case.

17 **MR. GRIFFON:** I guess my first question for that
18 one would be why did they continue to monitor him
19 if the practice was not to monitor the office
20 workers, too. You know, that's --

21 **DR. ZIEMER:** Right.

22 **DR. NETON:** Well, my -- my question is -- I've
23 got to look at the dose reconstruction, but did
24 we -- we -- we should have used his urine data --

25 **DR. MAKHIJANI:** I don't believe it's complete.

1 DR. NETON: What's complete?

2 DR. MAKHIJANI: His dose reconstruction.

3 DR. NETON: It has to be because it's -- oh, I
4 see what you're saying. I just assume --

5 DR. MAKHIJANI: I don't believe those numbers
6 have been done.

7 DR. NETON: Oh, okay. You're right, it's not
8 done.

9 DR. ROESSLER: But that's not the point as it is
10 why did he have that -- is that what you're
11 asking, why did he have a positive urine --

12 DR. MAKHIJANI: Yes --

13 DR. ROESSLER: -- value when he's working...

14 DR. MAKHIJANI: -- if he wasn't -- well after he
15 started working in the office --

16 DR. ROESSLER: What do you mean by well after?

17 MR. GRIFFON: A year (unintelligible), more than
18 a year.

19 DR. MAKHIJANI: More than a year.

20 MR. GRIFFON: Yeah, more than one year.

21 DR. NETON: But this was not at -- at
22 Mallinckrodt, it was at Weldon Springs.

23 UNIDENTIFIED: What kind of (unintelligible).

24 DR. ZIEMER: (Unintelligible) had a body burden
25 to start with.

1 **MR. GRIFFON:** (Unintelligible) didn't seem like
2 it could have just been (unintelligible).

3 **DR. MAKHIJANI:** But it went out looking
4 (unintelligible).

5 **DR. ZIEMER:** Oh, I've seen -- I've seen people's
6 excretion go up.

7 **DR. NETON:** Yeah. I mean theoretically, if you
8 look at the plutonium levels --

9 **DR. ZIEMER:** After -- after a single exposure. I
10 mean it --

11 **DR. NETON:** Yeah. No, but actually if you look
12 at the plutonium curves -- I don't know about
13 uranium, but many years after exposure there is
14 an increase, and I don't know what's driving that
15 in the -- in the (unintelligible).

16 **DR. ROESSLER:** It's coming out of the bone for
17 some reason.

18 **DR. ZIEMER:** Well, there's -- there 's -- it's
19 recompartmentalizing or -- or it's --

20 **DR. NETON:** Yeah, maybe --

21 **DR. ZIEMER:** -- changing its chemical
22 (unintelligible).

23 **DR. NETON:** -- all these compartments converted
24 at one point to where they -- because it actually
25 does, the intake retention fraction goes up at

1 some point -- not a lot --

2 **MR. GRIFFON:** Yeah, for a little while.

3 **DR. NETON:** For a little while and then it drops
4 right down. But that -- that might not be the
5 issue here.

6 **MR. GRIFFON:** Yeah.

7 **DR. NETON:** I guess without looking through all
8 700 pages to see what this guy did --

9 **DR. MAKHIJANI:** No, no. This is toward the end -
10 -

11 **DR. NETON:** -- because I just happened to flip
12 through there and I see he was a night
13 maintenance supervisor or something listed on
14 there. I don't know whether that was --

15 **MS. BLOOM:** Could you write the name on that one?

16 **MR. GRIFFON:** Do you have a name? Yeah.

17 **DR. NETON:** Yeah, I got it here.

18 **MS. BLOOM:** Or actually, can you plug back into
19 that, or no?

20 **DR. NETON:** I suppose I could but then it would
21 bother Ray. Yeah. I think --

22 **DR. MAKHIJANI:** It -- it just -- this is -- I
23 don't have answer to this. It just raised --

24 **DR. NETON:** Right. It's a good question.

25 **DR. MAKHIJANI:** It raised a question in my mind.

1 I did write down the numbers for this one and
2 then I came across another one. It may be the
3 same explanation for both of them.

4 **DR. NETON:** Let me see what this guy claimed.
5 Mallinckrodt Chemical downtown St. Louis,
6 electrician, worked in all areas with uranium
7 (unintelligible), downtown maintenance supervisor
8 Weldon Springs. I mean that's not --

9 **DR. MAKHIJANI:** And then -- no, no. It was for
10 the subsequent job title of data -- data
11 something.

12 **DR. NETON:** Oh, yeah, but see he went to Weldon
13 Springs and he was a maintenance supervisor --

14 **DR. MAKHIJANI:** Right.

15 **DR. NETON:** -- in and out of all areas, which
16 would explain positive bioassay --

17 **DR. MAKHIJANI:** Right. That was after '62.

18 **DR. NETON:** Right. In later years analyzed
19 exposure levels and worked with computer-
20 generated exposure notices to employees, worked
21 inside electrical furnaces, exposed to
22 contaminated dust.

23 **DR. MAKHIJANI:** Yeah, that was --

24 **DR. NETON:** That's something separate. Right.

25 **DR. MAKHIJANI:** So this was -- this was the data

1 processing/data analysis part of his job from '62
2 on.

3 **DR. NETON:** Right.

4 **DR. MAKHIJANI:** And...

5 **DR. NETON:** So from '62 I don't -- I'd have to
6 look at the urine data and see what it means by
7 quite variable, but it's possible that if he was
8 exposed from '57 to '62 at Weldon Springs --

9 **MR. GRIFFON:** I guess not.

10 **DR. NETON:** -- there's no good way,
11 unfortunately, to get at these.

12 **DR. ROESSLER:** He could be having positive urine
13 for quite some time.

14 **DR. NETON:** Right, it just depends on how
15 variable these values are.

16 **DR. MAKHIJANI:** Well, is it okay to say what
17 these values were? I have them.

18 **DR. NETON:** Yeah, why not. We're not -- yeah, I
19 think --

20 **DR. MAKHIJANI:** His -- his -- at the start of his
21 data processing job, he had 14 micrograms per
22 liter and then the range of -- of values during
23 his data processing was 4 to 25 micrograms, and
24 the highest value of 25, if I -- I didn't write
25 down the date here -- if I remember correctly it

1 was sometime in 1963. He went to office work in
2 mid-1962 and --

3 **MS. BLOOM:** And the values were lower than that
4 when he was working in the production areas
5 typically?

6 **DR. MAKHIJANI:** I didn't -- I didn't write down
7 his -- in my notes the production values, but his
8 termination urine sample from the production time
9 was 14, and then a year after he started office -
10 - in the next year it was -- the peak was at 25
11 in his office period, so it was quite a big jump.
12 It was not a small -- it wasn't like a --

13 **DR. NETON:** Well --

14 **DR. MAKHIJANI:** -- what you might expect.

15 **MS. BLOOM:** I don't know about --

16 **DR. NETON:** It could -- it could be any number of
17 things. I mean it's not uncommon for people to
18 change locations. I don't know if the guy moved
19 and he's got a well with uranium, natural uranium
20 in it. I've seen this happen at -- at Fernald
21 and Argonne National Laboratory. I had one guy
22 who was positive all the time after his brother
23 sent him this special water from someplace out
24 west and he drank it. We analyzed it; it was
25 like 1000 micrograms per liter uranium. It was

1 some health water. It was a brackish-looking
2 thing. So I'm not saying that that's the answer
3 here, but there's any -- you know, there's a --

4 **DR. ROESSLER:** Also medications -- I'm not so
5 sure about uranium, but medications can do that -
6 -

7 **DR. NETON:** Can affect --

8 **MR. ALLEN:** Act like a chelation.

9 **DR. ROESSLER:** I don't know.

10 **MS. BLOOM:** Plutonium --

11 **DR. ROESSLER:** Really?

12 **MS. BLOOM:** -- there was a study that somebody
13 started drinking a lot of cranberry juice.

14 **DR. NETON:** It's possible he's had a body burden
15 and something changed but -- but you raise a
16 valid issue, is this -- is this in any way
17 related to his office work and it seems --

18 **DR. MAKHIJANI:** Yeah.

19 **DR. NETON:** -- not likely, but if the office
20 happened to be in the middle of the controlled
21 area somehow -- I mean I don't know where these
22 offices are located.

23 **DR. MAKHIJANI:** It was in a separate building at
24 -- at Weldon Spring, and the reason I kind of
25 thought from Weldon Spring to downtown is in

1 downtown -- (unintelligible) I asked, you know,
2 and he said it was two or three city blocks from
3 production building. And so in downtown clearly
4 you have production areas that were much closer,
5 you had --

6 **DR. NETON:** Yeah.

7 **DR. MAKHIJANI:** -- you had stuff outside that
8 were --

9 **DR. ROESSLER:** Right.

10 **DR. MAKHIJANI:** -- contaminated from the '40s and
11 was a much more -- messier situation, and so
12 definitely raised a question about --

13 **DR. NETON:** Yeah, I really don't --

14 **DR. MAKHIJANI:** -- and it's just question. I
15 don't have a hypothesis to offer.

16 **DR. ROESSLER:** Uh-huh.

17 **DR. MAKHIJANI:** Well, you know, it was a question
18 of whether it was environmental dose
19 (unintelligible).

20 **MR. ALLEN:** There's any number of things it could
21 be without being environmental dose in the -- the
22 office there. I mean...

23 **DR. NETON:** Well, in this particular instance, I
24 think -- I think the dose reconstruction would be
25 done using his data.

1 **DR. MAKHIJANI:** Oh, here. I can tell you where
2 they are. It was -- exposure data are early on,
3 age 40s, 50s and so on.

4 **DR. NETON:** External exposure -- here we go.
5 Yeah, I got it -- '54 to '61 (unintelligible)
6 external.

7 **DR. MAKHIJANI:** Somewhere, but I can't remember.
8 I wish I'd written the page number down.

9 **DR. ZIEMER:** So the generic question is whether
10 or not there are contamination levels at Weldon
11 Springs that might --

12 **MR. ALLEN:** This is off-site?

13 **DR. MAKHIJANI:** Or, you know, in the -- in the
14 streets, in the offices, in areas right adjacent
15 to production areas where, you know, clerks and
16 typists and --

17 **MR. GRIFFON:** Administrative areas --

18 **DR. MAKHIJANI:** -- administrative areas, since in
19 -- in downtown the administrative areas were
20 close to the -- close to the production area.

21 **DR. NETON:** It's suspicious that he was monitored
22 --

23 **MR. GRIFFON:** Right.

24 **DR. ZIEMER:** Yeah.

25 **DR. NETON:** -- being in a -- in a --

1 **MR. GRIFFON:** That's what makes me --

2 **DR. NETON:** -- administrative area.

3 **DR. ZIEMER:** Well, unless they -- unless they
4 were basing that on finding earlier positive
5 results and --

6 **DR. NETON:** Right. He could have just --

7 **MS. BLOOM:** Follow-up.

8 **DR. NETON:** Yeah.

9 **DR. ZIEMER:** Nowadays people would continue to
10 follow someone like that (unintelligible).

11 **DR. NETON:** Oh, yeah.

12 **MS. BLOOM:** Uh-huh. Those aren't very large
13 results for that time period, though, 'cause...

14 **DR. ZIEMER:** Well, I --

15 **MR. GRIFFON:** That wouldn't trigger follow-up
16 sampling necessarily.

17 **DR. MAKHIJANI:** In any case it's (unintelligible)
18 --

19 **DR. NETON:** Yeah, it's --

20 **DR. MAKHIJANI:** -- question.

21 **MS. BLOOM:** Curious.

22 **DR. ZIEMER:** Unless he was still having to roam
23 around in the other areas --

24 **DR. NETON:** Yeah, and maybe he went to -- what is
25 it he was doing, dose records -- records or

1 something like that. I don't know whether he --
2 he went and got film badge result-- here we go,
3 '59...

4 **DR. MAKHIJANI:** There's a lot of those pages that
5 are repeat...

6 **DR. NETON:** Yeah, they are. I've noticed that.
7 There's -- I don't know if that's the scanner or
8 just...

9 **MR. GRIFFON:** While you're looking through the
10 data, I had another question that just -- that
11 Cindy brought to my attention -- just the trigger
12 level, if there was a trigger level at
13 Mallinckrodt for returning for a follow-up
14 bioassay, because I saw a number sample -- and I
15 couldn't determine -- and just looking at the raw
16 records, it looked as though it was maybe .03 or
17 something because then they'd be sampled a couple
18 days later where they're usually quarterly or
19 even annually. But there -- I think there was
20 some kind of trigger. If they exceeded a certain
21 value, they'd do -- they'd go back to the
22 (unintelligible).

23 **MS. BLOOM:** I don't recall a specific one from
24 Mallinckrodt --

25 **MR. GRIFFON:** Yeah.

1 **MS. BLOOM:** -- but I do think there was
2 discussion from some sites about some level that
3 they thought (unintelligible).

4 **DR. NETON:** Well, there was some --

5 **MS. BLOOM:** (Unintelligible)

6 **DR. NETON:** I think -- I think it depends on what
7 you're working with. I know at Fernald at one
8 point we had a trigger level was based on kidney
9 damage. If you happened to be working with the
10 very soluble uranium and your result exceeded X -
11 - I don't remember what that was.

12 **MR. GRIFFON:** Yeah.

13 **DR. NETON:** I want to say it was like .05, 50
14 micrograms or something per liter, they would --
15 it would trigger a protein albumin ureo* test,
16 and that was based on some default calculation we
17 did and showed that, you know, if it was really
18 soluble uranium this could have accumulated so
19 much X at the no-effect -- above the no-effect
20 level of the kidney.

21 **MR. GRIFFON:** Right.

22 **DR. NETON:** I -- I don't know. There was
23 actually some NRC guidance I think at one point,
24 an NRC -- but that was not until like '87 time
25 frame that talked about -- I don't remember.

1 **MS. BLOOM:** I do recall seeing something in the
2 '50s, but I don't know that it was generically --

3 **MR. GRIFFON:** Yeah. I know I've seen it at other
4 sites. I wasn't sure what the practice was --

5 **MS. BLOOM:** I'll see if I can find that.

6 **DR. NETON:** We can follow up on this, but --

7 **DR. MAKHIJANI:** Yeah. All right.

8 **DR. NETON:** -- yeah, that's a good, you know --

9 **DR. MAKHIJANI:** Now take Case A --

10 (Whereupon, Dr. Ziemer retired from the
11 meeting room.)

12 **DR. NETON:** Just let me make a note here. Okay.
13 So Case A?

14 **DR. MAKHIJANI:** Case A.

15 **DR. NETON:** Okay.

16 **DR. MAKHIJANI:** This person started in 1950 so
17 had no internal or external monitoring data till
18 '55. He had a renal cell carcinoma. His wife
19 knew of incident but had no detail, so this is a
20 survivor -- also no urinalysis data
21 (unintelligible) and a high reading of 58. This
22 is obviously a relative dose.

23 **DR. NETON:** Right.

24 **DR. MAKHIJANI:** The -- the DOE response, if
25 you'll open that and go to page 42 is what my

1 notes indicate (unintelligible).

2 **DR. NETON:** Okay. There's some urine data
3 starting '60/'61 time frame.

4 **DR. MAKHIJANI:** (Unintelligible) downtown and
5 Weldon Spring. His 58 would be (unintelligible).

6 **DR. NETON:** This is what I was talking about. It
7 may be -- if he has no data at Mallinckrodt,
8 we're getting (unintelligible) urine data --

9 **DR. MAKHIJANI:** No, he had data at Mallinckrodt,
10 but not for the first five years.

11 **DR. NETON:** Right, but -- I don't know, Dave, if
12 you could build up some chronic scenario that
13 would actually be chronic high and then come back
14 -- continue the chronic -- there'd be two chronic
15 exposure periods, I guess. How would that work?

16 **MR. ALLEN:** I'm not sure what you're asking.

17 **DR. NETON:** Well, you've got a gap of -- you have
18 a gap of three years of data but you have samples
19 down in here later on. Could you construct a
20 chronic model that would fill in the early gaps
21 in these --

22 **MR. ALLEN:** Yeah, and the -- the bigger the gap,
23 the higher this chronic --

24 **MR. GRIFFON:** Right.

25 **MR. ALLEN:** -- but then that means the shorter

1 that chronic period, so you end up with lesser
2 intake. In general you take it out to where it's
3 close to the monitoring period of your -- your
4 highest intake and there's not a lot, if I recall
5 -- a huge difference in the --

6 **DR. NETON:** Right. But that's my point is --

7 **MR. ALLEN:** You're getting one thicker urinalysis
8 sample, you know, or a set of them -- it -- it
9 fairly well locks you in on the intake.

10 **DR. NETON:** Yeah, but that's my point. You'd
11 have to have two chronic scenarios in there to do
12 that, right? The first one large enough to get
13 you down to the first data point, build up, and
14 then to sustain that --

15 **MR. ALLEN:** Yeah, I'm just saying if you take a
16 chronic that builds up to that data point, that's
17 one thing. But you're saying you want to build
18 up higher and then let it come down? That'd be
19 your worst case.

20 **DR. NETON:** Right. That's what I'm saying.

21 **MS. BLOOM:** Uh-huh.

22 **DR. NETON:** You build up a chronic to get you to
23 that first point because you really don't know
24 anything about this and so you build up this
25 large chronic and --

1 **MR. ALLEN:** The -- yeah, I'm saying --

2 **DR. NETON:** Yeah.

3 **MR. ALLEN:** -- it all depends on that -- you've
4 got the start date locked in pretty much --

5 **DR. NETON:** Right, right.

6 **MR. ALLEN:** -- so it all depends on that gap
7 between that first urinalysis and the end of the
8 chronic.

9 **DR. MAKHIJANI:** No, the beginning of the chronic
10 wouldn't it? Isn't that what -- I'm sorry.

11 **MR. ALLEN:** That -- that time period you know.
12 You know the beginning of employment, you know
13 the date of urinalysis.

14 **MS. BLOOM:** Right.

15 **DR. MAKHIJANI:** The beginning of employment to
16 the first urinalysis, five years.

17 **MR. ALLEN:** Okay. So you -- you got that five
18 years you know. The question is, if you assume
19 that he's exposed from day one chronically --

20 **MR. GRIFFON:** Yeah, so --

21 **DR. NETON:** So you've got to do something like
22 this to bring it down to there?

23 **MR. ALLEN:** Right.

24 **DR. NETON:** But then this would have to start
25 coming in -- I'm not sure what that would --

1 **MR. ALLEN:** What I was just trying to say is if
2 you -- you got that curve you're looking at right
3 there, but the part that's unknown is the end
4 date for that chronic exposure.

5 **MS. BLOOM:** That chronic intake so it --

6 **DR. NETON:** Right, right. Yeah, right.

7 **MS. BLOOM:** -- so it just squishes --

8 **MR. ALLEN:** If you adjust that you find out it
9 doesn't make -- it does make a difference, but
10 it's not as big as you would think because you
11 have competing effects there --

12 **DR. NETON:** Right.

13 **MR. ALLEN:** -- because if you say it was a four-
14 year chronic intake and then he was sampled a
15 year after that, you know, for your five-year
16 period, you get an intake for that four-year
17 period. If, on the other hand, you assume he was
18 only exposed for that first year of employment
19 and then, you know, it got way up there and it
20 came down for that urinalysis, it looks like a
21 much bigger intake. But in reality, since it's
22 only a year, it comes out near the same.

23 **DR. MAKHIJANI:** Yeah, so that's (unintelligible)

24 --

25 **MR. ALLEN:** (Unintelligible)

1 **DR. MAKHIJANI:** -- it seems you've got two
2 unknowns so you can't really determine the peak.
3 But what you're saying is the peak doesn't
4 matter?

5 **MR. ALLEN:** It's the area in the curve that
6 matters, not the peak. And the area in the curve
7 ends up being -- since you have those competing
8 factors there, the area in the curve ends up
9 being similar. You know, I'd have to run some
10 numbers and they're not --

11 **MR. GRIFFON:** And -- and the extreme of that is
12 if you (unintelligible) --

13 **DR. MAKHIJANI:** I'm not convinced about that.

14 **MR. GRIFFON:** -- acute exposure on day one before
15 the five years, I think he's still -- you have a
16 very small curve --

17 **MR. ALLEN:** Right, but the next acute is steep.

18 **MR. GRIFFON:** -- but very small, and then it
19 tapers down.

20 **DR. MAKHIJANI:** So these are your data points
21 here?

22 **MR. ALLEN:** Right.

23 **DR. MAKHIJANI:** And if you assume a chronic
24 intake that looks like what this person might
25 have had during the period of monitoring you'd

1 have something like this, right?

2 **MS. BLOOM:** You'd start it to, yeah.

3 **MR. ALLEN:** Well, it would build up --

4 **MR. GRIFFON:** Yeah.

5 **DR. NETON:** Well, that would be -- but that you
6 can't demonstrate is the truth.

7 **DR. MAKHIJANI:** No, you can't, so what I'm saying
8 is if you actually have -- if you use the second
9 example that Dave just talked about, the heavy
10 exposure in the first year, reaching a big peak
11 and then going down, then the area under the
12 curve would be much bigger than -- than this in
13 the case of chronic (unintelligible) --

14 **MR. ALLEN:** But -- but the intake ends at the
15 peak of that thing. That's how it's sort of
16 coming down, right?

17 **MS. BLOOM:** Yeah, you have to have that stop.

18 **DR. MAKHIJANI:** (Unintelligible) the end of the
19 peak --

20 **MR. ALLEN:** So you've got an intake per day for a
21 shorter period of time, you multiply it together.

22 **DR. MAKHIJANI:** Oh, I --

23 **MR. ALLEN:** The intakes end up being similar.

24 **DR. MAKHIJANI:** The intake, that's right. So
25 this is the curve of the urine -- expected urine

1 --

2 **MR. ALLEN:** Right.

3 **DR. MAKHIJANI:** -- not (unintelligible, but the
4 integrated intake.

5 **DR. NETON:** Right.

6 **MR. ALLEN:** Yeah, and it's -- like I said, it's
7 not exact. There's a hundred scenarios you can
8 run --

9 **DR. MAKHIJANI:** Yes.

10 **MR. ALLEN:** -- and get different answers, but
11 it's -- they are competing factors there.

12 **DR. MAKHIJANI:** Okay. But it's like the previous
13 thing that we talked about with -- with --

14 **MS. BLOOM:** With the little acutes and the
15 chronics.

16 **DR. NETON:** There are -- I guess the bottom line
17 is there are things you can do and work with that
18 dataset to bracket this person's exposure, given
19 his monitoring history.

20 **MR. ALLEN:** Right. And you can get different
21 answers, but there's some bounding amount there.
22 It's just a variable around some mean.

23 **DR. NETON:** And actually I haven't looked at this
24 case a little closer, I'm not sure why it's not
25 done.

1 **DR. MAKHIJANI:** External --

2 **MS. BLOOM:** Is it more than 5,000?

3 **DR. MAKHIJANI:** This person might get --

4 **DR. NETON:** Well, I don't know. Well --

5 **DR. MAKHIJANI:** Well, I don't want to comment.

6 **DR. NETON:** I don't know what the result's going
7 to be, but there appeared to be a fair amount of
8 data to work with here is what I was saying, and
9 -- and there's a lot of reasons cases are done
10 (unintelligible).

11 **MR. GRIFFON:** Cindy's fault.

12 **DR. NETON:** I don't know about externals. Did he
13 have any?

14 **DR. MAKHIJANI:** No. (Unintelligible) there's a
15 blank, maybe the data were lost for the first
16 five years or something.

17 **DR. NETON:** We don't -- we don't want to talk
18 about the job title here, but I think -- well,
19 again, if we knew the job title here and we could
20 position this person somewhere, we've got numbers
21 for external based on plant that we could -- we
22 could do. I suspect, given this -- this dataset
23 as looking at it, the predicted intakes could be
24 fairly large -- the data that we're working with
25 here. (Unintelligible)

1 (Whereupon, a recess was held from 4:18 p.m.
2 to 4:22 p.m., during which Mr. Griffon
3 retired from the meeting room.)

4 **DR. MAKHIJANI:** I cannot find -- oh, yes. This -
5 -this work, this -- one of the things that I had
6 down in that person's notes, and also throughout
7 my notes, is the people did seem to work like 48,
8 50, 55-hour weeks. Overtime was very common, six
9 days a week was very common. And if there were
10 like a default assumption of, you know, a six-day
11 week at least -- some. And I think this will
12 also only come up when you're actually using air
13 monitoring data --

14 **DR. NETON:** Right.

15 **DR. MAKHIJANI:** -- so I know it will come up so -
16 - but it's -- it's not accurate and a source of
17 aggravation. So if it's corrected, it will be
18 very helpful.

19 **DR. NETON:** Okay.

20 **DR. MAKHIJANI:** Oh, I had a -- those records I
21 was not able to find -- maybe I got his name down
22 wrong -- who had a -- an incident reported of --
23 of one of these digester tanks boiling over and
24 he had stuff lined up. He had burns all over his
25 body and wound up in the hospital. I don't know

1 if you had it. I didn't see a record of an
2 incident like that and --

3 **DR. NETON:** You mean in the profile itself?

4 **DR. MAKHIJANI:** No, or -- I could not find his
5 records so I did not know -- I'll try -- I'll get
6 back to you about that. I'll make a note to --

7 **MS. BLOOM:** There was a place on the Mallinckrodt
8 O drive and -- I believe that's on the O drive
9 for Mallinckrodt and I believe this is in the
10 dosimetry files, and I did run across a uranium
11 burn incident that they were following very
12 closely. They were collecting urine samples. I
13 did this over the weekend so I'm pretty sure it
14 was Mallinckrodt that I was looking at, and it
15 would have been in one of those site images in
16 the dosimetry files. And that may be the same
17 person if this was a fairly major incident.

18 **DR. MAKHIJANI:** It seemed to have been a very
19 major incident and I didn't see reference to it.
20 And I mean -- I think in terms of burns, there
21 was only this one person involved so there
22 wouldn't be a need for it to be in
23 (unintelligible) --

24 **MS. BLOOM:** Yeah. No, this was one individual --

25 **DR. MAKHIJANI:** -- for a file.

1 **MS. BLOOM:** -- they were in the hospital. They'd
2 gone to the hospital afterwards and they'd
3 collected a lot of urine data.

4 **DR. MAKHIJANI:** Okay. I -- I think I must have
5 gotten his spelling -- name -- the spelling of
6 his name wrong because I could not find -- and
7 I'm -- I'm pretty sure he said he was a claimant,
8 so there's some -- some disconnect there. But
9 maybe --

10 **MS. BLOOM:** Did it start with that letter?
11 That's what I recall. I'm not sure that that's
12 it.

13 **MR. ALLEN:** I'm not sure the first letter of the
14 last --

15 **DR. MAKHIJANI:** That's what I have.

16 **MR. ALLEN:** -- name (unintelligible) Privacy Act.

17 **DR. MAKHIJANI:** But I could not -- I could not
18 find -- I could not find anything like under that
19 name.

20 **MS. BLOOM:** It's not a name I recall.

21 **DR. MAKHIJANI:** I -- I didn't do permutations of
22 the spelling. I just have a call in to --

23 **MS. BLOOM:** Okay.

24 **DR. MAKHIJANI:** -- try to figure it out and I'll
25 -- I'll maybe just communicate it with -- with

1 Jim, or should I cc you? If you'll give me your
2 card I --

3 **DR. NETON:** CC Cindy too, but yeah, send it to me
4 and cc Cindy.

5 **DR. MAKHIJANI:** Okay. Actually maybe I'll just
6 regroup today. My brain is shutting down.

7 **DR. ROESSLER:** My body is shutting down.

8 **DR. MAKHIJANI:** I need to regroup and I'll do
9 that this evening.

10 **DR. NETON:** May I?

11 **DR. MAKHIJANI:** You didn't find anything under
12 that name.

13 **DR. NETON:** There's -- there's two people under
14 that name, but neither of them worked at Weldon
15 Springs.

16 **DR. MAKHIJANI:** Yeah. At Mallinckrodt you mean?

17 **MR. ALLEN:** I can cull the table with everybody's
18 and sort it and get anything close.

19 **DR. NETON:** Well, it's -- like I say, I don't
20 know. It's a pretty simple name --

21 **DR. MAKHIJANI:** Yeah, it is.

22 **MR. ALLEN:** Oh, is it? Okay. Never mind.

23 **DR. NETON:** It's not like --

24 **DR. MAKHIJANI:** Yeah. No, I think -- I think I
25 must have done something -- I must have gotten

1 something mixed up.

2 **MR. ALLEN:** I'll see what I can -- see if I can
3 find (unintelligible).

4 **DR. NETON:** All right. Dave's pretty good
5 with... You'd think out of 18,000 names there'd
6 be more matches. There's almost 19,000 people in
7 the database now.

8 **DR. MAKHIJANI:** Nineteen thousand? Is that the
9 number of claims?

10 **DR. NETON:** About. It's 18,900-something. We
11 have a...

12 I'm going to agree with Arjun's assertion that
13 we're tired and maybe this would be a good
14 stopping point for the day and --

15 **DR. MAKHIJANI:** Yeah.

16 **DR. NETON:** We'll reconvene tomorrow at 8:30.

17 **DR. MAKHIJANI:** Yeah, that's fine.

18 **DR. NETON:** Right now we're -- well, we have
19 slides to go over the external dosimetry, but I'm
20 sure --

21 **DR. MAKHIJANI:** Yeah.

22 **DR. NETON:** -- there will be other things to talk
23 about but...

24 **DR. MAKHIJANI:** Well, yeah. What I'd like to do
25 is just to go over -- go over -- I'm going to go

C E R T I F I C A T E O F C O U R T R E P O R T E R**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 June 1, 2005; and it is a true and accurate transcript of the testimony captioned herein.

I further certify that I am neither kin nor counsel to any of the parties herein, nor have any interest in the cause named herein.

WITNESS my hand and official seal this the 20th day of July, 2005.

STEVEN RAY GREEN, CCR

CERTIFIED MERIT COURT REPORTER**CERTIFICATE NUMBER: A-2102**