

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 ONE

The verbatim transcript of the Working
Group Meeting of the Advisory Board on Radiation and
Worker Health held in Hebron, Kentucky on
March 27, 2006.

C O N T E N T S

March 27, 2006

WELCOME AND OPENING COMMENTS 6
DR. LEWIS WADE, DFO

MATRIX 25

COURT REPORTER'S CERTIFICATE 218

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.

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

(By Group, in Alphabetical Order)

BOARD MEMBERS

EXECUTIVE SECRETARY

WADE, Lewis, Ph.D.

Senior Science Advisor

National Institute for Occupational Safety and Health

Centers for Disease Control and Prevention

Washington, DC

MEMBERSHIP

GIBSON, Michael H.

President

Paper, Allied-Industrial, Chemical, and Energy Union

Local 5-4200

Miamisburg, Ohio

GRIFFON, Mark A.

President

Creative Pollution Solutions, Inc.

Salem, New Hampshire

MUNN, Wanda I.

Senior Nuclear Engineer (Retired)

Richland, Washington

PRESLEY, Robert W.

Special Projects Engineer

BWXT Y12 National Security Complex

Clinton, Tennessee

IDENTIFIED PARTICIPANTS

ADLER, TIM, ORAU
BEHLING, HANS, SC&A
CHEW, MEL, ORAU
ELLIOTT, LARRY, NIOSH
FITZGERALD, JOE, SC&A
HOWELL, EMILY, HHS
KERR, GEORGE, ORAU
LIPSZTEIN, JOYCE, SC&A
MAKHIJANI, ARJUN, SC&A
MAURO, JOHN, SC&A
NETON, JIM, NIOSH
REID, STEVE, ORAU
RUTHERFORD, LAVON, NIOSH
STEMPFLEY, DAN, ORAU
TANKERSLEY, BILL, ORAU

P R O C E E D I N G S

(10:10 a.m.)

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22

(Note from the Court Reporter: The following transcript contains a great number of "unintelligible" messages. Unfortunately transcription was often rendered impossible due to faulty audio-visual equipment of the meeting facility and poor telephonic connections. Please know these gaps in transcription are not the fault of the court reporter and not the fault of the speakers.)

WELCOME AND OPENING COMMENTS**DR. LEWIS WADE, DFO**

DR. WADE: Could I ask if anyone is on the phone, joining us by phone right now?

MR. STEMPFLEY: This is Dan Stempfley from Cincinnati with the ORAU team.

DR. WADE: Welcome.

MR. REID: Steve Reid from Richland office.

MS. MUNN: No kidding.

DR. WADE: Welcome. Is Mark on yet, Mark Griffon?

(No response)

Anybody else but the two gentlemen who identified themselves?

1 **MR. ADLER:** Tim Adler.

2 **UNIDENTIFIED:** (Unintelligible) with SC&A.

3 **DR. WADE:** Okay, welcome.

4 **MR. GIBSON:** Hi, Lew, this is Mike Gibson.

5 **DR. WADE:** Hi, Mike, how are you?

6 **MR. GIBSON:** I'm doing okay, a little under the
7 weather.

8 **DR. WADE:** Okay. There's a lot of that going
9 around this time of year.

10 **MR. GRIFFON:** Yeah, another under the weather
11 person, Mark Griffon.

12 **DR. WADE:** Okay.

13 **MS. MUNN:** How far under?

14 **MR. GIBSON:** Walking pneumonia.

15 **MS. MUNN:** Oh, geez.

16 **DR. WADE:** I hope you take care of yourself.

17 **MR. GIBSON:** Yeah, yeah, I'll be okay, thanks.

18 **MS. MUNN:** You like injections. Right?

19 **MR. GIBSON:** Oh, yes.

20 **MS. MUNN:** Oh, yeah.

21 **MR. TANKERSLEY:** This is Bill Tankersley and
22 Tim Adler.

23 **DR. WADE:** Well, maybe we can begin. I think
24 all the principals are here. This is a working
25 group meeting of the Advisory Board. This is

1 the working group that looks at site profiles,
2 individual dose reconstruction reviews, as well
3 as procedures reviews, and it's chaired by Mark
4 and is populated by Wanda and Robert, Mike and
5 Mark -- I don't think I've forgotten anyone.
6 Mark acts as chair.

7 Let me just sort of put you in -- put this
8 meeting in context. The Board and SC&A have
9 been looking at the Y-12 site profile for some
10 time now, identifying issues and trying to
11 resolve those issues, you know, through the
12 Board sort of six-step process. And we've made
13 a great deal of progress and this is another
14 meeting along that line. So this is a meeting
15 dealing with the Y-12 site profile. So while
16 we have a member, Robert, who is conflicted,
17 his conflict really manifests itself relative
18 to a site profile as not being able to vote or
19 make motion. As a working group we really
20 won't be voting or making motion, so Robert is
21 fully empowered to participate in the
22 discussion. I don't think there's anyone else
23 who's materially conflicted for Y-12.

24 Now the thing we have going on in almost
25 parallel is we have a Y-12 SEC petition that is

1 pending before NIOSH. NIOSH intends to bring
2 that evaluation report to the public and Board
3 the first week in April. What will happen is
4 this working group will sort of transition to
5 start to look at SEC issues when it meets next
6 -- and that will be the afternoon of April 11th
7 here in Cincinnati. So again, today we're
8 focusing on the site profile. At the next
9 meeting, at the 11th, we'll be focusing on the
10 SEC petition. The meeting on the 11th will be
11 after NIOSH releases to the Board and the
12 public its SEC petition evaluation report.
13 SC&A is also tasked with doing a focused review
14 of the Y-12 SEC petition, and we'll know more
15 about what's precisely involved in that when
16 they're in receipt of the evaluation report.
17 Now that's probably confusing to everyone, but
18 hopefully not too confusing to everyone.
19 We also have going on a Rocky Flats situation
20 that's really exactly parallel. Tomorrow this
21 working group will meet concerning the Rocky
22 Flats site profile. There will be a meeting
23 the morning of April 12th looking at the Rocky
24 Flats SEC petition, again with this working
25 group transitioning.

1 Dr. Melius is chairing a working group that's
2 looking at the generic issues associated with
3 SEC petition reviews by the Board's contractor.
4 That workgroup will meet the morning of April
5 11th, also in Cincinnati.

6 NIOSH does intend to bring both petitions, Y-12
7 and Rocky Flats, before the Board so that they
8 can be considered at the Board's face-to-face
9 meeting in the end of April in Denver,
10 Colorado.

11 Again, we don't know exactly how this will all
12 play out 'cause we haven't seen the NIOSH
13 petition evaluation report. SC&A hasn't had an
14 opportunity to react to that report itself.
15 But again, those are the -- the paths we're
16 moving down. If there are any questions about
17 that I'd be pleased to take them and try and
18 say more clearly than I did the first time what
19 I just said.

20 **MS. MUNN:** I have one question. This is Wanda
21 Munn. I'd like to get a feel before we get
22 started from both NIOSH and SCA about their
23 feelings with respect to how close we're --
24 we're coming here. When I look at the matrix,
25 personally, I still see a great many things

1 that are unresolved, especially following the
2 GAO report with respect to how the Board
3 operates and how our, as a consequence, working
4 groups -- the operative word being "working" --
5 operate. I'm a little concerned that we inside
6 the working groups have not come to grips with
7 some of the issues that appear to be such that
8 there will always be differences of scientific
9 opinion with regard to their resolution. And
10 so I guess I -- I would be very appreciative if
11 both NIOSH and SC&A could just, in 25 words or
12 less, give us a feel whether they feel like
13 we're -- we're really and truly getting closer
14 to resolution of these sticky wickets.

15 **DR. WADE:** If I might -- while you think about
16 the question, I'd like to complete one other
17 aspect of the introduction, and that is I think
18 it's important as we come face to face with
19 issues of conflict of interest that I ask Jim
20 to identify his team and who's here and their
21 roles, and then, John, you might want to do the
22 same thing, highlighting any issues that need
23 to be before the Board and the public as we
24 have these discussions. Jim.

25 **DR. NETON:** Okay. Well, with us at the table

1 to my immediate left are Mel Chew and George
2 Kerr. Mel is a 30-year employee of Los Alamos
3 -- or Lawrence Livermore National Laboratory,
4 has retired -- since retired and owns his own
5 consulting firm. Mel was involved for many
6 years at Lawrence Livermore with the weapons
7 testing program and, to some extent, he did
8 interface with Y-12 folks in the testing of the
9 weapons that were processed through Y-12. He
10 is serving as an expert for us on the internal
11 dosimetry issues and is also assisting in some
12 data validation -- some of the data reliability
13 testing that we've been asked to do.

14 George Kerr has spent 37 years at X-10, I
15 believe is retired from X-10 at this point.
16 He's also an independent consultant and he's
17 specifically a subject matter expert in
18 external dosimetry issues. He was involved
19 from -- almost all of his career in external
20 dosimetry research at X-10, not Y-12, and we
21 are relying on George as our subject matter
22 expert for external dosimetry issues at Y-12.

23 **DR. WADE:** Okay. And then we have Bomber.

24 **DR. NETON:** Then we have LaVon Rutherford, who
25 is the team leader for Special Exposure Cohort

1 petitions from NIOSH, and Emily Howell who is
2 with OCG.

3 **DR. WADE:** Okay. John, how about your team?

4 **DR. MAURO:** Our team, I guess as it pertains
5 specifically to Y-12 and Rocky, which we will
6 be covering today and tomorrow, as far as
7 conflict situations possibly go, I have no
8 conflict. My entire career has been either
9 consulting for the nuclear utility industry or
10 consulting for the Nuclear Regulatory
11 Commission or the Environmental Protection
12 Agency. I have had no involvement on working
13 on any work related to Y-12 or Rocky in my
14 career.

15 Joe Fitzgerald has had very senior positions
16 with the Department of Energy in health and
17 safety where he had health and safety oversight
18 for many of the operations. In fact, Joe, you
19 may want to give a little bit more development
20 on what involvement you may have had in terms
21 of your role as health and safety tiger team
22 related to either Y-12 or Rocky for the -- for
23 the benefit of the working group.

24 **MR. FITZGERALD:** Yeah. Well, I was at
25 Department of Energy in management positions

1 for 20 years and headed the health and safety
2 office for ten. Basically my experience and
3 involvement was in the policy side for
4 radiation protection policy, DOELAP program,
5 all those were inaugurated under my watch.
6 However, less so operationally. I did lead two
7 tiger teams, but not at Y-12 or Rocky Flats, so
8 for those two sites there's no direct conflict.

9 **DR. MAURO:** Another key individual that's part
10 of our team is Hans Behling. Many of you know
11 Hans. Hans again came out of the nuclear
12 utility industry, GPU Nuclear. He has a key
13 role on the work we're doing, especially in
14 external dosimetry.

15 Some of you folks know Joyce Lipsztein, who is
16 our specialist on internal dosimetry, the work
17 we're doing, and she's -- basically has been in
18 academia and as part of ICRP responsible for a
19 lot of the ICRP standard making protocols. She
20 has no involvement at all directly with any of
21 these facilities.

22 **MR. GRIFFON:** Excuse me, John?

23 **DR. MAURO:** Yes.

24 **MR. GRIFFON:** It's very hard to hear you.

25 **DR. MAURO:** Okay, I'll speak up a little

1 further --

2 **MR. GRIFFON:** I'm sorry, and I know I should be
3 there anyway. I feel guilty not being there,
4 but...

5 **MS. MUNN:** Yeah, shame on you.

6 **MR. GRIFFON:** Yeah, I know. I know, shame on
7 me for --

8 **DR. MAURO:** I'll -- in a nutshell --

9 **MR. GRIFFON:** -- even being awake right now.

10 **DR. MAURO:** Mark, in a nutshell, I just
11 introduced Hans --

12 **MR. GIBSON:** Thanks Mark, I can't -- the volume
13 seems really muted today for some reason.

14 **DR. MAURO:** How's this -- is this a little
15 better? This is John Mauro.

16 **MR. GIBSON:** That's much better.

17 **UNIDENTIFIED:** Yes.

18 **DR. MAURO:** I was just introducing Hans
19 Behling, who's not here today, but I wanted to
20 point out that he is -- he is a key member of
21 our team and has no involvement in his
22 employment history in -- with either Y-12 or
23 Rocky Flats.

24 I also mentioned Joyce Lipsztein having a key
25 role on internal dosimetry. Again, her main

1 area of professional involvement has been in
2 the academic community and in support of ICRP
3 standard setting bodies.

4 And the last, and certainly not least, member
5 of our core team, core group, is Arjun
6 Makhijani. Arjun has been involved in some
7 work related to Fernald in terms of supporting
8 certain -- I guess there was some litigation,
9 but I do not believe you have had any
10 involvement at all in work related to either Y-
11 12 or Rocky Flats. Please elaborate.

12 **DR. MAKHIJANI:** Yeah, that's correct. I -- in
13 Fernald I -- I was one of the experts for the
14 plaintiffs in both the worker lawsuit and
15 neighbor lawsuit, but I've not had any
16 involvement in Y-12 or Rocky Flats.

17 **DR. WADE:** Thank you, John. I just wanted to
18 have that discussion. We'll have discussions
19 like that. I mean conflict of interest and
20 dealing with who's going to be a big part of
21 how we conduct our business, and the way to
22 deal with it is disclosure and then independent
23 review, and I think we're practicing both
24 today.

25 Now let's go back to Wanda's \$64,000 question,

1 which is certainly pertinent and either side --
2 NIOSH or SC&A -- wish to take on the question?

3 **DR. NETON:** Well, I guess -- I guess I could
4 start where I think -- I view that there are
5 three key areas that we still have to discuss,
6 and hopefully we can discuss those today some -
7 - in some detail. The first area I think that
8 we need to talk about is the progress that
9 we've made on the evaluation of reliability of
10 the data, that's -- that's something that we've
11 been talking about and we've got some -- some
12 additional information to discuss today.
13 That's the first issue I think that's on the
14 table that needs to be discussed.
15 The second issue I think is related to this
16 external cohort data, and most recently -- I
17 think on March 21st -- SC&A passed over to us
18 another memo that expressed concern about some
19 of the interpretations that we were using in
20 that area, and I think that needs to be
21 discussed. We are prepared at this meeting
22 today to go over that in some detail and
23 express our opinions as to where we stand on
24 that issue.
25 And somewhat tangentially related to that

1 external cohort information was this exposure
2 evaluation of weapons assembly/disassembly type
3 workers and how that may come to bear on the
4 analysis we've done for the external dosimetry
5 coworker model, and we -- we've got some very -
6 - very nice additional information to discuss
7 for that class of workers.

8 Now the third issue I think is related to this
9 investigation of these other radionuclides.
10 That's been an ongoing issue for some time now.
11 Mel Chew in particular has been down at the Y-
12 12 area much more than he'd probably like, and
13 we're prepared to discuss a lot about the
14 exposures at the Cyclotrons and Calutrons and
15 some of these other exposures such as
16 plutonium, thorium and neptunium.

17 So in my mind those are three issues on the
18 table, and then subsequent to that I think we
19 probably need to get -- engage in a discussion
20 about the eleven example dose reconstructions
21 that were passed over and, in light of our
22 discussion today, how relevant they might be
23 for us to pursue and clean those up.

24 That's where I think I stand. I hope I'm not
25 too far off the mark that I see

1 (unintelligible).

2 **DR. MAURO:** This is John Mauro. From my
3 perspective that's exactly the list that we
4 have in mind also. Joe, do you see any --

5 **MR. FITZGERALD:** Yeah, I was going to say --
6 no, my list is exactly the same, which I guess
7 is progress -- to answer your question. And
8 like I -- like I say, you know, we -- we --
9 when we originally did the site profile review
10 and got into this issue of the other nuclides,
11 it was, to me, a long horizon to answer a lot
12 of the questions that we're in the process of
13 answering. So I just -- be -- sort of a light
14 of optimism. I think we're making a lot of
15 headway on that particular issue. Maybe a
16 little less so on the other two tracks, but I
17 think today might be a good day to converge on
18 those, as well. But on the other nuclides, I
19 thought that was the furthest we had to go,
20 Wanda, and I think we've made a lot of progress
21 and I think where we are now is to hear more
22 about I think what Mel's going to be talking
23 about hopefully today, which is about some of
24 the issues on U-233 and neptunium and what --
25 what was said, so --

1 **MS. MUNN:** Good, I -- I really see that as key,
2 personally, because this is not going to be
3 simply a Y-12 issue. That's going to come up
4 again and again and again, this issue of -- of
5 radionuclides --

6 **MR. FITZGERALD:** Yeah.

7 **MS. MUNN:** -- anything in the decay chain is
8 going to be there, and that's -- that's good
9 news. Okay, fine.

10 **DR. WADE:** For those on the phone, we're
11 working to upgrade the phone system. Shouldn't
12 be long and we'll come through clear as a bell.

13 **MR. GRIFFON:** Okay, thanks.

14 **DR. WADE:** Mark, do you have anything that you
15 want to say in -- in your role as chair?

16 **MR. GRIFFON:** Yeah -- no, I mean I -- I don't -
17 - I think that was a good overview of where I -
18 - I think that's also where we stand on the
19 items, and I don't know that -- I think the --
20 I don't think on any of these we're at the
21 point -- I think Wanda said something about,
22 you know, are we at a point where there's just
23 disagreement between the two sides. I don't
24 think we've got all the pieces far enough along
25 to know whether there's just a disagreement or

1 -- you know, so we -- we've still been waiting
2 for some action items to be completed and I
3 think we're -- we've made good headway, but --
4 and maybe after today or tomorrow we'll -- you
5 know, we'll have moved the ball further along
6 here. That's -- that's what I hope.

7 **DR. WADE:** See, the work -- the SEC process
8 brings an element of -- of timing to the -- to
9 the table that we're -- we haven't dealt with
10 as -- when we've dealt with individual dose
11 reconstruction reviews or site profiles or
12 procedures, and -- and again, in the ideal
13 world, scientific issues would be raised,
14 debated and closure would be reached. It might
15 not be possible in the time frame. And I think
16 short of that, what the Board needs, in my
17 opinion, is a complete airing of the issues so
18 the Board can make its own judgments. Now
19 again, closure is the best, but sometimes we're
20 not going to be able to reach closure because
21 of time, and some of these issues are really
22 quite vexing. But I think a complete airing of
23 them so the Board can understand the
24 differences, if they exist, and then vote as
25 they see fit is really the process as it'll

1 play out.

2 I think an excellent effort has been made on
3 the part of this working group to raise issues
4 and resolve issues. And Mark, if anyone in the
5 world has no reason to feel guilty, it's you
6 for the work you've brought to this. But you
7 know, we'll see where we are when the vote
8 comes and -- but no -- regardless of where we
9 are, no one can say there hasn't been a
10 concerted effort made by right-thinking people
11 to try and address some very difficult
12 technical issues.

13 **MS. MUNN:** That was really I think the basis of
14 my question, Lew, thank you, is -- is when are
15 we going to reach a point that we can say to
16 the Board these are the differences in -- in
17 scientific thought and we must resolve them as
18 a board. So...

19 **DR. WADE:** I think the SEC process is going to
20 bring us to that, and I think that's fine. I'm
21 glad it's coming when it did, after we've been
22 able to develop really a level of trust and
23 facility in terms of working issues. This is
24 really a fairly mature process and everyone has
25 accorded themselves very professionally.

1 as well, that if there are any --
2 (Whereupon, a portion of the telephone
3 connections were disrupted.)

4 (Pause)

5 Okay, now we have two unit --

6 (Pause)

7 Bear with us, we're working this out.

8 (Pause)

9 Can you hear me?

10 **MR. GRIFFON:** Yeah.

11 **MR. GIBSON:** Yes.

12 **UNIDENTIFIED:** Yes.

13 **DR. WADE:** Okay. That's pretty good?

14 **MR. GIBSON:** Sounds a lot better to me.

15 **MR. GRIFFON:** Yep.

16 **DR. WADE:** Okay, we're going to try and
17 exercise discipline on this side, and even
18 maybe, you know, if there's going to be a long
19 statement made, make sure that the person comes
20 to the microphone or the microphone to the
21 person, and please shout out if you -- if you
22 have any difficulties --

23 **MR. GRIFFON:** Sure.

24 **DR. WADE:** -- so we're going to go now -- Mark
25 had raised the question or made the proposal

1 view, Mark, if you and the others here at the
2 table consider any of these items now closed.
3 I would really like to be able to mark -- just
4 mark them off.

5 **MR. GRIFFON:** Right.

6 **MS. MUNN:** But yeah --

7 **MR. GRIFFON:** Well, if -- yeah, I mean if we
8 start with 1-A --

9 **MS. MUNN:** Yes.

10 **MR. GRIFFON:** -- action number one is that
11 NIOSH provided something --

12 **MS. MUNN:** Yes.

13 **MR. GRIFFON:** -- so I think that is a closed
14 item, right.

15 **MS. MUNN:** Yeah, there are several --

16 **MR. GRIFFON:** Yep --

17 **MS. MUNN:** -- there are several --

18 **MR. GRIFFON:** -- there's quite a few of those.

19 **MS. MUNN:** -- of those. One of the other
20 things I hope this working group may be
21 instrumental in doing is helping to codify what
22 we've talked about before, how we are going to
23 track these items, since obviously our lack of
24 tracking them has attracted more attention than
25 we would like to have.

1 **MR. GRIFFON:** Right, I agree. Okay, why don't
2 we -- why don't we go on to number two then,
3 this is a question of -- under data
4 reliability, and the action was a follow-up of
5 the -- of the HP reports.

6 **MR. PRESLEY:** Right.

7 **DR. NETON:** Okay, this is Jim Neton. Tim
8 Adler, are you out there?

9 **MR. ADLER:** Yeah, I'm here, Jim.

10 **DR. NETON:** Okay. I've asked ORAU -- and I'm
11 passing around the table -- I don't think,
12 Mark, you're going to have all of this, but
13 there are four handouts going around that may
14 be spoken from, I'm not sure, between Bill --
15 Tim Adler and others, but they speak to some of
16 these issues that we've talked about. One of
17 the handouts is a summary statistics for
18 distribution of delta view uranium data. One
19 is titled OCAS request for Y-12 CER data
20 validation. Another one is a delta view Y-12
21 uranium urinalysis comparison, and there's
22 another one titled monitoring data sufficiency.
23 These all represent individual pieces of work
24 that have been ongoing, and some of them we had
25 promised to provide at the last meeting so we

1 are handing them out here. And Tim, if you'd
2 take the ball and -- and just provide a status
3 as to where we are with this data reliability
4 issue, please.

5 **MR. GRIFFON:** Jim, those weren't part of the
6 ones on the O drive, were they?

7 **DR. NETON:** Some of them were, some of them
8 aren't.

9 **MR. GRIFFON:** Okay.

10 **DR. NETON:** I think that the CER data
11 validation one was on the O drive where they
12 did the external data comparison, if you
13 remember. Bill Tankersley was speaking of how
14 he did a comparison -- was it Bill Tankersley -
15 -

16 **MR. GRIFFON:** Okay, I don't recall that being
17 on there, but it might have be-- yeah.

18 **UNIDENTIFIED:** It is.

19 **DR. NETON:** Yeah, it's there.

20 **MR. GRIFFON:** Okay.

21 **DR. NETON:** And I think that's the only one
22 that's out there on the O drive right now. But
23 Tim, if you'd just kind of work us through
24 where -- where -- where you are on this issue,
25 I'd appreciate it.

1 **MR. ADLER:** Okay. Some of it will undoubtedly
2 be -- kind of rehash of stuff we've talked
3 about at the last meeting, but as
4 (unintelligible) instances, we've pushed them a
5 little bit further. In the effort of going
6 through these HP reports and finding references
7 to number of analyses performed and maximum
8 values and discrepancies between number of
9 analyses performed and what we have on record
10 in the electronic database, we've got a few
11 things to discuss.

12 As we discussed earlier, we know from
13 interviews with the laboratory workers -- well,
14 let me back up for just a second. We know that
15 the HP reports typically contain more analyses
16 referred to than we have in the database. Now
17 as we discussed, there are interviews with
18 laboratory workers and people familiar with the
19 programs in place within the subject time
20 period have stated that standard analytical
21 procedure was to frequently run many additional
22 quality control analyses such as blanks,
23 standards and matrix spikes, and it's these
24 types of analyses were likely included in the
25 total report, but not -- but they would not

1 have been included in the database which was
2 designed to keep individual monitoring records.
3 In our last discussion, Mark, I believe you
4 raised a question regarding numbers of analyses
5 in the HP reports being as much as twice as
6 high as the number of analyses or records in
7 the database for the corresponding time.

8 **MR. GRIFFON:** Yeah.

9 **MR. ADLER:** I checked into that a little bit
10 further and we examined -- Bill Tankersley
11 helped, we examined all the available reports
12 to us and we identified a typical difference of
13 about 30 to 60 percent. However, it was -- the
14 first quarter of '51 there was a nearly 90
15 percent difference seen in that quarter. So to
16 investigate that further, I recontacted a
17 urinalysis laboratory technician I had talked
18 to earlier and posed the question. He
19 responded that the differences of that
20 magnitude would also not surprise him. He said
21 that during the two and a half years that he
22 worked doing urinalysis, they ran full metric
23 and gross alpha methods on nearly 100 percent
24 of the worker samples as a quality control
25 check and just to make sure that the exposures

1 weren't being missed.

2 Additionally he said that, you know, unexpected
3 discrepancies results would warrant even more
4 analyses or resampling, but he thought that
5 that was not -- not at all surprising.

6 Two additional checks we performed and came out
7 of Bill's additional work are related to a
8 reference made to percentage of urinalysis
9 samples exceeding the MPO of 70 DPM for 24-
10 hour, and also referenced it was made to a
11 maximum urinalysis result. In the January to
12 July 1952 report is the following statement on
13 page 30. It said (reading) to date ten to 30
14 percent of the total number of urine samples
15 analyzed for uranium have exceeded the MPO* of
16 70 DPM for 24-hour voidings. I think it's safe
17 to assume that the range of above NPL* results
18 is reflecting a range of weekly or monthly
19 (unintelligible) that they're making within
20 that six-month reporting period.

21 We examined -- Bill examined the electronic
22 record from that same six-month period and --
23 to -- to check out above-MPO results and that
24 yielded a result of 18 percent of the results
25 for that period being above the NBL*, which is

1 right in -- right in the middle of that ten to
2 30 percent, so it's not too surprising.
3 Then there's a statement in the November to
4 December 1950 report that said the highest
5 excretion level of uranium was 795 DPM per 24-
6 hour voiding, and within that time period in
7 the database (unintelligible) for the
8 (unintelligible) result, it is 795 DPM that is
9 there.

10 **MR. GRIFFON:** Yeah.

11 **MR. ADLER:** Discrepancies between the number of
12 film badges processed I believe we've covered
13 before. Do you have any interest in hearing
14 about that again? You know, we know that they
15 were processed on a weekly basis often, but --

16 **DR. NETON:** Tim, why don't we stick with the
17 urine samples right now --

18 **MR. ADLER:** Okay.

19 **DR. NETON:** -- because I think we've got some
20 more stuff to talk about here.

21 **MR. ADLER:** Yeah, we've got some more stuff to
22 talk about.

23 **DR. NETON:** Yeah.

24 **MR. ADLER:** Okay. Last week urinalysis results
25 specifically associated with 22 individuals

1 were located and obtained from a classified
2 health physicist report from November 13th,
3 1953. The results were presented as average
4 uranium urinalysis results for the month of
5 October 1953. The number of analyses, the
6 number of analyses exceeding the MPL and the
7 final (unintelligible) presented for each
8 individual. These results were compared to the
9 Y-12 electronic record, and I'm not sure
10 whether or not you have a table showing these
11 results or now -- Mel, do you have that?

12 **MS. MUNN:** Yeah.

13 **DR. NETON:** What's the title of it, Tim?

14 **MR. ADLER:** I don't think I actually got around
15 to giving it a title. It says -- the headings
16 are headings and data as presented in HP report
17 and Y-12 electronic record results for October,
18 1953.

19 **DR. NETON:** No, we don't have that table here.

20 **MR. ADLER:** Okay, well --

21 **UNIDENTIFIED:** Wait, actually we do --

22 **MR. ADLER:** -- it's in the --

23 **MR. RUTHERFORD:** Tim, this is Bomber, is it in
24 your draft monitoring data sufficiency --

25 **MR. ADLER:** It is.

1 **MR. RUTHERFORD:** Okay, could you pull that
2 report out? It's back on about six pages, it's
3 report -- reported urinalysis results.

4 **DR. NETON:** Okay.

5 **MR. RUTHERFORD:** I believe that's the one
6 you're talking about. Am I correct?

7 **MR. ADLER:** It is. And actually I guess it's
8 not too critical to have the table in front of
9 you because it doesn't take much imagination to
10 see that the results that were pulled up from
11 the electronic database are identical to those
12 that were cited in the report --

13 **MS. MUNN:** Great.

14 **MR. ADLER:** -- in all 22 cases. There's one
15 minor difference, one exception, for a worker
16 that we'll just call number 13, on that table.
17 Three results were found in the Y-12 record
18 with values of 157, 152 and two. The results
19 of 152 and two were recorded on the same day.
20 Average dpm per 24 hours for all three values
21 is 104, which is less than I guess the 155
22 that's in the table. But if you exclude the
23 two dpm anomalous result, the average is 155,
24 which is exactly the same as what's reported in
25 the report. So I think it's safe to assume

1 that the authors of the '53 report decided it
2 was appropriate to not use that questionably
3 low result in their summary. However, serving
4 as the official record, it would be expected
5 that the questionable result remain part of the
6 Y-12, you know, electronic database.

7 **DR. MAURO:** This is John Mauro, just a quick
8 question -- I get a little oriented -- so you
9 went into these health physics progress reports
10 I guess this, what, randomly found a 1953 set
11 of data representing 22 workers, so it was a
12 grab.

13 **MR. ADLER:** Well, we've been pursuing this sort
14 of data for quite a while, John.

15 **DR. NETON:** I think it's the only dataset they
16 could find that had individual workers
17 identified.

18 **MR. ADLER:** Right, trying to find individual
19 data that we --

20 **DR. MAURO:** Okay, and then you went ahead and
21 just mapped that back onto the CER.

22 **DR. NETON:** Right.

23 **DR. MAURO:** Okay, thank you.

24 **DR. NETON:** Right, that's the problem with the
25 health physics report is they tend to be

1 summary statistics as opposed to individual.
2 This just happened to be one that had had some
3 data.

4 **MR. ADLER:** This is -- was out of a classified
5 report that we did not have. All the
6 classified ones, we did not have anything but
7 the summary type data. And that reference to
8 the maximum, 795, that was helpful, too, but...
9 That's it on the reports. Want to talk about
10 the punch card?

11 **DR. NETON:** Yeah, I think it would --

12 **MR. GRIFFON:** Well, did -- just one question.
13 Did you look at the 50th, 90th, 75th
14 percentiles from these graphs versus the
15 database, by any chance?

16 **MR. ADLER:** I don't think we did that.

17 **MR. GRIFFON:** That's something that was noted
18 in there.

19 **MR. TANKERSLEY:** Mark, this is Bill. What did
20 you ask?

21 **MR. GRIFFON:** Well, the -- the graphs in the
22 health physics reports have -- have by week,
23 they show a data point, and I -- I understand
24 you might not be able to exactly confirm the
25 number, but it's just on a graph for the whole

1 half a year, but it graphs the 90th percentile
2 of the distribution of results for that time
3 period, and the 50th, and I thought that --
4 that's the most important thing, to me, is if
5 you're in agreement there with the database,
6 then I think that could -- if that's the main
7 way you're going to use the database is -- is
8 as a entire distribution, so if you're in the
9 same ball park on those, I think we could all --
10 -- you know, that would raise my level of
11 comfort, anyway.

12 **MR. TANKERSLEY:** Yes, I remember those graphs
13 now. No, I did not look at those, and yes, we
14 can.

15 **MR. ADLER:** On to punch cards? Do you have any
16 other questions?

17 **DR. NETON:** No, I think -- I think that's a
18 good thing that we -- we need to take note of,
19 this 90th percentile, and it sounds like, you
20 know, a mark would certainly -- like Mark said,
21 raise his confidence level. And you're right,
22 Mark, that these -- these data are more
23 important for coworker situations --

24 **MR. GRIFFON:** Right.

25 **DR. NETON:** -- because when we have the data --

1 I mean we have what we have. We have
2 individual monitoring points.
3 We're prepared to talk a little bit about these
4 punch cards if people -- people are ready to
5 move into the -- into that segment, and I think
6 Mel Chew --

7 **MR. GRIFFON:** Is that really number three --
8 under number three more?

9 **DR. NETON:** Is that number three?

10 **MR. GRIFFON:** Or -- I guess two or three,
11 whichever.

12 **DR. NETON:** Right, it's sort of related to the
13 log books or lack thereof and what we believe
14 would happen with the data once it left the
15 analyst's hands.

16 **MR. GRIFFON:** Okay.

17 **DR. NETON:** And Mel, I think -- or Tim, are you
18 going to take that or is Mel going --

19 **MR. CHEW:** Yeah, I'll -- start with it, Tim,
20 and I'll pick it up. I have the cards in my
21 hand here.

22 **MR. ADLER:** Okay, I'll start that off. Okay,
23 the internal data consistency effort was a full
24 exam by comparing these punch cards with the Y-
25 12 electronic record. I'll give you a little

1 bit of background. The cards were used to
2 record Y-12 employee monitoring information for
3 decades. They were prepared with
4 identification data and accompanying
5 individuals' bioassay samples to the analytical
6 lab. Sample information details and a raw
7 analytical count data were typically recorded
8 by hand directly on the card at the time of
9 analysis. Typically -- typical identification
10 type information included on the cards would be
11 worker I.D., sample date, sample volume, time
12 interval, and department.

13 At this point, to date, the oldest punch cards
14 located for this assessment have been from the
15 mid-'70s. These cards were therefore used to
16 check for consistency electronic database in
17 terms of flow of the sample and analytical data
18 from the laboratory to its final entry into the
19 monitoring record.

20 Selection of about 50 cards from the mid-'70s
21 to early '80s was randomly chosen from a box of
22 cards and then cleared by Y-12 personnel for
23 our use late last week. At some point -- I
24 mean at this point, eight of these cards have
25 been compared to electronic database. The

1 names, identification numbers, sample
2 information -- such as the void times, sample
3 sizes, dates, et cetera -- they correspond
4 precisely with the information stored in the
5 electronic database for each of the cards.
6 Comparing raw analytical count data present on
7 the cards to the final dose recorded in the
8 database requires performing a very simple but
9 a well-documented math calculation. Some of
10 the variables required to perform the
11 conversion are specific to analytical runs,
12 such as background measurements and possibly
13 (unintelligible) recovery. This analytical
14 run-specific information's not present on the
15 cards. However, recoveries and background
16 numbers described as typical or desired are
17 available in other literature. And when we
18 applied these to the punch card data and do the
19 conversion, the results come out to be very
20 close to that of the electronic record.

21 Now Bryce, do you want to add anything to this?

22 **MR. CHEW:** Go ahead, Bryce.

23 **MR. RICH:** I -- I think that's a -- a good
24 summary, Tim.

25 **MR. CHEW:** I'd like to -- Mark, you were not --

1 I'm holding three cards that came out of that
2 particular box. I want to thank the Y-12
3 management, all the way to the top there,
4 allowed me to take these cards out of the
5 classified vault. When we were pulling these
6 cards there was two radiation monitors that
7 carefully surveyed the backs and forth of these
8 cards, making sure they're not contaminated. I
9 told this to the people after I passed the
10 cards around to them (unintelligible) plastic
11 sleeve (unintelligible). But these are the
12 original data and I -- I firmly believe that
13 one of them on just that electronic database
14 was used as the official record and there was
15 really no reason to keep these later on.
16 (Unintelligible) very fortuitous, after a very,
17 very lot of help from the Y-12 vault people to
18 locate these cards and pull them. And anything
19 more anybody wants to say? I think just to
20 have these -- to know that these things -- the
21 procedures were done and the very fact that the
22 numerical values hand-written on these cards
23 that correspond to what is punched on the
24 things are really the key.

25 **DR. NETON:** I'd just like to ask a question. I

1 think I know the answer, too, but I'll ask it.
2 Is it our opinion -- and I think that it is --
3 it is -- that these cards go back well before
4 the 1970s. I mean this is what we were able to
5 find as a sample, but I believe Bill
6 Tankersley, at least in talking to him last
7 week, suggested that he thought they went
8 pretty far back so that this sampling, although
9 it does not validate the SEC period, would be
10 indicative of the similar process used for that
11 period. Is that right, Bill?

12 **MR. TANKERSLEY:** This is Bill. It's not just
13 my thinking, either, Jim. Everyone at Y-12 is
14 certain that the punch cards were used all the
15 way back, possibly even into the early '50s,
16 definitely back to the '60s. We don't know why
17 we haven't found any cards -- actually we found
18 cards back to January of '68. We don't have
19 any earlier than that. But they were used, and
20 they definitely were using IBM machines back in
21 the '50s, and we really are certain that this
22 system -- not necessarily the automated system
23 that's used now; there's not any handwriting on
24 the cards, you know, presently, but -- but the
25 punch cards were used back into the '60s and --

1 and they say probably back into the '50s.

2 **MR. CHEW:** I'd like to add one more comment,
3 Bill, if I may. In searching for the logbooks,
4 there was a lot of discussion about logbooks
5 (unintelligible) people, there are some
6 logbooks, but they appear to be the special
7 samples when there are either a special
8 sample's required either due to an incident or
9 some additional information needed. Now there
10 are clearly some handwritten logbooks that date
11 back into the '50s and '60s that are still
12 apparently currently kept at the Y-12 vault. I
13 don't think many of us (unintelligible), so
14 they are there.

15 **MR. RICH:** This is Bryce Rich. It just occurs
16 to me that from a -- just briefly, from a
17 background discussion -- Y-12 was one of the
18 pioneers I think in terms of using punch cards
19 in terms of keep analytical data well organized
20 and providing a mechanism for sorting and --
21 and (unintelligible) data analysis and the
22 like. It's interesting to note that they had
23 modified the punch cards themselves to -- and
24 placed filter papers for air samples, and they
25 used them also for contaminated smear analysis

1 and traced the air sample by punch card,
2 identifying the location and time and whatever.
3 We looked for the air sample punch cards but --
4 primarily because of the fact that the samples
5 taken were radioactive -- I'm sure that they
6 are placed either someplace else or perhaps
7 disposed of. And as we all remember, the
8 DOE/AEC did approve the electronic database as
9 the record, and so as a consequence there was
10 perhaps less attention to -- although oh
11 there's a remarkable amount of storage in the
12 classified vaults and elsewhere of primary data
13 of this kind. But what we were able to find is
14 that a -- an example box of 1,300 punch cards
15 that identified this type of procedure
16 recording analytical data on the punch card in
17 a pre-printed form.

18 **MR. GRIFFON:** Now maybe I -- maybe I missed
19 this -- this is Mark Griffon -- did you look at
20 any of the punch cards compared with the
21 database, even though they weren't in the time
22 period of interest? Did you do -- did you
23 cross-walk any of those to see if the results
24 were --

25 **MR. ADLER:** Yes, we did, Mark, and as I

1 mentioned, some of the data specific to run --
2 you know, analytical runs -- is not on the
3 cards, but using typical type background
4 measurements for (unintelligible) recovery
5 numbers, they come out very close.

6 **MR. GRIFFON:** Okay. Have you -- have you
7 written that up in any form? Maybe that's one
8 of the handouts that you have, I don't know --

9 **MR. ADLER:** No, no --

10 **MR. GRIFFON:** Okay.

11 **MR. ADLER:** -- (unintelligible) just very
12 recently just got the cards.

13 **DR. NETON:** I think -- we -- we have a document
14 that I've just seen for the first time myself -
15 - this is always late-breaking, the way these
16 sessions go -- called monitoring data
17 sufficiency. And I think some of these
18 comparisons are written up in here, but not the
19 punch card comparison. Is that what I -- my
20 sense is. Is that right?

21 **MR. ADLER:** That's correct, yeah, just --

22 **DR. NETON:** Yeah, and so you have sort of a
23 straw man, a rough version of where we're going
24 with -- how we intend to document all that was
25 done here is going to be included in this

1 appendix. In much of the discussion we've
2 heard, some of it's here, some of it's not, but
3 that would be our -- our end product.

4 **MR. GRIFFON:** Right, okay.

5 **MS. MUNN:** There's a section in the draft for
6 it.

7 **DR. NETON:** Right, it is where -- where we
8 ended up at the end of the day. As -- as Lew
9 indicated earlier, though, you know, we -- you
10 know, we do have finite time limits here, and
11 it's unlikely that, you know, some bolus of
12 information is going to drop in our lap that's
13 going to allow us to, you know, definitively
14 prove this beyond any shadow of a doubt. But I
15 think -- in the last few weeks I think -- hope
16 folks would agree we've made pretty good
17 progress here in documenting, at least to the
18 extent that there's nothing right now to
19 indicate that there are major discrepancies
20 that we've found. And in fact, there's some
21 indications that these things look pretty close
22 to what you'd expect. I -- I do think that
23 Mark's suggestion about looking at the 90th
24 percentile ranges and stuff would -- would
25 certainly, you know, add to that -- that

1 analysis.

2 **MR. GRIFFON:** And -- and actually, you know,
3 I've done a few really quick looks at that and
4 it looks -- it also looks consistent for the --
5 the few reports I looked at, but I haven't gone
6 through -- there are several graphs and I think
7 that'd be worthwhile to -- to do that
8 comparison. It's fairly quick -- quick to do,
9 too.

10 **DR. NETON:** Sure.

11 **MR. TANKERSLEY:** And Mark --

12 **MR. GRIFFON:** Yeah.

13 **MR. TANKERSLEY:** -- this is Bill Tankersley,
14 because this is so critical, let me -- let me
15 just restate, if you will, what -- what Tim
16 reported. On the cards there are four, five or
17 six pieces of data written on there in addition
18 to just the printed information as to the
19 person, the department and so forth. You have
20 the volume of urine written. There's also a
21 piece of information called time interval.
22 It's in hours or fractions of hours, and that's
23 the time between the voiding and the previous
24 voiding. Then you have the raw counts.
25 There's always two. As the RadCom manual says,

1 they always run the samples in two counters,
2 but often there's four different readings,
3 they've done them again. In one case I just
4 saw where there was six readings. So all of
5 those are variables that are found in the
6 RadCon manual, and you know, everyone has
7 access to that on the O drive, Y-1401 or
8 something like that. All of those variables
9 are there to be used in that calculation. It's
10 a very simple --

11 **MR. GRIFFON:** Right.

12 **MR. TANKERSLEY:** -- equation, A times B
13 (unintelligible) over C over (unintelligible)
14 times (unintelligible) which amount to
15 (unintelligible). The raw counts, you know,
16 are on the -- what they call total counts are
17 on the card (unintelligible) you know, we have
18 the results in dpm for 24 hours of voiding.
19 Now when -- when I first calculated those, the
20 number did not, you know, come out to be, you
21 know, the same. And then I -- we discovered
22 that, you know, the background is not included
23 in that and so in the RadCon manual they --
24 they say that they -- their goal is to keep the
25 background at a certain level, which was .12

1 counts per minute and it's a 30-minute count.
2 And so anyway, when I then subtracted that
3 background, as Tim said, the numbers do come
4 out really quite close. But because they don't
5 include -- we were -- Bryce and I were a little
6 surprised that they didn't include the -- the
7 background information on the -- the card. But
8 you know, that would be the same for hundreds
9 and hundreds of cards, you know, per day and so
10 I -- I'm sure tht they delivered that number to
11 the HP group and the computer people who was
12 goign to calculate this. If you simply use
13 that background number, you come out with
14 numbers really quite close. It's a -- you
15 know, they're very credible numbers.

16 **DR. MAURO:** This is John Mauro. I have a
17 question which steps back a little bit. Am I
18 correct in understanding when we first had our
19 discussions regarding these matters and we were
20 talking about the CER database, in this case
21 the internal dosimetry, am I correct we're
22 primarily talking about data that relates to
23 urinalysis for uranium? Is that where we are
24 right now, for all intents and purposes? Now,
25 when we were speaking about this originally, we

1 were working with the CER database and it was
2 represented as a primary database that was
3 converted -- that is, there was an original set
4 of data that DOE converted electronical into
5 this CER database, but at that time -- cor-- am
6 I correct about that?

7 **DR. NETON:** Well, it's -- not really. DOE
8 didn't convert it in the CER database. DOE
9 made an electronic database of their records.
10 The CER database, which is Center for
11 Epidemiological Research at ORAU, is an -- a
12 copy of the database.

13 **DR. MAURO:** A copy, but now -- thank you. Now,
14 what I'm hearing now -- at that time there was
15 some discussion that the original records, the
16 hard copy records, were not, at least at that
17 time, readily available or there was a lack of
18 knowledge of the degree of availability.
19 Apparently some of these records are in fact
20 available. What I'm looking at right now is an
21 example of what those records looked like back
22 then.

23 Now am I correct to assume that if we were to
24 go back and collect all of those cards, how
25 many there are, those cards in effect -- and

1 the -- what we're really talking about now,
2 there's a one-to-one correspondence between the
3 cards and the electronic information. And it's
4 not that there -- and if there are more cards
5 than there are electronic information on
6 individuals, that has something to do with what
7 we talked about earlier, this redundancy. So
8 for all intents and purposes, what I'm hearing
9 is that not only do we have the CER database,
10 but we apparently have a substantial amount of
11 the original records, also.

12 **DR. NETON:** Well, we only have 1,300 cards
13 we've identified --

14 **DR. MAURO:** Okay, that --

15 **DR. NETON:** -- (unintelligible).

16 **DR. MAURO:** -- that's where I was going. So in
17 other words, we -- you -- you managed to
18 actually find some subdivision, which certainly
19 doesn't represent -- it represents some
20 fraction --

21 **MR. CHEW:** John, let me just say the answer's
22 yes and no.

23 **DR. MAURO:** Okay.

24 **MR. CHEW:** We found the 1,300 cards exactly in
25 this form with the handwritten. But there are

1 other cards that didn't have the handwritten
2 information in, but they were punch cards --

3 **DR. MAURO:** Okay.

4 **MR. CHEW:** -- that I was able to now feed into
5 the database.

6 **DR. MAURO:** Okay.

7 **MR. CHEW:** They're just plain punch cards.
8 They have nothing written on them.

9 **DR. MAURO:** No, I -- I'm sort of like saying
10 okay, so where we are now is that because of
11 having these cards and a sub-- subset of which
12 are actually able to be discerned what the
13 information is, along with other information,
14 you were able to I guess confirm at least eight
15 numbers. I mean what I'm hearing is out of all
16 the car-- I mean 50 cards were pulled out of
17 the 13-- 1,300, and there were -- and I guess
18 part of the reason you pulled those cards were
19 they were fairly complete, they had fairly
20 complete information on it?

21 **MR. CHEW:** It was just like this.

22 **DR. MAURO:** Just like that, and then out of
23 those you went ahead and said listen, let's
24 take eight of them --

25 **MR. CHEW:** No, no, we're --

1 **DR. MAURO:** You -- what --

2 **MR. CHEW:** -- they're working on all 50.

3 **DR. MAURO:** All 50.

4 **MR. CHEW:** Right, Bill?

5 **MR. TANKERSLEY:** Well, the only reason why
6 there's only eight, when I discovered that we
7 did not have the background information, I
8 (unintelligible) you had to identify -- had to
9 get the I.D. number for the person. The person
10 has -- it's either the Social Security number
11 or a badge number there, and then -- this all
12 takes, you know, time and work to identify the
13 record in electronic database. And so when I
14 discovered that we did not have the background
15 information so that, you know, the numbers were
16 not going to come out exactly the same, you
17 know, I stopped doing these calculations. But
18 you know, I -- it's -- it's obvious that these
19 are the same records. They match perfectly on
20 date, on the volume of urine, on the time
21 interval and every piece of information that's
22 on there, and I -- we certainly can do the
23 others. It didn't seem to be worthwhile to
24 look at the others since we don't have the
25 background information.

1 **DR. MAURO:** Now when you refer to the
2 background information, is this gross alpha for
3 some control group representing the activity in
4 urine when you -- I'm not sure what you mean
5 when you say background.

6 **MR. CHEW:** Bryce and Bill, I think this is the
7 background count -- counting --

8 **DR. MAURO:** Okay.

9 **MR. TANKERSLEY:** (Off microphone) Right, it is
10 the (unintelligible) explained very clearly in
11 the (unintelligible) RadCon manual Y-1401.

12 **DR. MAURO:** Okay, thank you.

13 **DR. NETON:** I think, though, it is fair to say
14 that all 50 -- there's an indication that all
15 50 of those samples were in the electronic
16 database. That's true. Right? I mean the
17 volume matched up, the date and all that kind
18 of stuff.

19 **MR. TANKERSLEY:** I did not do that.

20 **DR. NETON:** Oh, you didn't do that. Okay.

21 **MR. CHEW:** He did eight of them. But actually
22 you did -- did you not do these three I have in
23 my hand plus eight, Bill?

24 **MR. TANKERSLEY:** I did eight of them
25 altogether.

1 **MR. CHEW:** Okay.

2 **MR. FITZGERALD:** Well, what's -- I guess --
3 what's the intent, to have all 50 reviewed and
4 provided as is, or as far as you can get? I
5 guess -- finish your question then. What's the
6 intent in terms of the sampling on this issue?

7 **DR. NETON:** Well, I guess we're doing this on
8 the fly as we're going because this is late-
9 breaking information, but I think we should --
10 we should pursue that and follow up with the 50
11 -- see, this is one piece of the puzzle,
12 remember. You know, we've done other things.
13 We've looked at the health physics -- every
14 health physics report and looked at ran-- we're
15 going to look at the 90th percentiles. We've
16 looked at the ranges and the ranges match up in
17 the health physics reports. The sample numbers
18 don't match up, but we've got some very good,
19 rational explanations from the health physics
20 staff why they -- why they wouldn't.
21 We're going to look at the -- we have 22
22 records that we found in a health physics
23 report that match up almost identically, and
24 then the punch cards were the last piece of the
25 puzzle to suggest that well, these records were

1 entered electronically into the database, and
2 in fact on these the lab results were entered
3 on the card by -- it looks like very close to
4 the lab analyst state, so they're right into
5 the database. So how could one then make an
6 argument that the database is corrupt at that
7 point? If this is the raw data and it's
8 electronically keypunched, the only argument
9 one could make is there may be some errors in
10 the keypunching.

11 **MR. GRIFFON:** Now when you said there was --
12 I'm sorry. No, you said there was -- there
13 were other hand-- there were other punch cards,
14 they just didn't have handwritten values on
15 them?

16 **MR. CHEW:** That's right (unintelligible) years.

17 **MR. GRIFFON:** Were there other punch cards from
18 the -- the time period of concern? Was there
19 anything from '50 to '57?

20 **MR. CHEW:** Mark, I don't know that for sure. I
21 just was busy looking at -- to see which cards
22 had the numbers on them, so I apologize, I did
23 not look.

24 **MR. GRIFFON:** Oh, that's all right. Punched
25 values can you -- can -- would you be able to

1 cross-walk those? Not -- not seeing them in
2 front of me, I'm not sure what -- what you
3 would be able to do with the punch cards if
4 they didn't have handwritten values on. Could
5 you do anything with them as far as comparison
6 against the database?

7 **MR. CHEW:** Bill, if I give you a blank -- give
8 you the punch cards, not the handwritten, can
9 you actually read the information on the punch
10 cards here?

11 **MR. TANKERSLEY:** Mel, I assume that we would
12 find the same things from the cards that are
13 not marked with handwritten information. And
14 by the way, Mark, you know, there's thousands
15 of cards over there. It's just that, you know,
16 Mel and them found these that had the
17 handwritten information --

18 **MR. GRIFFON:** Right.

19 **MR. TANKERSLEY:** -- we're not 100 percent sure
20 -- I guess just changes through history --
21 we're not sure why the other cards don't have
22 handwritten information on them. But you
23 certainly can read the cards. You know, you're
24 familiar with the --

25 **MR. GRIFFON:** Right.

1 **MR. TANKERSLEY:** -- you can read the
2 information on the cards.

3 **MR. GRIFFON:** The only reason I asked, Bill,
4 was if -- if you had a sampling -- even if they
5 didn't have the handwritten data, I agree,
6 that's more information. But if you had a
7 sampling of the others from the ti-- the
8 relevant time period, that would even further
9 strengthen the ca-- you know.

10 **MR. CHEW:** But the -- Mark, the error really
11 would be the person taking the raw information
12 -- I see here in the -- I wish you were here to
13 see this, but the numbers that are on the card
14 and how that person punched it into the
15 machine.

16 **MR. GRIFFON:** True, true, database was never
17 modified or anything --

18 **DR. NETON:** That's true.

19 **MR. GRIFFON:** -- that's all, you know. Yeah.

20 **MR. CHEW:** Okay.

21 **MR. TANKERSLEY:** As far -- Mark, I don't think
22 any of us can say for certain -- you know, Mel
23 and Bryce spent a lot of time out there. They
24 don't think -- that is, the Y-12 people don't
25 think that those cards go back into the '50s.

1 **MR. GRIFFON:** Okay.

2 **MR. TANKERSLEY:** There's a possibility that the
3 earlier cards have been sent to another place.
4 We refer to it as Summit or Summit Drive,
5 something like that. But from what -- this is
6 the new place where they're moving all of -- a
7 lot of the records over there and it's our
8 understanding that no one -- emphasize no one --
9 -- you know, is allowed over there, that -- that
10 one of the records centers have to make request
11 from an index, and they have searched that
12 index and do not find any -- any item, any line
13 item there that appears to be health physics
14 punch cards, you know, for the earlier period.
15 But for the place where, you know, Bryce and
16 Mel and I and Jack visited the other day, there
17 are lots of other cards, I mean thousands of
18 them. But as far as anyone knows, we -- or the
19 Y-12 people in charge of that set of records,
20 do not -- cannot say that there's any records
21 prior to I suppose these 1968 cards that we
22 saw.

23 **MR. GRIFFON:** Okay.

24 **MR. TANKERSLEY:** But we can -- you know, we can
25 continue looking for that if that's what needs

1 to be done.

2 **MR. GRIFFON:** Well, not necessarily. I mean I
3 -- I just -- I was thinking if you had some
4 from that relevant time period, even if they
5 didn't have all the information, it might be
6 worth the very -- you know, cross-walking it.

7 **MR. TANKERSLEY:** Sure.

8 **MR. GRIFFON:** But if -- if that's -- if it's
9 unlikely that there are -- are any -- it
10 doesn't -- it doesn't lessen the information
11 you found. I mean I still think that's
12 relevant to -- to demonstrating that the
13 overall database -- you know, the overall
14 database's reliability, so I think that was
15 useful. But I was thinking that if you had
16 something from that time period, it'd be even
17 more, you know, important.

18 **MS. MUNN:** By the same token, this turns out to
19 be a perfect example of how much is enough.
20 How far do you have to go to not prove a
21 negative. And in view of the fact that random
22 information that has been presented is very
23 clearly in sync, and mindful of the fact that
24 the whole purpose in providing -- in
25 transferring handwritten data into electronic

1 data has always been two-fold. One is to
2 dispose of the paper from which it was
3 transferred; and two is to be able to sort the
4 data after it has been electronically recorded.
5 It's marvelous that we've been able to find any
6 --

7 **MR. CHEW:** I thought so, too.

8 **MS. MUNN:** -- anything, so the fact that it
9 doesn't get the right year that we would like
10 most to see is, from my point of view,
11 secondary. It's --

12 **MR. TANKERSLEY:** Also the folks at Y-12, I
13 assure you, are very aware -- since we've, you
14 know, said it 25 times to them -- you know,
15 that we're really interested in this earlier
16 period -- not that we're disinterested in the
17 later periods because we know we're going to
18 have to address that, but they are aware that
19 the period up through 1957 is of great import
20 to us. And so they -- I'm telling you, they
21 have their antennae up, always alert to listen
22 and watch for any information about this. They
23 have not said -- you know, they can't say as a
24 fact that none of the cards are available for
25 that period, but you know, the time's been

1 short and other work is being done, but it's
2 possible maybe they would come across that. I
3 definitely agree with Wanda. I think we've
4 shown, you know, some -- some clear matching
5 from health physics reports in '53 and in '57 I
6 think, and then finally these later reports.
7 So I think the electronic database -- it is
8 what the original data were.

9 **MR. GRIFFON:** Yeah, and -- and I -- I agree
10 with -- with Jim Neton's earlier statement that
11 this is not, you know, using one source to
12 demonstrate it, you're using a bunch of
13 different pieces to demonstrate reliability.
14 And that's fine, so that's -- that's -- that's
15 just what I'm -- you know, I'm -- I'm -- well,
16 you know, what is enough. When we put this all
17 together, I think that's we have to -- to
18 judge. I think you've done a lot of work on
19 it, so that's good.

20 Can I address Mel's statement on the logbooks?
21 You said you did find some logbooks but they
22 were only for special urinalysis --

23 **MR. CHEW:** It appears so --

24 **MR. GRIFFON:** -- campaigns?

25 **MR. CHEW:** It appears so, Mark. The logbooks

1 would have, for instance, even some urine
2 results and in some of the -- like incident or
3 something and it would have that kind of
4 information in it, but it was not like -- it
5 was not analytical logbooks from the analysis
6 folks that were just transferring data from a
7 counter into the logbook. They were -- they
8 were not that (unintelligible) --

9 **DR. NETON:** Who -- who generated the logbooks
10 then, the health physics program?

11 **MR. CHEW:** It appeared to be like people who --
12 health physics people who were operationally on
13 the floor.

14 **DR. NETON:** Okay.

15 **MR. CHEW:** Bryce, would you -- you saw the
16 logbooks as well as I did, too -- you did, too,
17 Bill.

18 **MR. TANKERSLEY:** That's true, Mel.

19 **DR. NETON:** And these were not, though, from
20 the SEC time period, though. Is that correct?

21 **MR. CHEW:** Jack, were you -- are you -- you
22 copied some of the information I gave you on
23 the logbook as I handed it to you. Do you
24 remember the time periods that I
25 (unintelligible) -- Jim? I mean Jack Beck,

1 were you there? Is he there?

2 **DR. NETON:** I don't think Jack's on the phone.

3 **MR. TANKERSLEY:** Mel, I don't -- I don't know
4 that Jack is on the line --

5 **MR. CHEW:** Okay.

6 **MR. TANKERSLEY:** -- or if (unintelligible) saw
7 the logbooks. Now they were from -- they were
8 from earlier periods, but they were -- as Mel
9 said, they were very clearly special examples
10 where a whole body count did not look right,
11 and so they would do these special samples of
12 all types of -- of special quality control,
13 double-check kinds of samples. But they were
14 from earlier periods. Right now I can't quite
15 remember the years, Mel.

16 **MR. CHEW:** I don't, too. I don't want to --

17 **MR. GRIFFON:** So -- so nothing that would
18 really be useful in -- in rel-- in comparison
19 to this database.

20 **MR. CHEW:** Yeah, thes-- these are the kinds of
21 things that are -- probably would have shown up
22 from delta view because somebody copied them.
23 Yeah, not necessarily -- I don't think these
24 kinds of samples would be in the electronic
25 database or the CER database. I don't think

1 so, Don -- or Mark. I'd just like to sort of
2 give you a feeling that there -- we did a
3 comprehensive search to look for the things
4 that you're asking for.

5 **MR. GRIFFON:** If I understood Jim -- if I
6 understood correctly for (unintelligible) sort
7 of follow-up on that action item three, all
8 these analyses are going to be sort of rolled-
9 up into your evaluation report. Right? The --
10 the punch cards, the -- you know.

11 **DR. NETON:** Yes. Yes.

12 **MR. GRIFFON:** Okay. So that -- you know, that
13 --

14 **DR. NETON:** I don't know if it's going to
15 appear as an appendix or not. That's what it's
16 listed at right now, but we would have a
17 monitoring data sufficiency write-up somewhere.
18 Bomber may know better than I do.

19 **MR. RUTHERFORD:** Mark, this is Bomber. The
20 plan right now is -- is you will have an
21 appendix, so the monitoring data sufficiency in
22 the report itself will have a summary that will
23 summarize basically what's in that section, as
24 well as the outcome.

25 **MR. GRIFFON:** Okay. All right. And -- and

1 there was a comparison to the delta view data,
2 too. Is that right? Or is that later for the
3 other radionuclide information? Am I getting
4 ahead of the matrix here?

5 **DR. NETON:** I think that is the other
6 radionuclide -- although there was a uranium --
7 there was an outstanding issue that -- that was
8 related to the uranium data in the delta view,
9 and did that have any -- would that have any
10 effect on the integrity or the validity, for
11 example, of the coworker models that -- or
12 coworker datasets that were developed from the
13 electronic database.

14 **MR. GRIFFON:** Right.

15 **DR. NETON:** And I believe that Bill Tankersley
16 --

17 **MR. CHEW:** I think Tim is prepared --

18 **DR. NETON:** Tim is prepared to talk about that?

19 **MR. CHEW:** -- Bill.

20 **MR. ADLER:** (Unintelligible) talk to you about
21 this bounding exercise?

22 **DR. NETON:** No, we're talking about the uranium
23 values that were in the delta view database and
24 how they -- what the -- what effect they may
25 have on the CER -- the electronic database in

1 the -- that was used to develop the coworker
2 models.

3 **MR. ADLER:** Okay. Well, now you should have
4 that analysis. We -- we sent that in, you
5 know, about a week or two ago and, you know,
6 keep in mind that there's -- well, 500,000,
7 600,000 uranium urinalyses total and that the
8 set (unintelligible) is like four -- four --
9 no, 280,000, I think. The delta view uranium
10 set is -- Jim, do you have that in front of
11 you?

12 **DR. NETON:** Yeah, we do have it. I believe
13 it's called Delta View/Y-12 Record, Uranium
14 Urinalysis Data Comparison.

15 **MR. ADLER:** Yeah. How many uranium samples are
16 in the delta view?

17 **DR. NETON:** The delta view, it says 479.

18 **MR. ADLER:** How many?

19 **MS. MUNN:** 479 from '52 to '57.

20 **MR. CHEW:** And then the total '52 to '88 was
21 1,359. (Unintelligible) looking at the same
22 thing --

23 **DR. NETON:** Oh, yeah -- yeah, right. Between
24 '52 and '57 there are 479 uranium records in
25 delta view, and in the same time per-- well,

1 from '50 to '57 on the electronic database
2 there were almost 150,000 samples.

3 **MR. ADLER:** Okay. Now --

4 **MR. GRIFFON:** It -- it was also unclear to me,
5 though -- those numbers sound like the numbers
6 that you presented in your Excel spreadsheet,
7 Mel. Is that correct?

8 **MR. CHEW:** Yes, I think that --

9 **MR. GRIFFON:** But I thought that in our
10 discussion we said that the -- the delta view
11 was searched on other radionuclides and uranium
12 came out because it was run along with those
13 other radionuclides --

14 **DR. NETON:** That's correct.

15 **MR. GRIFFON:** -- and that there may be more
16 uranium data in delta view. Did -- did anyone
17 look back to see --

18 **MR. RUTHERFORD:** Mark, this is Bomber.
19 Actually we -- I know what you're talking about
20 --

21 **MR. GRIFFON:** Yeah.

22 **MR. RUTHERFORD:** -- when we -- we had that
23 workgroup meeting we discussed well, if those -
24 - those uranium data -- if there's uranium data
25 there, searching for other radionuclides -- if

1 we searched solely for uranium, would we get
2 more. And Bill Tankersley can discuss that --

3 **MR. GRIFFON:** Okay.

4 **MR. RUTHERFORD:** -- but Bill found out that
5 there was no other uranium data in there. It
6 was -- it was exactly -- pretty much as
7 discussed before, that that delta view was used
8 for the other radioisotopes.

9 **MR. GRIFFON:** Thanks.

10 **DR. NETON:** So --

11 **MR. GRIFFON:** Okay. So then will this -- not
12 having this report in front of me, Bill, maybe
13 you can summarize --

14 **MR. TANKERSLEY:** I think by far the most
15 important point was this. The question was did
16 the -- the Y-12 electronic database bound --

17 **MR. GRIFFON:** Right.

18 **MR. TANKERSLEY:** -- the data that are found in
19 the delta view, and we certainly showed that
20 that was true. The actual -- actually the
21 range of the uranium data in the delta view
22 dataset I think only went up to 230 dpm for 24
23 hours voiding, and of course the, you know, the
24 Y-12 dataset certainly does have some values
25 higher than that. And I actually calculated

1 the -- the percentiles on that and -- and I
2 know there's a -- well, Jim must have that
3 report, and it shows that the -- I guess I did
4 the 25th and the mean and the 75th percentile,
5 and you know, they're all really very, very
6 low. Bottom line is that the Y-12 uranium
7 dataset urine uranium dataset of course bounds
8 that small set of uranium data in the delta
9 view set. So that should not present any
10 problem at all -- although, you know, the delta
11 view data are available, you know, for use by
12 the dose reconstructors and -- and will be
13 used, as I understand, Jim. Isn't that true?
14 **DR. NETON:** Well, if -- if the uranium value --
15 if we have a claimant who has uranium data in
16 the delta view database, that's routinely
17 provided with the response from DOE, so that
18 would certainly be used. But what -- what I
19 think Bill's saying here, and I think it's
20 true, is that the -- the electronic database is
21 -- has much more variability, which is what you
22 would expect for 150,000 records, and the
23 effect of 500 records dumped into a pool of
24 150,000 records is not going to have any real
25 effect on the 95th percentile or the 50th

1 percentile of the dataset.

2 **DR. MAURO:** The only thing I lost tra--

3 **MR. GRIFFON:** Well, I guess the other important
4 conclusion there was that there are no more
5 uranium data --

6 **DR. NETON:** Right.

7 **MR. GRIFFON:** -- in the delta view. Right?

8 **DR. NETON:** Correct.

9 **DR. MAURO:** The only thing I may have missed,
10 and you may have mentioned this, is then the
11 people who have this urinalysis in the delta
12 view, are they a subset of the entire one or a
13 different group of workers?

14 **DR. NETON:** I'm sorry, I'm not sure what you're
15 asking.

16 **DR. MAURO:** All right, let me say it again. In
17 other words you've got -- you've got the Y-12
18 database of 149,000 -- okay? -- people, or
19 measurements. Then you've got the delta view
20 of 479. Are those 479 part of that --

21 **DR. NETON:** No.

22 **DR. MAURO:** They're their own --

23 **MR. CHEW:** We looked at that --

24 **DR. MAURO:** They're their own separate group
25 and the data show that that group, in it-- by

1 its very nature, had lower exposures as a
2 distribution --

3 **DR. NETON:** In general, that -- yes.

4 **DR. MAURO:** -- and that -- these data show
5 that.

6 **DR. NETON:** Right.

7 **DR. MAURO:** They do.

8 **DR. NETON:** So I guess the concern was that if
9 the delta view data were all incident samples
10 that had extremely high values, then maybe we'd
11 have some concerns about the upper limit of the
12 database. But according to the analysis that
13 Bill's done, that doesn't show that. So I
14 think -- I think we're pretty -- on very good
15 grounds to say that, you know, this -- the
16 incorporation of the delta view data into the
17 electronic database is going to have
18 (unintelligible).

19 **MR. CHEW:** (Unintelligible) exposure, Don --
20 John -- hey, Tim, I -- Tim, you there?

21 **MR. ADLER:** (Off microphone) (Unintelligible)

22 **MR. CHEW:** I think you -- you or Bill mentioned
23 to me that -- let me just make sure I'm saying
24 this correctly -- none of the urinalysis for
25 uranium in the delta view, the same people

1 showed up in the electronic database. Is that
2 correct?

3 **MR. ADLER:** No, I don't think that's true.

4 **MR. CHEW:** Okay, --

5 **DR. NETON:** Wait a minute -- no, no -- the
6 people may have showed up, but the urine --

7 **MR. CHEW:** Right.

8 **DR. NETON:** -- samples did not.

9 **MR. CHEW:** Right. Oh, the urine samples did
10 not, okay. That was the point.

11 **MR. ADLER:** The same people (unintelligible)
12 not -- not the urine samples themselves.

13 **MR. CHEW:** Okay, I'm sorry. The urine samples
14 (unintelligible) --

15 **DR. NETON:** They were -- urine samples, for
16 whatever reason, were not part of the routine
17 program.

18 **MR. CHEW:** Right. That -- that's our
19 (unintelligible).

20 **DR. NETON:** Our suspicion -- our suspicion was
21 that they took a plutonium sample, they went
22 along and analyzed it for uranium anyway.
23 That's sort of what -- what (unintelligible) --

24 **MR. CHEW:** We've answered John's question, I
25 think. He just nodded and walked away.

1 **DR. NETON:** So I think -- in my mind, that
2 addresses the issue that delta view data did
3 not invalidate the coworker data for -- that we
4 used from CER. So that -- that piece has been
5 -- we've provided analysis for that piece. You
6 guys can be the judge as to what there -- if it
7 addresses the issue, but in our opinion it
8 does.

9 **MR. GIBSON:** This is Mike Gibson. Can I ask a
10 question on this? So if I'm understanding you,
11 the original bioassay sample that was collected
12 and analyzed and -- from this -- these punch
13 cards or whatever, and then there's these
14 additional samples you talked about, Jim, that
15 are in this other database, and they're
16 different samples, not related to the original
17 sample. Is that correct?

18 **DR. NETON:** That's correct.

19 **MR. GIBSON:** Okay. Is this the case where DOE
20 has had the practice -- well, the DOE
21 contractors have had the practice of if they
22 get a bioassay sample and it comes back
23 positive, they will request two additional
24 samples and they will run those and they use a
25 two out of three method. And if the -- if two

1 of the samples come back less than detectable
2 limits, they conclude it to be a false
3 positive. Could that be the case here or is
4 this something --

5 **DR. NETON:** I know the practice that you're
6 speaking, I think, of which, but I don't know
7 there's any indication that this is --
8 represents that. There -- I think -- I don't
9 think that these are multiple -- two additional
10 samples in the database, nor do they
11 correspond, to my knowledge, to the same
12 incidents or, you know, the same -- I think
13 what really more happened is the uranium
14 urinalysis dataset for CER was -- was the
15 routine monitoring program, with maybe some
16 incidents. The delta view data are, for
17 whatever reason, special samples. In my
18 opinion, it seems to be that when they took
19 plutonium samples, for example, on workers who
20 may have been working with Calutron, plutonium
21 or whatever, they would have analyzed for
22 uranium on top of -- as long as you're doing an
23 isotopic analysis, it's not that big a deal to
24 pull off the uranium and analyze for it
25 separately. That seems to be the case,

1 although we have nothing in writing that says
2 that.

3 **MR. CHEW:** But let me expand on that, Jim.

4 **MR. RICH:** This is Bryce Rich. As you look at
5 the delta view, you'll find a num-- at least
6 two different analytical laboratories. There
7 were a large number of -- ORNL or the X-10
8 analytical laboratories that did analysis,
9 bioassay, for people working at Y-12, and a
10 good share of those uranium analyses came over
11 on -- as a part of the -- on datasheets
12 identified as ORNL analytical laboratory data,
13 and so -- and it also came over, as you
14 indicate, as a -- support of a comprehensive
15 analysis on samples that were taken, and if
16 it's -- it's clear that they were a different
17 set of -- and probably associated with the R&D
18 program.

19 **MR. CHEW:** And Bryce, you remember we looked at
20 the -- many of those images here.

21 (Unintelligible) specific letters to either a
22 special group or a department that focus in on
23 those people that handle those (unintelligible)
24 plutonium and the -- and I think Jim was
25 correct, the uranium came along with it, and so

1 they were really individual letters to
2 departments that -- that just focus a number of
3 people. Remember that, Bryce?

4 **MR. RICH:** That's right, and then -- and
5 analyzed by Oak Ridge Analytical Laboratory.

6 **MR. GRIFFON:** Right.

7 **MR. RICH:** At least in the case of the uranium.

8 **MR. GRIFFON:** Can I just -- I think we're still
9 on number three or thereabouts, but can I do
10 one -- one follow-up on -- on the logbook
11 question again? Mel, did -- did you -- I know
12 -- I know it was special and -- but I -- I
13 don't know -- I -- I don't remember if you did
14 any comparison against the database. Were --
15 were there any values to compare within those
16 logbooks, or would it be not a useful exercise,
17 in your opinion, there?

18 **MR. CHEW:** I'm not so sure they'd be really
19 useful, Mark. I think there was only like one
20 -- one -- a few numbers in here --

21 **MR. GRIFFON:** Okay.

22 **MR. CHEW:** -- and that we would have to pull
23 that logbook and try to discern what -- you
24 know, what -- particular incident even by name.
25 It was just numbers in a bunch of logbooks that

1 just -- that showed up here. I mean we could
2 do that, but I think it would be like looking
3 at a few small data points that
4 (unintelligible) just want to pull a sample to
5 compare. I'm not even sure -- confident that
6 they would be entered into an electronic data--

7 **MR. GRIFFON:** That's the other question that I
8 have was, were the specials even included in
9 the over-- yeah, in the routine database. But
10 there were -- there were identifiers and stuff
11 that you could, if you chose to, and how -- how
12 many data do you (unintelligible) were in those
13 logbooks? I mean was it hundreds, was it -- it
14 may -- it may be hard to estimate, but...

15 **MR. CHEW:** Yeah, we thumbed through the
16 logbooks just to get a feel for what was in
17 there --

18 **MR. GRIFFON:** Yeah.

19 **MR. CHEW:** -- Mark, and we made the decision
20 there was probably no consequence, so I don't
21 want to misinterp-- mis--

22 **MR. RICH:** Just -- this is Bryce Rich. I know
23 there -- just impression from looking at those
24 specific logbooks, which are in a box, and we
25 were on the lookout for primarily analytical

1 logbooks, and it appeared that these logbooks
2 were -- you know, they -- they had things like
3 incident investigation where there was air
4 sample results and survey readings and -- and
5 some -- some -- you know, the classical things
6 that you do to document a -- an unusual
7 occurrence.

8 **MR. GRIFFON:** Oh, okay. Okay. Thank you.

9 **MR. TANKERSLEY:** This is Bill. Let me add one
10 more thing, and I've thought about this. Mel
11 and Bryce, you know, one of the books, the one
12 that we focused particularly on if I'm not
13 mistaken, had on the front of it or in the
14 title page -- I think it was 1963 through '78,
15 you know, to show -- this was really a fairly,
16 you know, small, you know, book. But now there
17 were others in the box that Mel referred to. I
18 don't know, it seems like to me there were five
19 or six or seven others. Now we did make a
20 request for several pages. I marked -- I think
21 I marked a half a dozen pages out of, you know,
22 one of those books, and that's supposed to be -
23 - they did not get it cleared for us last week,
24 but that's supposed to be coming to us, and it
25 might be useful or worthwhile, you know, for

1 you to look at those. You know, I think it'll
2 show you very clearly what Mel and them have
3 described. They are definitely special samples
4 following a -- you know, a high air sample or
5 something, and didn't -- was not a lot of data
6 in them. But when we get those pages we'll
7 make those available and, you know, Jim, you
8 can do with those what you want.

9 **MR. GRIFFON:** And again, those weren't from the
10 '50 to '57 time period, either, though.

11 **MR. TANKERSLEY:** No.

12 **MR. GRIFFON:** Were there any in that time
13 period or no?

14 **MR. TANKERSLEY:** No.

15 **MR. GRIFFON:** No. Okay. All right. Jim, did
16 you have anything to continue on this topic
17 with or...

18 **DR. NETON:** No, I think we've -- we've covered
19 the waterfront on number three, at least in my
20 mind.

21 **MR. GRIFFON:** And then number four is the --

22 **DR. NETON:** Right.

23 **MR. GRIFFON:** I think you provided that.
24 Right? The conversion?

25 **DR. NETON:** We provided that, right after Bill

1 Tankersley had. Everyone should have access to
2 a copy of that.

3 **MR. GRIFFON:** And is -- is -- SC&A, did you
4 have time to look at that and any comment on
5 that?

6 **MR. FITZGERALD:** No, we did have Joyce and some
7 of the other internal dosimetrists look at it.
8 We have no issues that I know of.

9 **DR. MAKHIJANI:** The -- the one -- this is
10 Arjun. The one question that I had is from the
11 site profile in which -- that we said in the
12 site profile, that because (unintelligible)
13 method was used from -- for all uranium from
14 '48 -- pre-1950 that you'll use a default
15 assumption of (unintelligible) uranium
16 (unintelligible). And at the last meeting when
17 we discussed this question of conversion
18 (unintelligible) I had the impression from the
19 notes that -- I mean only natural uranium was
20 subject to fluorometric analysis. It seems to
21 me that it makes a -- makes a difference of
22 about a factor of -- well, three orders of
23 magnitude between natural uranium and highly
24 enriched uranium, so it -- it seems that you
25 get a very drastic reduction in dose estimate

1 when you go from '50 to '51 if you adopt that
2 method. And that's the one conversion issue
3 that seems to me -- not -- that -- for that
4 time slot.

5 **DR. NETON:** I don't think that there are any
6 urine samples prior to 1950.

7 **DR. MAKHIJANI:** Oh, there aren't -- there are
8 no --

9 **DR. NETON:** I don't believe. I don't know if
10 anyone's on the phone that can confirm this,
11 but I --

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

13 **DR. NETON:** -- I don't -- and -- and so we
14 don't have urine data prior to '50, and what is
15 used there is a backwards extrapolation from
16 '51 time frame to go back into the '48 and '49
17 --

18 **DR. MAKHIJANI:** Oh, okay.

19 **DR. NETON:** -- period.

20 **DR. MAKHIJANI:** Well, then the -- that section
21 in the site profile just (unintelligible) --

22 **DR. NETON:** (Unintelligible) just -- yeah,
23 right. So we would use whatever the coworker
24 data was from the '51 going backwards in time,
25 documenting that the processes were similar.

1 In fact I don't think there was almost anything
2 going on --

3 **UNIDENTIFIED:** There were not (unintelligible).

4 **DR. NETON:** -- in '48, '4-- see, that's when
5 the Cyclotron stopped producing anything -- or
6 Calutron stopped producing and they were
7 gearing up for production. But they took very
8 little samples because there wasn't much going
9 on. Production increased in '51, they started
10 taking urine samples, so I think we feel fairly
11 comfortable that the urine sample distributions
12 in the '51 time frame will pretty much bound
13 what happened in '48 and '49.

14 **DR. MAKHIJANI:** Okay.

15 **DR. NETON:** That's the -- I think --

16 **MS. MUNN:** We can call four done. Right?

17 **MR. GRIFFON:** I think we can call four done.
18 Is that correct?

19 **UNIDENTIFIED:** From our standpoint, yeah.

20 **MR. GRIFFON:** And five and six are also
21 completed, I believe. We --

22 **DR. NETON:** Right, to the extent that we can't
23 find any QA/QC data to help --

24 **MR. GRIFFON:** Unless you can -- right, unless
25 something comes up. Right.

1 **DR. NETON:** Right. Before we leave this, I'd
2 just like to give ORAU some credit. They have
3 really burned the midnight oil. I mean, you
4 know, you end up with a few little snippets of
5 data and it seems like wow, how hard can that
6 be, but there are many people that have worked
7 well into the evening hours trying to make some
8 sense out of this, and I'd just like to
9 acknowledge their hard work.

10 **MR. CHEW:** The logistics of getting into the
11 vaults with everyone and --

12 **DR. NETON:** Right.

13 **MR. CHEW:** -- having everyone (unintelligible).

14 **DR. NETON:** We applied a lot of pressure in the
15 right areas to get folks to help us, and it's --
16 -- it's really -- it's really I think paid off
17 and I think a lot of -- lot of effort behind
18 the scenes that just is not apparent when you
19 look at one table that shows 20 samples
20 compared, but that may have taken a lot of --
21 lot of hours.

22 Before we move on, also I would just like to
23 caution everyone that in looking through some
24 of the handouts there are several pieces of
25 Privacy Act information that are contained

1 here, so please treat them as such. I don't
2 know that there's any issues with anyone here
3 having that in their possessions, but please,
4 these should not be distributed anywhere. And
5 in fact, if you have no need for them when
6 we're done, please give them back to me. I'll
7 collect them and dispose of them properly.
8 There's not much, but I just noticed there's a
9 couple of pieces.

10 **MR. GRIFFON:** Do we want to go into
11 (unintelligible) at this point or do people
12 need a break? I'm (unintelligible) if Ray's
13 raising his hand or anything.

14 **DR. WADE:** Well, we have one hand waving.
15 We'll take a brief break. Let's say ten
16 minutes.

17 **MR. GRIFFON:** Ten minutes? Okay.

18 **DR. WADE:** It's 2:30, so be back on at 2:40;
19 we'll keep the line open, though.

20 **MR. GRIFFON:** Okay.

21 (Whereupon, a recess was taken from 2:35 p.m.
22 to 2:45 p.m.)

23 **DR. WADE:** Where are we in our quest?

24 **UNIDENTIFIED:** Item 1(b).

25 **DR. WADE:** 1(b).

1 **MR. GRIFFON:** Yeah, 1(b), is Ray up and ready?

2 **DR. NETON:** Yeah, I think so.

3 **MR. CHEW:** Ray's ready.

4 **MR. GRIFFON:** Okay. All right. 1(b) -- number
5 one, obviously, is -- is complete. It remains
6 in the site profile review, I guess, but not in
7 the SEC.

8 **DR. NETON:** Right.

9 **MR. GRIFFON:** And then on to number two. We're
10 back to the delta view. Now we might have
11 covered some of this, but not -- certainly not
12 the other radionuclide portion.

13 **DR. NETON:** Right. I think, as we talked about
14 when -- on the Board conference call, the
15 spreadsheet including -- well, I don't know
16 about any raw data, but everything that was in
17 the delta view that was coded is out there now
18 on the O drive. We put it out there -- it's
19 been a few weeks. It's an Excel spreadsheet
20 that's there. I think there's something like
21 1,000 records or somethi-- somewhere
22 thereabouts, so that is there.

23 And then I think the next line that talks about
24 will -- NIOSH will determine why the additional
25 uranium samples were collected as part of the

1 delta view database and why they're not in the
2 CER database. We kind of touched on that,
3 although I wouldn't say that we, you know, have
4 definitive answers on that. But it does appear
5 that these were special samples collected as
6 parts of special projects, and they weren't
7 part of the -- of the routine uranium
8 monitoring program.

9 And then --

10 **MR. GRIFFON:** Can you -- can you just go back
11 to number two for a second, Jim?

12 **DR. NETON:** Yeah.

13 **MR. GRIFFON:** Was -- was there analysis files -
14 - the spreadsheet was definitely provided, but
15 did you mention descriptive statistics this
16 morning of those?

17 **DR. NETON:** No, we did not.

18 **MR. GRIFFON:** Oh, okay.

19 **DR. NETON:** No, we -- we don't have -- I don't
20 believe at this point we've done -- Mel, have
21 you done any descriptive statistics on the
22 delta view?

23 **MR. CHEW:** Be more -- be more specific, Mark.
24 What -- what --

25 **MR. GRIFFON:** Or -- or any -- I guess -- I

1 guess what I was kind of looking for, and maybe
2 this is going to be saved for the evaluation
3 report, is exactly how will these data be
4 applied --

5 **DR. NETON:** Right.

6 **MR. GRIFFON:** -- to -- for -- for the workers
7 of interest or -- or more broadly, the site,
8 you know.

9 **DR. NETON:** Right, I think that maybe some of
10 that will become more apparent as we discuss
11 what Mel's learned about the different
12 processes that we're going to talk about, but
13 as of this point, the question is do we have
14 any proposed coworker models using delta view
15 database. The answer --

16 **MR. GRIFFON:** Right.

17 **DR. NETON:** -- is no --

18 **MR. GRIFFON:** Okay.

19 **DR. NETON:** -- that we don't. Okay. And then
20 the next, 2(b) -- 2(b) in that write-up talks
21 about what we just discussed, which is we're
22 going to compare the delta view data to
23 determine how it compares with coworker models
24 in the CER dataset, and that's exactly what
25 Bill Tankersley just discussed. So I think

1 that all of 2(b) we've talked about already, in
2 my mind.

3 **MS. MUNN:** So done?

4 **DR. NETON:** I don't want to speak for the
5 group, but --

6 **MS. MUNN:** We're done.

7 **DR. NETON:** -- we're done.

8 **MS. MUNN:** I'm getting heads nodding.

9 **MR. GRIFFON:** Yeah, I mean we haven't looked at
10 it yet so I think that -- but -- but as far as
11 an action for NIOSH, I think it's complete.
12 Correct? I bel-- I agree with that.

13 **DR. MAKHIJANI:** Yeah. Mark, this is Arjun. I
14 just -- since there's a lot of new material --
15 I mean is there a process of kind of signing
16 off more than instant for things that are more
17 complex than -- well, the obvious, obviously --
18 if there's something obvious, sign off on it,
19 but the proc-- do you have a deadline or
20 process in mind, given the shortness of the
21 time?

22 **MR. GRIFFON:** I'm sorry, I couldn't -- I
23 couldn't hear a lot of that, Arjun.

24 **DR. MAKHIJANI:** Mark -- sorry. I was just --

25 **MS. MUNN:** Sorry.

1 **MR. GRIFFON:** No, I did hear you, Wanda.

2 **DR. MAKHIJANI:** -- wondering, for the new
3 complex items, what's the process of sign-off.
4 I mean NIOSH has put a lot of work on the
5 table, and how do you envision -- is there
6 anything for us to do further than to take note
7 of it or to give a tentative comment?

8 **MR. GRIFFON:** Well, I -- I guess that's a good
9 question, but time frame of the SEC evaluation
10 process, I'm not -- I -- I don't know the
11 answer to that. I -- I think that all these
12 pieces are going to be pulled together probably
13 in support of your conclusion in your
14 evaluation report, but I -- I think at this
15 point SC&A should have all these deliverables
16 and, you know, be reviewing them in an-- in
17 anticipation that they'll be used in some way
18 in the final evaluation report. I don't know
19 that there's any action -- follow-up action.
20 Is there? I'm asking my other workgroup
21 members or -- or anyone --

22 **MS. MUNN:** I wouldn't think so, unless there's
23 something -- some obvious concern that jumps
24 out at you and whacks you across the head.

25 **DR. MAKHIJANI:** Yeah. No, obviously, Ms. Munn,

1 what -- if there's an obvious concern we -- we
2 would say so right away.

3 **MS. MUNN:** But otherwise I wouldn't anticipate
4 that you would be required to submit a
5 statement to the effect that that's okay.

6 **DR. MAKHIJANI:** Thank you.

7 **MR. GRIFFON:** Right, I agree. So -- so 2(b),
8 from that standpoint, is completed. Correct.
9 Are -- are we on to 2(c)? And you did provide
10 some information on the O drive, Jim. Correct?

11 **DR. NETON:** Right, there are Cyclotron,
12 Calutron references out there, those -- I think
13 they're annual reports --

14 **MR. GRIFFON:** Did -- did you -- did you by any
15 chance put together any sort of simplified time
16 line on -- on what production runs were done
17 over what -- over that -- especially over that
18 '50-'57 time frame?

19 **DR. NETON:** You make a good straight man, Mark.
20 We're ready to go with that and --

21 **MR. GRIFFON:** There you go.

22 **DR. NETON:** -- I appreciate that. Mel -- Mel
23 Chew actually has some handouts which -- it's
24 unfortunate you can't see 'cause they're pretty
25 colors.

1 **MS. MUNN:** They are.

2 **MR. CHEW:** Mark, I wish I can show you this
3 (unintelligible). I have a few copies, but I
4 also have it on the (unintelligible). Mark,
5 what we did, to answer your question. I
6 appreciate your comment the last time to go
7 look for that and we did not realize that --
8 how reasonably extensive that would be. It
9 would have been easier for me to bring you the
10 table of isotopes and tell you what's not
11 there, you know, but -- but -- and I did that.
12 I actually have a copy of the table of isotopes
13 (unintelligible) in case we need to reference
14 some of the half-lives or (unintelligible).
15 Let me (unintelligible) you what you have in
16 front of you that you do not see and the other
17 members of the Board do see. You want -- Bob?

18 **MR. PRESLEY:** Go ahead.

19 **MR. CHEW:** I have -- I have -- we developed
20 that and I -- thanks to several people who
21 worked entirely through the evening -- most of
22 the data we got -- recovered from the Oak Ridge
23 National Laboratory library, and if any of you
24 have not been there, it's about the size of a
25 football field and very well put together here.

1 We worked so late one evening that the janitor
2 closed the light (unintelligible) on us, Mark,
3 on the way -- on the way out then that we had
4 to yell to him to bring the lights back on.

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

6 **MR. CHEW:** Okay, very good. Most -- it turns
7 out that pretty much both the Y-12 information
8 and the ORNL information was all together in
9 one location here, but we supplemented that
10 also by pulling some of the information from
11 the classified portion of the -- of the Y-12,
12 but it was also declassified and put into the
13 ORNL library.

14 I have a spreadsheet in front of me by years on
15 the upper column from '47 to '68, and then I
16 put -- I focused in that particular period of
17 time here, and I literally -- this is from A to
18 Z and it's a 340 some-odd isotopes that I have
19 listed, and all these are entered by hand from
20 aluminum 28-M, okay, to zirconium -- I can pull
21 the last page here, I think all you guys can
22 see this if I open it up -- to zirconium 96, so
23 it's really A to Z here. And if you look at
24 the -- it's in alphabetical order and it's --
25 it's available electronically. I'm going to

1 have to make a small -- I put it draft because
2 as we were putting this spreadsheet together
3 for you we had one person pulling the
4 information, I think it was Bryce. I was
5 reading the information to the person putting
6 it into the computer, and sometimes my
7 remembrance of some of the rare earth was --
8 the spelling was not exactly correct, so I'd
9 like to go back and correct that. It was -- it
10 was clearly not a chemistry (unintelligible) --
11 **DR. NETON:** You should -- you should all
12 clearly label what you have in your hands as
13 "draft." It will -- it will be edited
14 slightly.

15 **MR. CHEW:** We al-- we also did one thing. We
16 also separated out the radioactive species here
17 in millicuries, or curies in case may be, and
18 al-- except for the uranium and thorium because
19 they were -- those information was in grams.
20 Okay? And I don't think we needed to do a
21 conversion because it takes a lot of grams to
22 make a few milli-- millicuries (unintelligible)
23 microcuries --

24 **MR. FITZGERALD:** And now again the units mean
25 what? The units themselves, are these annual -

1 - or total?

2 **MR. CHEW:** This -- this is the -- that -- what
3 the -- the particular quarterly -- or the
4 annual records showed that that particular
5 isotope was produced in that year. Okay? Not
6 necessarily tell you what -- exactly which --
7 well, we could go down (unintelligible)
8 quarter, but we basically put everything in
9 that year the total amount that was produced.

10 **MR. FITZGERALD:** Total amount.

11 **DR. NETON:** It's the annual production of that
12 isotope --

13 **MR. CHEW:** Annual production.

14 **DR. NETON:** -- from the Cyclotron --

15 **MR. CHEW:** And the --

16 **DR. NETON:** -- and the Calutron.

17 **MR. CHEW:** -- Calutron. Along with this, later
18 on in the years -- in the past years when the
19 two divisions actually were transferred over to
20 the isotope division, we had a little bit more
21 trouble, Mark, because the stable isotopes --
22 we put together the same -- the information
23 with the radioactive species, so we had to
24 figure out which ones were stable and which
25 ones were radioactive so we can clearly mark --

1 they are, and so the ones that are stable are
2 marked -- they're marked -- introduced or
3 presented in grams and the active ones in the -
4 - colored yellow in the millicuries or activity
5 as necessary. So we got you 342. We're always
6 afraid that we're going to give this to our
7 esteemed colleagues from (unintelligible) Joe
8 and John (unintelligible) and Arjun says well,
9 they'll take out some isotope, he says well,
10 how do you do the dose reconstruction
11 (unintelligible), you know, we're prepared to
12 do that.

13 We -- so this is what -- a fairly comprehensive
14 list. It was a little bit more than the few
15 isotopes than we had originally had thought for
16 obvious reason that we should have not done
17 otherwise.

18 There's a -- there's a denotation of a B there,
19 Joe and Arjun. You see there's a little B?
20 What it means, B, that since my computer does
21 not have the scientific notation for cross-
22 section and B stands for (unintelligible),
23 thank you, and as I think all of you know and
24 have in your past work and know what the
25 (unintelligible) looks like. Okay? So B

1 stands for -- that was (unintelligible) trace
2 isotopes produced for cross-section work.
3 Okay? So that's what we have from that
4 standpoint.

5 I'd like to go on (unintelligible) --

6 **DR. NETON:** Mel, before you go -- is it true,
7 then -- I think it's obvious, but is it not
8 true then that the -- all the blue stable
9 isotopes were produced in the Calutron --

10 **MR. CHEW:** Yes.

11 **DR. NETON:** -- because there would be obviously
12 --

13 **MR. CHEW:** (Unintelligible) separation, yeah.

14 **DR. NETON:** -- separations from the Calutron.

15 **MR. CHEW:** One of the things that we also had
16 to look at when we looked at this report, they
17 have to bring in the example -- if you were
18 going to look for a specific specie, like you
19 were going to separate thorium or plutonium,
20 they had to bring in the small parent quantity
21 and then we listed that, too -- okay? -- in our
22 example, so it was -- it was known it was to be
23 there -- okay? -- so there's a little bit more
24 information about some of the isotopes
25 (unintelligible) doing just to separate a

1 specific specie in that particular isotope.

2 **MR. FITZGERALD:** Now in terms of the -- the
3 years you have, it looks like it's -- it's
4 interesting from an operational standpoint --
5 '57 is the cutoff, certainly a step function,
6 or is that a anomaly of -- you just cut it off
7 --

8 **MR. CHEW:** If you look at that last few sheets,
9 Joe, where the uranium --

10 **MR. FITZGERALD:** Right, I saw that.

11 **MR. CHEW:** Yeah, the majority of that was done
12 early (unintelligible) --

13 **MR. FITZGERALD:** Early years.

14 **MR. CHEW:** -- separation of uranium.

15 **MR. FITZGERALD:** Uh-huh.

16 **MR. CHEW:** Then they tried to do some of the
17 separations for plutonium and then went on to -
18 - to -- on to (unintelligible) cross section
19 research and the medical research that was
20 using both the Cyclotron and Calutron for that
21 particular purposes, and that's why you see a
22 lot of activity going on. But also at the same
23 time they really got those machines
24 (unintelligible) working (unintelligible).

25 **MR. FITZGERALD:** But you really -- you really

1 did the analysis for '57 and then just showed
2 the cross-sections after '57?

3 **MR. CHEW:** Yeah (unintelligible). Joe, ask me
4 the question again (unintelligible).

5 **MR. FITZGERALD:** I wondered if there's an
6 anomaly -- I think -- anomaly in the
7 presentation. Is it pretty much just through
8 '57 that you looked at the detail of the
9 production and then after that you just noted
10 the cross-sections? 'Cause '57 you have all
11 the -- all the production numbers and then '58
12 there's very little.

13 **MR. CHEW:** Yeah, that particular isotopes was
14 mentioned earlier, and then if there was a
15 trace quantity that we could not identify --
16 any place where the reports told us either
17 activity or in mass or activity, we put it in,
18 Joe. Where they said trace quantities
19 (unintelligible) for research and only mention
20 the isotope without any quantity
21 (unintelligible).

22 **DR. NETON:** Yeah, I think we talked a little
23 bit about it -- this at lunch, and there may be
24 some additional production after '57 that's not
25 here. It's very -- it's very conclusive,

1 though, for '57, and that's what we want to
2 talk about today, but --

3 **DR. KERR:** Mainly I think what listing is
4 behind on some of this is isotope production
5 (unintelligible) --

6 **MR. FITZGERALD:** Medical -- medical isotopes,
7 yeah.

8 **DR. KERR:** -- medical isotopes, and there's was
9 -- I looked at promethium 147 and that was a
10 big medical isotope --

11 **MR. FITZGERALD:** Yeah, and (unintelligible) --

12 **DR. KERR:** -- and it's not showing up after
13 that date, so you've got some medical isotope
14 data to add to that yet.

15 **MR. CHEW:** Now, the -- it -- it's interesting,
16 Joe, we had the -- as I said, again, there --
17 there was -- the reports we're looking at
18 combined both -- all of the isotope production
19 group. That includes Calutron or -- or -- I
20 beg your pardon, Cyclotron, and also the
21 reactor. And so it was -- obviously we pulled
22 out the reactor-producing -- I mean like the
23 cobalt was produced in large quantities and
24 things like that -- okay? -- and that did not
25 show up here --

1 **MR. FITZGERALD:** Uh-huh.

2 **MR. CHEW:** -- because I think the original
3 question from you, Mark, was to address what
4 was produced by the Calutrons and Cyclotron.

5 **DR. KERR:** But -- this is up through the SEC
6 period.

7 **MR. CHEW:** (Unintelligible) SEC --

8 **MR. FITZGERALD:** Right, right.

9 **MR. CHEW:** -- okay, and we focused on that
10 (unintelligible).

11 **MR. FITZGERALD:** Okay.

12 **MR. CHEW:** We have a table with 342 pretty
13 colors there, Mark. I wish you'd been there.
14 You will get a copy here.

15 **DR. NETON:** I'll make sure we get a copy out on
16 the -- well, O drive and --

17 **MR. CHEW:** Okay.

18 **DR. NETON:** -- it's small enough that I might
19 e-mail it, too, for those who have trouble
20 accessing the O -- O drive.

21 **MR. CHEW:** And now it brings up the question,
22 now we have all these isotopes, what do they
23 do? You know, what is the safety involved.
24 Well, in going -- in doing the research, and I
25 like to show a couple of pictures here I can

1 show on the site, I'd like to pass them around,
2 this is a picture of some of the early uranium
3 separation -- and Mark, you cannot see that.
4 Let me try to describe to you is a person who
5 is working on the collect--

6 **DR. NETON:** Mel, do we have this on the --

7 **MR. CHEW:** Yeah, we have actually on the screen
8 here, I've got to find which one, but he's
9 working with a respirator on and inside of a
10 glovebox, and this picture was taken in 1949.

11 **MS. MUNN:** Wonderful. Excellent.

12 **MR. CHEW:** Okay. I have another picture here -
13 - we talked about the dees last time and I sort
14 of waved my arms and described to you what a
15 dee looked like, so I brought you a picture of
16 a clean dee -- okay? -- and so that's
17 available, too. That's what the dees look like
18 here and this is where the contamination would
19 show up. Don't forget, the majority of it's
20 collected in the collector, but when they open
21 up the chamber and rigging up the vacuum,
22 things will come back through the Cyclotron and
23 contaminate the dees at the same time or if
24 (unintelligible) the dees do get contaminated.
25 Well, what do they do? That's another set of

1 question -- pictures here and I think I
2 (unintelligible). There was two pictures I
3 thought was worthwhile. There's a -- here is a
4 -- a (unintelligible) and a plastics bag, 1951-
5 '52 data, and I interviewed the health
6 physicist who was the Cyclotron health
7 physicist, Doc Emerson everybody called him.
8 Many of you might remember Doc Emerson, Lewis
9 Emerson, who worked -- who was the health
10 physicist at Y-12 responsible for the 86-inch
11 Cyclotron and he was -- I interviewed him on
12 Thursday, and he remember the bag and he
13 remembered the suits that the people wore, but
14 this is the real -- most important one. Joe
15 would appreciate that, being an operational HP.
16 This is the cleaning of the liners and the dees
17 and the suits, and they just showed that.
18 Okay? All right. I think that's
19 (unintelligible) important aspect to show that
20 this is the kind of level of protection, and
21 this is why sometimes you didn't necessarily
22 find bioassay results, you know, for people.
23 Maybe they just didn't feel (unintelligible)
24 well enough to take them. There's clearly
25 records that there was contamination and that

1 some of them are fairly high level. This is
2 the level of protection that the people used.
3 This is the picture of transferring the plastic
4 bag as they moved (unintelligible) from the
5 Cyclotron and the dee in to where the locations
6 were -- the dees were cleaned and so this is a
7 picture (unintelligible). I tried to describe
8 this the last time but I thought of -- when
9 finding a picture in the report which you can --
10 -- is I think a -- talks about the --

11 **DR. NETON:** Those plastic suits were from what
12 era, do you know?

13 **MR. CHEW:** This is 1951-'52.

14 **DR. NETON:** Okay, so that's the relevant time
15 frame.

16 **MR. CHEW:** Okay. I thought the --

17 **MR. GRIFFON:** (Unintelligible) pictures were
18 taken?

19 **MR. CHEW:** Did I talk to any? Is that what
20 you're saying, Mark?

21 **MR. GRIFFON:** Yeah, just out of curiosity.
22 You're talking about operational physics, I
23 think --

24 **MR. CHEW:** Yeah, I did talk to Doc Emerson --

25 **MR. GRIFFON:** -- health physics manual, but --

1 **MR. CHEW:** Right. Doc -- let's see, I have a
2 record of when he actively showed up -- Doc
3 showed up in 1949 at X-10 as a researcher.
4 Then in 1950 he was the Y-12 health physics --
5 health physicist. And then I think a couple of
6 years after that he was the head of the health
7 physics group, but his first assignment at Y-12
8 in 1950 was the 86-inch Cyclotron.

9 **MR. GRIFFON:** No, I -- I mean other than the
10 health physics -- did you interview --

11 **MR. CHEW:** Oh, I'm sorry --

12 **MR. GRIFFON:** -- like maintenance people or any
13 other -- probably hard to find some of them --

14 **MR. CHEW:** Yeah. No, I did not -- I did not do
15 that, Mark. I did not (unintelligible) some of
16 these people.

17 **MR. GRIFFON:** Okay.

18 **MR. CHEW:** But I think clearly that what I can
19 show you here is that -- you know, the people
20 (unintelligible) the suits (unintelligible)
21 protection -- I would say the people -- well,
22 you didn't see this -- people cleaning the dee
23 would either be either operational or
24 (unintelligible) maintenance person where --

25 **MR. GRIFFON:** Right.

1 **MR. CHEW:** -- where I -- I -- little bit more
2 discussion were the people, the maintenance
3 person or like a -- like a person in part of
4 the SEC, like a pipefitter or a plumber, could
5 get involved with actually working there is
6 that many of these -- all the dees and all the
7 liners were water-cooled. There was tubes.
8 You can actually see this in the picture here,
9 and sometime when the beams stray they would
10 punch a hole in the -- in the -- in the tube.
11 You would know that right away because you lose
12 vacuum and then -- and then they would have to
13 open the Cyclotron to get those things out to
14 repair. But I think you can see that they
15 probably clean it because I think not only did
16 they clean it for -- to reduce the
17 contamination, but I think every one of these
18 materials are quite valuable, as you well know,
19 and then they went back in and repaired the
20 tubes. I don't -- I don't have any pictures of
21 that, but I just know that from my personal
22 experience at the 90-inch Cyclotron in
23 Livermore. We did the same thing.

24 **DR. KERR:** There were also -- we also had some
25 write-ups of what was required for people to go

1 and work in the Cyclotron pit, and we've got
2 those and it tells you exactly what you had to
3 do, you (unintelligible) to work, so
4 (unintelligible) the pictures essentially show
5 this.

6 **MR. CHEW:** (Unintelligible) we will get them to
7 you. And then that brings -- I think that's
8 probably the -- the part of the Cyclotron
9 story. We can now continue and have a
10 discussion of other isotope -- is that what's
11 next (unintelligible) continuing?

12 **DR. NETON:** Yeah.

13 **MR. CHEW:** Okay. Well, when Joe Fitzgerald --

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

15 **MR. CHEW:** Go ahead, Mark.

16 **DR. NETON:** Unless there's any --

17 **MR. GRIFFON:** I just wanted to (unintelligible)
18 one follow-up on that (unintelligible) I don't
19 have that one (unintelligible). Did you cross-
20 walk the data in the delta view against
21 (unintelligible) history to see if you had
22 ample coverage for the -- (unintelligible)
23 polonium and plutonium, thorium and others that
24 were mentioned in the delta view. Were they --
25 was there, you know, data (unintelligible)

1 delta view database that (unintelligible)
2 spreadsheet --

3 **MR. CHEW:** Well, I can quickly say --

4 **MR. GRIFFON:** -- (unintelligible) --

5 **MR. RICH:** Yes, we did.

6 **MR. CHEW:** Go ahead, Bryce.

7 **MR. RICH:** This is Bryce. Yes, we did cross-
8 walk that.

9 **MR. GRIFFON:** Okay.

10 **MR. RICH:** The delta view bioassay matched the
11 operational periods.

12 **MR. GRIFFON:** Okay, 'cause for instance
13 (unintelligible) --

14 **MR. RICH:** I might just add that -- that the
15 Calutrons obviously were used for isotopic
16 separation and enrichment, purification, and at
17 times it's clear that radioactive material
18 would be produced, and then the isotopes of
19 those radioactive materials would be separated
20 in the Calutron. And of course the Calutron
21 itself, that uses the radioactive material as
22 the ion source, would be more vulnerable of
23 course to the contamination of the dees, and
24 that was the process they're most concerned
25 about. And also the one where the collection

1 of the product and the -- and the isotopic
2 counts would be done in -- in glovebox control
3 of that -- of that kind. The plutonium
4 separation of course in the Calutron was one of
5 the big ones, as well as the -- the polonium
6 production in the 86-inch Cyclotron.

7 (Unintelligible) --

8 **MR. GRIFFON:** Can -- Bryce, I'm sorry to
9 interrupt. The polonium was of interest to me.
10 Did that -- was there any production '50 to
11 '57? 'Cause there was no data in the delta
12 view dataset for that time period.

13 **MR. CHEW:** They actually stopped producing the
14 plutonium/polonium (unintelligible) --

15 **UNIDENTIFIED:** '52.

16 **MR. CHEW:** Yes, we know that for a fact, Mark.

17 **MR. RICH:** Then -- and -- and the production of
18 different polonium isotopes continued in -- in
19 the reactor, though.

20 **MR. GRIFFON:** Okay.

21 **MR. RICH:** And the -- the -- as Mel indicated,
22 the -- in June of 1951 of course the R&D
23 program at X-10 assumed administrative
24 responsibility for the Y-12 programs, and so
25 it's all rolled in together, the isotopic

1 production and the interchange between the
2 reactor production and separation in the
3 Calutrons and the like. So it's -- it's a --
4 there's a certain amount of complexity
5 introduced as a result of that administrative
6 combination.

7 **MR. GRIFFON:** Right.

8 **MR. CHEW:** Example, would you believe that they
9 did some cross-section work for polonium 209
10 and 211 in trace quantities in 1961 and '68.
11 It's on the spreadsheet there.

12 **MR. GRIFFON:** Yeah.

13 **MR. CHEW:** I mean that's example
14 (unintelligible). I hope we're answering your
15 questions here.

16 **MR. GRIFFON:** Yeah, yeah.

17 **MR. CHEW:** Okay, I -- I think -- I think this
18 puts -- I'd like to thank all the people who
19 helped put this table together. It was a lot
20 of -- many hours to populate this table, to
21 pull the information from the reports, but the
22 reports are there and they're certainly
23 documented.

24 **MS. MUNN:** Really interesting.

25 **MR. CHEW:** Yeah, it is very interesting because

1 (unintelligible) give an idea of what kinds of
2 things that they were doing and so now -- now
3 you sort of know where the data comes from when
4 you see the isotopic chart with all the
5 nuclides. Go ahead, George.

6 **DR. KERR:** Yeah, I was going to say that the
7 Cyclo-- the 86-inch Cyclotron was used up
8 through 1980 for medical isotope
9 (unintelligible).

10 **DR. MAKHIJANI:** Mel --

11 **MR. CHEW:** Yes, sir?

12 **DR. MAKHIJANI:** -- I saw -- there is some
13 polonium (unintelligible) data in the late
14 '50s. Would that be reactor related? But it's
15 in the Y-12 -- I saw that in the delta view --

16 **MR. CHEW:** Yeah, I mean this (unintelligible).

17 **DR. MAKHIJANI:** -- database -- uh-huh.

18 **MR. CHEW:** Yeah, the (unintelligible) --

19 **DR. MAKHIJANI:** And so if there was no
20 production, why would there have been bioassay?

21 **MR. GRIFFON:** I think the -- Arjun, that was
22 thorium (unintelligible) --

23 **DR. MAKHIJANI:** Oh, that was thorium, I -- why
24 do I keep mixing those two things? That's the
25 second time I've done that.

1 **DR. NETON:** Polonium data would be hard to
2 interpret because of natural incidence --

3 **DR. MAKHIJANI:** (Unintelligible) the isotopes.

4 **MR. CHEW:** I know. That's why when Joe, on the
5 last working group, said well, what other
6 isotopes, I said oh, my gosh, Joe, I didn't
7 know the question was going to be
8 (unintelligible) -- you opened the door there.

9 **MR. FITZGERALD:** Oh, sorry. No, I thought
10 (unintelligible).

11 **DR. NETON:** I think -- let's back up a little
12 bit here. We now know the source term, at
13 least, for each year for each isotope, and then
14 you also need to remember, I think, that as we
15 discussed previously, the exposure would only
16 really occur when the target is taken out. And
17 the targets themselves -- correct me if I'm
18 wrong, Mel -- were processed over at X-10. Is
19 that not right?

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

21 **DR. NETON:** So there was some potential for
22 exposure -- the largest potential for exposure
23 is when they would move the target and move it
24 over to the (unintelligible). So -- so as we
25 indicated before, even though these are large

1 quantities there, the potential for exposure is
2 on a very limited basis per removal of the
3 target. And I think even when Mel was talking
4 about the water lines being ruptured, that
5 would not be the target material, would it be?

6 **MR. CHEW:** That's right, it would be.

7 **DR. NETON:** It would have been the dees who
8 were contaminated with the induced products in
9 the materials. So that's a fairly stable
10 commodity. I mean it would be known what those
11 were. It would not be dependent upon what the
12 target materials, which were encapsulated in
13 the -- in the accelerator.

14 **DR. KERR:** Yeah. Also the targets could be
15 removed by remote equipment.

16 **DR. NETON:** Right. Yeah, 'cause they were
17 actually very radioactive --

18 **DR. KERR:** (Unintelligible) shielding --

19 **DR. NETON:** -- as far as (unintelligible).

20 **DR. KERR:** -- and they could remove the target
21 material and even position it into peaks for
22 shielding to move it, so --

23 **MR. CHEW:** I'd like to add one more comment to
24 what Jim has said, the -- when you're talking
25 about the quantities, you know, the quantities

1 may be in activity, but in mass it's
2 (unintelligible) you know, very small because
3 these are very short half-life materials here.

4 **DR. NETON:** Right.

5 **MR. CHEW:** So when you see a millicurie of
6 something very short half-life, we're only
7 talking about a few nanograms. Okay? And so
8 that's -- so -- but all this is written down,
9 Mark. I think when you see the chart, I think
10 I -- I think I tried to answer your question,
11 sir.

12 **DR. MAURO:** So the story we have here is we --
13 we have a handle on the time periods and types
14 of radionuclides that were being handled under
15 very special and controlled circumstances. We
16 also have the delta view database which coin--
17 which is a urinalysis samples, I assume. Some
18 of these radionuclides show up. Along comes a
19 worker, that time period, and you want to
20 reconstruct his doses as part of his story.
21 And you know that -- let's say you know he --
22 he worked in this area, based on his records,
23 or you suspect he might have.

24 **MR. CHEW:** Sure.

25 **DR. MAURO:** And you -- you want to somehow take

1 all this into consideration, this story we just
2 whole -- heard. Now I could see several lines
3 of -- of attack, one being well, you know, we
4 don't have any bioassay data for this fella,
5 and everything we just heard, it's unlikely
6 that you really got much of an exposure.
7 Everything was contained -- contained. But we
8 do have a few people who are picking up some of
9 these. Right now do you have a model in your
10 head about how do you -- how do you come to
11 grips with that -- that particular worker when
12 you -- when the time comes to reconstruct his
13 doses, given everything that you -- that you
14 now know about this?

15 **MR. CHEW:** Jim, you want to talk --

16 **DR. NETON:** We need to flesh out some more
17 detail-- I mean the source term has just become
18 obvious to us.

19 **DR. MAURO:** Okay, I understand.

20 **DR. NETON:** We know that there are episodic,
21 small increments of time when they could have
22 been exposed, and how they actually apply to
23 the class -- which is steamfitters, pipefitters
24 and plumbers -- is also an issue. Because,
25 again, were those people there during the time

1 period when these things were being -- targets
2 were being moved and were they really at
3 potential for exposure?

4 **DR. MAURO:** Could I wander into an area that
5 may be a little bit off the direction button?
6 I know that the scope of the SEC petition
7 explicitly defines those categories of workers.

8 **DR. NETON:** Right.

9 **DR. MAURO:** And that petition is that petition.
10 But now we're starting to learn more about the
11 story that goes on here and -- is -- is that
12 going to be a boundary? In other words -- I
13 hate to say it like this, but is that good
14 enough to just say well, listen -- well, we
15 know he wasn't a pipefitter; he's out of the
16 picture and we're going to walk away from that.
17 Or are we go-- or do you feel as if there's an
18 obligation here? Let me explain -- I'm going
19 to -- I'm -- again, take -- take the hat off
20 for a second, just think about it. Here we
21 have some workers. Turns out he wasn't a
22 pipefitter. Okay? So therefore does not fall
23 into the box that's been created in the SEC
24 petition. He's applied. He's part of -- well,
25 he's not part of the SEC, but he -- he worked

1 there at that time, did some of these things,
2 and -- and you feel as if you have an
3 obligation to this person to ease his mind that
4 we understand his exposures, or is he just
5 going to be cut right out of the picture
6 because he wasn't a pipefitter?

7 **DR. NETON:** Well, no, no, we have an obligation
8 to review any potential class within -- within
9 the period of time we're investigating. That's
10 absolutely true. But we also have a primary
11 obligation, though, to give these people an
12 answer for the class that was petitioned --

13 **DR. MAURO:** Okay.

14 **DR. NETON:** -- in a fairly timely manner, so we
15 will evaluate this class. If we -- if we can,
16 we will, you know, expand the boundaries to
17 other classes that might be relevant.

18 **DR. MAURO:** The reason I ask is from a
19 practical standpoint -- and I guess I've
20 crossed the boundaries going from SEC to dose
21 reconstruction --

22 **DR. NETON:** Yeah, sure.

23 **DR. MAURO:** -- is SEC going to be that clean,
24 so that well, we've answered the SEC issue.
25 But of course we still have an obligation if

1 this fella is a claimant. We have to take care
2 -- we have to address him, and so he'll fall
3 into that box. So it's really one of -- of
4 parsing out, or -- or is --

5 **DR. NETON:** No, no, I think you've seen our
6 approach. I mean I'm trying to remember which
7 one we did this on, but I think -- National
8 Bureau of Standards comes to mind where there
9 was a fairly narrow petition class --

10 **DR. MAURO:** Yes.

11 **DR. NETON:** -- and we opened it up --

12 **DR. MAURO:** You did, okay.

13 **DR. NETON:** -- to say well, we really can't
14 tell, you know, who -- who was in harm's way
15 necessarily for that class --

16 **DR. MAURO:** Okay.

17 **DR. NETON:** -- and we'll do that sort of
18 analysis --

19 **DR. MAURO:** And you'll bring it out on that
20 basis.

21 **DR. NETON:** -- to the extent we can, given --
22 you know, what we -- what time frame --

23 **DR. WADE:** The obligation is to do dose
24 reconstruction for individuals.

25 **DR. NETON:** Sure.

1 **DR. WADE:** And if we can, we can. If we can't,
2 then we need to deal with it at some point.

3 **DR. NETON:** Right. But whether it pops out
4 immediately during our analysis or not is hard
5 to predict. But you're right, there are --
6 there are other workers who may have been, you
7 know, exposed here during the handling of the
8 issues, but they may not have been -- I'm not
9 saying they were or not, but if they were, they
10 may not have been plumbers, pipefitters or
11 steamfitters.

12 **MR. CHEW:** John, I'd like to just add
13 (unintelligible) specific question here. I'd
14 like -- I think we have a model in our minds
15 and our thoughts, but I'd like to make sure I
16 run it through --

17 **DR. MAURO:** I understand.

18 **MR. CHEW:** -- (unintelligible) before I
19 (unintelligible). You know, we've looked at
20 the data and -- and anticipated your question.
21 I think, you know, it's a fair question. Okay?

22 **DR. MAURO:** Certainly.

23 **MR. CHEW:** I think I would like to make sure I
24 discuss it with OCAS before (unintelligible).

25 **DR. MAURO:** Sure.

1 **DR. NETON:** And keep in mind these are very
2 short duration isotopes so doses tend to be
3 fairly small per unit intake, even though
4 they're large -- large amounts of activity with
5 short half-lives, the doses are fairly small,
6 so we -- we need to think -- that in mind, we
7 need to keep the potential exposure population
8 in mind and the short episodic duration of
9 their exposures. And then -- and there are
10 some actual reports of some measurements for
11 these folks. They're not -- they're not zero.

12 **DR. MAKHIJANI:** So you have some actual like
13 bioassay --

14 **DR. NETON:** There -- there have been --

15 **DR. MAKHIJANI:** -- (unintelligible) --

16 **DR. NETON:** -- you know, there have been some
17 incident evaluations that we can rely on to
18 possibly bound these exposures.

19 **DR. MAKHIJANI:** Oh.

20 **DR. NETON:** If there were incidents and you
21 know what the exposures were during some what I
22 would call off-normal circumstances, then one
23 may be able to say well, during normal
24 operation it would certainly be less than that.
25 It's no more than (unintelligible), and we just

1 haven't fleshed that out to the extent we need
2 to right now.

3 **MR. CHEW:** Let me pick up on Joe's question the
4 last time, the other isotopes, and I'd like to
5 discuss -- not necessarily in isotopes, Joe,
6 because as you -- I saw -- you show -- I just
7 showed you 340-some of them. Let's -- to
8 answer -- the real question is what other
9 radioactive or hazardous materials that Y-12
10 workers may happen to work that potentially
11 give them a rad-- a radiation exposure. I
12 think I'd like to attack the question from that
13 side (unintelligible) materials, not
14 (unintelligible) isotopes.

15 Let me tell you what we did, trying to answer
16 your question. We went back and started with
17 the materials balance ledgers. Okay?
18 (Unintelligible) key, those are documented
19 ledgers. Every one that we -- every page we
20 had to look at had to be hand-monitored and
21 surveyed before we were able to touch the data.
22 Wonderfully, Y-12 actually kept uranium 235,
23 natural uranium, plutonium, neptunium 233,
24 tritium and thorium in separate ledgers. We
25 were able to discover that. So for a given

1 year if you want to find out how much 235 or
2 233 or plutonium, it showed you exactly where -
3 - the material balance when it came in. You
4 can identify things like parts --
5 (unintelligible) talked to Bob Presley about
6 that today and I'll go ahead and discuss that a
7 little more. So we looked at the plant
8 records. We went to the -- there's some
9 classified records that the plant manager was
10 obligated to talk about the yearly activities.
11 I think Bob is probably familiar
12 (unintelligible) some yourself. And those were
13 all the classified information of the different
14 programs and the projects that involved
15 materials. And so even programs that did not
16 involve (unintelligible) were in there. There
17 was four or five, six boxes that we went
18 through, this -- particularly focusing on this
19 particular period to see if we could identify
20 any programs and mention of other materials
21 that we have not talked about (unintelligible)
22 address. So with that, I'd like to -- I'd like
23 to talk about that a little bit.
24 Let's -- let's pick on the -- let's talk about
25 plutonium, and I want to be careful that we do

1 not (unintelligible) on anything classified.
2 Okay? There was some plutonium parts that
3 actually came in to Y-12 clearly confined to
4 the time period that we were able to --
5 identified in the ledger. It came in and came
6 out. They were clearly part of the test
7 program for the Nevada Test Site.

8 **DR. NETON:** Just before Mel goes on, I want to
9 make it clear, I think that what Mel's talking
10 about is plutonium that's above and beyond any
11 plutonium that was processed through the
12 Calutrons. So this would be in addition to
13 that.

14 **MR. CHEW:** Uh-huh, and I think -- you know,
15 Joe, if you really pull the string or ask me to
16 pull the string and tell me what tests, I
17 probably can do that, but I think the ledger
18 defines exactly the period of time.

19 We actually confirmed that with several other
20 interviewees that we can talk about because
21 that was part of a (unintelligible) and that's
22 part of a story (unintelligible) talk about the
23 people who actually did assembly. They
24 remembered it very well. They even talked
25 about it. I think Mr. Presley (unintelligible)

1 that, too -- confirm that. There was two --
2 two incidences and two separate time period
3 year that those parts came in that would --
4 what I consider a significant quantity of
5 plutonium that came in. It was -- the material
6 was cladded -- okay? -- (unintelligible)
7 covered. It was protected. It was never
8 handled let's say out like we would see around
9 the class. This was an actual part.

10 **MR. FITZGERALD:** Right.

11 **MR. CHEW:** Okay? You can see the part number
12 on there. And I think that's all I really want
13 to -- unless you want to pull the -- the string
14 on that one --

15 **MR. FITZGERALD:** But time frame-wise, we're
16 talking about this being (unintelligible) --

17 **MR. CHEW:** '62 -- '62 was the first part and
18 (unintelligible) --

19 **MR. FITZGERALD:** Okay, so this doesn't --

20 **DR. NETON:** It's not relevant to the SEC.

21 **MR. FITZGERALD:** It's not relevant to the --
22 '57.

23 **MR. CHEW:** It isn't. I do not see any ledgers
24 telling me that there was any significant
25 quantities of plutonium like this in the SEC

1 period other than what Jim said was produced in
2 the Calutron. This was also confirmed by the
3 people who were there.

4 **MS. MUNN:** Most of that was (unintelligible).

5 **MR. CHEW:** Rocky Flats. There was also a
6 tritium part that came in, Joe --

7 **DR. MAKHIJANI:** Before you go on to tritium --

8 **MR. CHEW:** Sure.

9 **DR. MAKHIJANI:** -- what significant quantity of
10 plutonium? You said no significant quantity of
11 plutonium.

12 **MR. CHEW:** No, no, I said it is significant.

13 **DR. MAKHIJANI:** No, no, before '62 you said
14 there wasn't any significant quantities except
15 for the Calu--

16 **MR. CHEW:** (Unintelligible) grams, less than
17 grams.

18 **DR. MAKHIJANI:** Less than grams.

19 **MR. CHEW:** (Off microphone) (Unintelligible)
20 grams. Okay? This was significantly more than
21 that. That's -- I think that's all I really
22 feel comfortable saying.

23 **DR. MAKHIJANI:** But there wer-- wa-- were gram
24 quantities in the '50s?

25 **MR. CHEW:** (Off microphone) Yeah, I think so.

1 You know, Calutron certainly --

2 **DR. MAKHIJANI:** No, outside of the Calutron --

3 **MR. CHEW:** (Off microphone) Oh, outside -- not
4 that we could see --

5 **DR. MAKHIJANI:** Okay.

6 **MR. CHEW:** -- there -- there were some traces
7 that came in, but nothing that we could see
8 that we would consider (unintelligible). Okay?
9 But you can see also there were bioassay for
10 plutonium through that particular period. You
11 can almost track, you know, exactly what they
12 acquired. There were concerns about when these
13 particular (unintelligible) come in.

14 **MR. FITZGERALD:** Now the PU bioassay -- I mean
15 it -- that went from the -- I'll call it the
16 SEC period onward --

17 **MR. CHEW:** Sure.

18 **MR. FITZGERALD:** -- you say you can see the
19 step function when these operations began in
20 the early '60s, you can sort of -- you can
21 actually track --

22 **MR. CHEW:** (Off microphone) Oh, we can track
23 exactly when the part came in and when it left
24 and went -- went to the Test Site.

25 **MR. FITZGERALD:** Right, in terms of the number

1 of bioassays and what have you.

2 **MR. CHEW:** (Off microphone) Yeah, okay, I --

3 **MR. FITZGERALD:** Well, I'm saying they -- they
4 had -- certainly they had plutonium bioassay in
5 the '50s.

6 **MR. CHEW:** Sure.

7 **MR. FITZGERALD:** They were doing work at the
8 Calutron.

9 **MR. CHEW:** Sure.

10 **MR. FITZGERALD:** But you didn't really see
11 perhaps a pick-up in the bioassays as far as
12 numbers, as well as maybe even activities,
13 until the '60s?

14 **DR. KERR:** You would see it (unintelligible) --

15 **DR. NETON:** I'm not sure --

16 **DR. KERR:** -- at least (unintelligible) --

17 **MR. FITZGERALD:** I'm just trying to clarify
18 (unintelligible) --

19 **DR. KERR:** There wouldn't be any internal
20 exposure.

21 **DR. NETON:** It wouldn't necessarily follow
22 they'd monitor plutonium because if they were
23 (unintelligible) --

24 **MR. CHEW:** (Off microphone) (Unintelligible)

25 **MR. FITZGERALD:** I was wondering if you -- I

1 thought you said something about bioassays.

2 **MR. CHEW:** (Off microphone) (Unintelligible)

3 Let me tell you what I didn't do. These --

4 **MR. FITZGERALD:** Okay.

5 **MR. CHEW:** (Off microphone) I have not looked
6 at -- for instance, there's a group of
7 bioassays that focus in when that particular
8 part came in. I haven't done (unintelligible)
9 lay it on top of each other yet.

10 **MR. FITZGERALD:** Right.

11 **MR. CHEW:** (Off microphone) And so I'm sure we
12 can do that, but I think the (unintelligible)
13 necessarily had to be done. These parts were
14 only handled --

15 **MR. FITZGERALD:** Right.

16 **MR. CHEW:** -- only a few people, very clearly,
17 like two.

18 **DR. KERR:** And they (unintelligible) processed
19 when they come in.

20 **MR. CHEW:** (Off microphone) Nothing was
21 processed.

22 **DR. KERR:** Nothing was processed.

23 **MR. CHEW:** (Off microphone) Nothing was
24 processed. The part came in and put into a --
25 a device --

1 **MR. FITZGERALD:** Right.

2 **MR. CHEW:** -- (unintelligible) test Nevada and
3 -- and then taken out.

4 **MR. FITZGERALD:** Okay, that helps because I
5 think, from the site profile standpoint, the
6 time frame wasn't clear and it was --

7 **MR. CHEW:** Sure.

8 **MR. FITZGERALD:** Okay.

9 **MR. CHEW:** (Off microphone) I -- I think
10 clearly the Y-12 people -- and I want to make
11 sure I say this --

12 **MR. FITZGERALD:** Right.

13 **MR. CHEW:** -- correctly here -- are very
14 sensitive to the very fact that
15 (unintelligible) plutonium did show up at Y-12
16 and I think that was kept very --

17 **MR. FITZGERALD:** Yeah.

18 **MR. CHEW:** -- to a minimum for knowledge
19 (unintelligible) you can understand that
20 (unintelligible).

21 **MR. FITZGERALD:** Well, sure. I -- I think
22 going back to John's comment earlier, even
23 though for this very specific petition, you
24 know, we're -- we're clearly comforted by
25 getting those time frames straight 'cause that

1 was something we couldn't get in the site
2 profile, it certainly has relevancy for
3 characterization for further -- future work.

4 **MR. CHEW:** Yes.

5 **MR. FITZGERALD:** Yeah, okay.

6 **MR. CHEW:** (Off microphone) We are talking
7 about (unintelligible) beyond isotopes and it
8 may cross over SEC, and I'll bring it back.
9 Okay?

10 **MR. FITZGERALD:** All right.

11 **MR. CHEW:** (Off microphone) There was a -- yes,
12 sir?

13 **DR. NETON:** Couple more questions.

14 **MR. GRIFFON:** (Off microphone) You said that
15 before '61 or whatever (unintelligible) (on
16 microphone) there were traces that came in of
17 plutonium. What do you mean by that? In the
18 form of recycled uranium or what -- what do you
19 --

20 **MR. CHEW:** Yes, I think that's a --

21 **MR. GRIFFON:** Mainly that would be the --

22 **MR. CHEW:** Yes, I was going to talk about the
23 recycled uranium here, and that would --

24 **MR. GRIFFON:** The traces wouldn't be from some
25 other -- I mean what -- that would -- that

1 would be the form mainly. Right?

2 **MR. CHEW:** Well, I do have a -- a table that we
3 pulled out, and just give me a second here and
4 let me look for it and (unintelligible).

5 **MR. FITZGERALD:** Is the mass balance that
6 precise that you could see the
7 Calutron/Cyclotron production and the trace
8 materials, as well?

9 **MR. CHEW:** (Off microphone) (Unintelligible)
10 Joe, I think -- I'm not sure that all of the
11 Calutron/Cyclotron production was put into the
12 ledgers -- okay? -- because they are
13 (unintelligible) more R&D. You know, this is
14 for accountability (unintelligible) --

15 **MR. FITZGERALD:** This is strictly --

16 **MR. RICH:** (Off microphone) (Unintelligible)

17 **MR. CHEW:** -- (unintelligible) -- go ahead,
18 Mark.

19 **MR. RICH:** I don't -- I don't think that detail
20 was in the ledgers.

21 **MR. CHEW:** Yes. Okay. You don't --

22 **MR. RICH:** (Off microphone) It was -- it was
23 (unintelligible) quantities (unintelligible)
24 the Calutron for separation.

25 **MR. CHEW:** Bryce, you probably have that piece

1 of paper in front of me, I just can't reach --
2 when you were holding some of the information
3 from the classified ledger of some of the
4 smaller quantities of plutonium in the early
5 years.

6 **MR. RICH:** My overnight mail just got here --

7 **MR. CHEW:** I have here, I just --

8 **MR. RICH:** Okay.

9 **MR. CHEW:** But no, I don't -- I can't pull it
10 up right now with my hand. Do you have that in
11 front of you?

12 **MR. RICH:** I think -- I think it was -- I don't
13 have it in front of me. That's my problem, it
14 didn't get here in time.

15 **MR. CHEW:** I do, actually. I apologize.

16 **MR. RICH:** I think it was in the '62 time
17 frame, though.

18 **MR. CHEW:** Yes, but that was the larger
19 quantity --

20 **MR. RICH:** Yes.

21 **MR. CHEW:** -- (unintelligible) and they even
22 keep a track down to the milligram quantity to
23 the kilogram quantities, Joe. I did not have --
24 -- I have a -- I have a ledger example on that.
25 There was 56 milligrams in 1951

1 (unintelligible) example. Okay?

2 **MR. RICH:** In the ledger?

3 **MR. CHEW:** 1950 was three --

4 **MR. FITZGERALD:** The answer --

5 **MR. CHEW:** -- to five milligrams.

6 **MR. FITZGERALD:** The answer to Mark's comment,
7 you have the -- you know, there are gram
8 quantities, small gram quantities, but if it's
9 not the Cyclotron/Calutron, you would have to
10 attribute that to the recycled uranium?

11 **MR. CHEW:** Well -- and it could be, and I'm --
12 I don't want to --

13 **MR. FITZGERALD:** (Unintelligible)

14 **MR. CHEW:** -- (unintelligible) if I -- I said
15 we -- to pull down exactly what that part was,
16 I --

17 (Whereupon, Mr. Chew, Mr. Fitzgerald and other
18 participants began speaking simultaneously,
19 rendering isolation of individual comments
20 impossible.)

21 **MR. CHEW:** -- (unintelligible) there was a --
22 in the note remember we had to use notes
23 declassified, Joe -- okay?

24 **MR. FITZGERALD:** Right.

25 **MR. CHEW:** There was -- in 1949 there was like

1 69 milligrams and it was called engineering
2 device and --

3 **MR. FITZGERALD:** Yeah, I'm just trying to
4 clarify, is the inventory components and
5 devices but would not necessarily envelope
6 something like trace materials in --

7 **MR. CHEW:** Yeah.

8 **MR. FITZGERALD:** -- in recycled uranium. I
9 mean --

10 **MR. CHEW:** No.

11 **MR. FITZGERALD:** -- it would seem like it
12 wouldn't because this would be mostly what the
13 inventory suggests coming in --

14 **MR. CHEW:** (Unintelligible)

15 **MR. FITZGERALD:** -- (unintelligible) and
16 recycled is more or less a contaminant in the
17 material itself, so --

18 **MR. CHEW:** (Off microphone) I'll talk about the
19 recycled --

20 **MR. FITZGERALD:** Separated --

21 **MR. CHEW:** Yeah.

22 **MR. FITZGERALD:** So this is really -- this is
23 really --

24 **MR. RICH:** The recycled uranium contaminants
25 did not show up in that --

1 **MR. FITZGERALD:** In the ledger.

2 **MR. RICH:** -- in the listing.

3 **MR. FITZGERALD:** Right.

4 **MR. CHEW:** Okay, Joe --

5 **DR. MAKHIJANI:** I had one more question about
6 the plutonium in the '50s.

7 **MR. CHEW:** Uh-huh, sure.

8 **DR. MAKHIJANI:** Which is the -- the delta view
9 database has these -- I don't know, several
10 hundred odd whatever -- several -- several
11 hundred plutonium bioassays.

12 **MR. CHEW:** Uh-huh.

13 **DR. MAKHIJANI:** So I guess the implication of
14 what you're saying is that they were not
15 related to any production type of things
16 related to devices, but they were related to
17 the Calutrons or recycled uranium? Can we dis-
18 - are we in a position to distinguish what
19 those bio-- why those bioassays were done for
20 plutonium in the '50s?

21 **MR. CHEW:** Arjun, I'd like to say this -- I
22 think the plutonium bioassay represents both of
23 what you're saying. Okay?

24 **DR. MAKHIJANI:** Okay.

25 **MR. CHEW:** It would probably representing some

1 of the isotopes in production of -- separation
2 of plutonium, but later on to assure that the
3 contamination of plutonium was not present in
4 those parts we're talking about --

5 **DR. MAKHIJANI:** Right.

6 **MR. CHEW:** -- there may be a bioassay that is
7 also in the data -- data (sic) view because it
8 expands to past those years.

9 **DR. NETON:** But I do think that we know that
10 the plutonium samples were not -- I don't think
11 those plutonium samples were taken to monitor
12 for recycled uranium.

13 **MR. RICH:** (Off microphone) (Unintelligible)

14 **DR. NETON:** Exposure to recycled uranium.

15 **MR. RICH:** (Off microphone) (Unintelligible)
16 mostly -- mostly for the Calutron separation of
17 plutonium isotopes.

18 **DR. NETON:** Right. That I think addresses one
19 of the comments we received from you guys that
20 the ratios appeared to be out of line with what
21 would be in the recycled uranium. I think they
22 just weren't collected for that purpose.

23 **DR. MAKHIJANI:** Okay. So that would re-- that
24 would sort of resolve that issue because the
25 numbers didn't otherwise make sense.

1 **DR. NETON:** Right.

2 **MR. CHEW:** (Off microphone) Joe, the -- you
3 asked a question (unintelligible) bring it to
4 another material that -- the issue here is this
5 tritium. I think -- I mentioned in the last
6 meeting, tritium monitoring was triggered by a
7 letter from Pantex that (unintelligible)
8 potentially was (unintelligible) contamination
9 from some of the parts that may be coming back
10 after this assembly because of issues with
11 tritium being released and so I know Hap West
12 was (unintelligible) about that, started a
13 tritium bioassay program, but we do have in the
14 ledger a part that came in. I can't -- it was
15 a classified part for part of the Nevada test
16 and that part actually came in from there and
17 it showed up and then it was sent out to Nevada
18 Test Site. Probably on a couple of occasions
19 that particular test -- that particular
20 component did come in, but these were
21 (unintelligible) called encapsulated because
22 they were part of (unintelligible) unit that
23 (unintelligible). So I would say the tritium,
24 even though we see some tritium bioassay, I can
25 comfortably say there was no significant amount

1 of tritium that was handled here at the
2 (unintelligible).

3 **MR. FITZGERALD:** Uh-huh, any sense of time
4 frame on that one, too?

5 **MR. CHEW:** (Off microphone) Actually I can pull
6 the ledger. I just didn't (unintelligible).

7 **MR. FITZGERALD:** Okay. I mean I just wondered.

8 **MR. CHEW:** (Off microphone) We were trying to
9 minimize (unintelligible) --

10 **MR. FITZGERALD:** Fifties -- '50s or --

11 **MR. CHEW:** -- '60s.

12 **MR. FITZGERALD:** -- to the '60s, okay.

13 **MR. CHEW:** (Off microphone) The neptunium story
14 -- right? -- it was a very good question
15 (unintelligible) about what happened
16 (unintelligible) neptunium. The neptunium came
17 in in several different ways. It's -- so
18 (unintelligible) talking about neptunium 237,
19 it is part of obviously the contaminant for the
20 recycled uranium here.

21 **MR. FITZGERALD:** Not necessarily.

22 **MR. CHEW:** Well, I'm going to go on.

23 **MR. FITZGERALD:** Okay.

24 **MR. CHEW:** (Off microphone) You're absolutely
25 correct, not necessarily. But then -- then --

1 so I don't need to discuss about the
2 contaminant -- the neptunium, but as the
3 recycled uranium did come into the plant there
4 was a call by the Atomic Energy Commission to
5 try to recover as much neptunium 237 as
6 possible to be a target material for the
7 production of plutonium 238, as you all know,
8 and therefore there was some (unintelligible)
9 exchange (unintelligible) put into the -- into
10 the process line to pull (unintelligible) out
11 of the uranyl nitrate. These (unintelligible)
12 exchange (unintelligible) were installed in the
13 uranyl nitrate (unintelligible) program, and so
14 they did pull out the neptunium and -- and
15 actually shipped the columns directly back to
16 Savannah River, and so they were
17 (unintelligible) --

18 **MR. RICH:** (Off microphone) I think they went
19 to Oak Ridge.

20 **MR. CHEW:** (Off microphone) Okay, they went to
21 Oak Ridge? Which --

22 **DR. NETON:** X-10?

23 **MR. CHEW:** (Off microphone) They went to X-10?

24 **MR. RICH:** (Off microphone) X-10.

25 **MR. CHEW:** (Off microphone) Okay.

1 **MR. RICH:** (Off microphone) They -- they were
2 sealed off and sent as (unintelligible) X-10
3 developed a process for that tritium extraction
4 by ion exchange method and that -- that
5 (unintelligible) chemical separation
6 (unintelligible).

7 **MR. CHEW:** (Off microphone) And Bryce, I will
8 just add this that it was known by a few
9 individuals in the plant. An ion exchange
10 column was installed in the uranyl nitrate
11 (unintelligible) to specifically remove
12 neptunium from the incoming SRS RU for use in
13 another program. Okay?

14 **MR. RICH:** (Off microphone) (Unintelligible)
15 for uranium to liquid form had processed it in
16 a chemical processing system, and that included
17 all the gaseous diffusion plants and -- and
18 fundamentally Y-12 and the gaseous diffusion
19 plants.

20 **MR. CHEW:** From (unintelligible), Joe, there
21 was a significant amount actually in the -- the
22 total amount of RU that came in was like
23 150,000 kilograms (unintelligible) material, so
24 the overall balance that there was about 220 --
25 2,200 grams of neptunium available, you know,

1 based on concentration, and so -- which only
2 represents 1.75 curies. I just want to make
3 that particular point here. And they -- they
4 were able to go back and they thought some of
5 it went to the S-3 ponds and by sampling the S-
6 3 ponds they can only kind of account for about
7 145 grams. And so by deduction they basically
8 said the other parts of it went out in those
9 particular exchange columns, you know, back to,
10 as Bryce says, it went to X-10.

11 **DR. NETON:** Back up a second, Mel. They were
12 pulling off this neptunium on these ion
13 exchange columns. Now what were they looking
14 for in the waste ponds then, the material that
15 was in the recycled that was...

16 **MR. RICH:** (Off microphone) (Unintelligible)
17 get it all.

18 **MR. CHEW:** (Off microphone) Didn't get it all.

19 **DR. NETON:** Okay, right, so this essentially is
20 what would have been -- what we would
21 characterize in the recycled uranium analysis
22 then for --

23 **MR. RICH:** Yes, that's --

24 **DR. NETON:** -- dose reconstruction.

25 **MR. RICH:** It's just part of the raffinate that

1 went out to the disposal --

2 **DR. NETON:** The fact that -- it would be -- the
3 neptunium exposures would actually be lower
4 than we would account for --

5 **MR. RICH:** Yes, yes. Yes.

6 **DR. NETON:** Okay, I just want to make clear on
7 that.

8 **MR. FITZGERALD:** But in terms of the
9 operations, are you saying there was no --
10 certainly they -- they took what they
11 extracted, but you're saying there was no
12 rolling or any processing at Y-12?

13 **MR. CHEW:** (Off microphone) Not of neptunium
14 but I will come to (unintelligible), Joe.

15 **MR. RICH:** (Off microphone) (Unintelligible)
16 (on microphone) neptunium at Y-12 as a result
17 of the neptunium extraction.

18 **MR. CHEW:** (Off microphone) And Joe asked a
19 specific question (unintelligible) ledger.

20 **MR. RICH:** Yes. Yes.

21 **MR. CHEW:** (Off microphone) Joe, there was a --
22 an introduction to the ledger. There were
23 about -- ther was a sample of -- I'm just going
24 to say it was less than 70 grams --

25 **MR. FITZGERALD:** Uh-huh.

1 **MR. CHEW:** -- of neptunium 237 that came in,
2 and this was a part of a classified project
3 (unintelligible) used the neptunium as a
4 diagnostic tool for the weapons test program
5 (unintelligible). And Joe, it's just --
6 looking at --

7 **MR. FITZGERALD:** The time frame, or is that
8 classified?

9 **MR. CHEW:** (Off microphone) Yes, we know it's
10 in the '60s.

11 **MR. FITZGERALD:** Okay.

12 **MR. CHEW:** (Off microphone) Early in the '60s.
13 Okay? Now it's clear that that was shown up in
14 the ledger and they -- and we were able to then
15 plot exactly what they did with -- by looking
16 into a classified report that showed what they
17 did with the material and -- and so that was --
18 as I said, was part of a tool that they put on
19 -- the neptunium was used as part of the Nevada
20 Test Site program, the weapons test program.

21 **MR. FITZGERALD:** Okay.

22 **MR. CHEW:** (Off microphone) I want to
23 (unintelligible) more information that you
24 might need --

25 **MR. FITZGERALD:** Right.

1 **MR. CHEW:** -- should be --

2 **MR. RICH:** (Off microphone) This is Bryce Rich
3 again. I think it's worth mentioning that the
4 exposure potential is so low we have found no
5 neptunium bioassay.

6 **MR. FITZGERALD:** You have found no bioassay.

7 **MR. CHEW:** (Off microphone) Not --

8 **MR. RICH:** Yes.

9 **MR. CHEW:** -- so far, Joe.

10 **MR. RICH:** What's that?

11 **MR. CHEW:** (Off microphone) I was just
12 confirming what you just said. Joe asked if
13 you had not found any neptunium bioassay.

14 **DR. NETON:** Mel --

15 **MR. CHEW:** (Off microphone) There was other
16 ways we were trying to do that rather than with
17 some -- (unintelligible) go ahead then, Jim.

18 **DR. NETON:** Well, there's two questions, Mel.
19 The neptunium 237 that was processed through
20 these ion exchange columns, what time period
21 was that?

22 **MR. CHEW:** (Off microphone) Ah --

23 **MR. RICH:** Well, that was early on in the --
24 right after the initiation of the recycled
25 uranium program in the very early to mid-'50s.

1 **DR. NETON:** Okay, so -- so that -- that portion
2 is certainly relevant --

3 **MR. GRIFFON:** Is relevant.

4 **DR. NETON:** -- to the SEC period, but then the
5 only other -- and we can account for that with
6 our recycled uranium --

7 **MR. RICH:** Yes.

8 **DR. NETON:** -- (unintelligible), I believe.
9 The only other neptunium then that was at Y-12
10 is this less-than-70-gram quantity --

11 **MR. RICH:** Yes.

12 **DR. NETON:** -- and we have no bioassay for that
13 at this point.

14 **MR. RICH:** Right.

15 **MR. FITZGERALD:** Well, I have some issues, but
16 they're post-'61 issues so I'm not going to
17 raise them here because even though I have
18 cleared material, it's just not worth getting
19 into --

20 **MR. CHEW:** (Off microphone) Okay.

21 **MR. FITZGERALD:** -- but there are certainly
22 some questions from a site profile standpoint
23 that would be mid-'60s and involve handling of
24 material that would be more than the gram
25 quantities you're talking about that would be

1 pertinent for the site profile.

2 **MR. CHEW:** (Off microphone) Okay.

3 **MR. FITZGERALD:** We'll have that off-line.

4 **MR. CHEW:** (Off microphone) Okay. Thanks, Joe.
5 Let's go on. The -- the uranium 233 was well
6 documented, particularly (unintelligible) --
7 okay? -- and the ones we were focusing in --
8 there was a -- several tests in Nevada that
9 used U-233 to a significant (unintelligible),
10 and so these were cast and made into parts in
11 the mid-'60s, 1965 to '66 time period. You can
12 also track -- almost track by their ledgers
13 when these particular parts -- uranium 233 was
14 brought into the Y-12 plant as coincide with
15 the specific tests that we're looking at.
16 Bryce, want to comment on any other U-233
17 activity here?

18 **MR. RICH:** (Off microphone) No, I think you've
19 covered it.

20 **MR. CHEW:** (Off microphone) As you -- we know,
21 on U-233, you know, the bioassay program for
22 uranium (unintelligible) is primary an external
23 -- use that information, but there was some
24 processing, Joe, and this was in the '60s time
25 frame with the 233. It's cov-- I think this

1 covered -- you can almost track exactly when
2 those different parts came in and came out as
3 corresponding to the tests.

4 **MR. FITZGERALD:** The only discrepancy in what
5 you've just said -- I think we had '62 as the
6 early part of U-233 --

7 **MR. CHEW:** (Off microphone) That's true.

8 **MR. FITZGERALD:** -- (unintelligible), so you
9 know, just --

10 **MR. CHEW:** (Off microphone) It was
11 (unintelligible).

12 **MR. FITZGERALD:** -- again, it doesn't get into
13 the --

14 **MR. CHEW:** (Off microphone) (Unintelligible) to
15 say the peak was in '66, but then --

16 **MR. FITZGERALD:** Right.

17 **MR. CHEW:** -- I do have the log so exactly when
18 (unintelligible) I can tell you how much the
19 ledgers show (unintelligible) '62.

20 **MR. FITZGERALD:** I think we're on the same
21 page.

22 **MR. CHEW:** (Off microphone) Right. There were
23 -- there were some there, and it was really to
24 try to develop the process for handling 233 --

25 **MR. FITZGERALD:** Uh-huh.

1 **MR. CHEW:** -- (unintelligible) program before
2 they actually made the parts. It's one of the
3 crazy Livermore experiments (unintelligible).

4 **MR. FITZGERALD:** Right, so this would fall
5 outside of the SEC, as well.

6 **MR. CHEW:** (Off microphone) Yes, again
7 (unintelligible).

8 **MR. FITZGERALD:** But not by much. I think it's
9 --

10 **MR. RICH:** (Off microphone) Actually the
11 uranium came in (unintelligible) (on
12 microphone) they developed a small unit,
13 glovebox contained, to actually do the F4
14 conversion to metal and then the creation of
15 the parts, so it was contained in glovebox
16 operation. Also I think it'd be well to
17 mention the fact that uranium 233, from the
18 bioassay standpoint, would have been handled as
19 any other uranium isotope and dose
20 reconstruction be converted on the basis of
21 234, so it should show up in the claimant's
22 file adequately and be adequately
23 reconstructed.

24 **MR. CHEW:** (Off microphone) I want to continue
25 -- does that answer your question, Joe,

1 (unintelligible) --

2 **MR. FITZGERALD:** Yeah, thank you, Bryce.

3 **MR. CHEW:** (Off microphone) Let's go on with
4 some of the other (unintelligible) materials
5 that we were able to pull out as you -- along -
6 - in the recycled uranium there's plutonium,
7 primarily in the form of plutonium 238, and the
8 neptunium, the technitium 99, but there was few
9 parts per trillion -- Bryce actually calculated
10 it this morning, said it was like .4 parts per
11 trillion and -- of ruthenium 103 and ruthenium
12 105, zirconium 95 and niobium 95, and I just
13 want to mention that for completeness here and
14 (unintelligible) isotopes that -- trace
15 quantities of that -- in this -- this --
16 actually information will show up in the RU
17 report. Is that correct, Bryce? I
18 (unintelligible) say that correctly here.

19 **MR. RICH:** (Off microphone) (Unintelligible)

20 **MR. CHEW:** (Off microphone) We're putting
21 together an OTIB for the -- complex-wide for
22 the recycled uranium (unintelligible) and this
23 information will show up, Joe.

24 **MR. FITZGERALD:** Right, and this -- this --
25 just getting on back to our original issue,

1 this will be the basis for whatever modeling
2 would have to be done to address these
3 materials -- say post-'60, basically -- in the
4 site profile itself. Okay.

5 **DR. MAURO:** I've got a question on -- more for
6 my edification. Now the -- the U-233* was
7 produced from what, irradiation of thorium 232?

8 **MR. CHEW:** (Off microphone) Yeah, they had to
9 make it by (unintelligible) -- right, Bryce?
10 Yeah.

11 **DR. MAURO:** So --

12 **MR. RICH:** (Off microphone) (Unintelligible)

13 **DR. MAURO:** Yeah, my question had to do with --

14 **MR. CHEW:** (Off microphone) How'd they make the
15 233.

16 **DR. MAURO:** -- the starting point -- it sounds
17 like there was a time period where thorium 232
18 was used as feed stock for producing uranium
19 233.

20 **DR. KERR:** Molten salt reactor*
21 (unintelligible) produce (unintelligible) U-
22 233.

23 **DR. MAURO:** So did -- was -- was there --

24 **DR. KERR:** It was the thorium.

25 **DR. MAURO:** The thorium was the starting point.

1 In other words, that -- was it the thorium --

2 **DR. KERR:** (Unintelligible) thorium fuel cycle.

3 **DR. MAURO:** Okay, and the thorium fuel cycle
4 took place where?

5 **MR. RICH:** It was -- there were thorium targets
6 in -- in Hanford, and -- and then processed at
7 ORNL.

8 **DR. MAURO:** Okay, so it was sep-- so it was
9 chemically separated at Hanford, and the 233
10 was shipped -- but --

11 **MR. CHEW:** (Off microphone) As
12 (unintelligible).

13 **MR. RICH:** To Y-12 as uranyl nitrate.

14 **DR. MAURO:** Okay, and -- okay. And there -- at
15 that -- now if I recall, one of the problems
16 with 233 was 232, which was a strong gamma.

17 **MR. RICH:** Yes.

18 **MR. CHEW:** (Off microphone) That's -- that's
19 the issue with thorium 232 is it carries about
20 50 parts per million, and with this particular
21 part we're talking about a U-232, which decays
22 to thorium till -- down the chain to 228 and it
23 goes down to like thalium 208 (unintelligible)

24 --

25 **DR. NETON:** Right, just like thorium 232

1 exposures.

2 **MR. CHEW:** -- (unintelligible) --

3 **DR. MAURO:** So from a --

4 **MR. CHEW:** -- gamma (unintelligible) --

5 **DR. MAURO:** So from a dose reconstruction point
6 of view, what you're -- your starting point,
7 though, is not the thorium 232 here. The
8 starting point is the material that showed up
9 in Y-12 at some date, perhaps early -- as early
10 as the early '60s, I guess --

11 **MR. CHEW:** (Off microphone) Sure.

12 **DR. MAURO:** -- was U-233 and, from a dose
13 reconstruction point of view, what I -- as I
14 understand it is you have your strong gamma --
15 okay? -- you've got --

16 **MR. CHEW:** (Off microphone) Let me -- let me
17 jump in here, John -- John, because I happen to
18 be familiar with that part that was made, and
19 help me, guys, with the chemistry here.

20 (Unintelligible) going down there, they always
21 said well, it's pretty -- about as clean as it
22 can be right now 'cause we just did a thorium
23 strike on it.

24 **DR. MAURO:** Okay.

25 **MR. CHEW:** (Off microphone) That was the term

1 they used.

2 **DR. MAURO:** Okay.

3 **MR. CHEW:** (Off microphone) And then they got
4 rid of the thorium and so we basically started
5 with as low as a radiation part as we can so we
6 can handle it 'cause literally with an
7 instrument you can -- I'm exaggerating -- you
8 can sit there and watch it grow in.

9 **DR. MAURO:** Uh-huh.

10 **MR. CHEW:** (Off microphone) And they grow in in
11 days. Okay?

12 **DR. MAURO:** Uh-huh.

13 **MR. CHEW:** (Off microphone) And so -- so it's
14 not like you receive old-age 233 with aged 232
15 in it 'cause I'm -- now I was about to -- you
16 asked me the specific chemistry, how they did
17 that, I don't -- don't know, but I do remember
18 mentioning the -- the thorium strike.

19 **DR. NETON:** (Unintelligible) strip out the
20 thorium 238 (unintelligible) chemically, so
21 then you take out all the --

22 **MR. CHEW:** (Off microphone) (Unintelligible)

23 **MR. RICH:** (Off microphone) (Unintelligible)
24 for certain (on microphone) quantity of thorium
25 -- or uranium 232 with the 233. The 232, as

1 you've indicated, was the source of the -- the
2 grow-in of the uranium 232 daughter products,
3 which were very high energy, and over a period
4 of a relatively short period of time it would
5 become an external radiation hazard. That's
6 the reason it didn't wind up in the stockpiles.

7 **MR. CHEW:** (Off microphone) I do remember
8 (unintelligible) some less than -- well, it was
9 about 50 parts per million 232.

10 **DR. MAURO:** Well, I'm visualizing exposure of a
11 worker to 233 somehow.

12 **MR. CHEW:** (Off microphone) Uh-huh.

13 **DR. MAURO:** It becomes an internal emitter.
14 Then alpha -- that's -- I assume an -- that's
15 your -- an alpha problem --

16 **MR. CHEW:** (Off microphone) Sure.

17 **DR. MAURO:** -- and along -- now any in-growth
18 or any -- the residual 230 -- thorium 232 of
19 course is also the alpha -- an alpha
20 contributor, which would be small, I presume,
21 in terms of parts per million --

22 **MR. CHEW:** (Off microphone) Sure.

23 **DR. MAURO:** -- (unintelligible) in terms of
24 picocuries or curies or whatever.

25 **MR. CHEW:** (Off microphone) Right.

1 **DR. MAURO:** But then the radium 228 or whatever
2 --
3 **DR. NETON:** Thorium 228.
4 **DR. MAURO:** -- the thorium 228 coming in --
5 **MR. CHEW:** (Off microphone) (Unintelligible)
6 **DR. MAURO:** Okay. So -- so I guess what I'm
7 understanding is then if you're going to do a
8 dose reconstruction for workers who might have
9 been involved in uranium 233 handling --
10 **MR. CHEW:** (Off microphone) Uh-huh.
11 **DR. MAURO:** -- the way you track it is -- is
12 urinalysis for uranium --
13 **MR. CHEW:** (Off microphone) Uh-huh.
14 **DR. MAURO:** -- and you get a -- now -- now
15 there -- is this -- now you get dpm per -- per
16 24-hour --
17 **MR. CHEW:** (Off microphone) Uh-huh.
18 **DR. MAURO:** -- and the -- you've got your dpm,
19 but you're not quite sure what it is.
20 **MR. CHEW:** (Off microphone) Well, you assume
21 it's (unintelligible) --
22 **DR. NETON:** No, 230-- well, you'd assume it was
23 a uranium-233 intake. No?
24 **DR. MAURO:** Oh, for that -- because you'd --
25 (unintelligible) work with your own 233.

1 **UNIDENTIFIED:** You'd assume it's -- what's your
2 intake of uranium 233 and then knowing what the
3 contaminate is of 232 you could fold that into
4 the calculation. You just can't -- you
5 wouldn't measure the 232.

6 **DR. MAURO:** Let's say -- okay, let's say we had
7 a situation where you're really not sure --
8 this guy had multi-tasked. He did a lot
9 (unintelligible) -- he worked for, you know --

10 **UNIDENTIFIED:** (unintelligible)

11 **MR. CHEW:** Not -- not in this particular --

12 **DR. MAURO:** Oh, is that right? Well, see, this
13 is an important part of the story, too.

14 **MR. CHEW:** That's an important part of the
15 story. Yeah, that was very unique.

16 **DR. MAURO:** Okay. So this becomes a track. In
17 other words, what you're saying is you've got
18 bioassay data. You look at a dpm per liter, a
19 dpm for 24 hours. You know you could follow up
20 with uranium 238 after 233. So therefore you
21 know U 233 and you also could assume that along
22 with that came everything else --

23 **MR. CHEW:** Right.

24 **DR. MAURO:** -- that would normally be
25 associated with that.

1 **MR. CHEW:** (Unintelligible) was clearly --
2 because it was quite hot externally a number of
3 people worked on it very quickly. And I
4 remember at Y-12 we were -- they were very
5 happy to get rid of it.

6 **DR. MAURO:** Uh-huh (affirmative).

7 **MR. CHEW:** And then when we got it to Nevada it
8 sat around for a little while and made us a
9 little nervous (unintelligible).

10 **MR. KERR:** The separation with U-233, Y-12 well
11 documented. And it was almost -- was entirely
12 a closed operation. And they monitored the
13 workers, even go back and look at some of the
14 reports and some of the -- the preliminary
15 stance to -- to build up to work with it. They
16 monitored the workers extremely well. That
17 monitoring data is all in the reports. It's a
18 -- It's a very well documented thing.

19 **DR. RICH:** Yeah, they wouldn't have had any
20 problem detecting that with a personal
21 dosimeter because of the energy of the
22 radiation.

23 **MR. CHEW:** They go hand in hand.
24 (Unintelligible) right now.

25 **MR. FITZGERALD:** And just to follow on where

1 you're all headed. So the groups of workers
2 that would have been involved, and not just
3 this one but perhaps all of these, the
4 plutonium, neptunium and U 233 would be fairly
5 well defined I would think. You would know
6 pretty much who they are.

7 **MR. CHEW:** You know, that's a very fair
8 question.

9 **MR. FITZGERALD:** Well, I'm saying is that
10 something that has come out of your review or
11 is that something that --

12 **MR. CHEW:** Well, we know that they're well
13 defined.

14 **MR. FITZGERALD:** Yeah.

15 **MR. CHEW:** That's what the people tell us, you
16 know. We --

17 **MR. FITZGERALD:** So it's not going to be a
18 challenge trying to figure out --

19 **MR. KERR:** These U 233 workers were specially
20 trained to handle this material so it wasn't
21 just going out and getting --

22 **MR. FITZGERALD:** Right.

23 **MR. KERR:** -- some people in to say come in
24 here; we need your help. They got them in
25 there and trained them before the --

1 **MR. FITZGERALD:** When they come in for DR
2 you're going to -- you're going to be able to
3 know that as soon as they mentioned NP> or
4 mentioned PU> they're going to, you know,
5 certainly be categorized fairly well.

6 **MR. CHEW:** And I --

7 **MR. GRIFFON:** (Unintelligible) I don't disagree
8 with (unintelligible) that statement. It's one
9 thing to know who they were but going backwards
10 to identify might be a little -- little
11 different, especially if it's a survivor
12 claimant. You know, they -- because are the
13 departments specific enough? In other words,
14 that might be another question for -- for all
15 of these isotopes. And I think, you know, in
16 other words, I don't know that you had a
17 department that specifically was assigned to U
18 233 processing.

19 **MR. CHEW:** No, I don't think you could find
20 that, Mark. (unintelligible)

21 **MR. GRIFFON:** So, you know, you might -- they
22 might have well been specially trained and
23 assigned just to work in those areas for certain
24 time periods but retrospectively looking back 50
25 or 40 years or whatever --

1 **MR. CHEW:** Yeah.

2 **MR. GRIFFON:** -- whether it's survivor you may
3 not necessarily know just from the records that
4 they were in that area. Is that fair? I don't
5 know. Maybe I'm --

6 **MS. MUNN:** Well, by the same token one should
7 just from the information you know be able to
8 eliminate casual workers, concerns over
9 individuals who might have been sweeping up or
10 moving through the building as a security
11 guard, those kinds of things.

12 **MR. PRESLEY:** I think that's absolutely
13 correct. You would not have a security guard
14 or a janitor picking up and working with those
15 type of things. It would be an assembly person
16 and the assembly person's supervisor and that's
17 it.

18 **DR. MAURO:** In terms of surprises they're
19 always, you know, looking for, you know -- I'm
20 over here. Search for an SEC. You know,
21 search for where -- where can you get fooled,
22 you know. Okay. Take a urine sample of a
23 worker. And I get my dpm for 24 hours. And
24 I'm not -- and I assume that -- that what we're
25 looking at is, you know, natural uranium. But

1 lo and behold it turns -- because you're in
2 dpm, an alpha -- gross alpha count. You're
3 assuming that, well, that he was a uranium
4 worker and you may throw in some recycled other
5 -- other radionuclides that go hand in hand
6 with that, say. But then along, you say, what
7 happened -- how much different is the dose when
8 -- if you -- when in fact it turned out was U
9 233 that was giving you the alpha along with
10 whatever else comes with it. Are we talking
11 about differences that lend to a critical
12 (unintelligible)

13 **UNIDENTIFIED:** (unintelligible)

14 **DR. MAURO:** -- per dpm per -- per -- per liter
15 between U 233 versus the U 238 or natural
16 uranium series. Are we talking about big
17 differences?

18 **DR. NETON:** I don't know. We'd have to do the
19 calculations.

20 **DR. MAURO:** Because you see, if it turns out
21 it's not a big difference then --

22 **DR. RICH:** My understanding is that the part of
23 the uranium dose reconstruction is done as
24 though the uranium is uranium 234 which is
25 unequivocally claimant favorable in all cases.

1 **DR. MAURO:** I know that's true for natural
2 uranium. I -- I wasn't quite sure -- I think
3 we need to do it for U-232 --

4 **DR. NETON:** Right. I think we need to -- we
5 need to answer that question

6 **DR. MAURO:** -- with this other stuff that goes
7 with it.

8 **DR. NETON:** I know your head --

9 **MR. GRIFFON:** Yeah, yeah.

10 **DR. NETON:** -- (unintelligible) worth worrying
11 about if it doesn't make a difference in the
12 dosimetry.

13 **MR. GRIFFON:** Right.

14 **DR. MAURO:** What I'm concerned about is I'm
15 sitting back here saying, geez, how do I get
16 surprised? If it turns out that that
17 difference makes no difference then I don't
18 need to worry about it.

19 **DR. RICH:** What we need to worry about is the
20 thorium 228 --

21 **DR. MAURO:** That's what I was going to say.

22 **DR. RICH:** -- that would have a different
23 exposure -- internal exposure profile than the
24 uranium.

25 **DR. MAURO:** You see, where that -- where that

1 puts you is if that -- there is a substantial
2 difference between the two scenarios.

3 **DR. RICH:** Sure.

4 **DR. MAURO:** -- then it becomes critical that
5 you know when it's 233 and when it's not 233.

6 **UNIDENTIFIED:** (Unintelligible)

7 **DR. MAURO:** (Unintelligible) I guess that --
8 but if it turns out that the difference is not
9 a big difference then it's not so -- so
10 important any more.

11 **DR. CHEW:** I think that's a very good question,
12 John, and I think --

13 **DR. RICH:** One additional perspective. This
14 was a very short-term project and it was also
15 the formative materials involved was very small
16 relatively. It was kilogram quantities as
17 opposed to metric tons and the process was
18 fundamentally enclosed in -- in a glovebox
19 operation. And so with all of those I suspect
20 that the -- the -- all of those factor involved
21 I suspect that the concern and -- and plus the
22 fact that the number of people involved would
23 probably be very restricted.

24 **DR. NETON:** But notwithstanding those issues we
25 would still need to address what John mentioned

1 and also --

2 **DR. RICH:** Yes, that can be done easily.

3 **DR. NETON:** But if we can't identify who was
4 there and there are significant dose issues
5 then we need to maybe think somewhat
6 differently about this problem. I would remind
7 everyone that this is the mid-'60s.

8 **DR. MAURO:** (Unintelligible)

9 **UNIDENTIFIED:** (Unintelligible)

10 **DR. NETON:** Now, that doesn't mean that we
11 don't have to address this and -- and deal with
12 it.

13 **DR. MAURO:** That's -- That's more --

14 **DR. NETON:** But as far as the current petition
15 --

16 **MR. FITZGERALD:** (Unintelligible) asking for
17 the dates because a lot of these issues are on
18 the cusp of the (unintelligible)

19 **MR. GRIFFON:** (Unintelligible) a lot of these
20 issues and I think we should move on
21 (unintelligible).

22 **MR. FITZGERALD:** That's exactly correct. It's
23 -- It's an issue that we need to resolve but -
24 -

25 **MR. CHEW:** The last one we want to talk about

1 is the thorium. In the SEC period, Bryce, you
2 -- you know, since you wrote this up you may
3 want to just go ahead. We can hear you pretty
4 clearly here. This is under your section on
5 the thorium study group (unintelligible) today.

6 **MR. GRIFFON:** Did you finish recycled U? Did
7 you -- I mean, Mel, I guess my question on the
8 recycled U is more one of methodology and that
9 -- is that going to be forthcoming in some of
10 the examples, Jim, or - or --

11 **DR. NETON:** Well, we need to talk about that
12 because I think, you know, our approach to
13 using the generic default values for the
14 recycled uranium are still -- we believe to be
15 valid. The issue was raised in one of the
16 example dose reconstructions about the Paducah
17 feed plant ash that came in. And I think Bryce
18 Rich has gone and pulled that thread pretty
19 far. And we're -- we're prepared to talk about
20 that particular issue. I think that was an
21 issue that SC&A was trying to surface to
22 question as to were there other, you know, more
23 enriched to use that term, you know, quantities
24 of recycled uranium.

25 **MR. GRIFFON:** Right, concentrated more.

1 **DR. NETON:** Right. And -- And I'm not sure of
2 any where it was concentrated more other than
3 this Paducah issue that was -- was raised and,
4 you know, we -- we're prepared to discuss that.

5 **MR. GRIFFON:** Those areas were raised in the
6 recycled U report; is that not true?

7 **DR. NETON:** In the recycled U report?

8 **MR. GRIFFON:** In the -- In the mass balance
9 report I should say, DOE mass balance report it
10 was cited.

11 **MR. CHEW:** Bryce -- Bryce, the -- the report
12 2000 you're referring to, right?

13 **DR. RICH:** Yeah.

14 **MR. CHEW:** Uh-huh (affirmative). Go ahead,
15 Bryce. Do you want to talk about this since
16 you were part of the authors of that report?
17 What the issue was specifically, we know there
18 were some mistakes in it, Mark, if that's -- is
19 that what you're talking about?

20 **MR. GRIFFON:** Not necessarily mistakes but the
21 question of, you know, the bottom line of it is
22 are -- were there areas where there were higher
23 concentrations -- certain process areas that --
24 that would be of concern from a dose
25 reconstruction --

1 **DR. RICH:** This -- This -- This has been
2 addressed in the current version of that
3 technical basis document but there were --

4 **MR. GRIFFON:** So that's your final version of
5 that -- of how -- of the bounding condition is
6 in the TBD?

7 **DR. RICH:** Yes.

8 **MR. GRIFFON:** Okay.

9 **DR. RICH:** And the -- other than the fact that
10 there's additional information related to the
11 fission plant contaminants which actually do
12 not contribute significantly to the dose and
13 can be legitimately ignored.

14 **MR. GRIFFON:** Right.

15 **DR. RICH:** The approach for assigning default
16 amounts as a result of recycled uranium
17 contaminants, which in the case of Y-12 since
18 the processed -- since the -- the bulk of the -
19 - all your contaminants came by way of very
20 high enriched -- over 80 percent for high
21 enriched uranium. In these cases plutonium 238
22 becomes dominant and neptunium 237 plus thorium
23 238 has a significant contribution as a result
24 of residing in the -- the highly enriched
25 uranium residing in the -- in the reactors.

1 And -- And of course technitium 99. The
2 approach there because of the fact that they
3 exist in parts per billion to parts per
4 million, bioassay was inadequate to demonstrate
5 exposure to those contaminants so the approach
6 for recycled uranium contaminants is simply to
7 assign an -- -- a -- an adequately concertive
8 ratio of contaminants, plutonium, neptunium,
9 thorium, technitium to each uranium analysis.
10 And that's -- that -- that technical basis
11 document I think describes that approach.

12 **MR. GRIFFON:** Right. Right. I guess the
13 question -- the real question was the ratios
14 but -- and I'll leave it at that --

15 **DR. RICH:** Okay. Just on a --

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

17 **DR. RICH:** -- related to enrichment the Y-12
18 processed every -- all of the enriched uranium
19 that they received through chemical extraction
20 but primarily tuned to removing heavy metals
21 and to cleaning up the uranium, or purifying
22 uranium. There was some removal of trace
23 quantities but not nearly so much as in a
24 standard liquid -- liquidonics, a processing
25 plant. But there was some enrichment in the --

1 the raffinates which has already been
2 mentioned, which went directly to the disposal
3 ponds but that's been adequately addressed also
4 I believe.

5 **MR. GRIFFON:** Okay.

6 **DR. CHEW:** Mark, you okay?

7 **MR. GRIFFON:** We'll leave it as it's, yeah, the
8 final version. I just wanted to make sure
9 there wasn't an update on that as described in
10 the TBD.

11 **DR. RICH:** There is none other than the fact
12 that the <fission> product contaminants are
13 addressed in a little more detail --

14 **MR. GRIFFON:** Okay.

15 **DR. RICH:** -- in the -- in the technical basis
16 document for -- as general RU contaminants for
17 the site-wide.

18 **DR. NETON:** Bryce, this is Jim Neton. I
19 thought that, you know, SC&A had raised this
20 issue with the Paducah feed plant ash, which I
21 don't think is --

22 **DR. RICH:** Yes, thank you, Jim. The Paducah --
23 when they -- when they shut down the feed plant
24 they sent -- they distributed the feed plant
25 ash which was enriched in the contaminants a

1 significant amount by orders of magnitude.
2 They sent it (unintelligible) who processed it
3 and blended it in with existing materials.
4 That that came to Y-12 was held in storage and
5 never processed. So it was held as -- and
6 (unintelligible) able to determine in sealed
7 metal containers. And most of it was returned
8 to Paducah and the other -- there's a small
9 faction of it that was buried in I think it's
10 called Bear Creek Disposal Area in sealed
11 containers. But it was never processed in Y-
12 12.

13 **DR. NETON:** That was the only update I think we
14 had was that this material was -- and this had
15 a higher enrichment of the recycled product --
16 contents.

17 **MR. GRIFFON:** Can I ask a silly question on
18 that, Bryce?

19 **DR. RICH:** Sure.

20 **MR. GRIFFON:** Why was it -- why did Fernald
21 blend it?

22 **DR. RICH:** Well, after they --

23 **MR. GRIFFON:** Was it for dilution what were
24 they trying to --

25 **DR. RICH:** Yes. Yes, it -- they added -- they

1 blended it in with the current stock --

2 **MR. GRIFFON:** Okay.

3 **DR. RICH:** -- because the current stock was
4 orders of magnitude greater than the amount of
5 materials that they received. But they -- it
6 was sent there for uranium recovery. There was
7 a significant amount of uranium in the --

8 **MR. GRIFFON:** Okay.

9 **DR. RICH:** -- in the ash. They -- They just
10 blended but they did not remove as they
11 processed it. Blended it with the current
12 inventory and still stayed below the -- the --
13 the inventory. It turns out that that plant
14 ash doubled their inventory of (unintelligible)
15 but was still in the (unintelligible) range --

16 **MR. GRIFFON:** Okay.

17 **DR. RICH:** -- maximum.

18 **MR. CHEW:** Mark, are you okay? Can we move on
19 to the next part of the discussion?

20 **MR. GRIFFON:** Yeah. Yeah.

21 **MR. CHEW:** Okay. Bryce, I'm going to -- you
22 can either do that or I'll go ahead. This is
23 the -- the Y-12 thorium and we'd like to just
24 talk about, you know, where the calutron and
25 then (unintelligible) process. Bryce, since

1 you wrote this up do you want to go ahead and
2 (unintelligible)?

3 **DR. RICH:** There were a couple of processes
4 that used uranium at Y-12 and it takes us back
5 to the -- the ID program with calutrons and the
6 -- and the cyclotron program.

7 **MR. CHEW:** You mean thorium.

8 **DR. RICH:** Thorium. Did I say -- what did I
9 say?

10 **MR. CHEW:** You said uranium.

11 **DR. RICH:** Pardon me. It was a small program,
12 100 gram quantities of -- for separation and
13 enrichment of thorium 230 on (unintelligible)
14 and that shows up on Mel's table. The other
15 process was in terms of kilogram quantities of
16 thorium that was used as a salting agent in --
17 as a -- as a removal -- as they cleaned up the
18 calutrons, 1,100 and some odd calutrons that
19 they cleaned up and removed the uranium from --
20 left over from that process, they -- they used
21 that as a salting agent for precipitation of
22 the uranium. That -- and there were some
23 thorium fecal samples in the SEC period which
24 was about the best they knew how to do at the
25 time. Urinalysis was not an effective way and

1 for that matter fecal was not well done but
2 that was before lung counting so those two
3 processes existed before they -- and then the -
4 - a third one was that they used some -- and I
5 -- I presume although we don't have a quantity
6 but (unintelligible) was used in the
7 engineering metallurgical laboratory to develop
8 the processes that would eventually be used to
9 process the hundreds of metric tons of thorium
10 during the 16-year period of time from 1960 to
11 '70, up to the mid-'70s. There were recorded
12 air sampling that was done in the metallurgical
13 laboratories. I -- I -- We didn't find
14 bioassay confirming information in that -- in
15 that time period so the assumption is made
16 although we don't have any firm data to support
17 that is that that was a small operation in the
18 RD process development area.

19 **MR. GRIFFON:** You have -- you said there --
20 there's air sampling data?

21 **DR. RICH:** A single air sampler was mentioned
22 in one of the --

23 **MR. GRIFFON:** Oh.

24 **DR. RICH:** -- health and safety reports --

25 **MR. GRIFFON:** Okay.

1 DR. RICH: -- as a monitoring tool for that --

2 MR. GRIFFON: We don't really have any -- any
3 data per se?

4 DR. RICH: No, I don't have -- we have not been
5 able to retrieve the results from that single
6 sample which would be in the '57 to '58 time
7 frame.

8 MR. GRIFFON: And you said there was some fecal
9 sampling from '50 to '57 for the --

10 DR. RICH: In that time period, yes.

11 MR. GRIFFON: Oh, I didn't -- in that -- was
12 that in the delta view or that was --

13 DR. RICH: It's in the delta view.

14 MR. GRIFFON: Because I didn't see anything
15 pre-'58. Maybe I'm -- maybe I'm mistaken
16 though.

17 DR. RICH: I'll have to look at that again.
18 Maybe I'm incorrect.

19 MR. GRIFFON: I thought most of it was in 1958.
20 I think --

21 MR. CHEW: Arjun remembers.

22 DR. MAKHIJANI: This is Arjun.

23 DR. RICH: You're probably right. I'll --
24 I'll take -- I'll take a look at that, Mark.

25 MR. GRIFFON: Okay.

1 **MS. MUNN:** Arjun says you're right, Mark.

2 **DR. NETON:** Bryce, could you -- could you sort
3 of go over the time frames as to when these
4 materials were used? It wasn't clear to me.
5 You talked about the 100-gram quantities.

6 **DR. RICH:** That was a little later than the --
7 let's pull that up.

8 **DR. NETON:** Do you have that on your --

9 **MR. GRIFFON:** That's on Mel's table, right?

10 **DR. RICH:** Yes.

11 **MS. MUNN:** Post-1960 data we talked about
12 before?

13 **DR. NETON:** 1952 was 150.

14 **MR. CHEW:** Bryce, what you have here is between
15 1952 and 1957, the isotopic separation program
16 with the beta calutrons used small quantities
17 of 100-gram quantities of thorium. However, in
18 the ledgers that we looked for Y-12, Mark, is
19 in the -- in this '49/'50/'51 time frame there
20 is quantities of thorium that came into the
21 plant. These were probably in kilogram
22 quantities and -- and it stayed about that
23 particular level. I actually have a table or I
24 mean I have a chart that talks about the
25 kilogram quantities present all the way through

1 each of the years. And it really seems to
2 increase in the 1959 to 1960 time frame to
3 many, many thousands of kilograms of --

4 **MR. GRIFFON:** Right. That's when the air
5 sampling came in and all that, yeah.

6 **MR. CHEW:** That's when the bioassay program was
7 more important, you know.

8 **DR. NETON:** Well, but they also had -- you've
9 got the --

10 **DR. RICH:** I just -- I just -- I just pulled
11 up the -- Mel's chart and there's a thorium 230
12 separation in -- in 1952 --

13 **MR. CHEW:** Right.

14 **DR. RICH:** -- so they were working that at that
15 time.

16 **MR. CHEW:** That was for the main calutron but
17 the other material came into the plant because
18 it came into the ledgers --

19 **DR. RICH:** Yes.

20 **MR. CHEW:** -- for that to be worked to develop
21 the program, for the -- for the weapons
22 program.

23 **DR. RICH:** Well, I don't have my notes for that
24 so if you have yours, Mel --

25 **MR. FITZGERALD:** Your notes are basically based

1 on this ledger and it would tell you for
2 example -- although I think Bryce was saying he
3 wasn't sure -- you would have some measure of
4 the amount of thorium that was being handled in
5 the pilot program. Was that coming in?

6 **MR. CHEW:** Well, we certainly have --

7 **MR. FITZGERALD:** Late '50s?

8 **MR. CHEW:** Yeah, we certainly have the kilogram
9 quantities -- important quantities and it goes
10 back to I have data as far as '49.

11 **MR. FITZGERALD:** Right. You have some handle
12 on the thorium inventory.

13 **MR. CHEW:** Sure. Yes, we do.

14 **DR. MAKHIJANI:** This would be 232.

15 **DR. RICH:** (Unintelligible)

16 **MR. CHEW:** I hope so.

17 **DR. MAURO:** Yeah, because I heard you talking
18 about this 150 grams of thorium 230 that was
19 part of this table.

20 **MR. CHEW:** That's for the calutron.

21 **DR. MAURO:** Calutron. And then you crossed
22 over; then I heard the kilogram quantities and
23 I thought you were still there.

24 **MR. CHEW:** No. No. That is only calutron
25 millitron.

1 DR. MAURO: Very good.

2 MR. CHEW: And what I'm telling you is what
3 came in (unintelligible).

4 UNIDENTIFIED: Okay.

5 DR. NETON: Now, Bryce, you talked about these
6 kilogram quantities used as salting agents for
7 the calutron. Those were sort of like co-
8 precipitants -- precipitants?

9 DR. RICH: Yes. Uh-huh (affirmative).

10 DR. NETON: So when they were trying to extract
11 all the uranium they would add this thorium --
12 kind of interesting -- to --

13 UNIDENTIFIED: (Unintelligible)

14 DR. NETON: -- to help it precipitate out just
15 like we would use iron --

16 DR. RICH: Right.

17 DR. NETON: -- to help co-extract uranium now -
18 - plutonium nowadays. I assume they chose to
19 use thorium 232 as the co-extractant. So --

20 DR. RICH: That was -- that was interesting. I
21 never heard that used that way.

22 DR. NETON: These were definitely wet processes
23 then.

24 DR. RICH: Yes.

25 DR. NETON: Wet --

1 **DR. RICH:** Right. And -- And -- And beyond
2 that I don't know if a -- haven't been able to
3 find a lot of information other than just that
4 simple report in the -- an operational report.

5 **DR. NETON:** And what time frame were these
6 salting agents used?

7 **DR. RICH:** I'll have to look at that again,
8 Jim. I don't have that right in front of me.

9 **DR. NETON:** Because Mel talked about '49 to
10 '51.

11 **MR. CHEW:** That's -- That's for the Y-12
12 plant. See, the salting is only used for the
13 calutron activity there. Right, Bryce?

14 **DR. RICH:** That would -- that would have been
15 in the '47 to '50 time period.

16 **DR. KERR:** After the calutrons were shut down.

17 **DR. NETON:** After the calutrons were shut down
18 they were going to --

19 **DR. RICH:** Yes.

20 **DR. NETON:** -- (unintelligible) out the -- the
21 processes.

22 **DR. RICH:** Right. And -- And -- And it could
23 have been briefly before that because they were
24 recovering uranium all during a period from,
25 you know, the '43 time period on. I'll just

1 have to look and get a -- get a more --

2 **DR. NETON:** Okay.

3 **DR. RICH:** -- precise time period for that.

4 **DR. MAKHIJANI:** You don't have information
5 about the reactor program, the molten salt
6 reactor experiment and fuel preparation. It
7 seemed to me that -- I think -- did we send
8 along the reference showing that there was
9 quite a bit of funding for the molten salt
10 reactor experiment in '56, half a million
11 dollar --

12 **MR. CHEW:** They were going to make the fuel for
13 molten salt --

14 **DR. MAKHIJANI:** Yeah.

15 **MR. CHEW:** They were going to make the fuel for
16 the molten salt with the funding.

17 **DR. MAKHIJANI:** Yeah. I -- I mean I don't --
18 I don't have a document directly saying that
19 but I would presume since they were going to
20 build a reactor that prior to that they would
21 be doing some fuel preparation --

22 **MR. CHEW:** Uh-huh.

23 **DR. MAKHIJANI:** -- work which would probably
24 involve quite a bit of chemistry and quite a
25 bit of thorium.

1 **MR. CHEW:** This could have been in the time
2 frame we would be talking about, the
3 '52/'53/'54 time period. It was a few hundred
4 kilograms if I'm --

5 **DR. MAKHIJANI:** Right.

6 **MR. CHEW:** -- exactly right.

7 **DR. MAKHIJANI:** Those -- Those would be sort
8 of (unintelligible) or do you know whether they
9 were like fuel preparation pilot programs or --

10 **MR. KERR:** I would think they did -- they did a
11 little fuel preparation at Y-12 but they
12 certainly didn't do much.

13 **MR. CHEW:** I think that's because --

14 **MR. TANKERSLEY:** I would almost say -- I'd
15 almost be willing to bet that --

16 **MR. KERR:** Because I think they used enough
17 molten salt or enough thorium that they
18 probably got it from some other supplier rather
19 than Y-12.

20 **MR. TANKERSLEY:** Right.

21 **MR. KERR:** I can't imagine Y-12 providing that.

22 **DR. MAKHIJANI:** What was the few hundred
23 kilograms for?

24 **MR. CHEW:** I'm under the impression it was
25 stocking for the development for the weapon

1 program because (unintelligible) -- because
2 they needed them. Because the later production
3 was significantly much more than that and this
4 would -- and actually, Arjun, to -- to really
5 (unintelligible) we can go back to the ledger
6 and it tells you which MDA it went to, like the
7 RD MDA and you can track that.

8 **DR. MAKHIJANI:** Okay.

9 **MR. CHEW:** And if it would have went to fuel
10 application it might probably have went to a
11 different MDA.

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

13 **MR. CHEW:** Yeah, so you could do that.

14 **MR. FITZGERALD:** Now, in contrast to the other
15 source trends we were talking about, neptunium,
16 uranium, whatever, it strikes me that from what
17 we described in terms of the uses of the
18 thorium, that this may not be as exclusive in
19 the (unintelligible) work group. Would you be
20 able to identify the workers that might be
21 associated with the pilot activities for
22 example?

23 **MR. CHEW:** I think we could do that, Joe.

24 **MR. FITZGERALD:** You really think so?

25 **MR. CHEW:** Yeah, but I think for the -- for the

1 large production run which you can really point
2 out that in a the year's period of time there -
3 - well, you know, it depends some on the
4 timeline. You know, they -- they actually did
5 some melting and (unintelligible). That was
6 done in the box for example. I mean, you know,
7 I'm thinking of your question.

8 **MR. FITZGERALD:** Well, I'm just saying. You're
9 talking about pipefitter or --

10 **MR. CHEW:** Yeah.

11 **MR. FITZGERALD:** Definitely --

12 **MR. CHEW:** A process worker.

13 **MR. FITZGERALD:** (Unintelligible) focus. I mean
14 would you -- I would -- I would agree that you
15 wouldn't expect those folks, even if they're
16 rovers to get anywhere near the 233 or the
17 plutonium activity. It probably wouldn't be,
18 you know, likely.

19 **MR. CHEW:** That's true.

20 **MR. FITZGERALD:** But for the thorium operations
21 which were pilot activities and some of these
22 other evolutions I'm not sure. I'm not as
23 convinced that you might not have --

24 **MR. CHEW:** I'm still comfortable saying that
25 for the pilot activity, probably not, Joe.

1 **MR. FITZGERALD:** Uh-huh.

2 **MR. CHEW:** But possibly of when they actually
3 went and processed (unintelligible) --

4 **MR. PRESLEY:** Right. When we went into
5 production that's when you start worrying about
6 your pipefitters and stuff like that because
7 when we would do a development, an R&D program,
8 it was all done in development and there was
9 very, very few --

10 **MR. FITZGERALD:** Close confined.

11 **MR. PRESLEY:** Yeah, very much confined. When
12 we went into production, things like that,
13 that's when I'd worry about the craft people.

14 **MR. CHEW:** On that note, that's the -- it
15 starts to -- starts to pick up around 1960s
16 time frame --

17 **MR. FITZGERALD:** Right.

18 **MR. CHEW:** -- so we clearly have about 10,000
19 lung counts. That's when they really start to
20 do the lung counts for all the people that were
21 involved with the thorium. I have not pulled
22 the data of how many, you know, of -- of those
23 kind of maintenance people but from a period of
24 -- this particular period --

25 **MR. FITZGERALD:** Right.

1 **MR. CHEW:** -- I really pulled '60 when they
2 really --

3 **MR. FITZGERALD:** Well, I think the question we
4 had posed the last time around was the fact
5 that we wanted to characterize better that pre-
6 '60 period because --

7 **MR. CHEW:** Yeah.

8 **MR. FITZGERALD:** -- it wasn't clear if that was
9 as --

10 **MR. CHEW:** Well, I can tell by the masses here
11 they did not do any production (unintelligible)
12 --

13 **MR. FITZGERALD:** Production (unintelligible).

14 **MR. CHEW:** -- in '60. Yeah.

15 **MR. FITZGERALD:** Okay.

16 **MR. CHEW:** Yeah. (Unintelligible). Okay,
17 Mark. Well, Joe, I'd like to make a closing
18 comment. And now that we've kind of gone
19 through what we would characterize the isotope,
20 I'd like to make a kind of a comment here other
21 than maybe something that you have uncovered,
22 I'd like to say that other than
23 (unintelligible) sources that they brought in,
24 you know, (unintelligible), neutron source and
25 all that, I don't think by looking at the

1 classified plant records, the ledgers, the
2 alpha six programs and any program
3 documentation, I really cannot -- I have not
4 found any additional significant radioactive
5 material (unintelligible) at Y-12.

6 **DR. MAKHIJANI:** I thought you said that the few
7 hundred kilograms of thorium was -- it was in
8 the weapons program so you can't describe what
9 it was. But wasn't it part of the production -
10 -

11 **MR. CHEW:** It was in the development
12 production.

13 **DR. MAKHIJANI:** Yes.

14 **MR. CHEW:** Yeah. And when they --

15 **DR. MAKHIJANI:** Now, did they have some health
16 physics bioassay measurements, air samples
17 associated with that?

18 **MR. CHEW:** Well, that's what Bryce is talking
19 about. Some of the -- in the R&D area that we
20 -- at least we know of one air sample being
21 taken. As I said, you know, the thorium
22 doesn't show up in the bioassay or the urine
23 sample very closely --

24 **DR. MAKHIJANI:** Right.

25 **MR. CHEW:** -- and it doesn't -- I don't think

1 there's even an attempt to -- because they saw
2 that they were -- the lung -- that's why the
3 lung counting was -- was initiated. To answer
4 your question specifically I -- I don't -- I
5 don't probably know how many are considered
6 data from people, thorium, you know, prior to
7 1960 that would -- could be developed into a
8 co-worker. I would say that the amount of
9 people would be limited to the amount of
10 (unintelligible). Does that answer your
11 question?

12 **DR. MAKHIJANI:** Yeah.

13 **MR. FITZGERALD:** I think that's a good
14 characterization. You know, we looked at some
15 of the classified information and went down --

16 **MR. CHEW:** Sure.

17 **MR. FITZGERALD:** -- dug some samplings, too, so
18 this -- this tends to characterize in a better
19 way. We couldn't get down to the level of
20 follow-up that you did but I think this kind of
21 corroborates what we were looking at in terms
22 of source trend. I think the most useful part
23 of it is the time frames.

24 **MR. CHEW:** Yes.

25 **MR. FITZGERALD:** We couldn't really nail those

1 down precisely enough. We were right on the
2 cusp so this -- this helps a great deal.

3 **DR. MAURO:** There's going to be quite a
4 disparity (unintelligible) in the evaluation
5 report.

6 **MR. CHEW:** I hope you're recording it. I don't
7 think we want to do it again.

8 **DR. MAURO:** Yeah, because the granu-- I never
9 expected this much granularity. You guys
10 really, really mined this thing.

11 **MR. CHEW:** Thank you.

12 **DR. MAURO:** And it's an education to listen to
13 the -- I mean the history basically of this
14 whole weapons program that's (unintelligible).

15 **MR. CHEW:** I do have one more story. Mark,
16 with you -- with your permission I'd like to
17 move on to something I think was worthwhile
18 because it took us several days and I want to
19 (unintelligible) some credit. And that is the
20 question that you have about the weapons
21 disassemblers. Could I move on to that? Mark,
22 have you --

23 **MR. GRIFFON:** (Unintelligible) external
24 (unintelligible). Were there several
25 questions?

1 **MR. CHEW:** I can't --

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

3 **MR. CHEW:** Yeah.

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

5 **MR. CHEW:** I'll be back, you guys.

6 **DR. MAURO:** Before we leave the internal, I
7 guess just to say that I think what we have --

8 **MR. GRIFFON:** John, I can't hear you.

9 **DR. MAURO:** I'll speak up. It's just I'm
10 thinking about the days not too far in the
11 future we're going to be looking at the
12 evaluation report. And it's clear that you
13 really I guess dug as hard as you can dig to
14 tell the story, the complete story, all of the
15 nuances, all the relationships. And as a
16 health physicist I was racing just to keep
17 track of you -- to keep track of you because
18 it's another world. But what's going to be
19 equally important is as you move through the
20 story -- because what you really have is
21 chapters, overlaid chapters of what was going
22 on. The implications of it with regard to the
23 dosimetry, internal dosimetry -- now we're
24 talking internal dosimetry -- and how to -- if
25 I were a claimant, to convince the claimant

1 that you have a handle on being able to
2 reconstruct his doses. You were talking the
3 thorium 232 story for example. Now, I'm not
4 quite sure, once you understand the story and
5 the quandaries and when it showed up. It
6 sounds to me like there might be more to the
7 story on the -- the way in which a worker might
8 have been exposed or if he was exposed. And
9 then how do you go about convincing yourself
10 that you've got a handle on how to make sure
11 that I could place a plausible upper bound, not
12 only on the thorium 232 but whatever comes with
13 it. Now, so I guess all I'm saying is that
14 story is a net that has to be unfolded and for
15 -- for -- looking at it from our perspective I
16 assume it's going to show up a table someplace
17 along the way. I guess I just ask, the amount
18 of work that went into it, if it could be
19 reflected in the work product so that we can
20 follow it and -- and so that we are convinced
21 that not only have you dug up the story but you
22 have a tractable way to reconstruct the doses
23 that is -- that is defensible.

24 **MR. GRIFFON:** Is the method (unintelligible) --

25 **DR. MAURO:** Yeah, and there's a lot here.

1 **MR. GRIFFON:** -- and apply it to people.

2 **DR. MAURO:** To people, real people. And so all
3 I want to say is you've got quite a challenge
4 in front of you to tell that story. And it's
5 an amazing story. My compliments.

6 **MR. FITZGERALD:** Yeah. I was going to add to
7 that. I'm assuming that, you know, like I said
8 before, this is all being shaped into the next
9 edition of the site profile which will then
10 turn around into an implementation document
11 made. Even though this is thorium
12 (unintelligible) very precise time frame with
13 specific SEC (unintelligible) and a lot of this
14 is really getting into that.

15 **DR. NETON:** Right. That's what I was going to
16 suggest is that most of these issues that we
17 talked about do fall outside the SEC time frame
18 with the exception of thorium 232 I think is
19 what I've heard here.

20 **MR. CHEW:** And a little bit of plutonium.

21 **DR. NETON:** And a little bit of plutonium. We
22 need to go back and we have some plutonium
23 monitoring data. We have almost thorium data.
24 So then we need to go back. And John's right,
25 flesh out what processes were -- were these

1 workers involved with. And for instance I'm
2 hearing salting agents used to precipitate
3 uranium. If one could get a handle on the
4 percentage of thorium that was added to
5 precipitate presumably pounds of uranium --

6 **DR. MAURO:** Right. Right.

7 **DR. NETON:** -- then you might have some better
8 handle on the potential concomitant exposure of
9 both those radionuclides. You've got uranium
10 data, you know. There are approaches that can
11 be developed with the thorium. What concerns
12 me a little bit though is when we're talking
13 about the thorium that may have been used in
14 the development of the weapons program. We're
15 going to have -- we're going to have to flesh
16 that out to some degree.

17 **MR. CHEW:** There was 10,000 -- Bryce
18 (unintelligible) there was 10,000 lung counts
19 that was taken that we had data on.

20 **DR. NETON:** But that was not until 1960.

21 **MR. CHEW:** 1960 but you can certainly, you
22 know, you consider what (unintelligible) and --

23 **DR. NETON:** Well, one can.

24 **MR. CHEW:** Use that as co-worker and --

25 **DR. NETON:** We could possibly do that but you -

1 - we want to make sure that we do plausible
2 bounding scenarios so then you could take a --
3 if you back-extrapolate a ten-year-old thorium
4 lung measurement you're going to end up with
5 gram quantities in the lung potential as the
6 upper limit so that -- I think that we need to
7 look at some fecal data that may exist post-
8 1960-some --

9 **MR. RUTHERFORD:** I think we have fecal data
10 from '57/'58 time frame.

11 **DR. NETON:** If we start taking thorium fecal
12 data and then developing chronic exposure
13 scenarios. How much chronic exposure could one
14 have, you know, occurred and still have almost
15 no thorium in 1960, and look at that and see if
16 it's a plausible boundary analysis. And
17 there's a lot of -- a lot that we can do but we
18 need to do our homework and go back and look at
19 that.

20 **DR. RICH:** (Unintelligible) summary of
21 (unintelligible) quite a bit of bioassay on
22 thorium in the '56 time period and then it
23 jumps into the '60s.

24 **DR. NETON:** I think the question is are those
25 sufficient?

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

2 **DR. NETON:** That's the issue I think that
3 strikes me between the eyes as being one that
4 probably needs to have more -- more detail.

5 **MR. TANKERSLEY:** When it comes time to actually
6 doing the dose reconstructions let me remind
7 all of us that, you know we have the capability
8 of tracking the workers, each individual worker
9 the very day that they go into any particular
10 department, the very day that they go into any
11 particular job and job code. And so this is
12 not perfect of course, but I think that in --
13 and then I haven't looked at the claimants but
14 I think it would be possible to exclude --
15 easily exclude probably many of the claimants
16 from the work that we're talking about. Now, I
17 -- I'm assuming that there might be, you know,
18 some population of workers that -- that we
19 would not be able to exclude from this type of
20 work. But do keep in mind that we can track
21 these workers very, very precisely in what they
22 were doing department-wise, job-wise, job-code-
23 wise and so forth.

24 **MR. GRIFFON:** Right. And that comes in the --
25 in the description of the approach, Bill. I

1 think if you say, you know, any thorium worker
2 who has been in the time frame from '50 to '57
3 was likely to involve departments, you know,
4 26-whatever, 27-whatever, 23, you know. Then
5 you narrow down your -- your -- your workers of
6 interest and you can use an approach for those
7 who fall in it and those who fall outside of it
8 are not affected by it. Yeah. But -- But we
9 haven't seen, you know -- that's I guess what
10 we're talking about as we're waiting for that.
11 We'll see that in the final analysis I suppose.
12 Can we move on to 1B5 I think is the last one
13 in the internal section. 1B5, we've sort of
14 discussed the REU but we haven't specifically
15 answered the question that this is an action
16 for you to look at SC&A's comments and maybe
17 that's -- I think we've heard the answer is the
18 final approach is as described in the TBD; is
19 that correct, Jim?

20 **DR. NETON:** I believe so. I don't know. I'm
21 trying to -- I'm trying to remember this a
22 little better now. I thought that --

23 **MR. GRIFFON:** I know this is sort of a
24 (unintelligible) process.

25 **DR. NETON:** Right.

1 **MR. GRIFFON:** SC&A did -- did provide comments,
2 yeah.

3 **DR. NETON:** I've actually forgotten which
4 version of the site profile SC&A reviewed
5 because it had been updated. I don't really
6 remember to be honest. So I think we need to
7 go back and -- and check that. I honestly
8 can't remember.

9 **MR. GRIFFON:** Well, maybe just consider it in
10 your final --

11 **DR. NETON:** Yeah.

12 **MR. GRIFFON:** -- approach I guess. That's all
13 I would say.

14 **DR. NETON:** Yeah, we'll consider it in the
15 final.

16 **MR. FITZGERALD:** Yeah, I don't think we closed
17 -- we didn't close that action. I think we did
18 send you the analysis. I'm not sure. We've
19 talked about it but there was no specific
20 response. I think that's what happened.

21 **MS. MUNN:** Still on for April.

22 **MR. GRIFFON:** Okay.

23 **DR. MAURO:** Jim, the -- coincidentally I'm
24 right now reviewing I guess it's an O-TIB 18,
25 an O-TIB -- the latest O-TIB 4, both of which

1 have guidance in it related to recycled
2 uranium. And there are look-up tables in
3 there. And I find myself reviewing a number of
4 documents, very large documents dealing with
5 recycled uranium. One is dated 1985 and one is
6 dated 2000. And I'm starting to -- that's
7 where I've noticed the -- the Paducah ash, and
8 these two (unintelligible) higher than all the
9 other sources in terms of relative to the
10 uranium. I -- Is the story that's going to
11 emerge on recycled uranium associated with Y-12
12 substantively different than those procedures?
13 Should I put those procedures on ice until we
14 get back into (unintelligible)

15 **DR. NETON:** Well, I think Y-12 is Y-12
16 specific. I believe that they knew what was
17 coming in. I think what you're looking at in
18 TIB-14 and 18 are generic --

19 **DR. MAURO:** Yeah.

20 **DR. NETON:** -- generic factors --

21 **DR. MAURO:** Yeah.

22 **DR. NETON:** -- that were used for bounding
23 estimates for the efficiency process.

24 **DR. MAURO:** They are.

25 **DR. NETON:** Then that's not what we're talking

1 about --

2 **DR. MAURO:** Okay.

3 **DR. NETON:** -- in the Y-12 site profile.

4 **DR. MAURO:** Okay.

5 **DR. NETON:** Yeah. Yeah. We would not -- not
6 assume them to be --

7 **DR. MAURO:** There -- There -- There's not --
8 There's not --

9 **DR. NETON:** -- comparable.

10 **DR. MAURO:** -- necessarily --

11 **DR. NETON:** There's no parity there.

12 **MR. GRIFFON:** Okay. Do we want to try to get
13 through external sections?

14 **MS. MUNN:** Yeah, I don't -- looking at my copy
15 of the -- of the site profile there aren't very
16 many items.

17 **DR. NETON:** Well, actually we have a fair
18 amount of discussion on this issue I think.

19 **MR. GRIFFON:** On 147 worker issue I think we've
20 got a fair amount, yeah.

21 **DR. NETON:** I think -- I think --

22 **MS. MUNN:** Not the number of items is what's
23 material it seems.

24 **MR. GRIFFON:** Yeah, yeah, yeah.

25 **DR. NETON:** I think that there's still some --

1 **MR. GRIFFON:** Yeah, this is -- you -- you sent
2 three lengthy Word documents, I know that.

3 **DR. NETON:** Yeah. And, you know, SC&A has sort
4 of reevaluated and reassessed our opinion on
5 this and I think we need to take the time to
6 really think about this issue in this session
7 and -- and, you know, examine all the issues.
8 I don't know that we can do it in half an hour.

9 **MR. GRIFFON:** Well, that's the question
10 (unintelligible). Could we look at -- does it
11 make sense to look at the example now and save
12 the external section for tomorrow morning or --
13 or --

14 **DR. NETON:** Yeah. I'm sorry, Mark. I was
15 having a sidebar. What did you just say?

16 **MS. MUNN:** What he was saying, is it worth a
17 look at the examples that have been run now?

18 **MR. GRIFFON:** Get the bigger -- I don't know.
19 Given the time I'm not sure we want to delve
20 into the 147 worker --

21 **DR. NETON:** No, not at this point. I think
22 maybe -- maybe a piece of the external that Mel
23 was prepared to talk about might fit in at this
24 point which is -- well, here's my thinking,
25 Mark. It seemed to me that your -- your

1 concern was -- was centered about were the 147
2 workers that were used to do the backward
3 extrapolation really all the exposed workers or
4 -- or were they representative. Let's put it
5 that way. And you had identified this sort of
6 pocket of workers who possibly didn't wear
7 their badges and were doing some other work.
8 And we pulled the thread on that and Mel's done
9 a good job, you know, interviewing folks, and I
10 think we're prepared to address, you know, that
11 issue.

12 **MR. GRIFFON:** Okay. Yeah.

13 **DR. NETON:** And I think Mel can cover that
14 probably fairly --

15 **MR. CHEW:** Yeah.

16 **DR. NETON:** -- easily in the time we have.

17 **MR. CHEW:** I can do it pretty quickly.

18 **MR. GRIFFON:** Okay.

19 **MR. CHEW:** I'd like to first thank Bill
20 Tankersley who set up the interviews with
21 several real key people. (unintelligible)
22 privacy information I'm not going to mention
23 their names here (unintelligible) phone but
24 they were the department heads for assembly;
25 they were the supervisors and actual people who

1 did assemblies and disassembly and it was quite
2 an honor for me to be in the same room with
3 those people. I'd like to mention that the key
4 area, the issue that you brought up, Mark, I
5 think -- I'm hoping I'm addressing it because
6 I'm getting this second-hand. You and I were
7 going to try to have a conversation but we
8 never made it -- is the issue about the dry
9 room. And there's clearly -- when the people
10 had to work with the dry room, it really
11 started right in about the 1960 time frame,
12 okay. So to me it's outside of the SEC but I
13 think it's important to -- to go ahead and
14 discuss it here. The dry room, the people,
15 because of the components that they were trying
16 to put together, which I think you know what
17 they are. They were quite hydroscopic. The --
18 The people had to go in -- not a lot of people,
19 two at a time, had to wear what they called an
20 Air Force suit. I think (unintelligible) Air
21 Force suit because they were colored that
22 color; they maybe got them from the Air Force.
23 They didn't like them but that's a separate
24 issue here. The inspectors, other people,
25 looked through the window. And you were

1 correct. When the people had to put on the
2 suits to work with these particular materials
3 and the assembly, they left their badges
4 outside of the dry room on their coveralls
5 because they were required to remove all their
6 clothing -- on -- and just put on this suit
7 here. We pulled the string on this thing as we
8 said. There -- We -- We have received in
9 discussions with them the number of hours in a
10 week that they would have potentially had in
11 this suit example. It's like it could be as
12 much as a maximum of about 20 hours per week,
13 but in reality only about half of that time or
14 even less of that time near the parts of
15 concern, that potentially can give them an
16 (unintelligible) exposure here. When any
17 maintenance worker came in they basically
18 didn't have to wear the suit because they
19 basically shut down that operation when these
20 people were badged because they didn't have to
21 wear the suits here. And several of the people
22 mentioned they were only in there minutes per
23 week at a time here. No pipefitters, plumbers
24 -- No pipefitters, plumbers and steamfitters --
25 - I asked the question even though it was

1 outside of the SEC -- was in the area while
2 these kinds of operations were going on. The -
3 - The people who were potentially close --
4 what do they call them -- millwrights and the
5 machinists, but we even did ask them to -- to
6 show me what kind -- what they were doing with
7 the assembly and even down to the particular
8 units that we're talking about which we have
9 some familiarity with. But the parts that they
10 were coming in contact with was both the -- the
11 depleted v naturally depleted uranium and the
12 uranium 230 ore (unintelligible) a few seconds
13 of the particular time here. We -- Probably
14 the key, Mark, in the order of dose
15 reconstruction, I asked the health physics
16 people to pull me some information on a
17 measurement of these particular units. And lo
18 and behold, they were able to uncover a
19 measurement, direct measurement of both with
20 contact at one foot and at the three foot level
21 of the particular unit that was built in the
22 1960s, okay, which would be representative
23 here. So I would say that -- that we also
24 pulled the information. There was on the
25 interviews they gave us names of about 16

1 different people that potentially was involved
2 because there was a limited number and they all
3 kind of knew each other very, very well. And
4 Bill Tankersley has pulled the information,
5 both external and bioassay just this morning.
6 I didn't have a look at the data but in the way
7 of dose reconstruction it is -- I think George
8 characterized this thing correctly. It's
9 really a missed dose, there's something that
10 needed to be added, okay? And so if these
11 people who were working in those particular
12 time frames, I think by the measurements and by
13 the time that they were involved, how close
14 they were to the particular units here, I think
15 a good health physicist will be able to do the
16 dose reconstruction on these particular groups
17 of people.

18 **MR. GRIFFON:** (unintelligible)

19 **MR. KERR:** Could I add one thing Mel left out?
20 The reason they didn't wear their badges is
21 they sweat profusely inside these clothing that
22 they had to put on and they sweat so much that
23 it would have ruined the film and the badge to
24 wear it that way.

25 **MR. CHEW:** That's good.

1 **MR. KERR:** That was one reason they didn't wear
2 the badges. The other thing that a couple of
3 these people said, and (unintelligible) there
4 wasn't much exposure in doing these things
5 because we didn't spend that much time close to
6 these units. So these people didn't seem too
7 concerned about the fact that they didn't wear
8 badges in there although now we know that they
9 didn't and they had some exposure that wasn't
10 recorded on their badge. And the other thing
11 is that I -- I did dig out is this I guess to
12 start this off is there's a history of Y-12 by
13 Wilcox. And he documents very carefully in
14 there when dry rooms were first used. And in
15 1960 he discusses the weapons were assembled in
16 dry boxes before that time. And they got up
17 here and of course, this -- they were really
18 (unintelligible) to a different kind of a
19 device which necessitated moving into dry rooms
20 and then they went on to say eventually they
21 built long, narrow dry rooms with glove ports
22 in. And instead of wearing suits inside they
23 worked alongside, more of a production line.
24 And even in the dry rooms, welders never went
25 inside the dry rooms. They could push things

1 over to the side of the dry room and a welder
2 could work through glove ports into the dry
3 room if there was any welding needed to be
4 done. So some of these people didn't
5 necessarily have to go inside the dry room
6 during assembly. They could work through glove
7 ports --

8 **MR. GRIFFON:** Right.

9 **MR. KERR:** -- if they needed to so ...

10 **MR. GRIFFON:** (unintelligible)

11 **MR. KERR:** You know, I think we really tied --
12 tied this down and it's a question, I think, of
13 not a cohort problem but it's a missed dose
14 problem for these people who worked in
15 assembly.

16 **MR. GRIFFON:** (unintelligible) this is only
17 1969.

18 **MR. KERR:** 1969.

19 **MR. GRIFFON:** Prior to that any assembly work -
20 -

21 **MR. KERR:** Was in a glovebox.

22 **MR. GRIFFON:** Was in a glovebox?

23 **MR. KERR:** Yeah. And they wore their badges.

24 **MR. CHEW:** Yeah, they wore their badges. Bob
25 was going to say something.

1 **MR. PRESLEY:** Mark, also inside those dry rooms
2 there were also TLD's. And when you put stuff
3 together you also had -- and therefore argue
4 they did have physicists doing some of the
5 monitoring right there. So there should be
6 plenty of data on what went on in those dry
7 boxes while the stuff was being put together.

8 **MR. GRIFFON:** Okay. That was going to be my
9 question. (Unintelligible)

10 **UNIDENTIFIED:** You have to help me out on that.

11 **MR. GRIFFON:** (Unintelligible) if it matters
12 that much here in this discussion but yeah,
13 it's a question of missed dose. I just didn't
14 know how significant or not significant it
15 could have been.

16 **MR. CHEW:** I can give you a range now, Mark.

17 **MR. GRIFFON:** I had some discussions that they
18 said they -- they just kind of sit and -- I
19 can't discuss it here but certain ones they
20 described as being pretty --

21 **MR. CHEW:** Warm.

22 **MR. GRIFFON:** -- elevated.

23 **MR. CHEW:** Yeah.

24 **MR. GRIFFON:** The exposure was
25 (unintelligible).

1 **MR. TANKERSLEY:** Mark?

2 **MR. GRIFFON:** Bob, is that you?

3 **MR. TANKERSLEY:** This is Bill Tankersley.

4 **MR. GRIFFON:** Oh, I'm sorry, Bill.

5 **MR. TANKERSLEY:** Mark, a moment ago you asked,
6 you know, how much data there were. I just got
7 the information to Mel this morning. We did
8 look at, you know, 16 people. And these are
9 definitely assembly/disassembly people during
10 the -- the earlier period, the SEC period. And
11 those people had -- were very well represented
12 in both the external dosimetry data set as well
13 as I think prior to 1960 those 16 people had
14 500-and-something urinalyses. And how many
15 film badge readings did they have, Mel, prior
16 to 1960? I think --

17 **MR. CHEW:** Prior to 1960 was film badge
18 (unintelligible). You gave me 163.

19 **MR. TANKERSLEY:** Yeah, that's right.

20 **MR. CHEW:** Throughout the whole period there
21 was 1,243.

22 **MR. GRIFFON:** I don't doubt that, Bill. The
23 question I have was -- because all these guys
24 that I talked to had badges, too. It's just
25 they weren't wearing them when they were doing

1 the hot work. So that was really the question,
2 you know. It's not a matter of them not being
3 in the database. And -- And if it -- I don't
4 -- I didn't interview the folks regarding the
5 assembly work prior to, where they were in the
6 gloveboxes so I'll, you know -- you explained
7 that they probably did keep their badges on in
8 that situation, and that's -- that's
9 reassuring.

10 **MR. TANKERSLEY:** Again, be really -- be really
11 clear on that if you will. Now, the -- the
12 people -- you did not hear people say that when
13 they were working with the gloveboxes that they
14 took off their badge?

15 **MR. GRIFFON:** No, I did not. No, I did not.

16 **MR. TANKERSLEY:** Okay.

17 **MR. GRIFFON:** But my focus was on the dry rooms
18 so it was a later -- yeah.

19 **MS. MUNN:** But these people are easily
20 identified and are very limited in number so
21 that their missed dose would not be any major
22 problem.

23 **MR. TANKERSLEY:** It would be estimated.

24 **MS. MUNN:** Yeah.

25 **MR. GRIFFON:** I'm not sure how easily

1 identified they are but -- because the assembly
2 department -- I'm not sure -- the assembly
3 department I think is much broader than the
4 people that actually got into those --

5 **MR. CHEW:** Oh, much.

6 **MR. GRIFFON:** -- individual areas, you know, so
7 -- but I think you could at least narrow it to
8 a department probably.

9 **MR. CHEW:** There were interviews and we asked
10 them kind of the numbers of people that were
11 involved in this kind of operations. I think
12 one of the persons who was a supervisor listed
13 about 100.

14 **MR. GRIFFON:** Yeah.

15 **UNIDENTIFIED:** (unintelligible)

16 **MR. GRIFFON:** That's consistent with what I've
17 heard, too.

18 **MR. CHEW:** Mark, we're talking about the dry
19 room?

20 **MR. GRIFFON:** Right. Right.

21 **MR. CHEW:** But it lasted a long time. Actually
22 it still exists.

23 **MR. GRIFFON:** Right.

24 **MR. CHEW:** Yeah.

25 **MR. GIBSON:** This is Mike Gibson. Can I ask a

1 question?

2 **MR. CHEW:** Sure.

3 **MR. GIBSON:** I'm sorry. I didn't -- I didn't
4 hear who was making the statement that
5 perspiration or moisture could affect the
6 reading of dosimeters. Who was that?

7 **MR. GRIFFON:** That was George Kerr.

8 **MR. GIBSON:** George, okay. I just want to make
9 sure we get this on the record that that could
10 be a case or a problem not only for this site
11 but that could be a problem complex-wide.

12 **MR. KERR:** Well, no. It was these guys sweated
13 so profusely in these suits. They were heavy
14 and they were made out of extremely heavy
15 material and they were supplied with air inside
16 the suits. And every one of them said you just
17 sweat in them. And this is not like a guy
18 working out in his coveralls.

19 **MR. GIBSON:** No, no, no. But (unintelligible)
20 for years. That's what he's making
21 (unintelligible).

22 **MR. KERR:** Well, I'm saying that's the reason
23 they didn't wear their badges.

24 **MR. GIBSON:** My -- No, my -- my statement is,
25 you know, and I've been at the DOE site and,

1 you know, I have personally lost seven pounds
2 in one day due to sweat. And so I'm just
3 saying it's not necessarily this site or this
4 suit but there -- I'm just wondering -- this
5 could be a complex-wide issue that if
6 dosimeters could be damaged or have misleading
7 readings because of moisture then this is
8 something -- I'm speaking as a person right
9 now, not on behalf of the Board, but I think if
10 the group agrees, we need to bring it up to the
11 Board. This could be a complex-wide issue for
12 multiple sites.

13 **MR. KERR:** I think there's a difference. If
14 you sweat and your badge is out to the open I
15 don't think the moisture is going to affect it
16 as much as if you put it in a closed
17 environment where it's exposed to a high
18 humidity. It's a -- It's a different
19 situation I think. And keep in --

20 **MR. GIBSON:** What I'm talking about is wearing
21 full-face and plastic suits where you are
22 completely totally enclosed. There's no
23 supplied air, and yes, you did sweat profusely.
24 Otherwise you wouldn't lose seven pounds in one
25 day. So I just think that's just an issue I

1 just want put on the record just for future
2 discussion, just to make sure that we consider
3 that situation and that fact.

4 **MR. KERR:** You know, it could be. I -- I --

5 **MR. GRIFFON:** Right. It's a good point. And -
6 - And it could -- I mean I'm not sure -- I'm
7 sure there's actually probably been some
8 studies on this type of thing.

9 **MR. CHEW:** I think so, too.

10 **MR. GRIFFON:** The effects of film and -- might
11 be different for -- it would be different I
12 would think for film or TLD.

13 **MR. CHEW:** Yes, it would.

14 **MR. GRIFFON:** Okay. That's --

15 **MR. CHEW:** That's a point well taken.

16 **MR. GRIFFON:** Good point, yeah.

17 **MR. CHEW:** We'll just investigate that.

18 **MR. GIBSON:** Okay. Thank you.

19 **MR. CHEW:** Uh-huh.

20 **MR. GRIFFON:** All right. So is there anything
21 else on the assembly work?

22 **MR. CHEW:** Do you have any questions, Mark?
23 Because really it was primarily for your --

24 **MR. GRIFFON:** I mean it still -- I think that
25 answers the question of the dry room is out of

1 the time frame so it's good to know. And I
2 think in your analysis, I think the assembly to
3 power workers were actually included in the 147
4 workers if I -- I read that correctly.

5 **DR. NETON:** That -- that was a relevant issue I
6 think was were the assembly workers included in
7 the 147 workers that were used to generate the
8 back extrapolation.

9 **MR. GRIFFON:** Now, the (unintelligible) and
10 part of it raised my interest from the dry room
11 standpoint was the guys I interviewed never
12 phrased it as or never brought up the issue of
13 it might damage the dosimeter as part of the
14 reason they didn't wear them. They just said,
15 well, that was the protocol; that was the
16 procedure. We didn't, you know. And I thought
17 maybe it was associated with actually some
18 concerns, you know, some classification
19 concerns that they didn't want too many --
20 didn't want this measurement data getting out.

21 **DR. NETON:** I don't think so, Mark.

22 **MS. MUNN:** No.

23 **DR. NETON:** These devices, the material in
24 there is no different than what was pretty much
25 the exposure in the plant.

1 **MR. PRESLEY:** Mark, you got plain exposure in
2 there, you got people who were working in
3 there, people that were standing by the machine
4 -- machine (unintelligible)

5 **DR. NETON:** In fact I would think that the
6 exposures of the workers in the plant are
7 bounding for exposures to those workers working
8 in those plants.

9 **MR. PRESLEY:** Mark, the people that are -- that
10 are working in the dry box have a dry room suit
11 on. The people that are working in the machine
12 shop standing in front of the part watching it
13 turn have cotton coveralls on. I'd say that
14 the difference would be in the people in the
15 machine shop.

16 **MR. GRIFFON:** (unintelligible) I think I'm
17 satisfied with the answer. We'll leave it at
18 that. And I still think we have the broader
19 question of the, you know, the analysis put on
20 the table and we'll save that for the morning,
21 right, Jim? The 147 worker --

22 **DR. NETON:** I think so.

23 **MR. GRIFFON:** -- yeah, analysis.

24 **DR. MAURO:** What time do we want to begin in
25 the morning, 8:00 o'clock?

1 **DR. NETON:** Yeah.

2 **DR. MAURO:** We'll start at 8:00 in the morning.

3 **DR. NETON:** Just a quick question. I just want
4 to make sure as part of that discussion for
5 tomorrow we did send out a memo from Joe and
6 everyone's got it. The most important thing is
7 table 1. So I guess just as a preview for
8 tomorrow we have a handout (unintelligible)
9 want to read tonight. You had some --

10 **DR. MAURO:** I already have it.

11 **DR. NETON:** Oh, had it? Okay. George Kerr has
12 it.

13 **DR. MAURO:** Yeah. George Kerr has provided a
14 handout called beta and gamma regression
15 analysis that if anybody really would like to
16 do some homework tonight it would be good
17 reading. And that does -- that speaks to some
18 of the issues in there.

19 **UNIDENTIFIED:** Okay. That'll be great.

20 **DR. MAURO:** So we have to do our homework
21 tonight and we'll be prepared then to talk
22 about the issue raised in the memo versus
23 (unintelligible) Yeah, I'll -- I'll get you a
24 copy, Mark. And yes, anybody that has any
25 materials, share them with Mark and Mike

1 (unintelligible) so they can have access to the
2 beta gamma regression analysis.

3 **DR. NETON:** To Mike as well.

4 **DR. WADE:** That's good because then folks can
5 maybe look at it a little bit and
6 (unintelligible).

7 **DR. MAURO:** 10:00 o'clock is for Rocky Flats.

8 **DR. WADE:** We decided to start at 10:00 to
9 accommodate the people from Rocky Flats joining
10 us so we can start at 8:00 on these issues.

11 **MR. GRIFFON:** I think that would be good. That
12 will give us two solid hours tomorrow.

13 **DR. WADE:** We'll probably need to break for
14 Rocky fairly on time, though, because of the
15 Colorado folks.

16 We can't start early though. We can start a
17 little bit later if we need to.

18 Okay, so tomorrow at 8:00, same time, same
19 station.

20 We're going to break off the call now.

21

22 (Whereupon, the proceedings adjourned at 5:00
23 p.m.)

24

1

CERTIFICATE OF COURT REPORTER**STATE OF GEORGIA****COUNTY OF FULTON**

I, Steven Ray Green, Certified Merit Court Reporter, do hereby certify that I reported the above and foregoing on the day of March 27, 2006; and it is a true and accurate transcript of the testimony captioned herein.

I further certify that I am neither kin nor counsel to any of the parties herein, nor have any interest in the cause named herein.

WITNESS my hand and official seal this the 3rd day of May, 2006.

STEVEN RAY GREEN, CCR
CERTIFIED MERIT COURT REPORTER
CERTIFICATE NUMBER: A-2102