

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

Y-12

The verbatim transcript of the Working Group Meeting of the Advisory Board on Radiation and Worker Health held at the Cincinnati Marriott Airport, Hebron, Kentucky, on May 18, 2006.

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May 18, 2006

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-- "\*" 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**

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KOTSCH, JEFF, DOL  
MAKHIJANI, ARJUN, SC&A  
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MCFEE, MATT, ORAU  
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RICH, BRYCE  
RUTHERFORD, LAVON, NIOSH  
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WOLFF, ALBERT W., ORAU

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

(9:40 a.m.)

WELCOME AND OPENING COMMENTSDR. LEWIS WADE, DFO

1 DR. WADE: This is Lew Wade and this is a working  
2 group -- a meeting of the working group of the  
3 Advisory Board. This is the working group  
4 chaired by Mark that's staffed ably by Mike,  
5 Robert and Wanda that look at a variety of  
6 issues including individual dose reconstru--  
7 site profile reviews. And they've gone from  
8 work on the Y-12 site profile to the Y-12 SEC  
9 petition. And that's the topic that we're here  
10 to discuss today is the Y-12 SEC petition. And  
11 I'd like to identify who's on the phone  
12 starting with Board members. Mike, I know  
13 you're with us.

14 MR. GIBSON: Yes.

15 DR. WADE: Are there any other Board members on  
16 the phone?

17 (No response)

18 DR. WADE: Okay. Again, we need to keep our  
19 eye on producing a quorum, but I don't think  
20 that should be an issue at all. Robert will

1 not be joining us today. He's, you know,  
2 having some health issues. Robert is also  
3 conflicted on Y-12 so if he were to be here he  
4 could listen but not actively participate. It  
5 might be worthwhile identifying who's on the --  
6 the -- who's around the table here, who's on  
7 the phone, and then I'll ask the principals to  
8 go through and identify if they have particular  
9 conflicts relative to this site and then we can  
10 begin our deliberations. Around the table this  
11 is Lew Wade, the designated federal official  
12 for the Board.

13 **MR. GRIFFON:** Mark Griffin with the Advisory  
14 Board, chairing this work group.

15 **DR. MAKHIJANI:** Arjun Makhijani, SC&A, no  
16 conflict.

17 **MR. RUTHERFORD:** LaVon Rutherford, NIOSH.

18 **DR. NETON:** Jim Neton, NIOSH.

19 **MS. MUNN:** Wanda Munn, Advisory Board. No  
20 conflict in Y-12.

21 **MS. HOWELL:** Emily Howell, HHS.

22 **MR. FITZGERALD:** Joe Fitzgerald, SC&A.

23 **MR. MCFEE:** Matt McFee, ORAU team.

24 **MR. WOLFF:** Albert Wolff, ORAU team.

25 **MR. ADLER:** Tim Adler, ORAU team.

1           **MR. KERR:** George Kerr, ORAU team.

2           **DR. WADE:** Now, if I could ask if you're on the  
3 phone who -- who wishes to identify themselves to  
4 identify themselves. You don't have to but  
5 certainly if you intend to participate in the  
6 call I'd like you to identify yourself now.

7           **MS. BRACKETT:** Liz Brackett from the ORAU team  
8 and I have a conflict with Y-12.

9           **DR. WADE:** Okay.

10          **MR. KOTSCH:** Jeff Kotsch with Labor. I'll be  
11 in and out.

12          **DR. WADE:** Welcome. Anyone else on the phone  
13 who wishes to identify themselves as a  
14 participant?

15          **MR. CHEW:** This is Mel Chew, Dr. Wade. And I  
16 do not have a conflict with Y-12.

17          **DR. WADE:** Welcome.

18          **MR. RICH:** This is Bryce Rich. I do not have a  
19 conflict.

20          **DR. WADE:** Welcome.

21          **MR. GIBSON:** Lew, this is Mike. I have no  
22 conflict.

23          **DR. WADE:** Okay. Why don't we start now and  
24 ask Jim as the -- the -- the leader of the  
25 NIOSH contingent to identify his team, and if



1           there are people around the table with  
2           conflicts we need to hear that.

3           **DR. NETON:** Right. Yeah. This is Jim Neton.  
4           I don't have a conflict with Y-12 and I'll ask  
5           the -- well, LaVon Rutherford is here as SEC  
6           team leader from NIOSH.

7           **MR. RUTHERFORD:** And I have no conflict.

8           **DR. NETON:** And I'll ask the four ORAU folks  
9           starting with Matt McFee on the left to  
10          identify if they're conflicted or not.

11          **MR. MCFEE:** I am not conflicted with Y-12.

12          **MR. WOLFF:** Al Wolff and not conflicted with Y-  
13          12.

14          **MR. ADLER:** I am conflicted with Y-12.

15          **MR. KERR:** George Kerr. I'm not conflicted.

16          **DR. NETON:** Just for the record, Al Wolff is  
17          the document owner of the Y-12 document. Tim  
18          Adler is the subject expert on the document as  
19          is George Kerr.

20          **DR. WADE:** The document owner for the SEC  
21          petition evaluation --

22          **DR. NETON:** No, no, no. No. For the report.

23          **DR. WADE:** For the report? Okay.

24          **DR. NETON:** I'm sorry. Yeah.

25          **DR. WADE:** Arjun, your -- your folks?

1           **DR. MAKHIJANI:** This is Arjun Makhijani. I  
2           have no conflicts on Y-12.

3           **DR. BEHLING:** Hans Behling. I'm not  
4           conflicted.

5           **MR. FITZGERALD:** And Joe Fitzgerald. I'm not  
6           conflicted with Y-12.

7           **DR. WADE:** Okay. I think that's all of the --  
8           the preliminary business so I'll turn it over  
9           to -- to the chair to conduct the  
10          deliberations.

11          **INTRODUCTION BY MR. GRIFFON, CHAIR**

12          **MR. GRIFFON:** All right. I think what -- the  
13          best way to proceed, I sent a -- a mini-agenda  
14          out. I think most of you got that. Everybody  
15          probably has that except for me. I pulled it  
16          out of the conference -- oh, here we are. I  
17          just took it out of the conference call notes.  
18          There was a conference call on May 9<sup>th</sup>, between  
19          NIOSH and SC&A and this was an informal  
20          conference call. It wasn't a work group call.  
21          Mainly it was to go through the -- the -- some  
22          of the technical issues in preparation really  
23          for this work group meeting and for the  
24          upcoming Board meeting. And these were really  
25          the -- the remaining issues that were discussed

1 at that meeting and we're going to carry  
2 through that agenda here. I think that makes  
3 more sense. So just to go down the list, and  
4 I'll probably call on Jim and -- and SC&A as we  
5 usually do it. I think one thing that -- that  
6 we all recognize is that we received quite a  
7 few documents, many of them short as you said,  
8 Jim, but still quite a few documents last night  
9 so there may be, you know -- I don't think any  
10 of us have had much time to digest those if any  
11 time to even look at them. But at least you  
12 can present them here and we'll -- we'll go  
13 from there I guess.

14 **DR. MAKHIJANI:** Some of us -- actually I think  
15 you just sent them to John and --

16 **MR. GRIFFON:** Yeah.

17 **DR. MAKHIJANI:** -- because I didn't --

18 **DR. NETON:** I sent them to the team. Maybe --

19 **DR. MAKHIJANI:** I didn't receive them. I know  
20 they came from --

21 **DR. NETON:** Well, I have copies here so -- and  
22 -- and they are short and I apologize for a  
23 late delivery but as -- as we talked about it's  
24 --

25 **DR. MAKHIJANI:** I don't think --

1           **MR. GRIFFON:** You did the best you could.

2           **DR. MAKHIJANI:** I think -- well, I'm not  
3           blaming John.

4           **DR. NETON:** Okay. Well, I have copies. I  
5           recognized that they might not get distributed.

**ISSUE 1: EXTERNAL DOSE DATA VALIDATION**

6           **AND COWORKER MODEL**

7           **MR. GRIFFON:** So just to start off, Issue 1  
8           from the conference call. And this is the  
9           external dose validation along with the co-  
10          worker model and I guess two pieces that we  
11          want to discuss there but -- but I guess the  
12          primary -- primary remaining issue was the sort  
13          of pre-'56 external dose, the questions on the  
14          data reliability there. I think Jim is handing  
15          out some documents that were emailed --

16          **DR. NETON:** Right.

17          **MR. GRIFFON:** -- yesterday, yeah, so maybe you  
18          can --

19          **DR. NETON:** I only made nine copies so share  
20          among --

21          **MS. MUNN:** You can -- I have --

22          **DR. NETON:** Okay. Wanda -- Wanda printed hers  
23          out. That's good. Okay. Did you turn it over  
24          to me, Mark? I was kind of busy distributing.

25          **MR. GRIFFON:** Yep.

1           **DR. NETON:** Sorry.

2           **MR. GRIFFON:** You're all right.

3           **DR. NETON:** What I -- What I just handed out  
4           and -- and I apologize. I don't have quite  
5           enough copies but -- is -- is a summary. And  
6           again this is a last, late breaking issues in -  
7           - in -- late breaking summaries of issues that  
8           we put together in the last day or two. But I  
9           -- I've tried to summarize where -- where we  
10          are with this 19-- external doses prior to 19--  
11          essentially 1957. I think the -- the issue has  
12          -- has -- has arisen that, you know, SC&A and  
13          the Advisory Board working group have -- have  
14          questioned our ability to reconstruct external  
15          doses in the '48 to '56 time frame. A lot of  
16          it centers around -- there's two pieces here.  
17          One is the validation of the data that we have.  
18          And then the second piece is is the  
19          extrapolation model that we're proposing to use  
20          sufficiently bounding, given those data. So  
21          I'll just go through these briefly. The --  
22          The first one you have in front of you is a  
23          one-page document that we were asked to go back  
24          and look at some -- for some additional  
25          validation of what's in the CER database

1 compared to, you know, health physics reports  
2 and whatever -- whatever we could get a hand  
3 on. If you recall in the external area I think  
4 we were only able to come up with one  
5 validation using Delta View. So this is a -- a  
6 brief summary that Bill Tankersley put together  
7 that compares the results that were included in  
8 a 1957 memo that talked about external doses  
9 for 1956. And what it shows here is dose  
10 ranges and the number of doses -- number of  
11 workers with doses in those ranges in the memo.  
12 And you can see the second column refers to  
13 skin doses and -- in the memo and the fourth  
14 column talks about penetrating doses. And when  
15 we compare the skin dose in the memo to the  
16 skin doses in the database and penetrating  
17 doses in the memo and penetrating doses in the  
18 database, one can see that there's a fairly  
19 good concordance between the two numbers.  
20 Where there are discrepancies there are more  
21 data available in the CER database, more --  
22 more people in those ranges than -- than in the  
23 memo. But we feel that's a -- a -- a pretty  
24 good comparison at that point. And then we --  
25 the second set was the average doses, millirem

1 per week by department-specific comparison  
2 between a memo that was issued in '58 for doses  
3 that were 19-- for 1957. And again pretty I  
4 would say reasonable agreement between the two,  
5 the database and what was included in the memo.  
6 They aren't -- They aren't perfect and I'd  
7 like to talk a little bit down the line as to  
8 why those numbers might not be perfect and to  
9 show you what we discovered in the -- in the  
10 intervening weeks from Board meeting 'til now.  
11 So you might hold your questions on why there  
12 are any discrepancies until I can get into some  
13 of the meat of the issues. The second -- The  
14 second page has a -- a copy -- by the way, some  
15 of the information I've handed out does include  
16 Privacy Act information so please treat it as  
17 such. If you're not comfortable taking it home  
18 and disposing of it just give them all back to  
19 me and I'll -- I'll take care of it. And --  
20 And we certainly shouldn't be reading anybody's  
21 names and badge numbers off of these things  
22 because we are creating a public record here.  
23 Okay. The second memo is a July -- the second  
24 page shows a July 1<sup>st</sup>, 1957 memo in -- in which  
25 they attempted to reconstruct what the

1 cumulative exposures were for workers in -- in  
2 a foundry operation from 1952 to 1956. So  
3 anyone who was on the books in '57, they tried  
4 to figure out what their total exposure to date  
5 was from working from '52 to '56 or whatever  
6 years they happened to be working in -- in  
7 those -- in those years. And on the next page  
8 what you'll see is a -- a checklist -- I think  
9 there are 65 workers listed here -- of the  
10 years that the worker was actually involved in  
11 operations and -- and had badge results, and a  
12 column that shows what the -- what the site  
13 believed in this memo to be the total exposure  
14 through 1956, and what the average annual  
15 exposure was. You can kind of ignore that.  
16 They're trying to get a handle for what the  
17 average exposures, but what we're more  
18 interested here is the total exposures through  
19 1956. I should point out I believe that this  
20 is shallow dose reported, S-millirem to user  
21 nomenclature.

22 **MR. GRIFFON:** I'm assuming that was in the memo  
23 somewhere or -- because that's what I was  
24 trying to figure out, which time to compare it  
25 to.



1           **DR. NETON:** Where -- Where did I -- where did  
2 I come to that conclusion and I'm --

3           **MR. GRIFFON:** Yeah.

4           **DR. NETON:** As listed averages --

5           **MR. GRIFFON:** I imagine you're right. Just --  
6 Just by the numbers I imagine you're right.

7           **DR. NETON:** All right.

8           **MR. GRIFFON:** By the numbers I thought you were  
9 --

10          **DR. NETON:** Yeah. They -- They -- They --  
11 They certainly should be S-millirem. If you  
12 look at the --

13          **MR. GRIFFON:** Right.

14          **DR. NETON:** -- at the cumulative exposures here  
15 they're fairly large and it's a uranium  
16 foundry.

17          **MR. GRIFFON:** Yeah.

18          **DR. NETON:** And in my estimation it would be  
19 extremely difficult to get those kind of  
20 external exposures but --

21          **MR. GRIFFON:** Right.

22          **DR. NETON:** -- but it was a good question,  
23 Mark. Again I apologize. Some of this is just  
24 so late breaking that I'm -- I'm sort of going  
25 through this on the fly a little bit myself.

1           The -- The -- The Excel spreadsheet table  
2           behind that documents the comparison of the --  
3           of the doses that were in the cumulative doses  
4           through '56 in the memo versus what was added  
5           up for the doses that we had in the database.  
6           And of course, if you recall the database was  
7           quarterly doses that, you know, were added up  
8           to get a year and then we added up those years  
9           through '56 of what we had. This is not  
10          perfect agreement. I think in about 90 percent  
11          or almost 90 percent of the cases the agreement  
12          is pretty good, down in the single digit  
13          categories. But you'll find that there are 40  
14          percent discrepancies for a large number -- not  
15          a large number -- I think six or so of the  
16          cases. And if you'll -- if you'll look at it  
17          closer -- I've had a chance to look at it where  
18          you haven't -- the 40 percent discrepancies are  
19          for people who were monitored only in 1952 for  
20          the most part so there -- there are some issues  
21          there with what occurred maybe in 1952. What  
22          I've done though is on the -- after the  
23          spreadsheet I've just generated a plot of the  
24          comparison of the CER database against the  
25          health physics reports, and, you know, of

1 course if -- if it's a pretty good straight  
2 line which is what you'd hope, I did discount  
3 one data that was a 70 percent discrepant data  
4 that Bill Tankersley is working on that he  
5 believes was an -- was an incident where a  
6 person intentionally got irradiated doing --  
7 using some X-ray process. So I'll -- I'll put  
8 that caveat on it. But with that exception  
9 this is all the raw data that we had. So there  
10 are 64 points plotted here. And, you know,  
11 again it's not perfect but this certainly shows  
12 that we've got a -- a fairly one to one  
13 correspondence between what's in the database  
14 and what -- what is in the record.

15 **DR. MAKHIJANI:** This doesn't include the ones  
16 with the 40 percent --

17 **DR. NETON:** This does.

18 **DR. MAKHIJANI:** It does?

19 **MR. GRIFFON:** It doesn't include the 70  
20 percent.

21 **DR. NETON:** It doesn't include the -- the one  
22 70 percent outlier I didn't put on here. I  
23 probably should have indicated that but -- but  
24 the 40 percenters were on there. Again it's --  
25 it's not perfect but again it shows, you know,

1 for 50-year-old data that we've got a pretty  
2 good handle at least on the magnitude within a  
3 reasonable approximation of what these  
4 exposures were. So that's where we are with  
5 additional comparisons. You know, not a lot of  
6 new stuff but, you know, again we -- we've --

7 **MR. GRIFFON:** Yeah.

8 **DR. NETON:** -- managed to glean a couple more  
9 supporting pieces of data. I'd like to shift  
10 our attention then, if there's no questions on  
11 that, to the so-called back extrapolation model  
12 and how this might be used given the quality of  
13 the data that we may or may not have to bound  
14 exposures to workers prior to 1956. Okay, so  
15 the next page --

16 **MR. GRIFFON:** Did we say we didn't have  
17 questions on that?

18 **DR. NETON:** Oh, I'm sorry. I'm -- I'm --

19 **MR. GRIFFON:** If you could stop there just for  
20 a second.

21 **DR. NETON:** Go ahead. I'm sorry.

22 **MR. GRIFFON:** I mean if the graph is  
23 interesting, what you can do with the graph is  
24 interesting.

25 **DR. NETON:** Yeah.

1           **MR. GRIFFON:** The -- I'm trying to look and  
2 see, I mean on the fly here but it seems like  
3 most of the differences in your difference  
4 column are in the positive side meaning that  
5 the --

6           **DR. NETON:** Right.

7           **MR. GRIFFON:** -- hard copy was higher than the  
8 --

9           **DR. NETON:** Yes.

10          **MR. GRIFFON:** -- so if they tend to be --

11          **DR. NETON:** Internal but within about 10/15  
12 percent.

13          **MR. GRIFFON:** But in most of them you're saying  
14 during that '52 year. And is that related to  
15 that memo where the doses apparently were --

16          **DR. NETON:** No, that was a 1954.

17          **MR. GRIFFON:** That was a different thing?  
18 Okay. That was interesting though --

19          **DR. NETON:** Well --

20          **MR. GRIFFON:** -- as well -- I'm sure you're  
21 going to bring that up.

22          **DR. NETON:** Yeah. Well, I can get into that a  
23 little bit now. At the end of this -- I won't  
24 -- I won't go over these in detail but the last  
25 ten or twelve pages that I've included in this

1           handout are internal company correspondences  
2           primarily by the health physics folks, Matt Hap  
3           West and others. In a 1956 -- '51 -- '58 time  
4           frame which sort of document what was going on  
5           in the early years. And maybe I'll take the  
6           opportunity since you brought it up to -- to  
7           explain a little bit at this point. This is an  
8           interesting story. There's always a story  
9           behind the story in a 60-year-old document.  
10          Prior to February 28<sup>th</sup>, 1955 -- this is  
11          interesting. I had -- I had not realized this  
12          having been in health physics for a -- more  
13          than a quarter of a century -- that prior to  
14          1955 the skin dose and the deep dose limits  
15          were identical. In other words, they were both  
16          15 rem.

17          **MS. MUNN:** Yeah, I noticed that.

18          **DR. NETON:** And -- And so what that meant --  
19          and -- and George -- George Kerr has mentioned  
20          this several -- in several discussions but it  
21          just sort of dawned on me, you know, the  
22          implications of this is that given that the  
23          skin dose and the shallow -- the skin dose and  
24          the shallow -- the skin dose and the deep dose  
25          limits were equivalent, there was no incentive

1 on their part necessarily to track them  
2 independently.

3 **MS. MUNN:** Unh-unh.

4 **DR. NETON:** In other words, you'll look.  
5 There's a memo in here that talks about the  
6 beta gamma column. So they would put dose  
7 information in the beta gamma column and it  
8 didn't really matter whether it was beta or  
9 gamma because they were still comparing it  
10 against the 15 rem dose limit which applied to  
11 both working systems. So what you'll see in  
12 these other memos is an attempt on management's  
13 part, and particularly health physic's  
14 management's part over the years to tease those  
15 pieces of information apart and put them in the  
16 right locations. Because if -- after '55 then  
17 you started getting into the later years into  
18 this 5 x N - 18 requirement which, you know,  
19 limited dose to a certain cumulative exposures.  
20 And so they really felt a need to start to get  
21 a better handle. So what I'm -- the bottom  
22 line of that is that you would not necessarily  
23 expect these memos to agree with the CER  
24 database perfectly because the CER database was  
25 updated periodically in response to these new

1 requirements to -- to more accurately reflect  
2 what the workers were exposed to than some of  
3 these sort of contemporaneous memos that were  
4 generated on the pro-- snapshots of programs at  
5 the time. So if one took a 1954 memo, you may  
6 indeed see a discrepancy between skin dose and  
7 deep dose because they may have been added into  
8 the same column and then later on in the CER  
9 database per these memos they may have been  
10 teased apart. In fact there's a memo in here  
11 where like 50 or 60 workers -- they said these  
12 workers were exposed primarily to deep dose.  
13 Move their beta gamma column over into the deep  
14 dose. So there have been some shuffling of the  
15 information over the years and that's  
16 essentially what -- and George can back me up  
17 if -- if there's anything I'm missing here but  
18 that's sort of what -- what's happened prior to  
19 February 28<sup>th</sup>, 1955 when the skin dose limit  
20 actually went up. I mean I think it went up to  
21 30 rem. I -- I don't recall exactly but -- so  
22 the -- the skin dose when it went up. So then  
23 there was an incentive on their part to track  
24 these -- those calculations separately. So  
25 even given that though, you know, this graph --



1 and I understand what Mark is saying. You --  
2 especially when a graph -- you show especially  
3 when it's on a large scale -- but it does show  
4 that it's a, you know -- we -- we have a pretty  
5 good snapshot of what the range of doses were  
6 for these workers in those time frames. That's  
7 -- I think that's what we're trying to say.  
8 Now, let me -- let me expand the story a little  
9 more here. On top of the fact that prior to  
10 '55 the beta gamma columns were -- the beta and  
11 gamma were -- were some tracked -- not tracked  
12 separately, in 1950 and 1951 -- prior to 1960  
13 all badges were exchanged on a weekly basis.  
14 So you've got 52 potential reads a week and  
15 there's a 30 millirem detection limit about,  
16 depends on the year, but 30 to 50 millirems so  
17 you've got a lot of missed dose. In 1950 and  
18 '51 it was the policy and it's in this Hap West  
19 memo that's listed here. Okay. It was the  
20 policy that any badge that was not positive was  
21 recorded as zero. So this explains why '50 and  
22 '51 are zeros for deep dose because it's pretty  
23 hard to get that kind of deep dose in a uranium  
24 worker. In fact, to flesh out the story a  
25 little bit more, most of the doses in '50--

1 almost all the -- all the -- all the doses in  
2 '50/'51 do not include the cyclotron workers.  
3 It's another -- another part of the puzzle. So  
4 you got '50 and '51 showing essentially all  
5 zeros because the workers who were monitored,  
6 their doses on a weekly basis were less than  
7 say 30 millirem a badge exchange cycle which  
8 would give them a maximum missed dose of say  
9 100 -- 50 to 100 millirem if they were  
10 monitored every week during that year. So we  
11 know that in '50 -- '50 and '51. '52 and '53  
12 the practice changed.

13 **MR. GRIFFON:** So then there's ones in that  
14 Delta View -- I mean I'm sorry.

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

16 **MR. GRIFFON:** The ones in the Delta View  
17 database were cyclotron workers and they  
18 wouldn't have been recorded that database that  
19 we've seen? That's why that data wasn't  
20 necessarily in there?

21 **DR. NETON:** Some of them were not in that.  
22 Were some in there during the cyclotrons?

23 **MR. KERR:** No. If you -- if there's a --

24 **DR. NETON:** It -- It -- It's spotty though.

25 **MR. GRIFFON:** But they were all zeros. Okay.

1           **MR. KERR:** I would like to check. The amazing  
2 thing is to me that there's a lot of things  
3 with what we found out with -- we have just  
4 recently been able to verify the cyclotron.  
5 And before we had no handle on who was really  
6 working at the cyclotron because we would  
7 through departments but we didn't know names or  
8 badge numbers. The reason we found enough  
9 numbers there we can really tell who the  
10 cyclotron crews were over really a fairly wide  
11 period of time. Once you have that then you  
12 can go back and easily check and see what their  
13 dose is.

14           **MR. GRIFFON:** Right.

15           **DR. NETON:** Right.

16           **MR. KERR:** And we now find that there's a lot  
17 of information on cyclotron workers. It's in  
18 the X-10 database.

19           **DR. NETON:** Yeah, so this --

20           **MR. KERR:** And probably more information on  
21 cyclotron workers in the X-10 database than  
22 there is in the Y-12 because most of the  
23 workers at the cyclotron were actually X-10  
24 people.

25           **DR. NETON:** Right. I don't want to jump into

1           too much the cyclotron issue because that --  
2           they're separate issues of cyclotrons but --  
3           but the bottom line I think -- I'm sorry.  
4           Wanda, you were going to say something?

5           **MS. MUNN:** I was just trying to say your soft  
6           voice is -- is not getting --

7           **DR. NETON:** Oh.

8           **MS. MUNN:** -- to the recorder I don't think.  
9           You're --

10          **DR. NETON:** We'll move the mike over.

11          **MR. GRIFFON:** You need to move the mike down to  
12          the end of the table maybe or something.

13          **DR. NETON:** But -- So the -- the cyclotron is  
14          a separate issue. I'd like to sort of tease  
15          that out for the moment if we could --

16          **MR. GRIFFON:** Right. Sorry.

17          **DR. NETON:** -- and say that, okay, the uranium  
18          -- essentially the people who were mostly  
19          working with uranium at this point in the CER -  
20          - are captured in the CER database as -- as  
21          zero values because when they measured them  
22          they just made them zero when they read them if  
23          they were less than the detection limit. You  
24          know, it's pretty hard I think, unlikely to get  
25          more than 40 -- 30 millirem in a week working

1 in a uranium foundry. That's at least my  
2 opinion at this point. In '51 and '52 though -  
3 - '50/'51, that's what they did. In '52 and  
4 '53 then it became management policy to record  
5 the detection limit if it were zero, if it were  
6 not measurable. So then you see --

7 **DR. MAKHIJANI:** '53 or '52?

8 **DR. NETON:** '52 and '53. In '52 and '50-- this  
9 is documented in one of the attachments that I  
10 -- it's a Hap West interview that was conducted  
11 with Donna Cragle I think in the '80s.

12 **MR. GRIFFON:** So then they recorded the LOD --

13 **DR. NETON:** So then they started recording the  
14 LOD -- LOD at times --

15 **MR. GRIFFON:** -- if it was less than  
16 measurable?

17 **DR. NETON:** -- if it was less than measurable.  
18 So what you see is -- is a lot of doses  
19 centered around 400 millirem all of a sudden.  
20 Well, 30 times 13 is 390 so you're -- you're  
21 starting to see a jump, a quantum jump in the  
22 exposures and it looks like there's a lot of  
23 dose there. So these are essentially, in '52  
24 and '53, missed dose. To a large extent the  
25 values that we see are influenced by missed

1 doses and so -- and onward from there actually.  
2 It was the policy after '53 to keep doing that.  
3 So you got the data in the CER database are  
4 influenced tremendously after '51 by missed  
5 dose values. Keep that -- Keep that in mind.  
6 In fact it -- it's amazing how high some of  
7 those could be. Now, there were high exposures  
8 to extremities and external from -- from  
9 working in foundries. I'll grant you that.  
10 But some of the extra -- specific-- especially  
11 since cyclotron workers were not in there, you  
12 know, some of the high doses you see recorded  
13 for internal, deep penetrating seem -- seem  
14 somewhat high to us but again they're assigning  
15 potentially 390 millirem a quarter based on  
16 just missed dose. And in fact if you read the  
17 report 32 that was put out by ORAU that sort of  
18 developed this co-worker or the back  
19 extrapolation model you'll see they have  
20 detailed tables of distributions by year from  
21 '52 through whenever and the distributions in  
22 the '53/'54/'55 time frame when they were  
23 monitoring selected workers who were we believe  
24 would be the highest exposed workers, don't fit  
25 any real distribution. That's why -- in fact

1           that's what -- that's what was the genesis of  
2           this back extrapolation model because you'll  
3           see if you look at those little histograms  
4           there you'll see nothing and then all of a  
5           sudden, bloop, a large block of workers at  
6           almost 400 millirem per quarter and then  
7           nothing and then a few more out here that  
8           people may have had real high -- you know, real  
9           exposures. So there are -- the data are not  
10          amenable to developing distributions prior to  
11          1956 and that -- that's well stated in the  
12          report 32. So I'm like a yarn -- yarn teller  
13          here but if you look on the next page, this is  
14          a -- page 26 out of report 32. And what I'd  
15          like to just focus on here is -- is the back  
16          extrapolation graph. So how -- how is NIOSH  
17          really treating workers who have no monitoring  
18          data prior to 1956? Everybody have that page?  
19          Hans, you don't have it?

20          **DR. BEHLING:** Yeah, I do.

21          **DR. NETON:** Is this -- This is it right here.

22          **DR. MAKHIJANI:** I have a question before you go  
23          on.

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

25          **DR. MAKHIJANI:** On the first page of that, the

1           only real discrepancy in that first table there  
2           in the -- before the 556 and the 703 --

3           **DR. NETON:** Uh-huh.

4           **DR. MAKHIJANI:** And given the numbers of  
5           workers involved it seems like a -- if it were  
6           a dose discrepancies were not that large. It  
7           would seem that 150 worker discrepancies -- and  
8           they don't appear anywhere else in the table so  
9           where did the 150 workers appear from in the  
10          CER database?

11          **DR. NETON:** What's their -- What's their job  
12          categories? I mean we didn't analyze --

13          **MR. GRIFFON:** No, Arjun. For the number of  
14          people.

15          **DR. MAKHIJANI:** Right. They're not --

16          **MR. GRIFFON:** There was 150 workers in the --

17          **DR. MAKHIJANI:** -- in the old -- did the old  
18          memo miss workers that were later caught or --  
19          that just --

20          **DR. NETON:** It -- It may be -- well, this is  
21          1956 so this is after the skin and shallow.

22          **DR. MAKHIJANI:** Uh-huh.

23          **DR. NETON:** I really don't have an answer for  
24          that at this point, Arjun, you know.

25          **DR. MAKHIJANI:** All right. I have another



1 question, just a quick one here. On this chart  
2 here, the -- the one that you showed to us,  
3 it's not -- it doesn't look like a slope of one  
4 but that should be a slope of one. I think the  
5 slope was a little less than one.

6 **DR. NETON:** That's an interesting observation.

7 **DR. MAKHIJANI:** As I'm reading it because it's  
8 --

9 **DR. NETON:** Well, and I think that -- that --  
10 that does go along with the fact that most of  
11 the biases are in the negative in the --

12 **DR. MAKHIJANI:** Yeah.

13 **DR. NETON:** -- in that direction. Yeah, I  
14 agree with that.

15 **DR. MAKHIJANI:** So the best fit would actually  
16 --

17 **DR. NETON:** Right.

18 **DR. MAKHIJANI:** So while the points look like  
19 they fall along the line pretty well it looks  
20 like there's a systematic bias --

21 **DR. NETON:** Yeah.

22 **DR. MAKHIJANI:** -- because their slope is less  
23 than one. So it would be useful to see the  
24 regression.

25 **DR. NETON:** Good point. Very good point.

1           **MR. GRIFFON:** You raised a good point which  
2           might be useful in adjusting.

3           **DR. MAKHIJANI:** Yeah, it might be because there  
4           is a systematic error you might be able to make  
5           some corrections.

6           **DR. NETON:** That's a very good point. I  
7           appreciate that. Okay. I'll just make a note  
8           of that before I forget.

9           **MR. GRIFFON:** That's sort of what I was  
10          exerting with the differences being all on one  
11          side.

12          **DR. NETON:** I agree with that.

13          **MR. GRIFFON:** Right.

14          **DR. NETON:** And again, some of those  
15          differences may be because of the shifting of  
16          the skin dose into the --

17          **MR. GRIFFON:** Right.

18          **DR. NETON:** -- deep dose category as I  
19          indicated, you know.

20          **MR. GRIFFON:** Uh-huh.

21          **DR. NETON:** There certainly are some -- some  
22          issues with the data. I mean you certainly  
23          agree with that. To the extent that they  
24          prevent us from doing dose reconstructions I  
25          think is the subject of -- of where we're

1 heading here. Now, on this graph on page 26  
2 you -- you'll see a scatter plot here and it's  
3 somewhat deceptive because it's a log -- I  
4 think it's a log scale. Yeah, it's a log  
5 scale. And -- But -- But this is right out  
6 of this report 32 and what ORAU has done is fit  
7 a function for the data from starting in '57,  
8 last -- last quarter of '56 through '60--  
9 whatever time frame that is, '66, and picked,  
10 you know, this is the famous 147 workers that  
11 were selected who had -- were fully monitored  
12 from '57 through '60-something and in fact had  
13 -- had monitoring data in each of the quarters.  
14 And in fact, in our opinion probably  
15 represented the higher end of the work force  
16 because of they were fully monitored and had  
17 positive results and -- and such. Now, the  
18 data -- the regression line fit through there  
19 included missed dose for all those workers so -  
20 - so when they had a quarter with a positive  
21 value ORAU went back and added in the -- I  
22 don't think it was a full 30 millirem. It was  
23 probably the LOD over two which is what we  
24 would normally do. Add those into their doses  
25 to account for any missed dose because we only

1 had quarterly data so -- so that line that you  
2 see through the black dots from '50-- into '56  
3 through '65 time frame is -- is a regression  
4 line through their doses including missed dose  
5 because we only had quarterly data.

6 **DR. BEHLING:** Let me ask you a question on  
7 that, your -- your assignment of missed doses  
8 based on LOD value as opposed to using the  
9 measured doses for those periods when they were  
10 in fact monitored. And think we had that  
11 discussion before when you said for instance,  
12 let's assume that if the -- a person was  
13 monitored on a weekly basis and you realize  
14 that in a counted quarter there should be  
15 thirteen entries but instead you only find six  
16 and you said you would probably take thirteen  
17 over six and multiply it times the --

18 **DR. NETON:** Correct.

19 **DR. BEHLING:** -- doses received during that  
20 six-week period as an adjustment factor.

21 **DR. NETON:** Correct.

22 **DR. BEHLING:** And this was not being LOD  
23 adjustment. This was being basically assuming  
24 that if the doses received during the times  
25 when the individual was monitored would in

1           essence be identical to the balance of the time  
2           when he was not monitored.

3           **DR. NETON:** Well, we're saying the same thing.  
4           I mean if I have one -- one result in the  
5           quarter --

6           **DR. BEHLING:** Yes.

7           **DR. NETON:** -- and it's 100 millirem --

8           **DR. BEHLING:** Yes.

9           **DR. NETON:** -- then I'm going to assume that  
10          the other 12 weeks --

11          **DR. BEHLING:** Also would have 100?

12          **DR. NETON:** No.

13          **DR. BEHLING:** No?

14          **DR. NETON:** Were LOD.

15          **DR. BEHLING:** LOD?

16          **DR. NETON:** Because you couldn't be higher than  
17          that.

18          **DR. BEHLING:** Well, that's assuming that the  
19          person was monitored and the monitoring --

20          **DR. NETON:** Okay. Well --

21          **DR. BEHLING:** -- resulted in the zero dose.  
22          But suppose he was not monitored? That's the  
23          question.

24          **DR. NETON:** Okay. If he wasn't monitored we're  
25          -- we're still going with our opinion that they

1           were -- the people who were the highest  
2           monitored -- were highest exposed were  
3           monitored and so if he wasn't monitored then he  
4           was not in that category.

5           **DR. MAURO:** This is a -- a change though from  
6           what we discussed last time.

7           **MR. KERR:** He could have been sick. He could  
8           have been on vacation, you know.  
9           You don't know why it's not showing up. He was  
10          assigned some regardless. If there was a zero  
11          there for that time --

12          **DR. BEHLING:** Yeah.

13          **MR. KERR:** -- he was assigned an LOD because we  
14          don't know what the situation was. But there's  
15          -- I mean these people had vacation, they were  
16          sick.

17          **DR. NETON:** Yeah. I think, you know --

18          **DR. BEHLING:** No, I think this is where we --  
19          the difference is is as a conservative measure  
20          I would have potentially said well, maybe not  
21          every person was monitored for each of the  
22          cycles in the calendar quarter and there is  
23          some point, and I think you -- you may have had  
24          that discussion on the conference call -- when  
25          I look for instance during the second quarter

1 of 1958 when I think one of your tables, table  
2 8-3 or something had identified somewhere  
3 around 690-some odd people who were monitored  
4 but for that one week, the 25<sup>th</sup> week of 1958,  
5 the health physics record showed that there  
6 were only something like 378 or something like  
7 that monitored. And it gave me the feeling  
8 that perhaps the people who were monitored  
9 during that week weren't always monitored  
10 throughout the quarter even though their job  
11 may have been the same.

12 **MR. KERR:** From 147 people selected for the  
13 fact that they were continuously monitored over  
14 the period.

15 **DR. NETON:** Right.

16 **MR. KERR:** There were just some zeros in the  
17 record here, there and yonder. We filled in  
18 and didn't --

19 **DR. NETON:** Right.

20 **MR. KERR:** -- and tried to measure as  
21 conservatively as possible.

22 **DR. NETON:** This -- These people were -- were  
23 hand-picked for a reason that they had  
24 exposures that were well monitored over an  
25 entire period. It is not like we went and just

1 ran and we selected workers for 40-- from '57  
2 through -- and I think we -- we ought to focus  
3 on those people's records because that's the --  
4 I think and ORAU -- SC&A has actually done a  
5 review of those and I thought that they -- they  
6 did agree that those workers appeared to be  
7 more highly exposed workers.

8 **DR. MAURO:** I think the confusion may have been  
9 that it was our understanding that some of  
10 those 147 did not have -- were not monitored  
11 every week in every quarter.

12 **DR. NETON:** Well, we have no way of knowing  
13 that really. And in fact after '60 it wasn't  
14 weekly any more. It went to --

15 **DR. MAURO:** Right.

16 **DR. NETON:** Quarter.

17 **DR. MAURO:** -- quarter.

18 **DR. BEHLING:** In which case it makes no  
19 difference.

20 **DR. NETON:** After '60 it's -- it's a moot --  
21 it's not -- it's not an issue so you're talking  
22 between '57 and '60.

23 **DR. MAURO:** Right. And, you know, the -- the  
24 only thing is there are two different things in  
25 here. And one is that, okay, if we have a



1 worker in 1957 who's part of the 147 and you've  
2 got six weeks worth of actual measured  
3 monitored data, then the rest of it --

4 **DR. NETON:** We wouldn't have weekly data  
5 though. We only have quarterly data.

6 **DR. MAURO:** And all -- all of those are  
7 quarterly?

8 **DR. NETON:** Every -- Every dose as a result we  
9 have is quarterly.

10 **DR. MAURO:** For the 147?

11 **DR. NETON:** For anyone.

12 **DR. BEHLING:** So you're blindly assuming that -  
13 - that the -- if there were missed doses it's  
14 due to the fact that they were -- the recorded  
15 dose that came out as zeros as opposed to --

16 **DR. NETON:** Correct.

17 **DR. BEHLING:** -- I think it was not monitored?

18 **DR. NETON:** Correct. Now, you know, one would  
19 argue why would they -- if the person is  
20 showing positive results, you know, why would  
21 they -- we have no indication to believe that  
22 they were rotating people through as I know  
23 Hans, has been one of your thoughts all along.  
24 That they would rotate people through and Mr.  
25 Worker X would get his 100 millirem badge this

1           week and we take it away and give it to the  
2           next guy because he might be -- That's not the  
3           way at least the memo trails that I have read -  
4           - they look to us like they were purposely  
5           picking people that were working in the  
6           trenches doing the work and -- and monitoring  
7           the -- the high end of the -- of the --

8           **MR. RUTHERFORD:** And wouldn't that -- I mean if  
9           they did that in those early years, '57 to '60,  
10          artificially drive the maximum doses down?  
11          Because if you're spreading the TLD around the  
12          -- the total cumulative dose for that  
13          individual is going to be driven down which we  
14          clearly didn't see that when you looked at the  
15          later data for the same operations to the  
16          earlier data. So I -- I -- I'm -- I don't see  
17          that effect.

18          **DR. NETON:** Well, in fact you could see on this  
19          graph the spread of the data for the 147  
20          doesn't look tremendously different to me prior  
21          to 1960 and these are the same monitored  
22          workforce --

23          **MR. GRIFFON:** Right.

24          **DR. NETON:** -- who were monitored quarterly  
25          versus weekly. It's the same people. I -- I

1 don't see that there's a -- a drop in that at  
2 all. In fact it looks very similar. It does  
3 go up per the -- the regression line. But I  
4 think this is a point where we're just going to  
5 have to say we may disagree on whether missed  
6 doses are appropriate to add to those workers  
7 or not. And the bottom line is what effect it  
8 might have on the overall back extrapolation  
9 because I think -- I think the line that's fit  
10 from '60 onward is pretty much consistent with  
11 the line before 1960.

12 **DR. BEHLING:** That's it. I only base it on  
13 circumstantial evidences. I have no real data.

14 **DR. NETON:** Yeah.

15 **DR. BEHLING:** But as I said one data point that  
16 came up was the 1958 25<sup>th</sup> week where for that  
17 second counted quarter I think one of George's  
18 tables identifies somewhere around 700 people  
19 were monitored in that quarter but yet for the  
20 25<sup>th</sup> week there was some accounting that was  
21 done at the request of health physicists to --  
22 to say how many people were -- were there  
23 exposures to in that group. And I only counted  
24 370 which is about 50 percent of the people  
25 monitored in that counted quarter.

1           **DR. NETON:** '58 sounds suspiciously in the --

2           **DR. BEHLING:** Well --

3           **DR. NETON:** -- criticality time frame.

4           **DR. BEHLING:** Yes. It was within that time  
5 frame.

6           **MR. RUTHERFORD:** The 25<sup>th</sup> week is that week,  
7 yeah.

8           **DR. BEHLING:** Yes, it was --

9           **DR. NETON:** Yeah, well, this may be somewhat of  
10 an anomaly then. I don't know whether --  
11 whether --

12           **DR. BEHLING:** The only thing I can say, it's  
13 true. You don't want to match one by one. As  
14 you mentioned there are people coming in and  
15 out of the system. They may retire. They may  
16 come into the workforce in any counted quarter  
17 and so the numbers should never match one to  
18 one. But a factor of two seemed a bit too much  
19 to -- as a discrepancy for me to assume. But  
20 to the way a person is monitored, he's  
21 monitored always and -- and that's the only  
22 reason I bring it up.

23           **DR. NETON:** Okay.

24           **MR. KERR:** I -- I -- I've got to submit that  
25 the way we have -- we have amendments here that

1 I'd like to let you look at.

2 **THE COURT REPORTER:** Dr. Kerr, could you come  
3 close to the table, please?

4 **MR. KERR:** Sorry. Hans, when we have a time  
5 away from the table today I have some memos  
6 with me that I'd like to show you and let you  
7 look at. And I think we can really clear up  
8 this -- some of these questions you have about  
9 who's ro-- the rotational monitoring --

10 **DR. BEHLING:** Uh-huh.

11 **MR. KERR:** -- and so forth so let's don't take  
12 up time here.

13 **DR. BEHLING:** Yeah.

14 **MR. KERR:** But let's look at those aside and  
15 see if we can resolve some of these questions  
16 you have.

17 **DR. BEHLING:** Okay.

18 **MR. GRIFFON:** Also, if you have the references  
19 on those memos or if they're on the O-drive  
20 somewhere that would be --

21 **DR. NETON:** Yeah.

22 **MR. GRIFFON:** -- I think we'd all be interested  
23 in that.

24 **DR. NETON:** And I think some of them are maybe  
25 attached --

1           **MR. GRIFFON:** Some of them might be in your  
2 package? Yeah.

3           **DR. NETON:** George -- George might not realize  
4 it but I've attached a number of these memos to  
5 your handout.

6           **DR. MAURO:** Could I just step back a little  
7 bit? When we had our conference call it was my  
8 sense that in regard to this -- the issues  
9 we're talking about here, the concern was some  
10 discrepancies in the early extent of dosimetry  
11 data that we sort of identified in the minutes.  
12 And the problem was those discrepancies created  
13 the situation which might have made it  
14 difficult for you to validate your  
15 extrapolation model. And that one -- that was  
16 the only real issue. The -- Once -- Once  
17 there was a confidence on your part that you  
18 understood what the discrepancies were then as  
19 I understood, then you were back to the place  
20 where we are in a position where we can  
21 validate our model using your earlier data.  
22 And then we leave the SEC realm and we move  
23 into the site profile realm. Is -- Is that  
24 where we are right now?

25           **DR. NETON:** That's where I'm trying to head but

1 I -- I can't get past Hans's issue here with  
2 this whether we put 100 millirem or -- and I  
3 think that's a tractable problem. I think to  
4 answer Hans's issue I mean you -- you could go  
5 and go back and redo this entire analysis and  
6 give them that dose for every week and -- and  
7 see how it changes this back extrapolation  
8 model.

9 **MR. GRIFFON:** That would still make the site  
10 profile.

11 **DR. NETON:** Yeah, that -- that -- that's just a  
12 difference in opinion as to how one interprets  
13 the '57 through '64 data so --

14 **DR. MAURO:** No, the reas-- no, that's what I --

15 **DR. NETON:** Bear with me here.

16 **DR. MAURO:** So I want to -- I guess I'd like to  
17 get a little more crisp in terms of I guess in  
18 light of the analyses that I --

19 **DR. NETON:** Right.

20 **DR. MAURO:** -- that -- and the tables you've  
21 shown us --

22 **DR. NETON:** Right.

23 **DR. MAURO:** -- and the description you've  
24 explained regarding these columns --

25 **DR. NETON:** Right.

1           **DR. MAURO:** -- am I hearing that you're getting  
2           a little bit more comfortable with  
3           understanding what transpired in those early  
4           years and the discrepancies that apparently  
5           y'all saw?

6           **DR. NETON:** I think yes.

7           **DR. MAURO:** Is that what I'm hearing?

8           **DR. NETON:** I'm trying to -- I'm trying to get  
9           there but unfortunately I have to go through  
10          and explain what we're doing on individual dose  
11          reconstructions to give you a sense of how the  
12          data do or do not support that conclusion. I'm  
13          going to have to -- you have to bear with me.  
14          I don't think it's well understood how we're  
15          doing these.

16          **MR. GRIFFON:** Let me ask about data, too, on  
17          the -- it seems like you've -- and we did ask  
18          for this, this question of pre-'56.

19          **DR. NETON:** Right.

20          **MR. GRIFFON:** But also the -- the overall  
21          external data reliability question. You know,  
22          obviously the model is relying on '56 through  
23          '65, right?

24          **DR. NETON:** Uh-huh.

25          **MR. GRIFFON:** Heavily on -- on that data.



1           **DR. NETON:** Right.

2           **MR. GRIFFON:** Have -- Have you found any  
3 supporting documents in that area? I know we  
4 focused on probably '48 to '57 because it's the  
5 SEC period.

6           **DR. NETON:** Sure.

7           **MR. GRIFFON:** But, you know, really --

8           **DR. NETON:** Yeah.

9           **MR. GRIFFON:** -- the dose reconstruction would  
10 rely on the later data. I just, you know, in --  
11 -- in glancing at some of these memos and --

12          **DR. NETON:** Yeah.

13          **MR. GRIFFON:** -- it was 11:00 o'clock last  
14 night. I mean there -- there are some  
15 interesting twists and turns on how they got  
16 from here to there -- for these database data.  
17 I mean the -- the West memo --

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

19          **MR. GRIFFON:** -- where he discussed -- I mean  
20 he -- he clearly says that there was no raw  
21 data even then when he was trying to --

22          **DR. NETON:** Right. But --

23          **MR. GRIFFON:** -- understand this stuff so --

24          **DR. NETON:** -- if I can explain the comparison  
25 I'm getting to an invalidation it might -- it

1           might at least make my point.

2           **MR. GRIFFON:** All right. I'll wait for you to  
3           -- to finish.

4           **DR. NETON:** Now, whether you guys agree or  
5           disagree with that interpretation, but bear  
6           with me. Remember, we got a missed dose -- we  
7           got the monitored workforce with, you know,  
8           thousands of quarters per year and -- and so  
9           they were monitored. And it is our contention  
10          that they were more highly monitored workers  
11          and so in worst case you've got a missed dose  
12          issue. I mean they didn't record anything for  
13          less than zero so you've got 52 weeks times 30.  
14          You've got a 15 -- 1.5 rem missed dose issue to  
15          deal with. But I want to point out where we --  
16          what this back extrapolation model shows. We  
17          did get -- well, there's one additional data  
18          point we got in 1955 that I'll talk about later  
19          with an HP report where they -- the average  
20          millirem per quarter in 1955 came out 1554 and  
21          the CER database came out 1531 so we do have  
22          one additional piece of information I just  
23          received this morning.

24          **MR. GRIFFON:** Okay.

25          **DR. NETON:** It's not in here but -- so we do

1           have some validation there. And again after  
2           '55 we're much more confident because remember,  
3           February 28, '55 is when they upped the skin  
4           dose limit so they had to intentionally track  
5           separately deep and shallow. And so they were  
6           monitored separately. And the comparison that  
7           we did later on with the -- with the Delta View  
8           showed that the data matched fairly well. I  
9           think it was a later time frame but --

10          **MR. GRIFFON:** I think it was '53.

11          **DR. NETON:** Was that '53?

12          **MR. GRIFFON:** Wasn't that '53?

13                 So anyway we still -- the '56 -- I mean I -- I  
14                 agree on the '56 through '65 therefore should  
15                 be more one to one correlation --

16          **DR. NETON:** Right.

17          **MR. GRIFFON:** -- is what you're saying.

18          **DR. NETON:** Right. Yeah.

19          **MR. GRIFFON:** So if you were --

20          **DR. NETON:** It's very difficult to find those -  
21                 - those pieces of data unfortunately. But if  
22                 we can get past the red line through the solid  
23                 black dots here and whether we use Hans's  
24                 approach or our approach, let's assume that  
25                 that line can be constructed somehow. Now

1 we've got the extrapolated line back into the  
2 1950 era where -- where -- we -- we know we  
3 have a lot of workers who -- who were not  
4 monitored. So let me just brief-- briefly  
5 explain what we would assign. This is -- This  
6 is -- it's a little misleading because it says  
7 year on the bottom but this would be the dose  
8 assigned per quarter to each individual so in  
9 other words, if you go back to 1950, you know,  
10 you'll see it will be somewhere around 300  
11 millirem per quarter assigned to a worker based  
12 on the back extrapolation so you're talking  
13 about 1.2 rem or exposure at a uranium facility  
14 not counting cyclotron workers. Pretty --  
15 Pretty generous dose assignment I think.

16 **MS. MUNN:** Very generous. Very generous.

17 **DR. NETON:** Now, one thing I want to point out  
18 though is this curve is based on assigning  
19 missed -- two things: missed dose is included  
20 to generate that curve so it -- we're -- we're  
21 already in my opinion accounting and somewhat  
22 biasing it high because it's our -- it's been  
23 our experience that missed dose -- if you add  
24 missed dose in at face value it biases a  
25 worker's exposures high. It's almost

1 impossible to have 13 -- 12 badge reads at the  
2 detection limit in a row all read less than  
3 detectible and add that dose. So that's point  
4 number one. The second point is that this  
5 curve in itself was -- it's a little difficult  
6 to explain because of the -- the maximum  
7 likelihood process that was used here but in  
8 the regression analysis for this curve they  
9 assumed a geometric standard deviation of the  
10 data points here. Instead of using sigma in  
11 the regression analysis they used the 95<sup>th</sup>  
12 percentile of sigma to fit the curve. Now, how  
13 that corresponds one to one with what came out  
14 here is difficult to explain other than if you  
15 look at the table on the next page. You'll see  
16 the geometric mean of the regression line, say  
17 in '47, was 194 E-dose which is what NIOSH  
18 would use in the quarterly dose assignment,  
19 came out 385. That is a direct result of using  
20 the 95<sup>th</sup> percentile of the geometric standard  
21 deviation in fitting the regression model. It  
22 -- It's -- It's very complicated to describe  
23 what the effects -- I can just show you  
24 empirically what the net effect was. But my  
25 point is that you have -- you have already used

1 missed dose to generate the regression line and  
2 on top of that you've used the 95<sup>th</sup> percentile  
3 of the sigma value to generate the regression  
4 line so you're -- you're already way up there  
5 is what I'm trying to point out.

6 **MR. GRIFFON:** That -- That's pretty -- you --  
7 you can easily track that through on these  
8 spreadsheets that support. I haven't looked at  
9 the -- I mean I've looked at those --

10 **DR. NETON:** Yeah.

11 **MR. GRIFFON:** -- that's laid out there. The  
12 calculations are --

13 **DR. NETON:** Yeah, the calculations are laid out  
14 there. And it -- it's pretty arcane subject  
15 matter but yeah, it's there. Okay. So now I  
16 can get into this -- this next --

17 **DR. BEHLING:** Okay. Can -- Can you just --

18 **DR. NETON:** Yeah.

19 **DR. BEHLING:** The E-dose is basically the  
20 assigned dose without a sigma value?

21 **DR. NETON:** No, it has a sigma value as well.

22 **DR. BEHLING:** You're saying it's built in.

23 **DR. NETON:** Right. Yeah.

24 **DR. BEHLING:** But this would be entered in as a  
25 deterministic value?

1           **DR. NETON:** No, it would have a sigma value  
2           associated with it as well which would be the  
3           propagated sigma of the geometric standard  
4           deviation and the organ dose conversion factor.  
5           I went through the -- the tools yesterday to  
6           verify this. So what you have is, you know,  
7           the do-- the organ dose conversion factor or  
8           the triangular distribution. And you -- you  
9           couple that with the geometric standard  
10          deviation on this E-value and you end up with a  
11          propagated log -- it ends up being lognormal  
12          because a lognormal drives the distribution.  
13          And so you'll end up assigning an E-dose with  
14          its associated geometric standard deviation  
15          that's propagated through the process. So  
16          again it's not just that although, you know,  
17          it's a sampling process and as we've been down  
18          the line you effectively end up sampling higher  
19          than that because if this uncertainty is small  
20          compared to the overall uncertainty you'll  
21          effectively sample the mean of the  
22          distribution. It's getting pretty technical  
23          here but --

24          **DR. MAURO:** Again, it's -- I'll ask you a  
25          simple question and just make sure I understand

1           what I'm looking at. On the table 5 that we're  
2           looking at now -- not -- we're looking at 1947  
3           -- you have this 194 millirem in that quarter.  
4           That -- That's a geometric mean obtained from  
5           real data?

6           **DR. NETON:** Yeah, that's the black dot. That's  
7           the geometric mean of the regression line --

8           **DR. MAURO:** So there was a certain number of  
9           workers that actually were measured in that  
10          quarter?

11          **DR. NETON:** That is the best estimate of the  
12          workers' exposures --

13          **DR. MAURO:** Right.

14          **DR. NETON:** -- in that quarter.

15          **DR. MAURO:** And that was from the data -- but  
16          this was from -- measured from badge film?

17          **DR. NETON:** Oh, no, no, no, not '47. This is  
18          the projected --

19          **DR. MAURO:** Okay.

20          **DR. NETON:** -- regression line from the --

21          **DR. MAURO:** Okay. Then -- and then the -- the  
22          past the progre-- from the regression line then  
23          what's -- then what's the I guess the E-dose?  
24          I'm having trouble understanding what this  
25          number is?



1           **DR. NETON:** Okay. That would be the regression  
2 line if one used the data as it was. Used it,  
3 the geometric mean of standard deviation for  
4 all the data after '55.

5           **DR. MAURO:** Okay. That would be the 194?

6           **DR. NETON:** Right.

7           **DR. MAURO:** Okay. Then --

8           **DR. NETON:** Now, I don't -- I didn't reproduce  
9 it here but there's a -- there's a -- in table  
10 -- in report 32 there's especially one  
11 sentence. It said to be more claimant  
12 favorable instead of using the sigma value for  
13 either of those years after '56 in the  
14 regression calculation they used the 95<sup>th</sup>  
15 percentile as if it were sigma.

16          **DR. MAURO:** Okay.

17          **DR. NETON:** And then they -- they fit the line  
18 using that. And this is what you end up with  
19 doing that. And in fact if you look at the  
20 equation underneath the -- underneath figure 2  
21 here that -- that -- that equation, E-dose =  
22  $\text{EXP}3.6 - .122 \text{ year} - 61$ , that little appendage  
23 there plus  $.5 \times 1.147$  squared is the correction  
24 that they added to increase the E-dose. In  
25 other words, if you would get the -- what you

1           would get -- 140-- 194 without that  $.51 \times 1.47$   
2           squared. And that's the additional increase  
3           due to account for the -- allowing for the  
4           sigma to be equal to the 95<sup>th</sup> percentile.

5           **DR. MAURO:** Now I understand. Now, a follow-up  
6           question.

7           **DR. NETON:** Sure.

8           **DR. MAURO:** Now, in one of the tables that you  
9           are providing you actually do have some records  
10          of external measurements. For example in 1948  
11          it looks like there were 162 personnel. I have  
12          it -- I'm looking at one if the tables you've  
13          provided. I'll just tell you what the numbers  
14          are. The -- There actually were measurements.

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

16          **DR. MAURO:** And there were 162 workers  
17          monitored in 1948. And the total number of  
18          records in 1948 for those workers were 3,599  
19          which is a lot of records. So there were a lot  
20          of records. Now, what I'd be interested in  
21          knowing, so okay, there's your real records.  
22          Now if I took the doses for those all 166  
23          workers and I just said, you know, here's --  
24          here's the dose in that year, 1948, here's the  
25          -- the highest dose for the highest person.

1 Second highest, third highest, you know, just -  
2 - just made a long list So here's -- here's -  
3 - if I just use the data for those -- and there  
4 -- by the way there were over 2,000 workers so  
5 what we're really saying is in 1948 there were  
6 2,511 workers. You had data in 1948 for 162 of  
7 them. And look, I'll show you --

8 **DR. NETON:** John, we're getting there. I --  
9 I've got that comparison.

10 **DR. MAURO:** Oh, is that where you're heading?

11 **DR. NETON:** I'm heading there.

12 **DR. MAURO:** I'm sorry.

13 **DR. NETON:** I'm heading there. I'm sorry. I'm  
14 sorry to have to be so -- but I think it's  
15 important to understand what we've done.

16 **DR. MAURO:** Okay.

17 **DR. NETON:** I hope you agree I mean because  
18 otherwise I mean we -- we -- we have no basis  
19 of comparison.

20 **DR. MAURO:** Okay.

21 **DR. NETON:** So we're going to -- we're going to  
22 assign this lot, okay, so you can read it.  
23 We're going to give them about 1,200 millirem  
24 with the distribution say for 1948. I think we  
25 all agree that seems to be a fairly generous

1 assignment of dose. The one other thing I just  
2 want to bring out because I don't want to get  
3 confused about these scaling factors. If a  
4 worker was monitored after '56 we have some  
5 additional knowledge that we don't have for  
6 people who were never monitored, right? I mean  
7 and so the scaling factor was built into the  
8 calculation to account for the fact that maybe  
9 a worker was at the high end of the exposure  
10 after '56. You can see there's a big spread of  
11 these black dots. What if he was the worker  
12 way to heck up here? So to account for that  
13 we'll say, well, if he's got five quarters of  
14 data here to show us that he's really at the  
15 higher end up in here we're going to scale his  
16 doses parallel to that red line and say it  
17 certainly goes up and it goes up proportionally  
18 and we're not going to under-assign him a dose  
19 prior to 1957. That -- That was the whole  
20 point of the scaling factors. If by definition  
21 though if you have no monitoring data at all  
22 before '57 your scaling factor is one because  
23 we've already decided that the highest exposed  
24 workers were monitored. He is not by  
25 definition one of these workers with the high -

1           - at the high end of the distribution. So that  
2           -- that's where we're at. Okay. Now, if you'd  
3           just -- there's a report here that George Kerr  
4           put together for us. It's called validation of  
5           backward extrapolation model. I'm sorry?

6           **DR. MAKHIJANI:** Can I ask you a question about  
7           that? In the '56 to '60 period some workers  
8           were monitored part of the time because some of  
9           the record in the evaluation report you  
10          indicate that people were taken off monitoring  
11          because they didn't have high doses or they  
12          were on monitoring -- they were put on  
13          monitoring so obviously it's varying so how --  
14          how do you deal in the scaling factor with the  
15          partially monitored?

16          **DR. NETON:** Right now my understanding -- my  
17          understanding of the procedure is that it's  
18          five quarters -- I think it's five quarters of  
19          monitoring data that you could use. But --  
20          But if it's not there then it would have to be  
21          -- there would have to be some judgment made.  
22          I mean, you know, we -- we --

23          **DR. MAKHIJANI:** Yes. You said that.

24          **DR. NETON:** We have clear-cut procedures but  
25          clearly the guy has a huge dose in 1958 and his

1           job title is the same and it goes back. We're  
2           going to -- We're going to make some -- some  
3           adjustment for that. But proceduralized right  
4           now it's five quarters. Okay. Let's move on  
5           to the next document that's entitled validation  
6           of back extrapolation model. And I'm not crazy  
7           about the term validation but maybe evaluation  
8           would be a better term. But given the data we  
9           have, if you'll look at the figure 1, after  
10          1957 we will assign, you know, we -- we have  
11          it. We have the data for the workers so we'll  
12          assign it. Prior to 1956 though what you see  
13          is a line that is equivalent to that red line  
14          on the other document. And the circles are the  
15          projected annual doses that we would assign to  
16          the workers for those years with unmonitored  
17          data. So you can see back around in 1958  
18          you're upwards around 1300 millirem per year.  
19          In 1951 you'd be right around a rem. So these  
20          are the -- these are the assigned deep doses  
21          for these workers who were unmonitored who in  
22          our opinion had lower exposures than the  
23          monitored workers. And remember this is based  
24          on an extrapolation of 147 workers including  
25          missed dose assigned to them. So that's --

1           that's what we assigned and -- and on top of  
2           this it's not shown but you would have a geo--  
3           it's not shown but you would have some kind of  
4           a geometric standard deviation about each of  
5           those points to account for the uncertainty of  
6           the backward extrapolation model. So you end  
7           up with some pretty high -- high -- you end up  
8           with a very high estimate and a geometric  
9           standard deviation about those values.

10          Has everybody got -- it's -- it's this page  
11          with the figure 1 and figure 2 on it.

12          **MS. MUNN:** Page 3?

13          **DR. NETON:** Right.

14          **MS. MUNN:** Right.

15          **DR. NETON:** The first one is deep dose. The  
16          second figure two is beta particles. So in an  
17          attempt to go back and look at the data that we  
18          have -- remember we have data prior to '57.  
19          We've looked at it. We -- We've acknowledged  
20          just earlier that there are issues with this  
21          data because of recording practices and  
22          whatnot. Notwithstanding those issues though,  
23          and remembering that after '51 all of the doses  
24          include missed dose by definition. Every time  
25          a person was monitored with zero they added 30

1 millirem so we've got -- what we have here is  
2 the projected line includes missed dose and now  
3 we're -- we're comparing it to values X factor  
4 '51 of people's doses that includes missed  
5 dose. And we just did a straight comparison of  
6 what the back extrapolation model would assign  
7 versus what we currently had in the database.  
8 And this -- this is the average value that's in  
9 the database.

10 **DR. MAURO:** So am I correct in interpreting  
11 that your extra-- extrapolation model provides  
12 a high level of ensurance that you're going to  
13 overestimate the mean dose in a given year for  
14 a given unmonitored worker?

15 **DR. NETON:** It is -- It is our opinion --

16 **DR. MAURO:** And I think we've never doubted  
17 that that -- that you overestimated -- I don't  
18 know. This is -- This is my opinion. You  
19 would always -- you would overestimate the mean  
20 dose, but it's always been our concern that  
21 there may be a population of workers -- sub-  
22 population of workers in the earlier years that  
23 that back extrapolation is going to be  
24 potentially underestimated for those workers.  
25 Now, granted, one of the discussions we had is



1           that that's going to be, you know, the vast  
2           majority of these thousands of workers are  
3           going to fall below the projected back  
4           extrapolation. That's true. And I think that  
5           that brings us -- you know, we're really in a  
6           site profile issue right now. So that brings  
7           us to the question is, are there substantial  
8           numbers of workers who are unmonitored in the  
9           early years that had a good likelihood of  
10          experience and exposures well above the values  
11          that were back extrapolated? No doubt that  
12          you've overestimated the mean for the  
13          population of workers. But the question is is  
14          this, you know, is this where you want -- where  
15          you want to be?

16         **MS. MUNN:** Is there any evidence --

17         **MR. KERR:** You can go to these means now and  
18         (inaudible) the monitored workers.

19         **MR. RUTHERFORD:** But the means are for the  
20         monitored workers?

21         **DR. NETON:** Yeah.

22         **MR. KERR:** The means that are shown down here  
23         at the bottom --

24         **MS. MUNN:** Right.

25         **MR. KERR:** -- are from the monitored workers.

1           **DR. MAURO:** Yes.

2           **DR. NETON:** Including the missed dose for the  
3           monitored workers.

4           **MR. KERR:** That's not unmonitored workers.  
5           That is the monitored workers.

6           **MR. RUTHERFORD:** So the only way you could come  
7           up with that is if you do not believe the  
8           maximum exposed people were monitored. That's  
9           the only way you can make that interpretation.

10          **MS. MUNN:** Has there ever been any evidence --

11          **DR. MAURO:** We have no evidence whatsoever of  
12          that. When you compare -- when you look --  
13          remember early on when we looked at the data  
14          from '61 on when everyone was monitored and we  
15          identified the maximum exposed people during  
16          that period. When we -- we went back in the  
17          earlier years those same people were the same  
18          maximum exposed people with the same max doses.  
19          So I think we've done that comparison already.

20          **DR. NETON:** Well, With some caveats.  
21          Be careful but --

22          **DR. MAURO:** There's a sim-- We're really --  
23          We're really right back I guess to where we  
24          started with in the population of workers that  
25          were all monitored. When those workers were

1           selected I am now convinced that two things  
2           happened. There was an effort absolutely to  
3           monitor the workers that had the high end  
4           exposures. There was also an effort to capture  
5           workers in a large number of different  
6           departments so there was like a little bit of  
7           both. A little bit of --

8           **DR. NETON:** Cohort worker.

9           **DR. MAURO:** But it wasn't all that. In other  
10          words, because there's no doubt that -- that  
11          the departments that have the higher exposures  
12          had a greater number of workers in the pot. So  
13          -- So it was a little bit of both. Now the  
14          question becomes when you look at the mean of  
15          all the numbers what we're really saying is you  
16          get the mean of all the numbers which reflects  
17          a chunk of people that were the departments  
18          that got higher exposures, but some people, a  
19          chunk of people that were in the departments  
20          that got low exposures. So when you roll the  
21          whole thing up what you get it an overall  
22          picture that would be a somewhat dilution of  
23          the exposures to the people that were in the  
24          high end departments. And that's -- But I see  
25          that as a site profile issue.

1           **DR. NETON:** I agree. I agree with you. But  
2           remember that this E-dose is a factor of almost  
3           two higher than the projected mean value of the  
4           distribution to begin with. We've already  
5           built into some conservatism on that level.

6           **DR. MAURO:** So that protects you from that.

7           **DR. NETON:** Well, we feel -- we feel strongly  
8           that that's the case.

9           **DR. MAURO:** Protects your position by doing  
10          that.

11          **DR. NETON:** Yeah.

12          **DR. MAURO:** Okay.

13          **DR. NETON:** And so --

14          **MR. RUTHERFORD:** I think your discussion on '48  
15          and '49 dose will even add. We already built  
16          in to some conservatism on that level.

17          **DR. MAURO:** Right. So that protects you.

18          **DR. NETON:** Well, we feel -- we feel strongly  
19          that that's the case.

20          **DR. MAURO:** That's your position, I mean by  
21          doing that. Yeah, okay.

22          **DR. NETON:** And so --

23          **MR. RUTHERFORD:** Well, back to your discussion  
24          on '48 and '49 those would even add more value  
25          to it.

1           **DR. NETON:** Well, '48 and '49 is way, way below  
2           as well. And that was based on some of the PIC  
3           data as well as the film badge data that George  
4           wrote a report on that we had talked about in  
5           the past. I just feel that, you know, you --  
6           you have a curve that is based on -- I don't  
7           know, on what -- our curve, our back  
8           extrapolation curve is based on including  
9           missed dose for the highest exposed worker --  
10          for the what we believe to be the highest  
11          exposed worker. We went back including that  
12          missed dose. And we used the 95<sup>th</sup> percentile  
13          of the -- of the same, jack it up by either a  
14          factor of two. And now we're comparing this to  
15          the monitored workers and they fall pretty well  
16          below that. And those monitored workers  
17          include, after '52, missed dose itself. So  
18          we're comparing a -- a huge missed dose  
19          overestimate to a missed dose overestimate of  
20          the actual workers and we're above that. I --  
21          I find that to be a pretty convincing scenario  
22          in my mind that we're not under-assigning doses  
23          to uranium workers in this facility. And in  
24          particular in light of the fact if we're saying  
25          that these cyclotron workers are not in here.

1           Now, if the cyclotron workers were in here I'd  
2           feel a little less comfortable --

3           **DR. MAURO:** Right.

4           **DR. NETON:** -- because we know that those were  
5           some very high exposures. I mean clearly very  
6           high. So you're talking about a uranium  
7           foundry, a facility. It's hard to imagine  
8           getting doses much higher than this in the  
9           workplace. Is there -- Is there a segment of  
10          population that was unmonitored? I -- I have  
11          trouble believing that that's true. Could it  
12          have happened? I can't say with 100 percent  
13          certainty that it didn't.

14          **DR. BEHLING:** To some extent I'm somewhat  
15          biased because I reviewed the Paducah TBD.

16          **DR. NETON:** Right.

17          **DR. BEHLING:** And they run a parallel path.  
18          Their conversion from partial monitoring to  
19          full monitoring occurred in exactly the time --  
20          time frame that occurred here. And -- And I  
21          looked at that data and they, too, expressed  
22          the opinion that the most or the highly exposed  
23          population was monitored prior to the  
24          conversion to whole monitoring. And then they  
25          actually had a couple documents that showed the

1 distribution of doses among people prior to  
2 that conversion and after and -- and they have  
3 distribution that says zero to one rem a year -  
4 -

5 **DR. NETON:** Yeah, I remember talking about  
6 that.

7 **DR. BEHLING:** -- to one to two rem and I  
8 believe the numbers go at a time when they  
9 monitored only 500-and-some odd workers they  
10 have 15 people in the one to two rem, the  
11 highest distribution. And then they converted  
12 to all monitoring workers that went from 500-  
13 some odd people to over 1,600, more than  
14 tripling the -- the original people monitored.  
15 And of course, the assumption now would have  
16 been that the people who weren't monitored, the  
17 additional 1,100 people would have fallen all  
18 into the low exposure category. And instead  
19 when you look at the people that went -- that  
20 were prior to that, 15 people who fell into the  
21 one to two rem among the 500, and then they  
22 went to 1,600 people monitored, they went from  
23 15 to 75. And you sort of say well, they don't  
24 -- it doesn't seem to -- to jive.

25 **DR. NETON:** I'd be careful, though,

1 interpreting that. I mean are we looking at  
2 missed dose issues here again?

3 **DR. BEHLING:** Yeah, I don't --

4 **DR. NETON:** Missed dose plays a huge part in  
5 these early dose reconstructions. You know,  
6 you've got 52 badges with a 30 millirem  
7 detection limit. Depends on whether you add  
8 the 50 in like they did in '53 or they did not,  
9 or was it, you know --

10 **DR. BEHLING:** I think there were quarterly  
11 doses and I don't think the issue of missed  
12 dose was part of that equation.

13 **DR. NETON:** Well, I don't know. I'd like to  
14 see it.

15 **DR. BEHLING:** Yeah. And -- And -- And it  
16 just struck me and so in that way I'm somewhat  
17 biased --

18 **DR. NETON:** Sure.

19 **DR. BEHLING:** -- in saying, okay, here we have  
20 Paducah and it's on a parallel path between  
21 partial monitoring of a workforce to full, and  
22 we have a distribution that in crude terms  
23 defined worker exposure between zero and one  
24 rem a year, one and two rem. And we went from  
25 15 people in the one to two rem representing a



1 total worker population monitored of 560. And  
2 then you add 1,100 new workers and -- and they  
3 should have all been in -- in the lower  
4 portion.

5 **DR. NETON:** Right.

6 **DR. BEHLING:** And instead you went from 15 to  
7 75, a five-fold increase. And that's what?

8 **DR. NETON:** Right. And that was at Paducah?

9 **DR. BEHLING:** That's correct.

10 **MS. MUNN:** But Hans, in the Paducah case you  
11 have evidence --

12 **DR. BEHLING:** Right. We have --

13 **MS. MUNN:** -- that there was a problem.

14 **DR. BEHLING:** Right.

15 **MS. MUNN:** In this case there is no evidence.

16 **DR. BEHLING:** No, I -- I understand that.

17 **MS. MUNN:** It's just --

18 **DR. BEHLING:** What I'm saying is that you could  
19 be -- I'm fully aware -- I think we're all  
20 assuming that the average dose is an inflated  
21 dose, that people are mostly going to get a  
22 generous assignment of the dose they probably  
23 didn't deserve. But as -- as John is saying,  
24 we're looking at it and it's just like the  
25 environmental protection. The reasonably

1 maximum exposed, he probably is a rare bird  
2 there's no question. But John's concern is  
3 that are there some potential people out there,  
4 a very few and who's to say if any of them even  
5 have a claim, that on a basis of your generous  
6 assignment would still be underestimated.  
7 That's the only issue.

8 **DR. NETON:** I -- I -- I understand.  
9 I understand what you're saying.

10 **MR. KERR:** As we handed out something or Jim  
11 did at an earlier meeting which re-looked into  
12 1961 group of workers, and we looked at --  
13 split that 1961 into two groups; ones who had  
14 been monitored before 1961, ones who hadn't.  
15 If you read that memo I don't think you'll find  
16 any evidence that there was a lot of workers  
17 before 1961 who were highly exposed that  
18 weren't being monitored. And if you haven't  
19 seen that I would advise you to get a copy and  
20 look at it.

21 **MR. GRIFFON:** We still have -- there is some  
22 caveats. I mean the salvage worker question is  
23 -- is one thing, right, the early amount.

24 **MR. RUTHERFORD:** Yeah. I think you addressed  
25 that separately though.

1           **DR. NETON:** Yeah, a salvage worker in my mind  
2           is -- is more of an internal dose issue than an  
3           external. I don't -- I don't have any believe  
4           to be that -- they were -- they were working  
5           with uranium.

6           **MR. GRIFFON:** Right. Yeah.

7           **DR. NETON:** And so, you know, I just don't see  
8           that there's a big difference.

9           **DR. MAURO:** We still haven't done this common  
10          sense thing that I've been --

11          **DR. NETON:** Okay.

12          **DR. MAURO:** I keep asking for and I don't know  
13          -- I don't know how much value it is. But in  
14          my mind it has value. Let me just -- Let me  
15          just point that out to you what it is.

16          **DR. NETON:** Sure.

17          **DR. MAURO:** And then, you know, sort of get it  
18          off my back. Okay. All I'm saying here is --  
19          is at this very nice table, I look at it and I  
20          got it to say oh, okay, in 1948 there were  
21          2,511 workers, okay --

22          **DR. NETON:** Uh-huh.

23          **DR. MAURO:** -- in Y-12. And we know that 162  
24          of them were monitored, okay? And these are  
25          the number of records we have. I guess these

1 are weekly records.

2 **DR. NETON:** Yes.

3 **DR. MAURO:** Okay. Now, are they good? Good.

4 **MR. GRIFFON:** Rank them highest to --

5 **DR. MAURO:** All right. So just do me a favor.  
6 Just take them high to low, all right? Forget  
7 about the distribution.

8 You may see -- you may see some high, three or  
9 four high numbers and you may see all zeros.  
10 Or if this is the -- whatever -- whatever it  
11 is, it is.

12 **DR. NETON:** Okay.

13 **DR. MAURO:** This is what the data say. Then  
14 along comes your extrapolation model.

15 **MR. RUTHERFORD:** See where it fits.

16 **DR. MAURO:** Where does it drop in?

17 **MR. RUTHERFORD:** I agree. I see what you're  
18 saying.

19 **DR. MAURO:** I mean I look at that and if I see  
20 a drop up in the 95<sup>th</sup> percentile of this  
21 distribution I say I don't -- I don't need to  
22 know any more. I'm -- I'm --

23 **DR. NETON:** Well, the average value here is  
24 around 200.

25 **DR. MAURO:** Right. Yeah, right.

1 DR. NETON: Okay. So --

2 DR. BEHLING: But he's wanting to check for any  
3 outliers to see how many outliers there may be?

4 DR. MAURO: Where does it sit? Do we have a  
5 whole bunch of people that were hired?

6 DR. NETON: Well, that may be but -- well, but  
7 -- well, but John because now --

8 DR. MAURO: Okay.

9 DR. NETON: -- now let's say we find one -- one  
10 person who was monitored that exceeds 1,500  
11 millirem.

12 DR. MAURO: Right.

13 DR. NETON: What are you going to do about  
14 that? Are you going to state that?

15 DR. MAURO: I just want to know it. I guess,  
16 no, here's where the judges --

17 DR. NETON: If he's monitored, see, now we --  
18 we maintain that the highest exposed people are  
19 monitored.

20 DR. MAURO: Right.

21 DR. NETON: Right. So my point is that just  
22 because there may be a few people over what  
23 we're assigning does not mean, you know, this -  
24 -

25 DR. MAURO: No. Remember -- Remember then we

1 go back to the conversation we had with Hans  
2 before. But we all agree that there were some  
3 departments where there may be a large number  
4 of people that -- that received substantial  
5 exposure but only a portion of them were  
6 actually selected for monitoring. There were --  
7 -- in other words, all the workers that had the  
8 potential for exposure in a given department  
9 were not monitored. So -- So -- So --

10 **DR. NETON:** But those workers were included in  
11 the distribution. I mean and the percentage  
12 would be included, you're right. Right.

13 **DR. MAURO:** But what I'm saying is that those --  
14 -- so here we have a worker that was not  
15 monitored, came out of a chem department where  
16 there was a high exposure but he wasn't  
17 monitored. Now -- but that department if you  
18 look at it, it was biased high by its very  
19 nature.

20 **DR. NETON:** Because it had a high exposure.

21 **DR. MAURO:** Do you see? You understand what  
22 I'm saying. Now, to me I say that problem goes  
23 away if you do this ranking. And I see that  
24 you're coming in at the high end. The  
25 extrapolation is bringing you in at the high --

1           and I'm not saying we're in the high end, but,  
2           you know, it shows that when you go back and  
3           extrapolate there are going to be very few  
4           people that will be high end. Now, we all know  
5           there's always going to be one or two are going  
6           to be higher than you in theory. The thing is  
7           where are we coming in? See that's what I call  
8           the common sense approach to looking at the  
9           data. And that would -- that would convince  
10          me. But I'll also say that what we're talking  
11          about now is a site profile issue because what  
12          I'm hearing is, unless I'm hearing differently,  
13          the data -- the question is being put to bed?

14         **MR. GRIFFON:** No.

15         **DR. MAURO:** No? Okay. Well, I -- that's what  
16          we should be --

17         **MR. GRIFFON:** It hasn't been. I mean that's  
18          what I'm saying. The first 60 -- 50 -- the  
19          first 56 right now, you know, hasn't.

20         **DR. MAURO:** Well, then that's what we should be  
21          talking about.

22         **MR. GRIFFON:** That's where we're at. I think  
23          the modeling is less an issue to me than the  
24          question of what we're -- what we're modeling  
25          with.

1           **MR. RUTHERFORD:** Yes.

2           **DR. NETON:** We're looking more to '57 to '60 --

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

4           **DR. NETON:** -- because '61 on everybody was  
5 monitored and so we should have data that we  
6 can do an -- easily a comparison with that.

7           **MR. GRIFFON:** Well, no, no, no.

8           **DR. NETON:** Okay.

9           **MR. GRIFFON:** '65 and I'm not saying, you know,  
10 I think these can help, physics reports for  
11 summary data. I don't know if they exist, Jim.  
12 I -- I agree with you there but, you know,  
13 it's just a -- a couple spot checks from that  
14 time period.

15           **DR. NETON:** Okay. I'm -- I'm -- I'm  
16 encouraged. I mean if that's where we're at I  
17 don't -- I don't --

18           **MR. GRIFFON:** I'm not trying to make a moving  
19 target out of this but really we are focusing  
20 on '57 for that time period of the SEC but  
21 really you're relying on the other and --

22           **DR. NETON:** Right.

23           **MR. GRIFFON:** -- quite frankly if we dig into  
24 the '57 through '65 period and see all these  
25 manipulations and maneuvers I'd be a little



1 more concerned.

2 **DR. NETON:** Yeah. I've learned -- I've learned  
3 my lesson. I'll never presume.

4 **MR. GRIFFON:** You've explained and -- and with  
5 good reasons and memos and good -- it seems  
6 like good -- you have a good trail --

7 **DR. NETON:** There's a -- There's a -- There's  
8 an explanation to what's been going on and I'm  
9 --

10 **MR. GRIFFON:** Right. But if that still exists  
11 afterwards -- you seem to think that that  
12 doesn't exist now and if we look and -- and we  
13 see problems still --

14 **DR. NETON:** I can't predict that there is not  
15 some new standard that occurred but --

16 **MR. GRIFFON:** Right. Right.

17 **DR. NETON:** So I'm encouraged. I mean if  
18 that's where we're at, that's fine. I mean we  
19 can -- we can go back and -- and look at the --

20 **MR. GRIFFON:** I mean I think that --

21 **DR. NETON:** -- the data that we have in '57  
22 through '65.

23 **MR. GRIFFON:** I think that's been my bigger  
24 concern throughout is the --

25 **DR. NETON:** I might have misunderstood that.

1           **MR. GRIFFON:** -- the data that we're using  
2           rather than the model itself, the data that the  
3           models rely on.

4           **DR. NETON:** Well, I think it was important  
5           though to establish that the model itself was  
6           bound.

7           **MR. GRIFFON:** Right. I agree.

8           **DR. NETON:** I think -- I think that's an  
9           important thing to demonstrate.

10          **MR. RUTHERFORD:** Well, I think once -- I think  
11          even if you end up tweaking it it's a site  
12          profile issue. It's not an SEC issue.

13          **DR. NETON:** That's been my belief for awhile.

14          **MR. RUTHERFORD:** Right.

15          **MR. GRIFFON:** Right.

16          **DR. NETON:** Right. Okay.

17          **MR. GRIFFON:** Well, but -- but the data, you  
18          know, we had to get there by looking at the  
19          data.

20          **DR. NETON:** Sure, absolutely. No problem.

21          **MR. GRIFFON:** George.

22          **MR. KERR:** The data that -- that John really  
23          wants is in a report on the '48/'49 --

24          **MR. GRIFFON:** It is.

25          **MR. KERR:** -- data.

1           **MR. GRIFFON:** Yeah.

2           **MR. KERR:** Because we give the maximum value  
3 that is recorded each month. It's not the 95<sup>th</sup>  
4 percentile. We give the 75<sup>th</sup> percentile but  
5 then we also give the maximum. So those --  
6 that data is available.

7           **DR. NETON:** There -- There -- Here's some of  
8 the data. '48 maximum -- July '48 was about  
9 300 millirem.

10          **MR. GRIFFON:** Where -- Where is this report?

11          **MR. KERR:** This is a report -- '47. Well, it's  
12 on --

13          **DR. MAURO:** This is -- Okay, this is in  
14 02/'47.

15          **DR. NETON:** It's been out since September of  
16 2005.

17          **MR. GRIFFON:** 02/'47, okay. Okay. So this is  
18 out there.

19          **DR. NETON:** It's been out there for awhile.  
20 And -- And it does -- it does have monthly  
21 statistics. And I'll tell you right now just  
22 at first when you look at this thing it looks  
23 like we're --

24          **DR. MAURO:** Well --

25          **DR. NETON:** I won't make any comment. Looks --

1 Looks pretty good to me.

2 **MR. GRIFFON:** Looks okay.

3 **DR. NETON:** Yeah. I don't -- I don't see that  
4 there is a --

5 **MR. GRIFFON:** Are those numbers in 02/'47  
6 derived from health physics reports or from  
7 where? Where are they --

8 **MR. KERR:** From that '48/'49 --

9 **DR. NETON:** Well, it's that '48/'49 data that  
10 as the film badge data that we talked about  
11 when, you know, Arjun was at one point saying,  
12 well, we said it wasn't valid two or three  
13 years ago or somebody did and then --

14 **MR. GRIFFON:** Right. So addressed that.

15 **DR. NETON:** The intent of that document was to  
16 go back and look at that to see if it could be  
17 used to do any kind of comparisons such as  
18 we're making. Actually I think the original  
19 intent to be honest may have been could we use  
20 these data to reconstruct doses.

21 **DR. MAURO:** Unh-unh.

22 **DR. NETON:** And I think we're not doing that  
23 now. We're just saying that in looking at the  
24 data there's enough information there that we  
25 can use to say that this 1,500 millirem that

1 we're projecting to assign is pretty darn good.  
2 And it's pretty bounding and and it's -- it's -  
3 - it's a plausible number.

4 **DR. MAURO:** I have to apologize. When I asked  
5 that question before, do we still have a date  
6 of that issue, I was thinking of about what  
7 George was saying.

8 **DR. NETON:** Yeah. Yeah.

9 **DR. MAURO:** What was the answer? I mean where  
10 are we on that?

11 **DR. NETON:** I agree and, you know, Mark says  
12 and it makes sense that we need to go back and  
13 look at after '57 and show that we don't have  
14 any disconnects there.

15 **DR. MAURO:** Got it.

16 **DR. NETON:** To the extent that we can.

17 **MR. GRIFFON:** But the model itself I think  
18 we're -- I mean we're -- we're I mean I think  
19 we're getting comfortable with it. And even if  
20 there's still some -- some smaller questions on  
21 it I think it's really a site profile issue.

22 **DR. NETON:** Yeah.

23 **MR. GRIFFON:** I don't know if everybody agrees  
24 but --

25 **MS. MUNN:** I just want to draw a box around

1 that. We're okay with the '52 through '57?

2 **MR. GRIFFON:** No, no. I mean we just got this  
3 stuff last night. It seems good as Jim  
4 presented it. It seems like they've got --

5 **MS. MUNN:** Well, okay.

6 **MR. GRIFFON:** What? What?

7 **DR. NETON:** No, no. I'm fine. That's fine.

8 **MR. GRIFFON:** I mean --

9 **DR. NETON:** No, no. I just -- I just -- I'm  
10 not --

11 **MR. GRIFFON:** You're looking at me funny.

12 **DR. NETON:** Well, I was going to say it seems  
13 sort of like I put some spin on it.

14 **MR. GRIFFON:** Well, there's a -- there's a --  
15 no, no, no. I'm not -- I'm not suggesting  
16 that but there is another problem. I mean you  
17 look at this at 11:00 o'clock at night. We  
18 don't have identified databases so I'm at a  
19 loss how to even compare, you know.

20 **DR. NETON:** My whole point --

21 **MR. GRIFFON:** This is an ongoing issue.

22 **DR. NETON:** My whole point is there are  
23 (inaudible) prior to '56 --

24 **MR. GRIFFON:** Yeah.

25 **DR. NETON:** -- and they're -- they're

1           understood and recognized. And given that  
2           though, and given that it's all missed dose it  
3           looks like we're up here, you know, well above  
4           where -- where we believe the workers were  
5           receiving dose.

6           **MS. MUNN:** It looks well above any probability.

7           **DR. NETON:** I think it's a very reasonable,  
8           plausible approach.

9           **MR. GRIFFON:** I think Arjun's been waiting to  
10          say something.

11          **DR. MAKHIJANI:** The back extrapolation and the  
12          modeling seemed okay I think, especially with  
13          the scaling factor and so forth so I think a  
14          lot -- the -- the crucial assumption is one of  
15          the things we've been debating and that was  
16          part of Harry's statistical analysis and in the  
17          review that we did last month, in appendix 3 of  
18          the review. And that revolves around  
19          interpretation of this table 45-B in your  
20          appendix of the evaluation report on page 33.

21          **DR. NETON:** Okay.

22          **DR. MAKHIJANI:** And, you know, if -- if you'll  
23          -- if you'll look at that table it's -- it's  
24          clear that in many of the departments if you  
25          define high exposure potential as high exposed

1           -- high mean exposure, what everybody was  
2           monitoring, and rank it that way as one  
3           approximate way of understanding which  
4           departments have the highest exposure --  
5           relatively high exposure potential compared to  
6           others. And you look at that table and it goes  
7           from 30 millirem average to 107 which is more  
8           than a factor of three. And then you look at  
9           the percentage of people who were monitored  
10          between '56 and '60. Do they correlate -- do  
11          the percentage of people increase? Were there  
12          consistent -- is there some consistent pattern  
13          in the monitoring even among the departments  
14          that are clustered at the high end, which is  
15          saying the 70 to 100-plus millirem dose. You  
16          don't find one. The --

17          **DR. NETON:** Well, I -- I don't have that table  
18          in front of me but the first table my -- that I  
19          saw in that comparison made no sense to me  
20          technically from a -- from a statistical  
21          perspective.

22          **DR. MAKHIJANI:** Which table?

23          **DR. NETON:** Well, are you talking about those  
24          tables that were generated, those graphs to  
25          show --



1 DR. MAURO: Figures 1, 2 and 3?

2 DR. NETON: Yeah.

3 DR. MAURO: I pulled those out. Yeah. Yeah.

4 DR. MAKHIJANI: Right. Because number 3 --  
5 number 3 seemed to support our case. Number 1  
6 didn't seem to be with merit because I saw no  
7 reason to believe the premise.

8 DR. NETON: Well, the workers who were low --  
9 the average exposure in workers prior to '56  
10 should be the same after '60. I think --

11 DR. MAKHIJANI: No, it's not '56. It's --  
12 It's -- It's not -- It's not a question of  
13 comparing the average exposure. It's a  
14 question of we simply did a correlation. Were  
15 -- Were those departments that had high  
16 exposures in the '61 to '65 period --

17 DR. NETON: Right.

18 DR. MAKHIJANI: -- also tending to have the  
19 relatively high exposures in the earlier  
20 period?

21 DR. NETON: Is this figure -- Is this figure  
22 1?

23 DR. MAKHIJANI: This is figure 1.

24 DR. NETON: Okay.

25 DR. MAKHIJANI: It's not the horizontal and

1 vertical axes are not on the same sphere.

2 **DR. NETON:** I understand.

3 **DR. MAKHIJANI:** And you're not required to have  
4 a slope of one. You're only required to have a  
5 relatively strong positive correlation between  
6 high values and high values regardless of what  
7 those high values actually are.

8 **DR. NETON:** But my question on that graph was  
9 what if the department had 1,000 people in it  
10 and they monitored one. You're going to dilute  
11 it and have a low exposure that after '61 it  
12 makes no sense to me, that comparison.

13 **DR. MAKHIJANI:** That -- That's exact-- That's  
14 part of the point -- well, there's another  
15 graph, of course, that we did.

16 **DR. NETON:** Well, figure 2 I'll grant you. But  
17 figure 1 makes no -- no technical sense to me  
18 why that comparison is a valid --

19 **DR. MAKHIJANI:** Well, it -- it -- it allows you  
20 to determine whether there is a correlation  
21 between the -- the departments that indicate  
22 high -- the doses that were indicated as  
23 relatively high in the department --

24 **DR. NETON:** Only if the departments all have  
25 the same number of workers. If you have

1 different number of workers by department  
2 you're going to dilute the dose way down. It  
3 makes no sense to me what you're doing.

4 **DR. MAKHIJANI:** No, but if -- if -- if your  
5 premise is correct that in the '56 to '60  
6 period that all of the monitored workers have  
7 the highest exposure potential clearly the  
8 average in those departments -- first of all  
9 the average in those departments for the '56 to  
10 '60 period should be higher than the average in  
11 the '61 to '65 period and that is clearly not  
12 the case. I will give you -- I will read you  
13 an example. The -- The --

14 **DR. NETON:** I don't have it in front of me.

15 **DR. MAKHIJANI:** Look. Department 2162, 50  
16 workers, average 17.1, 36 percent monitored.  
17 The average post when everybody was monitored,  
18 47.6.

19 **DR. NETON:** But --

20 **DR. MAKHIJANI:** Wait. I'll give you one with a  
21 lot of workers. Department 2776, 8.9 percent  
22 of the quarters were monitored. The mean dose  
23 was 20.6 when they partial monitored but the  
24 mean dose when there was universal monitoring  
25 was 90.7. That -- That -- That contradicts

1           the case that the people in the earlier  
2           periods, that's why that correlation is  
3           important is indicates that in some departments  
4           that had high exposure potential you had a lot  
5           of monitoring and in others you didn't. So,  
6           you know, your premise actually was indicated  
7           to not be correct.

8           **DR. NETON:** But I would argue that the doses  
9           that you're quoting there are well below the  
10          detectible doses of the badge exchanges. So  
11          you're really in a statistical wheeze, Arjun.  
12          There is no way that you can validly compare  
13          doses that are 100 millirem when you've got a  
14          badge that -- that reads 30 millirem and is  
15          exchanged weekly. It makes no sense.

16          **DR. MAKHIJANI:** Well, quarterly dose is only  
17          20.

18          **DR. NETON:** But my point is that you -- you've  
19          got built in there a lot of statistical issues  
20          with detectability of the radiation itself.  
21          You're comparing -- if you put air bars on  
22          those comparisons I guarantee you they're going  
23          to be like this. (Indicating.) They make no  
24          statistical sense at all to me. I could do  
25          this. I could go back and show that. But what

1 I'm saying is you're looking below the  
2 detectability of the measurement systems  
3 themselves and trying to make comparisons at  
4 zero.

5 **DR. MAKHIJANI:** Those were the data that you're  
6 using and including in your 147 workers.

7 **DR. NETON:** No, they were --

8 **DR. MAKHIJANI:** You are using -- you are using  
9 data from workers who were monitored in the '56  
10 -- that's the piece -- that's the only piece  
11 that really concerns me in this --

12 **DR. NETON:** Right.

13 **DR. MAKHIJANI:** -- is this piece.

14 **DR. NETON:** Right.

15 **DR. MAKHIJANI:** Is your -- There's -- To me  
16 as I look at this information both in regard to  
17 proportion of people who are monitored in the  
18 various departments and -- and the average  
19 doses that are indicated here is that there's a  
20 very mixed bag as regards who was being  
21 monitored in the '56 to '60 period.

22 **DR. NETON:** I don't think that that analysis  
23 says that at all. I think you've -- you've got  
24 statistical issues with what you've been  
25 comparing. We compared the highest exposed

1 workers who had really high doses and the  
2 highest exposed workers continued to be the  
3 highest exposed workers across the -- the  
4 graph. So you're -- you're up there in the  
5 level of doses that are meaningful  
6 statistically. You're comparing doses of  
7 workers who could have received, who knows?  
8 Again like I said, 30 millirem per badge  
9 exchange, 50 weeks, you've got a potential dose  
10 per worker of 1.5 rem, and you're comparing 20  
11 millirem averages. It's -- It's not a valid  
12 comparison I don't think. I think if you put  
13 air bars on there you can't come to any -- any  
14 valid comparison there. I mean it's a good  
15 statistical analysis but I think that they did  
16 not understand the limitations of the  
17 measurement devices that were used when they  
18 did the analysis. That's my opinion.

19 **DR. MAKHIJANI:** Why, when 90. -- let -- let's  
20 just take -- if -- if that -- and I'm quite  
21 open to not seeing this right. And I looked at  
22 this as much as you have obviously.

23 **DR. NETON:** Yeah.

24 **DR. MAKHIJANI:** Let's if we can -- if we can  
25 just understand this one department, 2776.

1           1,137 workers; number of monitored quarters  
2           with 8.9 percent. The mean dose in the '56 to  
3           '60 period per quarter is 20.6 millirem. Same  
4           department with the universal monitoring was  
5           90.7 millirem. All right. Now, in the second  
6           period it clearly had an above detectable dose  
7           --

8           **DR. NETON:** But the average --

9           **DR. MAKHIJANI:** -- of 90.7.

10          **DR. NETON:** But it's built up of a bunch of  
11          numbers that -- that aren't above the  
12          statistical --

13          **DR. MAKHIJANI:** But a lot of people had to have  
14          --

15          **MR. GRIFFON:** Maybe they just built up because  
16          the LOD was assigned --

17          **DR. NETON:** Exactly. What I'm saying --

18          **MR. GRIFFON:** -- Zeros assigned --

19          **DR. MAKHIJANI:** A lot of people had to have  
20          doses above 30 millirem in order to make up  
21          this average as 90. If the limit of detection  
22          is 30 --

23          **DR. NETON:** Right.

24          **DR. MAKHIJANI:** -- it couldn't be that 70  
25          percent of the people were assigned 30 and

1           you're coming up with an average of 90 because  
2           then you've got some very, very high exposed  
3           people.

4           **DR. NETON:** But the point is, Arjun, you're  
5           assigning missed dose to all those workers that  
6           are now monitored. That's my point. You're  
7           giving all those workers who didn't receive --

8           **DR. MAKHIJANI:** That's just 30 millirem per  
9           badge exchange per quarter.

10          **DR. NETON:** Times 13 is 400 millirem.

11          **MR. GRIFFON:** Six months or?

12          **DR. NETON:** These are per quarter doses.

13          **DR. BEHLING:** These are quarterly doses.

14          **DR. MAKHIJANI:** These are quarterly doses.

15          **DR. NETON:** Right. But what I'm saying though  
16          is the 90 millirem quarterly dose includes a  
17          lot of missed dose.

18          **DR. MAKHIJANI:** But only 30 millirem.

19          **DR. NETON:** For more workers though. You've  
20          added a lot more workers --

21          **DR. MAKHIJANI:** But not the early ones.

22          **DR. NETON:** -- (Inaudible) positive --

23          **DR. MAKHIJANI:** -- relevant in the average.

24          The -- The -- If you -- If you have an  
25          average of 90 millirem you have to have a very



1 significant number of workers --

2 **DR. NETON:** No.

3 **DR. MAKHIJANI:** -- who have above --

4 **DR. NETON:** No.

5 **DR. MAKHIJANI:** Please hear me out. Now, if  
6 you have an average of 90 millirem in a group  
7 of workers and the limit of detection is 30  
8 then you're going to have a large number of  
9 workers who have had doses above the limit of  
10 detection. And then you can't come up with an  
11 average of 90 unless you have real -- a few  
12 real outliers --

13 **DR. NETON:** Okay. Let me -- Let me --

14 **DR. MAKHIJANI:** -- which I'm excluding.

15 **DR. NETON:** Let me see if I understood what the  
16 comparison was. Prior to '56/'57, eight  
17 percent of the workers are monitored or  
18 something like that. So I have badge results  
19 for those and I'm assigning them missed dose or  
20 whatever to come up with my average but I'm  
21 dividing that value by the entire work  
22 population --

23 **DR. MAKHIJANI:** No, no.

24 **MR. GRIFFON:** No, no. No. Workers.

25 **DR. NETON:** I divide it by the monitored

1 workers?

2 **DR. MAKHIJANI:** Yes.

3 **DR. NETON:** Well, then that makes the  
4 comparison --

5 **DR. MAKHIJANI:** This is the mean dose -- this  
6 is the mean dose for -- for monitored workers.  
7 It would make no sense to divide it by average.

8 **DR. BEHLING:** They should go down. In  
9 principle they should go down.

10 **DR. NETON:** But not if you're measuring 1,100  
11 workers and assigning them all missed dose.

12 **DR. BEHLING:** No.

13 **MR. GRIFFON:** Let me make a -- can I make a --

14 **DR. NETON:** I know. They monitored everybody  
15 after --

16 **MR. GRIFFON:** Can I make a suggestion here?  
17 Hold on. Hold on. Let's -- it might be a good  
18 time for a ten-minute break?

19 **DR. MAKHIJANI:** Okay.

20 **MR. GRIFFON:** And during the break maybe Jim  
21 can look at -- do you have this tape on file?

22 **DR. MAKHIJANI:** No, I don't have it.

23 **MR. GRIFFON:** Maybe let's take ten and let Jim  
24 look at this table during the break with Arjun  
25 and we'll come back and --

1 (Whereupon, a recess was held from 11:05 a.m.  
2 to 11:20 a.m.)

3 **MR. PRESLEY:** Hey, Mark.

4 **MR. GRIFFON:** Yeah.

5 **MR. PRESLEY:** I'm on the line. It's Bob.

6 **MR. GRIFFON:** Hi, Bob.

7 **MS. MUNN:** Good. How are you feeling?

8 **MR. GRIFFON:** Yeah, how are you doing?

9 **MR. PRESLEY:** Much better.

10 **MS. MUNN:** Good.

11 **MR. GRIFFON:** That's good.

12 **MS. MUNN:** Great.

13 **MR. PRESLEY:** I'm on for about 30/45 minutes.

14 **MS. MUNN:** Are you behaving yourself?

15 **MR. PRESLEY:** Yes, ma'am. I'm sitting here  
16 laying back with my feet up in a chair.

17 **MS. MUNN:** Good.

18 **MR. PRESLEY:** Like to never found a telephone  
19 up here to use.

20 **DR. WADE:** I appreciate that. Bob, this is  
21 Lew. You understand that you're conflicted on  
22 Y-12. You're certainly welcome to stay on the  
23 line and listen to the discussion.

24 **MR. PRESLEY:** I would love to.

25 **DR. WADE:** Thank you.

1           **MR. GRIFFON:** Okay. Jim, I think I want to  
2 just, you know, let's -- let's try to wrap this  
3 issue and discussion up and see what we have  
4 remaining.

5           **DR. NETON:** I just have one -- one comment. In  
6 the interim during the break we were able to  
7 pull out a piece of documentation on the  
8 particular department number that Arjun was  
9 talking about, department 2776. And it looks  
10 for a two-year period here starting in '58 they  
11 were removed from the program completely, from  
12 monitoring. So that may --

13           **MR. GRIFFON:** Two year? Two year?

14           **DR. NETON:** I think it's starting in '58.

15           **DR. MAKHIJANI:** April of '58.

16           **DR. NETON:** April of '58 through '60. They  
17 were taken off the monitoring program  
18 completely because they didn't feel the workers  
19 had sufficiently high exposures. Anyway, that  
20 -- that's something we can probably talk about  
21 when we -- when we look through that particular  
22 example that Arjun raised.

23           **MR. GRIFFON:** Yeah, okay. And during the break  
24 we did have some discussion on these particular  
25 tables. We -- We needed an opportunity to let

1 Jim see which tables SC&A was looking at and  
2 vice versa so -- but I did want to try to at  
3 least get a path forward here. And I think my  
4 sense is that number one is a remaining  
5 question on data -- data reliability, '57  
6 through '65 if NIOSH can find, you know --  
7 support that case a little better I think that  
8 would be useful. I think the work group and  
9 SC&A still have to digest the information you  
10 provided for that '52 through '57 period as far  
11 as data validation goes but it looks like you  
12 have a fair -- fair amount of data there. I  
13 mean, you know, that looks like a good, strong  
14 case for that data although many twists and  
15 turns with some of these memos that I was  
16 reading. But at least there's some information  
17 there. But I can -- SC&A and the work group  
18 need a chance to look at that a little more.  
19 And then on the model part I think nothing  
20 remains as far as NIOSH analysis but I think  
21 SC&A wants to -- to further look at the tables  
22 in the evaluation report and I would say  
23 compare it to -- to the previous reports that  
24 George has provided on looking at the maximum  
25 exposed workers pre and post-'61 is the -- is

1           how the analysis is laid out.

2           **DR. NETON:** Right.

3           **MR. GRIFFON:** And I mean I think many of us  
4           feel that -- that what from the model  
5           standpoint, what to -- if anything it being a  
6           site profile issue more than an SEC issue. But  
7           I think we want to cross the T, dot the I on  
8           that issue. And I think we're -- we're close  
9           to that but, you know.

10          **DR. NETON:** Well, I still, you know -- we've --  
11          we've been at this juncture for awhile and I  
12          guess I still point out that if it's coming  
13          down to the situation where SC&A and the  
14          Advisory -- the working group is not  
15          comfortable assigning the geometric mean of the  
16          back extrapolated distribution then it's a  
17          matter of how much that is tweaked to cover the  
18          maximum exposed worker I think. And if that's  
19          the situation we're at then to me that -- that  
20          doesn't bear on the SEC process and, you know -  
21          -

22          **MR. GRIFFON:** And I think the final resolution  
23          is -- is are we -- are we convinced at least in  
24          -- in large part the highest exposed workers  
25          were monitored. And some of these -- this

1 table raises some questions I think that we  
2 need to at least explore a little further. I  
3 mean I think we've been pretty convinced.  
4 You've pointed out some pretty good arguments  
5 that that is the case.

6 **DR. NETON:** Right.

7 **MR. GRIFFON:** I think we need to just close that  
8 and then we're -- I'm -- I'm speaking for  
9 myself anyway, if that's closed then -- the --  
10 the regression analysis, that piece of it, it  
11 looks okay.

12 **DR. NETON:** Okay.

13 **MR. GRIFFON:** All right.

14 **DR. NETON:** I agree with that.

15 **MR. GRIFFON:** So --

16 **DR. NETON:** All right.

17 **MR. GRIFFON:** I agree with that.

18 **MS. MUNN:** Yeah, I want -- I have two questions  
19 that I'd like to ask you. If we come to the  
20 conclusion that some of the issues reveal that  
21 there are not necessarily applicable to the SEC  
22 but are site profile issues, are we simply  
23 postponing dealing with this? Does it come  
24 back to us?

25 **MR. GRIFFON:** Well, we still -- we have a lot

1 of site profile matrix issues from -- from --

2 **MS. MUNN:** I understand.

3 **MR. GRIFFON:** Right. So we -- we would be --  
4 it's not -- I mean I guess it's -- it's just a  
5 timing thing. We're trying to make as quick of  
6 a determination on the SEC petition as we can.  
7 So if we feel that they have enough information  
8 to maximum plausible doses then we don't need  
9 to go any further for this SEC closeout  
10 process. That's my opinion, Jim. Is that --  
11 so we are -- we are putting it aside for the  
12 meantime only because we wanted to --

13 **MS. MUNN:** But --

14 **MR. GRIFFON:** Yeah.

15 **MS. MUNN:** It comes back.

16 **MR. GRIFFON:** It -- It could come back. But  
17 it could -- it could be that John and -- and  
18 Arjun and -- and the SC&A folks and -- and the  
19 work group say, you know, the regression  
20 amounts looks good the way it is and we can  
21 close it up completely. I don't know. But I  
22 think -- I think we want to at least get to the  
23 point where we can say, you know, this -- this  
24 really -- we're not completely sure but we're  
25 pretty -- we're sure it's not an SEC issue.



1           Let's put it over here as a potential site  
2           profile issue and, you know.

3           **MS. MUNN:** Okay. One other point of  
4           clarification. Now, are there going to be  
5           additional -- in your mind are there going to  
6           be additional years following the '65 time  
7           frame where we're going to feel any -- to be  
8           reviewing the data in the same manner that  
9           we've done to this point?

10          **MR. GRIFFON:** The data reliability questions?

11          **MS. MUNN:** Yes.

12          **MR. GRIFFON:** I mean I think since the model --  
13          the co-worker models used that period -- up to  
14          '65, correct? So I would say, you know, that's  
15          the primary period of interest would be the SEC  
16          period but also to work the modeling period.

17          **DR. NETON:** Co-worker model after '61 is really  
18          the distribu-- well, after '57 is the  
19          distributions, the -- the normal distributions  
20          by year --

21          **MR. GRIFFON:** By year.

22          **DR. NETON:** -- of themselves. No extrapolation  
23          is --

24          **MR. GRIFFON:** Right.

25          **DR. NETON:** It's a traditional co-worker model

1 much as you see at other sites.

2 **MR. GRIFFON:** Right.

3 **DR. NETON:** Because at that point we have  
4 confidence that they do fit lognormal  
5 distributions and something can be done with  
6 them.

7 **MR. GRIFFON:** And that's after what year?

8 **DR. NETON:** After '57 -- '56. Starting in '57  
9 we have AAFC and the frequency charts that Hans  
10 has with him from report 32, the data appear to  
11 fit very nicely what you'd call normal --

12 traditional lognormal distributions. And so  
13 then you would be assigned either the geometric  
14 mean or the 95<sup>th</sup> percentile depending upon --

15 **MR. GRIFFON:** The co-worker back extrapolation  
16 relies on what period of monitoring data?

17 **DR. NETON:** '50-- last quarter '56 through '65.

18 **MR. GRIFFON:** Okay. So that -- I think that's  
19 --

20 **DR. NETON:** That's what --

21 **MR. GRIFFON:** That's the interest. That's the  
22 primary interest.

23 **DR. NETON:** Right. But -- But again I would  
24 point out that the back extrapolation model is  
25 based on this 147 workers. I think really

1           that's where the emphasis needs to be placed.  
2           Out of those 147 workers representative of the  
3           maximum exposed workers in that time period.  
4           And if they are then the model --

5           **MR. GRIFFON:** Well, then is -- But if that's  
6           the modeling side then the data reliability  
7           side is --

8           **DR. NETON:** Different issues.

9           **MR. GRIFFON:** -- data reliability.

10          **DR. NETON:** Now, the department issue that  
11          Arjun has raised again, maybe those 147 workers  
12          need to be looked at in that light. Do you  
13          know what I'm saying?

14          **MR. GRIFFON:** Yeah.

15          **DR. NETON:** Because we -- we relied on a very  
16          select subset of workers to develop that model  
17          and -- and they're the crux of the model. If -  
18          - If -- If we can convince folks that the  
19          model used people who were in the maximally  
20          exposed categories then I think we're okay.

21          **MR. GRIFFON:** That part goes away, right. I  
22          agree.

23          **DR. NETON:** So --

24          **MR. GRIFFON:** Then it becomes mainly a data  
25          reliability issue.

1           **DR. NETON:** Right.

2           **MR. GRIFFON:** Which is I think where we're --  
3           where we're -- we're real close to that.

4           **DR. NETON:** yeah. And it's data reliability  
5           '57 --

6           **MR. GRIFFON:** '57 to '65. And give us -- give  
7           the Board -- the work group and -- and SC&A an  
8           opportunity to look at your '52 through '57  
9           stuff that you've provided.

10          **DR. NETON:** Yeah. And again, that's getting  
11          close, but again one needs to look at the  
12          context of the projected curve versus, you  
13          know, what we can glean from that data.

14          **DR. MAKHIJANI:** Jim, do you have the  
15          departmental breakdown of the 147 workers?  
16          That might make this job a lot simpler.

17          **DR. NETON:** I agree.

18          **DR. MAKHIJANI:** Compare that to the --

19          **MR. KERR:** We have work descriptions. Those  
20          you already have.

21          **MR. GRIFFON:** Yeah, we've -- we've been given  
22          that.

23          **DR. MAKHIJANI:** But do we have the -- we have -  
24          -

25          **DR. NETON:** You have the worker num-- worker

1 ID's and those department numbers are listed in  
2 the database so you should --

3 **DR. MAKHIJANI:** Oh, so I could go back and --

4 **DR. NETON:** I don't know. I think --

5 **MR. KERR:** You asked -- You asked previously  
6 for job descriptions.

7 **DR. MAKHIJANI:** Yeah.

8 **MR. KERR:** But what you asked for -- and you  
9 got a breakdown in terms of job descriptions.

10 **DR. MAKHIJANI:** Right.

11 **MR. KERR:** And you realize most of them are  
12 uranium workers.

13 **DR. MAKHIJANI:** Right.

14 **MR. KERR:** They're machine shop worker, workers  
15 and special workers. Makes up almost the whole  
16 147.

17 **DR. MAKHIJANI:** Right.

18 **MS. MUNN:** Are you saying now we want to plot  
19 them another way?

20 **DR. MAKHIJANI:** In this context because, well,  
21 this issue didn't arise earlier because we  
22 didn't have the evaluation report. But the  
23 analysis that we've done subsequent to that  
24 publication was off the evaluation report where  
25 the doses are broken out by department number.

1           **MS. MUNN:** Right.

2           **DR. MAKHIJANI:** And so the question about were  
3 the highest people mon-- the potential exposure  
4 people monitored arose in the departmental  
5 context only because we saw that table and --

6           **MS. MUNN:** Sure.

7           **DR. MAKHIJANI:** -- realized it. We can have  
8 that breakdown or we could simply go to the  
9 table and it might become -- I think -- I think  
10 LaVon -- LaVon --

11          **DR. NETON:** Yeah, I think we can do that.

12          **DR. MAKHIJANI:** Okay.

13          **DR. NETON:** My -- My -- My real question is -  
14 - looking through the O-drive recently I -- I  
15 saw -- there's a spreadsheet, a list of the 147  
16 ID numbers I think so maybe --

17          **MR. GRIFFON:** I think that's in -- I've seen --

18          **DR. NETON:** But -- But it doesn't have --

19          **MR. GRIFFON:** -- I know I have --

20          **DR. NETON:** -- department codes but that's  
21 tractable through the -- the database which --

22          **MR. GRIFFON:** Which gets us back to the  
23 database. I think -- I think that's the only  
24 other thing I would ask for from NIOSH's side  
25 is if we can once and for all get the Y-12

1 access databases iden-- identified data. I  
2 mean it -- it -- it would just make this so  
3 much easier to -- to --

4 **DR. NETON:** Well, we've given you the access  
5 database for all the years we're working with,  
6 I think through '65 now.

7 **MR. GRIFFON:** Through '65, right but no  
8 identifiers.

9 **DR. NETON:** Well, it's got ID number.

10 **MR. GRIFFON:** Doesn't have --

11 **DR. NETON:** You can't -- You can't track it to  
12 a case number.

13 **MR. GRIFFON:** We can't track it to like these  
14 names, this list of names that you have, things  
15 like that. Just to spot check to get comfort  
16 with this data you've just provided in -- in  
17 real time. I think it would be much easier.

18 **DR. NETON:** Just to insert the identifier in  
19 the database?

20 **MR. GRIFFON:** Yeah. I mean you, you know, for  
21 the people extracted from there.

22 **DR. NETON:** Yeah, sure. I think we can do  
23 that. It's just the whole database --

24 **MR. GRIFFON:** I'm not trying to create work  
25 either.

1           **DR. NETON:** No, no, no, no.

2           **MR. GRIFFON:** I think it probably exists, you  
3 know, and --

4           **DR. NETON:** Yeah, I think -- I think we can do  
5 that.

6           **MR. GRIFFON:** I don't want to make work.

7           **DR. NETON:** Yeah. The -- The -- It's not a  
8 real reluctance on our part to provide the  
9 whole database but if it's a sequel database  
10 and you have to download these tables to  
11 convert them to Access, it's virtually  
12 impossible I've been told to make that entire  
13 sequel database, which is a relational  
14 database, into Access tables that are useable.  
15 You almost -- these Access ta-- database --  
16 files almost are the result of queries of this  
17 huge database which the data may be all over  
18 the place. You know what I'm saying?

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

20           **DR. NETON:** A relational database has, you  
21 know, many, many, many tables and key field  
22 indices. So what may appear to be very simple  
23 -- here's the year-end data, here's the guy's  
24 name -- may have actually been pulled from a  
25 number of different locations from a sequel



1 frame which only runs on, you know, several  
2 sequels.

3 **MR. GRIFFON:** So when Bill Tankersley did those  
4 comparisons he probably was using a sequel  
5 database directly?

6 **DR. NETON:** I don't know. Well, he can pull,  
7 you know -- he can ask their -- their computer  
8 people to give me -- give me, you know. It's  
9 very much like the database. You know, we have  
10 all kinds of stuff in there but to get an  
11 answer, how many people were working between  
12 19-- you know.

13 **MR. GRIFFON:** I understand.

14 **DR. NETON:** It takes some programming.

15 **MR. GRIFFON:** I mean I'm not trying to create  
16 additional work. I was thinking, well, it's  
17 probably a product that's --

18 **DR. NETON:** But the answer to your original  
19 question is can we put identified information  
20 in there.

21 **MR. GRIFFON:** Okay.

22 **DR. NETON:** I don't see why we shouldn't be  
23 able to.

24 **MR. GRIFFON:** All right. And -- And put a  
25 urinalysis in. You know, might as well do both

1 of them.

2 **DR. NETON:** Okay.

3 **MR. GRIFFON:** So is there any other -- other --  
4 other things on issue one? Do you still have  
5 stuff on issue one?

6 **DR. NETON:** No. No.

7 **MR. GRIFFON:** No?

8 **DR. NETON:** No, I --

9 **MR. GRIFFON:** The last little bit, maybe just  
10 as a -- from a presentation standpoint, because  
11 we really do need to move through the other  
12 seven issues. Do you -- can you give us a  
13 sense of some of these memos that you sent last  
14 night? Particularly there was one on the --

15 **DR. NETON:** Yeah.

16 **MR. GRIFFON:** -- I thought they indicated that  
17 --

18 **DR. NETON:** Yeah.

19 **MR. GRIFFON:** -- there's some analysis they --

20 **DR. NETON:** 1954.

21 **MR. GRIFFON:** -- had done and that was  
22 transposed and they put the penetrating in the  
23 skin and vice versa.

24 **DR. NETON:** Yeah. Actually ORAU discovered --

25 **MR. GRIFFON:** I'm not sure how they got there

1 but --

2 **DR. NETON:** ORAU discovered it after they took  
3 receipt of the electronic data for study --

4 **MR. GRIFFON:** Yeah.

5 **DR. NETON:** -- that the 1954 penetrating doses  
6 appeared to be inordinately high compared to  
7 the bracketing years '52 and '53 and '55. And  
8 on investigation they -- they worked with Hap  
9 West who was -- many of you maybe know was a  
10 long-time HP at the site and ran the program  
11 for awhile. He's since deceased. But they  
12 determined from several different avenues that  
13 the -- the data would transpose for penetrating  
14 and shallow in 1954. So they went and redid  
15 the database to match what they believed to be  
16 the truth for that year. And so the CER  
17 database then, which is -- actually the Y-12  
18 database would have been updated and then the  
19 CER database would have followed -- was  
20 changed.

21 **MR. GRIFFON:** I think that how they got there  
22 was the part I was -- and skimming this over  
23 last night --

24 **DR. NETON:** Well, you know, I skimmed -- I  
25 didn't read that report real closely either.

1           **MR. GRIFFON:** But I mean it was clear to me  
2           early on he said that he was unable to find raw  
3           records so they had to I think he said tap his  
4           own memory and others that worked in that time  
5           period and --

6           **DR. NETON:** So there are some, you know --

7           **MR. GRIFFON:** All right. We'll leave -- I mean  
8           I think we should look at that memo but just as  
9           a follow-up on the other -- other question --

10          **DR. NETON:** The other memos spoke to beta, you  
11          know, the data up here in the beta gamma  
12          column. And there's an instruction to the --  
13          and that just sort of validates this IBM  
14          keypunch thing that we were talking about that  
15          the IBM cards only had a column for beta gamma  
16          prior to '55 actually. And they -- they were  
17          instructing them to create a new column, one  
18          for gamma and one for beta, and there was some  
19          instruction and actually a list of workers who  
20          they believe the beta -- gamma exposures should  
21          be pulled out of the beta column and moved into  
22          the gamma field. But it was pretty much based  
23          on their work assignment, work location as best  
24          --

25          **MR. GRIFFON:** And that memo had a list of --

1           **DR. NETON:** Workers.

2           **MR. GRIFFON:** -- the guys' numbers or I think  
3           it --

4           **DR. NETON:** It was workers, the Social Security  
5           numbers.

6           **MS. MUNN:** Worker names and --

7           **DR. NETON:** The Social Security numbers, right.

8           **MR. GRIFFON:** So those'll be in the  
9           (inaudible).

10          **DR. NETON:** Right.

11          **MR. GRIFFON:** Okay. It might be interesting to  
12          look at the --

13          **DR. NETON:** Right.

14          **MR. GRIFFON:** Well, I think year is by  
15          department?

16          **DR. NETON:** Right. And then -- then there were  
17          other instructions of memos in there about how  
18          they wanted to see the data for certain years  
19          like, oh, there was a recollection by Hap West  
20          of the years as to what monitoring practices  
21          were in places and how -- the recording  
22          practices in particular. This is where I got  
23          the information for '50, '51. They didn't put  
24          any -- they put all zeros. Starting in '52  
25          they recorded missed dose and, you know, and it

1 goes up through the '60s. So --

2 **MR. GRIFFON:** In spite of --

3 **MR. KERR:** In --

4 **MR. GRIFFON:** Sorry.

5 **MR. KERR:** I was going to say something on --  
6 in one of those memos which is getting -- it  
7 was a '57 memo where they're getting ready for  
8 '58, where you need to know cumulative exposure  
9 --

10 **MR. GRIFFON:** Right.

11 **MR. KERR:** -- and you need to ensure that it  
12 didn't exceed so much per year and according to  
13 worker's age. They tell you how they got --  
14 how they went back and summed, you know, the  
15 doses.

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

17 **MR. KERR:** And if you'll see the ratio they  
18 used it was the number of badges over the  
19 number of records.

20 **MR. GRIFFON:** Right.

21 **MR. KERR:** So if they had a damaged badge or  
22 somebody didn't turn a badge in or something  
23 they tried to correct for missed dose in  
24 getting those S-rem and P-rem --

25 **MR. GRIFFON:** Yeah, I did see that correction.

1           **MR. KERR:** You saw --

2           **MR. GRIFFON:** The number of badges over the  
3           number of records, yeah.

4           **MR. KERR:** Yeah. But it was for missed dose,  
5           the thought that they were taken into account.

6           **DR. NETON:** I think they're interesting  
7           reading.

8           **MR. GRIFFON:** Yeah.

9           **DR. NETON:** And I do think they show that the  
10           level of effort they were trying to put into  
11           make it correct. But also it does point out  
12           that there are issues in that database but --

13           **MR. GRIFFON:** Well, right. Just -- And some -  
14           - somewhat it clarified some things that were  
15           recorded at different time periods so it was  
16           useful for that.

17           **MR. KERR:** Yeah. One other thing, Mark, and I  
18           have just this one comment. If you go back and  
19           look at say a '53 memo or a '54 memo, realizing  
20           that they made some of these changes at a later  
21           date, you may see some other discrepancies  
22           between the two values because of the  
23           corrections that were made later. And see,  
24           there may be some minor -- minor discrepancies  
25           may be coming in that way.

1           **DR. NETON:** But again --

2           **MR. GRIFFON:** One thing I was going to ask you  
3 then. I think some of this analysis probably  
4 answered this question for you but one of the  
5 earlier things we raised I think at the last  
6 meeting was the P-millirem question.

7           **DR. NETON:** Uh-huh.

8           **MR. GRIFFON:** And did -- what -- what's the  
9 upshot of that? I mean you -- you have the  
10 result of why it is the gamma dose in I think -  
11 - I thought you mentioned somewhere in my  
12 reading I thought I saw something about that  
13 but maybe not.

14           **DR. NETON:** Well, '50/'51 clearly there was  
15 nothing in any of those columns --

16           **MR. GRIFFON:** Right.

17           **DR. NETON:** -- so we understand now why that  
18 was the case.

19           **MR. GRIFFON:** Because it was all put in S?

20           **DR. NETON:** It was all put in S. Well, yeah.  
21 And also it was -- even if they were going to  
22 record it was missed dose wasn't listed and so  
23 it was unlikely that anyone would have received  
24 greater than 1.5 rem I guess in that period. I  
25 don't recall now, you know, --



1           **MR. GRIFFON:** I just sort of see a P-millirem  
2           versus --

3           **DR. NETON:** -- early estimates.

4           **MR. GRIFFON:** Yeah. I mean you remember the  
5           issue that was brought up?

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

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

8           **MR. KERR:** There was a problem back early  
9           because they assigned sometimes in the -- in  
10          the later years they assigned missed dose based  
11          on where they thought the person primarily had  
12          a gamma exposure problem or a beta exposure  
13          problem. But sometimes they wrote down -- put  
14          this 50 millirem over here in the gamma and  
15          didn't put it in the beta column. So anyhow  
16          you got this problem when you sum 'em up  
17          because that -- your deep penetrating were the  
18          contributing, your S-millirem as well as your  
19          P-millirem. If they only put it over here in  
20          the P-millirem column and summed up, it was  
21          possible you'd get P-millirem doses bigger than  
22          the S-millirem doses.

23          **DR. NETON:** That's -- That's true.

24          **MR. KERR:** And they went back later and tried  
25          to correct for this if they saw the P-millirem

1 was greater than the S-millirem. Then they set  
2 employee equal. And the reason they did that,  
3 if you go back and look in some of the  
4 claimants' files you're going to get down and  
5 you're going to see sometimes in the early  
6 years where the S-rem and the P-millirem are  
7 the same.

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

9 **MR. KERR:** And that was kind of a correction  
10 they tried to make because they may not have  
11 assigned any, you know --

12 **MR. GRIFFON:** Since they weren't sure?

13 **DR. NETON:** Yeah. In fact my recollection  
14 looking through the database, after '56 I was  
15 hard-pressed to find values that didn't sort of  
16 add up and make sense. In other words --

17 **MR. GRIFFON:** That's correct. After '56 we had  
18 --

19 **DR. NETON:** If you go in there -- It makes  
20 sense from a health physics perspective what's  
21 in the various columns.

22 **MR. GRIFFON:** And looking at it after '56,  
23 yeah.

24 **DR. NETON:** They all add up.

25 **MR. GRIFFON:** In other words '52 to '55 --

1           **DR. NETON:** Yeah, '52 to '55, and again, you  
2 know --

3           **MR. GRIFFON:** The gamma P-rem -- I mean the  
4 skin and the -- and the S-rem always -- always  
5 met, almost always I think.

6           **DR. NETON:** Might, yeah.

7           **MR. GRIFFON:** From '52 to '55 anyway. I'm  
8 going by memory which --

9           **DR. NETON:** And in fact it's never -- there is  
10 never a column -- I went through almost every -  
11 - every point last week and there's -- I don't  
12 think there's ever a column where the S-  
13 millirem is larger than any of the other  
14 columns. In other words, if there's a gamma  
15 dose the S-millirem is always larger or equal  
16 to the beta column. I went through it and it  
17 made -- it made sense to me that the -- the  
18 bracketing dose, and this was partly related to  
19 the fact that they recorded beta gamma doses in  
20 the same column, so you'll never see a --

21           **MR. GRIFFON:** I mean this is kind of a minor  
22 item.

23           **DR. NETON:** Yeah. Well, yeah.

24           **MR. GRIFFON:** The gamma versus P-millirem if --  
25 if you can just maybe follow up on that.

1           **DR. NETON:** Yeah.

2           **DR. BEHLING:** We may have at times at some  
3 facilities -- I'm not sure if Y-12 necessarily  
4 -- where they actually pulled out the gamma  
5 component of the shallow dose and reported as a  
6 beta dose which means that there can be  
7 incidents where the beta dose is clearly less  
8 than the deep dose if there's no beta component  
9 because they basically pulled out the gamma  
10 component and reported it as not shallow dose  
11 but beta dose.

12          **DR. NETON:** That was incorrect, but yeah. I've  
13 seen that out at facilities. You're right.  
14 But I don't see that in -- I -- I looked  
15 through pretty carefully the database and I  
16 didn't see any case where the shallow dose was  
17 exceeded by the gamma dose. It always was --  
18 was larger than the gamma dose.

19          **MR. GRIFFON:** That makes sense.

20          **DR. MAKHIJANI:** For Y-12 I think that is --

21          **DR. NETON:** For Y-12 -- see, originally I was  
22 thinking, well, that's -- that's certainly  
23 bounding. If you use all shallow doses because  
24 that's the largest dose in any of the columns,  
25 then you've got a bounding analysis there. But

1 I don't think you need to go there. But I  
2 wanted to satisfy myself that if there was this  
3 recording practice of putting beta and gamma in  
4 the same column is there an instance where --  
5 where the gamma dose is larger and the beta  
6 dose is not? So -- But I can't explain any  
7 more than that.

8 **MR. GRIFFON:** Anything else on issue one?

9 (No response)

10 **MR. GRIFFON:** So we've got those -- some action  
11 items on that then.

12 **DR. NETON:** Right.

13 **ISSUE 2: THORIUM BUILDINGS**

14 **MR. GRIFFON:** Issue two.

15 **DR. NETON:** Okay. Thorium buildings.

16 **MR. GRIFFON:** Thorium buildings.

17 **DR. NETON:** Okay. This --

18 **MR. GRIFFON:** Let's go into it and maybe, I  
19 don't know if people want to -- how about  
20 taking lunch at 1:00 or is that okay?

21 **DR. NETON:** That's fine by me.

22 **MR. GRIFFON:** Is that okay with everyone? Then  
23 maybe we'll miss any potential crowd in the --

24 **DR. NETON:** I thought it was pretty busy today  
25 actually.

1           **MR. GRIFFON:** Yeah. Okay.

2           **DR. NETON:** Okay. Thorium --

3           **DR. WADE:** There's coffee here by the way.

4           **MR. GRIFFON:** Okay.

5           **DR. NETON:** Okay. It'll keep me -- keep me  
6 going 'til 1:00 o'clock. I'm not really a big  
7 coffee drinker but these meetings, I just feel  
8 like I -- I need -- I need the extra energy.

9           **MR. GRIFFON:** Do you want a couple minutes to  
10 get a cup of coffee?

11          **DR. NETON:** I can make it okay.

12          **MR. GRIFFON:** As long as you're okay. I'm  
13 going to get one while you're talking.

14          **DR. NETON:** Okay. Well, once I'm done I'll get  
15 one. In the thorium area of course the -- the  
16 issue is have we -- have we bracketed all the  
17 buildings that had thorium in them in our, you  
18 know, class that we're adding to the SEC. Or  
19 more correctly have we -- have we bracketed the  
20 buildings that had thorium exposure potential  
21 in the SEC period. You know, we -- we have to  
22 be careful that because a building had thorium  
23 listed as being in its contents that, you know,  
24 it was really an exposure hazard, yes or no.  
25 To address that question we sent some people

1 back to the records area to look at the thorium  
2 -- the so-called thorium ledgers. These are  
3 ledgers that -- that kept track of material  
4 balance of the nuclides that -- that were of  
5 interest and thorium is one of those. And ORAU  
6 has gone back and looked at these ledgers and  
7 identified now all potential buildings that --  
8 or I have to be careful. Not necessarily  
9 buildings. Sometimes material balance areas of  
10 where thorium was actually -- to which thorium  
11 was actually distributed during the SEC period.  
12 This is fairly late-breaking news so I'm going  
13 to have to rely on Mel Chew. Is Mel on the  
14 phone?

15 **MR. CHEW:** Yes, I am Jim.

16 **DR. NETON:** Okay, Mel. Mel, could you flesh  
17 out for us where we are with the ledgers and  
18 the thorium buildings, please?

19 **MR. CHEW:** Glad to.

20 **DR. NETON:** Unfortunately I don't have any  
21 handout for --

22 **MR. CHEW:** Thanks to Jack Beck and Company I  
23 faxed you this morning two lists here. One is  
24 a list of buildings that we -- from the ledgers  
25 that we have identified where thorium is in the

1           1950s which is the SEC period. And then a  
2           second list that includes the additional  
3           buildings from the 1960s. And let's focus in  
4           on the area where the SEC period is here. The  
5           table -- there's a chart that I think you have  
6           in your hand there, Jim, that talks about --  
7           goes out to the account numbers and you're  
8           absolutely correct. The account numbers really  
9           relate to locations where material balances  
10          were segregated for control and accountability  
11          material, accountability of the thorium. It is  
12          very notable that the accountability is down to  
13          a gram level in quantity. Let me just try to  
14          give a summary without going through the long  
15          story. And we can go through I mean a detailed  
16          analysis. In the 1950s we have identified  
17          eight buildings in the 1950 time frame -- '50s  
18          time frame which is the SEC period of which  
19          there are -- I mean we have added some  
20          additional buildings because small samples that  
21          have went -- have been identified into  
22          analytical areas, even down to the like 11  
23          grams, 16 grams and 454 grams. So we have  
24          identified these particular eight buildings  
25          that we have indicated that thorium was



1 present. Okay. So --

2 **MR. GRIFFON:** Mel, are these -- you're --  
3 you're saying the '50s but you mean '48 through  
4 '57 or --

5 **MR. CHEW:** Well, I think that even in the '48  
6 through '50 I think there was the first  
7 indication of any thorium was like one and a  
8 half kg's in the '49 period, Mark, that showed  
9 up in the X-10 electromatic research area 9204-  
10 3.

11 **MR. GRIFFON:** But I mean --

12 **MR. CHEW:** -- four kilograms was listed as a  
13 total quantity. There's an account called  
14 control and control sort of is the -- by our  
15 analysis is where the total quantity of thorium  
16 is within Y-12 and then they break it out into  
17 the particular areas where they are located.  
18 So control is sort of like this is the total  
19 quantity we know of is at Y-12. So I hope I  
20 answered your question. We do have indication  
21 where in 1949 there were some in the R&D area  
22 and also in the electromatic research area of  
23 which we think the -- our control is like --  
24 like 57 kilograms in total here. But  
25 encompassing that -- and -- and so that goes

1 through 1950s all the way through '57 is the  
2 table that I submitted to -- to Jim on this  
3 particular time. The -- The quantities in --  
4 are in kilograms and we can clearly identify --  
5 we have listed all of the buildings through  
6 that entire period from '49 to the 1950s,  
7 probably including '59, that would be, you  
8 know, those buildings that would have contained  
9 the -- has -- has quantities of thorium  
10 present. So we're going to revise -- I think,  
11 Jim, this is your call -- I think we're going  
12 to revise the -- this particular list in the  
13 SEC evaluation report to reflect the -- these  
14 particular buildings that we did not originally  
15 include, including some of the analytical  
16 laboratories which contained small quantities.  
17 I'm going to stop here. Jim, do you want to  
18 pick it up from here?

19 **DR. NETON:** Right. I'm not sure we've actually  
20 made that decision at this point although it's  
21 certainly an option.

22 **MR. CHEW:** Right. This is your call. That's  
23 right. I'm --

24 **DR. NETON:** And -- And, you know, this is  
25 fairly new information. I just -- I just -- I

1 got this last night and didn't have time to  
2 look at it but --

3 **MR. GRIFFON:** Can we -- can you make copies --

4 **DR. NETON:** Yeah, we'll --

5 **MR. GRIFFON:** -- during the break or --

6 **DR. NETON:** Yeah, we'll get copies.

7 **MR. CHEW:** The bottom line, Mark, is that -- is  
8 the -- the base using the official ledgers that  
9 is in the (inaudible), you have identified all  
10 the specific locations in the time period we're  
11 talking about and what quantities of thorium  
12 has been at the -- at those particular  
13 locations here. And we have also not only  
14 accounted for the accountability number which  
15 is the identification of the MVA, but also a  
16 little bit about the location description like  
17 research laboratory, extraction and muffling,  
18 analytical lab, electromatic researching and  
19 ORNL reactor technology division. So I think  
20 what I'd like to say is that we think we have  
21 all of the thorium accounted for in the Y-12  
22 area for those particular buildings and  
23 locations during the 1950s, '49.

24 **DR. NETON:** And I'd like to give credit to --  
25 to the folks who -- who worked -- worked

1 through these ledgers. It was easy to find the  
2 -- the first few up through '55. I think '56  
3 and '57 took some doing. They weren't in the  
4 same location. But we were able to find a  
5 ledger for every single year which was good  
6 work.

7 **MR. GRIFFON:** We appreciate that.

8 **DR. NETON:** Now, Mel, when you say there's  
9 eight buildings you've identified then I assume  
10 then there's overlap with these -- the five  
11 that we've listed in the SEC period already.

12 **MR. CHEW:** That is correct.

13 **MR. GRIFFON:** And what are the three additional  
14 that aren't on the list?

15 **MR. RUTHERFORD:** Three additional.

16 **MR. CHEW:** Let's see. I don't have that in  
17 front of me here. Sorry about that. But I  
18 think 9203 had 11 grams of material. I'm just  
19 going to take a guess which one. I should have  
20 had that little bit of overlap here. But I can  
21 iden-- I can identify --

22 **MR. RUTHERFORD:** Mel, this is Bomber -- this is  
23 Bomber. I've got it. 9203 is an additional  
24 building.

25 **MR. CHEW:** Okay. Thanks.

1           **MR. RUTHERFORD:** 92-3 is an additional  
2 building.

3           **MR. CHEW:** All right.

4           **MR. RUTHERFORD:** And 9995 is the third  
5 additional building.

6           **MR. CHEW:** Yeah. I already got that, Bomber.  
7 And -- And I kind of -- I can give -- we have  
8 the maximum quantities --

9           **MR. GRIFFON:** Yeah.

10          **MR. CHEW:** -- in any given year that I just had  
11 to flip to for myself just for this discussion  
12 if necessary here. For example, like Bomber  
13 just mentioned, 9995 they had 436 grams. The  
14 9203 that Bomber mentioned was 11 -- 11 grams  
15 for example, and I showed it for 1954.

16          **MR. GRIFFON:** Are those both labs? They must  
17 be labs.

18          **MS. MUNN:** 11 grams, had to be.

19          **MR. RUTHERFORD:** The 11 gram was definitely a  
20 lab. I know that.

21          **MR. GRIFFON:** 9995 I know was a lab.

22          **DR. NETON:** It's an assay lab -- assay lab.

23          **MR. RUTHERFORD:** 9201-3 was an ORNL reactor  
24 technical division and that -- they picked up  
25 significant quantities in '57. But they --

1           they actually had quantities back in 1952.

2           **MR. GRIFFON:** What do you mean significant  
3           quantities?

4           **MR. RUTHERFORD:** Well, I mean I would --

5           **DR. NETON:** 9201-3, in '57 they picked up 7,800  
6           kilograms of material.

7           **MR. GRIFFON:** Alpha 3 -- Alpha 3's clearly not  
8           a research lab. I mean it's not a lab.

9           **DR. NETON:** Right. Yeah, these other two,  
10          again, I'll reserve judgment. We have to  
11          rethink this but when you -- again, as I  
12          preface my remarks, if you -- if you have 11  
13          grams of material in an analytical laboratory  
14          you're clearly calibration type standards.  
15          Now, how finely we want to split this is -- in  
16          terms of what the potential exposure is I don't  
17          know. I mean we need to -- we need to rethink  
18          this and --

19          **MR. GRIFFON:** Let me ask if that listing -- I  
20          mean I'm glad, you know, it got to the ledgers  
21          but were there other buildings, Arjun, that you  
22          found in these other previous memos that you  
23          saw that were mentioned? Maybe we can figure  
24          out if there's a discrepancy --

25          **DR. MAKHIJANI:** Can I look at the break?

1           **MR. GRIFFON:** Okay. Okay. We'll get back  
2 after lunch. Maybe we'll be at a place to take  
3 a break at noon.

4           **DR. MAKHIJANI:** (Inaudible)

5           **MR. GRIFFON:** The other -- The other question  
6 I had outside of the buildings in looking at  
7 some of the case data it's -- it's apparent to  
8 me that there is mainly a reliance on  
9 department information and this -- this is  
10 probably more of a deal out question but it  
11 gets back to the how do you determine question,  
12 you know. And if you're -- how do you find out  
13 if someone was in one of these five or seven or  
14 how many other buildings? And the onus comes  
15 onto DOL so maybe we need to bring Pete Turcic  
16 back in the mix.

17           **DR. NETON:** I think you're right.

18           **MR. GRIFFON:** But if you just have department  
19 information then I know from doing some work  
20 out there that the departments are not  
21 necessarily one to one linkage with buildings.  
22 So then you, you know, do they conservatively  
23 assume and some of these are big process  
24 buildings so then you get into a large number  
25 of claimants being put into this group which

1           may or may not belong in that group, you know.  
2           So...

3           **DR. MAKHIJANI:** Mark -- Mark, I have --

4           **MR. GRIFFON:** Anyway but you -- you don't have  
5           -- you can't shed any light on --

6           **DR. WADE:** We will ask Pete or someone  
7           representing DOL to come to the meeting  
8           prepared to answer those questions.

9           **MR. GRIFFON:** You don't know if anyone's done  
10          any department building sort of analysis. I  
11          don't think that's been done. Some of the work  
12          has been --

13          **MR. RUTHERFORD:** I -- I -- I would bet that  
14          Bill Tankersley and some of the -- done some of  
15          the studies, has done some of that -- that  
16          work.

17          **MR. PRESLEY:** Hey, Mark?

18          **MR. GRIFFON:** Yeah.

19          **MR. PRESLEY:** Can I talk?

20          **DR. WADE:** It's up to the group. Are you going  
21          to share information based upon your expertise  
22          at the site, Bob?

23          **MR. PRESLEY:** Yes.

24          **DR. WADE:** And not opinion? It's okay with me  
25          if -- is it okay with you, Mark and Wanda?



1           **MS. MUNN:** Yes.

2           **DR. WADE:** Okay. If you -- If you want to  
3 share --

4           **MR. GRIFFON:** I -- I don't want to violate our  
5 own ruling. That's the only thing.

6           **MS. HOWELL:** As long as he's speaking as a site  
7 expert only.

8           **MR. GRIFFON:** Right.

9           **DR. WADE:** If you speak as a site expert only  
10 and offer only facts as you know them, that  
11 would be acceptable, Robert.

12           **MR. PRESLEY:** Okay. What you're talking about,  
13 the departmental charges and buildings?

14           **MR. GRIFFON:** Yeah.

15           **MR. PRESLEY:** Just like the fabrication  
16 department. You've got -- it doesn't --  
17 somewhere in that time frame there was  
18 somewhere between 16 and 21 different shops.  
19 And those different shops could have had the  
20 same department number.

21           **MR. GRIFFON:** Right.

22           **MR. PRESLEY:** The same thing with your chemical  
23 workers, everything else. So you cannot really  
24 go by department number as to what building  
25 that is in.

1           **MR. GRIFFON:** And then from what I understand,  
2           Bob, they -- they, even within like say a  
3           maintenance department, these guys were telling  
4           me they -- they often bid out on jobs in  
5           various areas --

6           **MR. PRESLEY:** That could be.

7           **MR. GRIFFON:** -- within a year so they could be  
8           shifting around.

9           **MR. PRESLEY:** And that's not only just in Y-12.  
10          They could have gone to ORNL or 225 because we  
11          did maintenance. You had Y-12 maintenance  
12          people working in all three plant sites.

13          **DR. WADE:** We will ask you all to --

14          **MR. GRIFFON:** -- ask you all about --

15          **DR. MAKHIJANI:** Well, I have --

16          **MR. GRIFFON:** Oh, you found your other --

17          **DR. MAKHIJANI:** I found my list. We -- Now,  
18          we -- you've looked at our evaluation report  
19          review of April 24<sup>th</sup>. We do have time frames  
20          on these so, you know, if you eliminated these  
21          as not belonging in the right time frame. But  
22          there were in 9204-4 -- no, sorry -- 9201-5 and  
23          there was some thorium -- there was a storage  
24          building, 9720-5. And there's a thorium 230  
25          associated building, 9215.

1           **MR. GRIFFON:** And 9215 may have been a later  
2 period.

3           **DR. MAKHIJANI:** Yeah, I'm not sure about the  
4 period. We could not nail down the periods.  
5 Obviously all -- all of these --

6           **MR. CHEW:** Arjun, I think Bomber has that list  
7 I sent him. We have identified those  
8 particular buildings that you have just  
9 mentioned in the 1960s. I just caught some of  
10 them. You mentioned 9201-5, 9215. What was  
11 the other one you had mentioned? I'm sorry. I  
12 apologize.

13           **DR. MAKHIJANI:** 9720-5.

14           **MR. CHEW:** 9720-5.

15           **MR. GRIFFON:** Storage area I think you said it  
16 was.

17           **MR. CHEW:** Storage area.

18           **MR. GRIFFON:** (Inaudible)

19           **MR. CHEW:** Okay. We don't -- We didn't have  
20 that on the list from the 1960s but it wouldn't  
21 surprise me if 92-- a storage area would, you  
22 know, where the material would originally come  
23 into because we know large quantities came into  
24 the -- into Y-12 and was waiting to be  
25 processed here.

1           **DR. MAKHIJANI:** Yeah, I think that may be the  
2           one building where I don't remember the  
3           document but it seems to me that maybe thorium  
4           was received there.

5           **MR. CHEW:** Oh, that makes sense. We have a one  
6           called account number control. There was no  
7           building listed but we couldn't find that and -  
8           - and I'm just going to take a guess that may  
9           relate to that. But we could track that  
10          number, account number down, that MBA number  
11          down to make you sure that we are tracking 192  
12          -- 9720-5. The other two you mentioned we  
13          clearly have identified --

14          **DR. MAKHIJANI:** Okay.

15          **MR. CHEW:** -- the thorium being present in the  
16          1960s and not in the 1950s.

17          **DR. MAKHIJANI:** Okay. So that would resolve  
18          that.

19          **MR. CHEW:** Pretty much, Arjun. Appreciate it.

20          **DR. MAKHIJANI:** And 9204-4 I guess may be the  
21          last one on my list.

22          **MR. CHEW:** Yeah, 9204-4 is also listed in the  
23          1960s.

24          **MR. GRIFFON:** In the 60s.

25          **MR. CHEW:** Okay. You have those in front of

1           you, right Bob?

2           **MR. PRESLEY:** Yeah.

3           **MR. CHEW:** Good.

4           **DR. MAKHIJANI:** Okay. So then that would --

5           **MR. GRIFFON:** So we'll check that one --

6           **MR. RICH:** In the 1960s were buildings  
7 identified by extensive air samplings?

8           **MR. GRIFFON:** Bryce Rich.

9           **MR. RICH:** The main production areas, the  
10 thorium production areas.

11          **MR. GRIFFON:** Right.

12          **MR. RICH:** There are nine of them, nine  
13 buildings. But as has been indicated, three of  
14 those overlap, 9202, 9206 and 9203. That's the  
15 1950s.

16          **DR. NETON:** Yeah, with the exception of this  
17 9201-3 it seems like, you know, we covered the  
18 areas in the SEC --

19          **MR. GRIFFON:** Yeah.

20          **DR. NETON:** -- class that actually did  
21 something, you know, process-wise with thorium  
22 and --

23          **MR. GRIFFON:** You have a senior laboratory.

24          **DR. NETON:** Yeah, laboratories. And, you know,  
25 I'm -- I'm still right with this point not

1           certain where we're going to land on that  
2           issue. I mean but the 9201-3 is something  
3           NIOSH needs to take into consideration.

4           **MR. GRIFFON:** Yeah. Sure. And maybe free up  
5           this 9720-5.

6           **DR. WADE:** Yeah, I got it down.

7           **MR. GRIFFON:** And that's -- that's it.

8           **DR. WADE:** I think -- I think --

9           **MR. GRIFFON:** Other than that I think --

10          **MR. RICH:** 9201-3 was one of the old beta  
11          calutron buildings.

12          **DR. MAKHIJANI:** The last issue here doesn't  
13          relate to a building but to the S3 pond. Now,  
14          we -- we looked at the document that NIOSH  
15          pointed us to and we noted, you know, between  
16          our two reports, and we noted that the burial  
17          ground data included S3 pond discards before  
18          1974 so we weren't able to parse whether the S3  
19          pond was used in the SEC period or not. And I  
20          don't know if you have been able to. I think  
21          that's the last issue we have.

22          **MR. RUTHERFORD:** Well, I'll jump in a little  
23          bit here. We do have indication that there was  
24          some material that was discarded in 1952.  
25          We're still tracking identities. This table is

1 not very clear on that and -- and so if we can  
2 leave that S3 pond issue or burial ground issue  
3 as something that we're still looking into.

4 **MR. GRIFFON:** As for exposures of the people  
5 that would have been handling the waste, is  
6 that --

7 **MR. RUTHERFORD:** Yes.

8 **MR. CHEW:** I'd like to on that note, I'd like  
9 to distribute first a memo from Union Carbide I  
10 have in my hand from radiation safety because  
11 the question came up several times about the --  
12 considering the thorium contaminated in the  
13 uranium salvage operations that had potentially  
14 went into the pond. And it's called the  
15 maximum thorium concentration in process  
16 salvaging. It does some assessment of work  
17 they felt the thorium -- additional thorium  
18 exposure may be as a potential exposure pathway  
19 and so we do have information that that was  
20 studied. I will make sure that's going to be  
21 in your hand.

22 **DR. NETON:** Yeah, let's make sure we get that  
23 distributed, Mel.

24 **MR. CHEW:** Okay.

25 **DR. NETON:** Great.

1           **MR. GRIFFON:** Other issues on the thorium  
2           topic? I mean is there -- what about the --  
3           have we closed out the issues of the other  
4           (inaudible) that were used to outside of these  
5           buildings or -- or could we have covered it all  
6           in these buildings? Is that --

7           **DR. NETON:** Well, I think the material balance  
8           ledgers certainly --

9           **MR. GRIFFON:** Right.

10          **DR. NETON** -- if the thorium didn't get shipped  
11          there unless we believe the ledgers to be  
12          inaccurate I think we've covered the waterfront  
13          under thorium --

14          **MR. GRIFFON:** I think so, too.

15          **DR. NETON:** -- activities.

16          **MR. GRIFFON:** Me, too.

17          **DR. MAKHIJANI:** I would agree with that  
18          especially in light of what was said by  
19          Department of Labor at the Denver meeting.

20          **MR. GRIFFON:** Yeah.

21          **DR. MAKHIJANI:** Since we're not dealing with  
22          the uranium workers for the thorium, that's  
23          gone away so I think --

24          **DR. NETON:** Yeah, I believe so.

25          **MR. GRIFFON:** Right.



1           **MR. GRIFFON:** It makes it a lot easier for all  
2 of us.

3           **DR. MAKHIJANI:** So we covered the buildings  
4 then.

5           **DR. NETON:** Yeah.

6           **MR. GRIFFON:** As long as we cover, yeah, who  
7 worked in those buildings.

8           **DR. NETON:** Yeah.

9           **MR. GRIFFON:** That's the department building  
10 issue, yeah.

11          **DR. NETON:** Yeah.

12          **DR. MAURO:** I have just got --

13          **MR. GRIFFON:** John.

14          **DR. MAURO:** Just again for clarification, what  
15 we have is a circumstance where at some point  
16 waivers define the class in a way that the  
17 boundaries are very clear that who falls into  
18 the class and who doesn't and it has something  
19 to do with, what I'm hearing, with the  
20 buildings and perhaps to types of activities  
21 and locations within buildings. And a class  
22 will be defined in those terms. I'm trying to  
23 create a model in my head to -- to separate out  
24 where we might still have some residual SEC  
25 issues. Would that be --

1           **DR. NETON:** I think you heard -- I think you  
2           heard Pete Turcic pretty clearly say on the  
3           record that, you know, if -- if there was no  
4           way to parse those areas out at all that they  
5           would -- they would -- they would consider  
6           working in the building period as evidence of  
7           thorium exposure potential.

8           **MR. GRIFFON:** Of thorium exposure, right.

9           **DR. MAURO:** Then that puts to bed the only  
10          concern I have.

11          **MR. GRIFFON:** I think he did -- he might have  
12          parsed it a little bit saying that, you know,  
13          if there was any indication job-title-wise or  
14          whatever that they would --

15          **DR. NETON:** Right.

16          **MR. GRIFFON:** -- like an administrative person  
17          that was likely not in the process.

18          **DR. NETON:** Well, even then, yeah.

19          **MR. GRIFFON:** Even then, yeah.

20          **DR. NETON:** Say for instance if there was a  
21          cafeteria in the basement of the building that  
22          you entered and never went into the workplace -  
23          -

24          **MR. GRIFFON:** Right.

25          **DR. NETON:** -- I think they might make that --

1           **MR. GRIFFON:** But otherwise we can assume it's  
2           very clear?

3           **MR. RUTHERFORD:** If you look at the lab, assay  
4           lab, if we -- if we ended up putting the assay  
5           lab -- if we decided that that would include  
6           that. You know, you wouldn't necessarily look  
7           at a newspaper person if there's only 11 grams  
8           in the building and their doing, you know, so -  
9           -

10          **DR. NETON:** You've got -- I mean the definition  
11          was couched in the sense that, you know, you  
12          had to have -- should have been monitored or  
13          were monitored for exposure to thorium so  
14          that's a --

15          **MR. GRIFFON:** But see, they took the thorium  
16          part out of that definition.

17          **DR. NETON:** He -- He did in the sense that if  
18          you can't tell it's not going to be an issue.  
19          This takes care of Arjun's concern about co-  
20          located workers.

21          **DR. MAURO:** You have a pretty good sense then  
22          of what that boundary should have been  
23          monitored should be. In other words, you're in  
24          a - you're going to be in a position where  
25          you're going to help Pete say where that line

1 is drawn.

2 **DR. NETON:** And I think Pete's already said  
3 that. If there's any potential for thorium  
4 exposure at all, pretty much the way I --

5 **DR. MAURO:** Then it's clean.

6 **DR. NETON:** Yeah, I don't want to interpret.

7 **DR. MAURO:** Then it's clean. If it's not clean  
8 then it's a walkaway.

9 **MR. GRIFFON:** And the only part that I'm saying  
10 isn't quite clean is -- is that how do you  
11 determine if they ever were in the building?

12 **DR. NETON:** That's another issue.

13 **MR. GRIFFON:** It's not for us to -- it's a DOL  
14 question.

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

16 **MS. MUNN:** And the thorium balance record makes  
17 it a lot easier.

18 **ISSUE 3: RECYCLED URANIUM (RU)**

19 **MR. GRIFFON:** I think we're on to issue three  
20 if -- Recycled uranium.

21 **DR. NETON:** Wanda, could you start passing them  
22 around?

23 **MS. MUNN:** Uh-huh.

24 **DR. NETON:** I have some -- a handout here that  
25 was put together with ORAU. Bryce Rich

1 particularly was involved in -- in piecing this  
2 together. This -- I'll briefly cut to the  
3 chase on this. ORAU has raised a concern that  
4 I think fundamentally SC&A is not necessarily  
5 opposed to the defaults that we're using for  
6 the recycled uranium for process workers with  
7 the -- with the materials. They did raise a  
8 concern that in the cleanup of the recycled  
9 material that arrived you generate waste  
10 streams, ancillary waste streams that by  
11 definition have at some -- to some degree  
12 enriched the uranium -- I mean the contaminants  
13 relative to the uranium. And so we put  
14 together a -- a write-up on this. Bryce Rich  
15 has done -- done a good job on this. Some of  
16 it goes through the issues of -- of what are we  
17 doing and why our -- our conservative values  
18 are -- are -- are high already for the workers  
19 who are handling the material. We picked the  
20 highest -- the highest contaminant level to  
21 deal with the workers. I think that at the end  
22 we talk about the waste streams that were  
23 generated and it is true that the waste stream  
24 values are higher and I think we actually have  
25 measurements for those values. But it is our

1 opinion, at least my opinion at this point that  
2 the waste streams are wet process waste  
3 streams. They were handled wet and dispensed  
4 to the -- the disposal areas as such and so the  
5 potential for inhalation exposure to this  
6 enriched sort of -- bad choice of words -- this  
7 enhanced amount of transuranic material was --  
8 was very low and in fact our -- our default  
9 assumption using the highest concentration that  
10 came in the door is -- is probably a reasonable  
11 amount to assign to the workers. With that  
12 I'll ask if Bryce has anything to add and  
13 comment if that's a fair assessment of where --  
14 where we are or where he believes he wrote --  
15 what he believes he wrote up anyway.

16 **MR. RICH:** I -- In more of perhaps background,  
17 Y-12 was unique in the area of recycled uranium  
18 from the standpoint that they -- most of the  
19 contaminants came in with very high enriched  
20 uranium recycle materials out of -- out of  
21 (inaudible) and SRS. Plutonium 238 became the  
22 dominating plutonium isotope. They also  
23 handled a lot of other LEU and DU because of  
24 operational requirement, all of which had  
25 recycled uranium. As Jim indicated we -- we --

1 we defaulted at the maximum level to add to the  
2 uranium intake value since those were so  
3 extensive. In -- In the area of the  
4 enrichment there was -- there was some, maybe  
5 30 percent of the -- the recycled uranium -- I  
6 should back up and say that the -- the -- the  
7 very -- VHEU and the HEU that came in was --  
8 was pretty much all chemically extracted again  
9 primarily not to remove the uranium  
10 contaminants or the recycled uranium  
11 contaminants but primarily to remove the other  
12 contaminating non-radiological metals such as  
13 copper and nickel and the like. About 30  
14 percent of the recycled uranium contaminants  
15 did go out in the raffinates. But put in  
16 perspective on the history of the plant,  
17 something like a tenth of a gram of -- less  
18 than a tenth of a gram of plutonium went out  
19 and relatively small quantities of neptunium,  
20 technetium and -- and the like. Another unique  
21 factor was that there was some thorium 228 that  
22 came in as a contaminant as a result of the  
23 production in irradiating very high enriched  
24 uranium fuels. We think we've adequately  
25 covered the -- the additional exposure that

1           could have occurred as a result of the recycled  
2           uranium contaminants including the -- the  
3           raffinate waste processing. It'll -- It'll --  
4           It'll be perhaps as you look at the description  
5           I guess I'll have to admit that because of the  
6           complexity we -- we perhaps all a little more  
7           descriptive treatment, a little more of a -- a  
8           -- a narrative in the -- in the technical basis  
9           document which we tried to keep concise but  
10          perhaps too concise.

11         **DR. MAURO:** The only comment I -- I have is by  
12         way of clarification. I did read this write up  
13         on the way over and I got the sense that the  
14         answer is fairly simple. Notwithstanding the  
15         wet processing side of it is that the default  
16         method that's currently in the Y-12 TBD had  
17         adopted a set of assumptions which bound any of  
18         the scenarios that we were trying to struggle  
19         with. And if that's the case --

20         **DR. NETON:** I think you're right. If you look  
21         at table 5-6 is where you're getting that?

22         **MR. GRIFFON:** It's -- Yeah.

23         **DR. NETON:** If you look at the raffinate value  
24         of the footnote the maximum plutonium in the  
25         raffinate according to this table is 30 per



1 gram of sludge. That's pretty low. I mean you  
2 -- you would have to inhale a fairly large  
3 amount of sludge to -- to get any kind of  
4 exposure. As a matter of fact --

5 **MR. RICH:** As a matter of fact, that is right.  
6 The -- However -- And -- And the -- may not  
7 -- and I think it was clear in the write-up  
8 that was provided that we did not apply the  
9 maximum value to the few people that were  
10 involved actually in transferring, you know,  
11 the handling the transfer and the disposal in  
12 the S3 ponds. Those maximum models to the  
13 entire work class nor to the individuals  
14 themselves because they did other jobs, too.

15 **DR. NETON:** Oh, yeah.

16 **MR. RICH:** And -- And -- And so as a  
17 consequence, you know, if you want to go -- if  
18 you want -- and -- and a further default to  
19 accommodate that one rather small -- it only  
20 took 50 hours a week -- 50 hours a year to do  
21 that job.

22 **DR. NETON:** Say how many?

23 **MR. RICH:** Pardon me?

24 **DR. MAKHIJANI:** Fifty hours --

25 **MS. MUNN:** Fifty hours a year.

1           **MR. RICH:** Fifty hours a year. And this is --  
2           this is very well documented in the Y-12  
3           recycled uranium mass balance report. And so  
4           we didn't devote -- devote the entire -- at  
5           that level which would -- which would go in  
6           about a factor of five increase. And -- And  
7           that increase by the way, because we defaulted  
8           high, factor of ten in all of the other  
9           defaults above the -- above the average values  
10          we felt like that would -- that would certainly  
11          cover that -- that relatively short term  
12          operation at the increased level for the  
13          raffinates. Take a look at it and see what --

14          **MR. GRIFFON:** A factor of ten?

15          **DR. MAKHIJANI:** Bryce, can you explain the  
16          thing because I had a question about that  
17          factor of ten that you reduced the maximum  
18          value by in your example.

19          **MR. RICH:** Yeah, the range of, you know, the  
20          analytical range, result range through the  
21          plant for all of the -- the contaminant levels,  
22          the -- the maximum range to which we defaulted  
23          was in the -- in the range of a factor of ten  
24          or higher than the average.

25          **DR. MAKHIJANI:** And what's the basis for that

1 factor of ten?

2 **MR. RICH:** What's the basis? Because it was  
3 just the upper range of the distribution.

4 **MS. MUNN:** The maximum value.

5 **MR. RICH:** Yes, the maximum value.

6 **MS. MUNN:** To represent --

7 **MR. RICH:** And the reason for that -- the  
8 reason for that is that it -- it -- it's almost  
9 impossible to identify any individual as being  
10 associated with a process that represented --

11 **MR. GRIFFON:** Process --

12 **MR. RICH:** -- any -- any -- any given  
13 distribution.

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

15 **MR. RICH:** And as a consequence you're almost  
16 forced to default to the maximum since -- since  
17 this is a -- a missed dose they didn't do  
18 plutonium or neptunium analysis but at the  
19 levels we're talking about and the extent they  
20 didn't do an amount of bioassay at the -- at  
21 the levels for that purpose. They -- They  
22 controlled on the basis that the incoming  
23 limits placed on recycled uranium contaminants  
24 was agreed to to increase the overall hazard  
25 level by no more than ten percent. This did

1 not include concentrating mechanisms primarily  
2 of which was the liquid extraction process.  
3 And with that in mind it -- we feel that we've  
4 adequately defaulted on the high side and as --  
5 and the application of the default will provide  
6 a claimant-favorable result.

7 **MR. GRIFFON:** Bryce, you mentioned the DOE Y-12  
8 recycled uranium report.

9 **MR. RICH:** Yes.

10 **MR. GRIFFON:** I'm -- I'm going by memory here  
11 but it seems to me there were other operations  
12 listed in there as at least moderate in -- they  
13 had executive summary sort of table where they  
14 --

15 **MR. RICH:** Yes.

16 **MR. GRIFFON:** -- indicated the relative  
17 potential for neptunium and plutonium  
18 exposures.

19 **MR. RICH:** Yes, they figured out a matrix that  
20 --

21 **MR. GRIFFON:** And there are other operations  
22 other than the sludge handling that --

23 **MR. RICH:** Oh, yes. They had 36 fundamental or  
24 major operations associated with the processing  
25 of recycled uranium materials. There were over

1 100-plus different types of operations but they  
2 -- they all grouped within 36 categories and  
3 they analyzed and -- and then provided that  
4 data within those 36 categories. But three of  
5 which were the -- the recycled uranium -- no,  
6 the -- the waste product streams not only to  
7 the S3 pond but WETF waste processing that  
8 occurred after I think '86 or so. And then of  
9 course, there's some -- some burial of the --  
10 the material also.

11 **MR. GRIFFON:** You believe all those -- your  
12 sense is that all those operations fit within  
13 this range in table 5-6 that you've presented?

14 **MR. RICH:** They fit within the -- the -- the  
15 fundamental default range that I indicated with  
16 the exception of the --

17 **MR. GRIFFON:** Of the raffinate.

18 **MR. RICH:** -- of the raffinates. And the  
19 raffinates being again in that matrix they --  
20 they -- they made an effort to estimate the  
21 amount of time associated.

22 **MR. GRIFFON:** Yeah.

23 **MR. RICH:** And -- And also the probability of  
24 airborne activity and -- and that -- that all  
25 taken into account we felt we were defaulting

1 accurately.

2 **MR. GRIFFON:** And when you said you talk about  
3 this maximum, is that -- that's -- is that in  
4 table 5.6 or --

5 **MR. RICH:** No, they're in there, several  
6 tables.

7 **MR. GRIFFON:** Yeah.

8 **MR. RICH:** I think it's table .6 but then  
9 there's also a table in the appendix B under B-  
10 3 of the 4 pages. And a good share of the  
11 default or good share of the materials comes  
12 from that source also.

13 **MR. GRIFFON:** How about within your TBD though,  
14 within the TBD's I have these excerpts here I  
15 think.

16 **MR. RICH:** Yes.

17 **MR. GRIFFON:** Table 5.6, 5.7, 5.8 --

18 **MR. RICH:** Right.

19 **MR. GRIFFON:** -- that maximum you were  
20 discussing, is that -- and then you said you  
21 might divide by ten in some instances because  
22 the maximum --

23 **MR. RICH:** Yeah, I -- I think we -- well, that  
24 -- that's true. If -- If you were to -- the -  
25 - the -- the best estimates -- but -- but there

1 are other criteria for doing best estimates so  
2 I think that'll come out of the -- the -- that  
3 part of the TBD. That's actually dose  
4 reconstruction determination so if that's  
5 clear.

6 **MR. GRIFFON:** I think so, yeah.

7 **DR. MAKHIJANI:** Well, I'm still a little  
8 puzzled about what actually happens. Is you --  
9 you have the maximum value and there's a  
10 distribution that doesn't seem to include the  
11 maximum value because the maximum value belongs  
12 to a very limited set of processing, three out  
13 of whatever, 37.

14 **MR. RICH:** I took -- took the maximum  
15 distribution for the entire sets --

16 **DR. MAKHIJANI:** Right.

17 **MR. RICH:** -- all of them.

18 **DR. MAKHIJANI:** So the range -- the range that  
19 you've shown in table 5-6, .11 to 4.5 for  
20 instance for plutonium, does not include that --  
21 the raffinate value.

22 **MR. RICH:** I -- That's what I said.

23 **DR. MAKHIJANI:** Right.

24 **MR. RICH:** It will not include raffinate.

25 **DR. MAKHIJANI:** Bear with me. I haven't gotten

1 to the question yet. The -- The -- When you  
2 do a dose reconstruction you -- you use that  
3 range, .11 to 4.5 as a --

4 **MR. RICH:** You use -- You use the maximum, a  
5 maximum derived from that range.

6 **DR. MAKHIJANI:** A maximum. So you use 4.5 or -  
7 -

8 **MR. RICH:** Yes.

9 **DR. MAKHIJANI:** So you use 4.5 from that range?

10 **MR. RICH:** Yes.

11 **DR. MAKHIJANI:** Where did the 62 come in?

12 **MR. RICH:** The 62 is recognized as a -- as a --  
13 a -- a range for a given raffinate stream that  
14 was -- that was handled by -- as a wet process  
15 stream that was discharged directly to the S5  
16 pits or later to the WETF processing system.  
17 And -- And in the S5 pits -- S3 pits -- ponds  
18 they mixed again with -- with other uranium,  
19 mostly LEU and DU from other processes, a lot  
20 of uranium. And so as a consequence any  
21 exposure at that point -- then the -- the --  
22 the parts per billion compared to uranium would  
23 -- would go down again. See, in the raffinate  
24 stream the uranium was so cleanly removed that  
25 it was only parts per million of -- per gram of



1 material such that the use of the 62 parts per  
2 billion -- parts per -- yeah, parts per billion  
3 plutonium, is -- is really meaningless because  
4 there's precious little uranium in it.

5 **DR. MAKHIJANI:** Right.

6 **MR. RICH:** And so there are two reasons for not  
7 using that -- that -- that level in the  
8 raffinate stream directly as a default because  
9 it's -- it's not meaningful in terms of the  
10 fact there's precious little uranium there in  
11 the first place plus the fact that, you know,  
12 there was a total of a tenth of a gram, total,  
13 put into the ponds and -- and the fact that  
14 there's 62 parts per billion is -- is not a --  
15 not a consistent default based on the -- the  
16 overall default philosophy that has been  
17 developed. Plus the fact that that it was such  
18 a small time-wise and exposure potential  
19 process.

20 **MR. GRIFFON:** I guess the one -- again, I'm  
21 going by memory, but the one operation, I  
22 thought it was casting or furnace operations  
23 where -- and from -- from what I recall  
24 sometimes the slag would concentrate in the  
25 plutonium or neptunium.

1           **MR. RICH:** Yeah, I mentioned that, you know, in  
2           the --

3           **MR. GRIFFON:** And that's still covered within  
4           this range, is it -- I guess that's my  
5           question. If this range covers all those types  
6           of operations I think --

7           **MR. RICH:** Yes. Yes -- Yes, I think so.

8           **MR. GRIFFON:** You know --

9           **MR. RICH:** And -- And by the way, you know,  
10          when you -- when you reduce uranium it's  
11          converted to UF tetrachloride and then reduced  
12          with a magnesium bomb. And -- And there's a  
13          certain amount of slag that comes up which has  
14          impurities. It's -- Casting of uranium is a  
15          purifying process in itself. But because of  
16          the fact that they -- unique to Y-12 they  
17          processed all of the ACU directly, immediately  
18          and then -- then cast that to uranium directly  
19          so that the slag was -- was less than what you  
20          would normally get in some other process where  
21          the material had sat around and was less pure.

22          **DR. MAKHIJANI:** Okay. So basically we're not  
23          using the 62 ppb for anything?

24          **MR. RICH:** We really are not. And for -- And  
25          for the reasons that I've explained.

1           **DR. MAKHIJANI:** Okay. I'm just trying to  
2 understand what's happening.

3           **MR. RICH:** Sure. Sure.

4           **DR. MAKHIJANI:** And then sometimes we take the  
5 4.5 ppb and apply that and sometimes we reduce  
6 it by a factor of ten? No?

7           **MR. RICH:** That -- That -- That was -- That  
8 was given as a -- a -- an option if you wanted  
9 to get closer to the average. That's an  
10 option.

11           **DR. MAKHIJANI:** That's -- That's in the sample  
12 dose reconstruction.

13           **MR. GRIFFON:** Did they reduce it though?

14           **DR. MAKHIJANI:** I believe so. At least that  
15 was Joyce's conclusion when she looked at the  
16 number.

17           **MR. GRIFFON:** Okay. I need to look through --  
18 We'll bring that up later when we look at that  
19 example.

20           **DR. MAKHIJANI:** Okay. Why don't we -- I think  
21 it's -- it's number seven or eight.

22           **DR. NETON:** I'm not clear why we would have  
23 done that actually.

24           **DR. MAKHIJANI:** That's what she concluded. I  
25 just got it this morning from her.

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

2           **MR. RICH:** The -- The -- The reduction -- we  
3           -- we did list the -- the fact that the average  
4           was a -- a certain factor below the maximum  
5           that we used as the primary default.

6           **MR. GRIFFON:** Right.

7           **MR. RICH:** And -- And if you wanted to  
8           reconstruct the dose on the basis of average  
9           values why that was provided as a -- a guide.

10          **MR. GRIFFON:** And -- But there's no sort of  
11          operational guidance to that is there? I mean  
12          --

13          **MR. RICH:** Not -- Not -- Not in the TBD.

14          **MR. GRIFFON:** Not in the TBD?

15          **DR. NETON:** I think it's in the TBD. I'm  
16          looking at the dose reconstruction and it must  
17          have referenced why they did that if that's the  
18          case.

19          **MR. GRIFFON:** But I mean how would the DR know  
20          which --

21          **DR. NETON:** See, I'm looking at -- this may  
22          have been a machinist -- a machinist operator  
23          who's working with the already cleaned up  
24          uranium maybe. See, and, you know, when the --  
25          when they would come in there -- they'd have

1 the trained (inaudible) issue. Once they go  
2 through this cleanup phase and recast it there  
3 still may be something there and --

4 **MR. GRIFFON:** Yeah.

5 **DR. NETON:** -- and I'm just guessing at this  
6 point but there may be some justification for  
7 reducing that in a -- in a metals (inaudible)  
8 effort but I -- I'm going to look through that.

9 **MR. GRIFFON:** It's still more of a DR question  
10 anyway.

11 **DR. NETON:** It seems to me that, yeah, it did  
12 not --

13 **MR. GRIFFON:** It's not an SEC issue, right.

14 **DR. NETON:** If the upper range is valid then  
15 yeah.

16 **MR. RICH:** Another point of effect on that is  
17 that Y-12 and the handling of highly enriched  
18 uranium was unique to Y-12 and -- and resulted  
19 in operations where a -- a good share of the --  
20 the top of exposure could -- would occur. But  
21 you will notice in looking at other processes  
22 that a -- you know, it's -- the -- the value of  
23 the material is so great that the -- the -- the  
24 cleanup efforts were more effective and as a  
25 consequence the concentrations of the recycled

1 uranium contaminants was less coming in on the  
2 ACU than it was in other enrichment materials.

3 **MR. GRIFFON:** Which makes sense, yeah.

4 **MS. MUNN:** Yes.

5 **MR. GRIFFON:** It seems to make sense.

6 **MS. MUNN:** Yeah.

7 **MR. GRIFFON:** Anything else on this topic?

8 **MS. MUNN:** Don't think so but there is the  
9 action item to potentially beef up this section  
10 in the TBD.

11 **MR. GRIFFON:** Yeah, right.

12 **DR. NETON:** We're -- We're certainly going to  
13 do that.

14 **MR. GRIFFON:** But probably not an SEC issue.

15 **MS. MUNN:** No, not --

16 **DR. NETON:** No, no, no.

17 **MR. GRIFFON:** That's right.

18 **MS. MUNN:** Not for us today.

**ISSUE 4: POLONIUM-208**

19 **ISSUE 5: EXOTIC RADIONUCLIDES**

20 **MR. GRIFFON:** Issue four is the polonium. I  
21 think we got -- do you want to go through that  
22 and then --

23 **DR. NETON:** Yeah.

24 **MR. GRIFFON:** -- we can break for lunch? I  
25 think that'll be probably a good spot.

1           **DR. NETON:** I've kind of lumped these two  
2 issues together in my mind.

3           **MR. GRIFFON:** The exotics and the polonium?

4           **DR. NETON:** Yeah, they're --

5           **MR. GRIFFON:** Yeah.

6           **DR. NETON:** -- cyclotron-related issues --

7           **MR. GRIFFON:** Yeah.

8           **DR. NETON:** -- although they are different.

9           **MR. GRIFFON:** Issues four and five. Even  
10 better.

11          **DR. NETON:** All right. Well, I'll pass these  
12 around.

13          **MR. GRIFFON:** Do you need more coffee, Jim?

14          **DR. NETON:** No. I got a good night's sleep  
15 last night. I'll try the better night's sleep  
16 first.

17          **MR. GRIFFON:** I'm going to try the coffee  
18 first.

19          **DR. NETON:** Okay. What I -- What I handed out  
20 here is sort of a -- a compendium of issues  
21 related to cyclotrons so we can skip the first  
22 section on external dose information until we  
23 get to that issue. That's more relevant to the  
24 exotic radionuclides. And then cut to the back  
25 of this handout which includes some -- some

1 incident and -- and health physics reports from  
2 the era of the polonium operations.  
3 And let me just preface this -- these remarks  
4 by saying that we last time at the Board  
5 meeting and the working group and the  
6 conference call that, you know, we were aware  
7 of the incidents that were countable in this  
8 Delta View database. In fact we got a -- a  
9 very good sense that a number of hits on our  
10 queries of the database that -- that spoke to  
11 incidents, investigations, all that sort of --  
12 sort of thing. And we were fairly confident  
13 that we would come back here full of -- full of  
14 incident reports to show and demonstrate that -  
15 - that these things were followed up. Well,  
16 the fact is that we queried the database; we  
17 got -- depends on which query you use but the  
18 most refined query we had which was incident  
19 investigation in the SEC period showed up  
20 somewhere (inaudible) to 80 titles that looked  
21 to be of interest. And remember these are all  
22 over there on this 400,000-plus page Delta View  
23 database. We've pulled those reports, looked  
24 at them, and in fact we can't at this point  
25 provide any compendium of incidents for



1 internal dose investigations for cyclotrons or  
2 for the polonium operations. That fact is a  
3 big shock to us. It is what it is. I mean I  
4 can't make up incident reports when they don't  
5 exist. It also does not necessarily mean that  
6 there were a large number of incidents that  
7 went unrecorded but the fact is we just can't  
8 put our hands around the issues at this time.  
9 What I do have though is some -- some of the  
10 health physics reports that we actually had in,  
11 you know, at the last Board meeting --  
12 available at the last Board meeting that talked  
13 about follow-ups of issues. This first one on  
14 a polonium-beryllium spill I think we can kind  
15 of not ignore but we don't want to talk a lot  
16 about it. Really it's just a intent to show  
17 the flavor of -- of follow-up when there were  
18 incidents. This was a polonium-beryllium  
19 source which really has nothing to do with  
20 polonium 28 but, you know, they did a detailed  
21 follow-up with fecal sampling and -- and  
22 exposures and tracked the guy out for months of  
23 sampling and that sort of thing. I think I  
24 turned my attention to the accelerator section  
25 --

1           **MR. GRIFFON:** Jim, that first report, is it --  
2 I'm sure it has a date somewhere in there.

3           **DR. NETON:** It's July -- It was a health  
4 physics report between July through December  
5 1951, yeah.

6           **MR. GRIFFON:** Oh, it's -- it's on the top.  
7 Yeah.

8           **DR. NETON:** In that same time frame, in July  
9 through December '51 we also have an  
10 accelerator section that was written in a -- in  
11 an HP report where they tended to be fairly  
12 detailed about what was going on with the  
13 cyclotron. There's a general section on -- on,  
14 you know, the progress of where they are, how  
15 they were making gallium at the time. More  
16 significantly, when you get to page 39 you'll  
17 see a section labeled exposure analysis. And  
18 here they -- they -- they go to some great  
19 length about exposure monitoring for cyclotron  
20 operators and it's a pretty big deal. These --  
21 They were very high dose exposures, that sort  
22 of thing. At the very bottom you'll see a  
23 thing called airborne contamination. Here they  
24 summarize a report saying that there were 61  
25 air samples obtained during this six-month

1 period at the cyclotron and they divided these  
2 into four groups, and they provide these in --  
3 in results in table 8 which I believe is on  
4 page 41. Now, the airborne contaminate that  
5 we're talking about here, the best I can  
6 decipher from this is related to contamination  
7 from polonium 208. That was the main isotope  
8 of interest when they started the cyclotron in  
9 1951. In fact they made a lot of, of the  
10 stuff. The nature of the production of  
11 polonium 208 was that it was not amenable to  
12 being irradiated within a clad geometry.  
13 Absorption of the protons in the cladage  
14 (inaudible) so these -- the -- the (inaudible)  
15 I think which was the target, was irradiated  
16 there. That created a pretty large contaminant  
17 problem. If you look at table 8 you'll see  
18 that there -- as high as 15,000 DPM per cubic  
19 meter of cyclotron during the operational area  
20 -- in the operational area and down from there.  
21 So again we have 60-something samples that were  
22 taken in this -- in this period. We know what  
23 the level of work. I mean we're not flamboyant  
24 here. We knew that there were general airborne  
25 contaminants of polonium. We have, of course,

1 no access to bioassay samples for polonium 208  
2 that we could find. So at this point the  
3 polonium reconstruction, we have this report.  
4 And remember polonium reconstruction only  
5 bracketed 1951 and part of '52. I think it was  
6 September of '52 when it stopped.

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

8 **DR. NETON:** So the next report is on a similar  
9 line, January to July of '52 you'll see on  
10 table 7, airborne contamination during shut  
11 down and then on page 24 of that report,  
12 airborne contaminants are in the normal  
13 operation levels. These levels are -- are much  
14 lower but they're still very high compared to  
15 the limit which they site here as 70 DPM per  
16 cubic meter. Now, there are statements in here  
17 that say we require everyone to wear  
18 respiratory protection above 70 DPM per cubic  
19 meter which begs the question then, well,  
20 people were breathing up to 70 DPM per cubic  
21 meter and then there's also the issue of -- of  
22 the representativeness of the air samples and  
23 that sort of thing. We're left in a bit of a -  
24 - a pickle here right now with this polonium  
25 issue. I -- I don't know where we're going

1 with this but certainly we weren't able to  
2 produce what we -- we really firmly believed  
3 that we had, you know, 70/80 of these incident  
4 reports. In fact, I think ORAU went back and  
5 did a wider search, opening the title search,  
6 and pulled out 800 documents and looked through  
7 all those. And -- And the well is dry. You  
8 heard George speak earlier today that the data  
9 may actually reside now at X-10 because this  
10 was really an X-10 type operation. Now, you  
11 know, I think though that the time is running  
12 short and frankly maybe going to run out on us  
13 on this issue. So I honestly am here to say I  
14 don't know where we're at with this other than  
15 we have air sampling data that we could use for  
16 bracketing polonium. How robust that is and  
17 how that allows us to reconstruct doses for the  
18 workers right now is still a question mark in  
19 my mind.

20 **MR. CHEW:** Jim, this is Mel.

21 **DR. NETON:** Yeah.

22 **MR. CHEW:** I think I faxed you, too, this  
23 morning -- remember, we went out to the ORNL  
24 library to look for X-10 information to see if  
25 we could find inference to either incidences or

1 the way they operate. And I think I sent you a  
2 -- or faxed to you this morning -- we looked at  
3 the progress report, April 1, 1951 to June  
4 30<sup>th</sup>, 1951 is the cover page. And the second  
5 page it says 86-inch cyclotron. And  
6 considerable attention has been given to both  
7 personal protection from alpha activity  
8 associated with cyclotron components.

9 **DR. NETON:** Right.

10 **MR. CHEW:** Okay.

11 **DR. NETON:** Yeah, I -- I've looked through  
12 that, Mel, and -- and I think that there --  
13 there is a pretty good picture here that --  
14 that the health physics program paid a lot of  
15 attention to this activity. I mean there are -  
16 - there are air samples like I just talked  
17 about. There are recommendations for hand and  
18 foot monitors. There are protective equipment,  
19 clothing recommendations. And there is  
20 certainly indications of use of respiratory  
21 protection.

22 **MR. CHEW:** But I -- I want to --

23 **DR. NETON:** I put this in a situation though  
24 where we have monitoring data. We have -- We  
25 have indications that there was a -- a

1 reasonable health physics program but  
2 everywhere I look in here there are indications  
3 that -- that say that they are maybe below the  
4 maximum permissible levels. You know, they put  
5 respirators on when they reach 70 DPM. Yet we  
6 have acknowledgement then in their own reports  
7 that there were exposures. Yet we have no  
8 confirmatory bioassay data to -- to rely on to  
9 validate that that actually happened. And so  
10 I'm in a little bit of a quandary myself right  
11 now as to how -- how robust those data are in  
12 order to cover polonium exposure for cyclotron  
13 workers. That's where we are so I wish -- I  
14 wish we had more to offer. We certainly firmly  
15 believed we had -- had the data covered.

16 **DR. MAURO:** What kind of doses are you talking  
17 about at 70 DPM?

18 **DR. NETON:** Well, if -- if one -- and I haven't  
19 run this to ground but if 70 DPM were the --  
20 were the back or the MAC or whatever you want  
21 to call it in that period, you potentially, you  
22 know, at the -- in that time frame 15 rem to a  
23 critical organ maybe?

24 **MR. RICH:** It was -- It was set up for  
25 uranium.

1           **MR. GRIFFON:** Do you think that was a week  
2           though? I mean I don't know if they'd be doing  
3           that for --

4           **MR. RICH:** -- for the uranium.

5           **DR. NETON:** What's that?

6           **MR. RICH:** The 70 DPM was set up for uranium.

7           **DR. NETON:** Right. So that was not clear to me  
8           why they were using 70 DPM alpha in the  
9           polonium 208 facility. That -- That doesn't  
10          jive.

11          **MR. RICH:** Well, that's a relatively short-  
12          lived isotope.

13          **DR. MAURO:** Yeah, that's what I was going to --

14          **DR. NETON:** Well, it's two years. It's not  
15          that short. So you're going to get your 50-  
16          year dose within six years or so maybe but we  
17          could run that calculation and show what --  
18          what workers were exposed to, if they received  
19          the maximum allowable exposure at 70 DPM. Is  
20          that plausibly bounding? I -- I'm not sure.  
21          Let me look through that and say well, is this  
22          -- what do we do with that?

23          **DR. MAURO:** Is there an endangerment issue  
24          here? I mean that's what --

25          **DR. NETON:** Well, yeah.



1           **MR. GRIFFON:** Yeah.

2           **DR. MAURO:** I just wanted to make sure I  
3 understood that.

4           **DR. NETON:** Yeah, I -- I think with 70 DPM if -  
5 - if, you know, it's -- it's an alpha activity  
6 so let's assume it's similar to uranium in  
7 terms of its dose premiere intake. I think  
8 it's lower but it's in that ballpark. You're  
9 going to get into the range of doses that would  
10 endanger health. Okay. No doubt in my mind.  
11 Now, there's a whole additional piece. The  
12 cyclotron only operated for polonium for a year  
13 and a half period

14          **MS. MUNN:** Sure.

15          **DR. NETON:** But there may have been some  
16 residual contamination issues here. I mean it  
17 was clear they couldn't get rid of the problem.  
18 Once they -- once the polonium kind of  
19 distributed itself in the process it was kind  
20 of hard. You'll -- You'll see the locker  
21 rooms had contamination at this point so -- but  
22 yeah. I really wish we had some polonium  
23 bioassay samples, which I thought we had but we  
24 don't, to bracket. Again, the health records  
25 program seemed to have done everything they

1           could to limit exposure below the maximum  
2           allowable dose. But again it's been our  
3           practice in the past not to use that as a -- a  
4           logic path to say that that's what the maximum  
5           are. We've just not been comfortable doing  
6           that. So again I'll leave the issue open at  
7           this point but I guess that's as much  
8           information as I can present to you at this  
9           time.

10          **MS. MUNN:** Jim, there -- this report -- you had  
11          to turn in this report.

12          **DR. NETON:** Uh-huh.

13          **MS. MUNN:** It indicated that there were 63  
14          names identified in 1951 as being associated  
15          with this.

16          **DR. NETON:** Right.

17          **MS. MUNN:** Is this pretty close to the -- to  
18          the worker population we're looking at --

19          **DR. NETON:** I think --

20          **MS. MUNN:** -- in the '60 to '70?

21          **DR. NETON:** I think it's our opinion that  
22          that's in that ballpark.

23          **MR. GRIFFON:** It's fairly close.

24          **MS. MUNN:** Just about covers it?

25          **DR. NETON:** Yeah. We -- We had heard --

1           **MS. MUNN:** And we have well less than 100  
2 people.

3           **MR. KERR:** There were some people coming and  
4 going here as far as --

5           **MS. MUNN:** Oh, yes. Yeah.

6           **MR. KERR:** -- depending on what was being done.

7           **MS. MUNN:** Right.

8           **DR. NETON:** But it's our understanding from  
9 interviewing people who were involved with the  
10 process and others that cyclotron operation was  
11 a relatively small process operation relative  
12 to Y-12. Many of the people were actually X-10  
13 workers --

14          **MS. MUNN:** Right.

15          **DR. NETON:** -- not Y-12 workers and, you know,  
16 (inaudible) of physicists, technicians with  
17 some supplemental maintenance staff --

18          **MS. MUNN:** Right.

19          **DR. NETON:** -- that worked there. Certainly  
20 it's our opinion it's less than 100 workers.

21          **MS. MUNN:** And the whole thing lasted less than  
22 a year and a half?

23          **DR. NETON:** Well, for polonium.

24          **MS. MUNN:** For polonium, yes.

25          **DR. NETON:** The cyclotron --

1           **MS. MUNN:** Yes, the cyclotron.

2           **DR. NETON:** But the number is a relative,  
3 numbers of people working cyclotron I think  
4 stayed about in that ballpark.

5           **MS. MUNN:** Okay.

6           **MR. KERR:** Some of the, those studies done  
7 after -- immediately after this (inaudible)  
8 where radiation (inaudible). It was  
9 (inaudible). So it wasn't really radiated  
10 conferences.

11          **MS. MUNN:** These workers should be fairly easy  
12 to identify, shouldn't they?

13          **MR. KERR:** We have to. That's what I said.  
14 We've got -- we have obtained at least three or  
15 four memos that have the names of people --

16          **MS. MUNN:** You know just exactly --

17          **MR. KERR:** And we know --

18          **MS. MUNN:** Yeah.

19          **MR. KERR:** -- and has badge numbers.

20          **MS. MUNN:** Yeah.

21          **MR. GRIFFON:** A complete listing or as best you  
22 know?

23          **DR. NETON:** Be careful. As best we know. We  
24 know --

25          **MR. GRIFFON:** As best you know, right.

1           **DR. NETON:** We have written memos but --

2           **MR. GRIFFON:** We know it's a small group, a  
3 relatively small group.

4           **DR. NETON:** The cyclotron facility. We have  
5 that list. We have worker lists.

6           **MR. KERR:** We have some of the lists of people  
7 who have been monitored.

8           **MR. GRIFFON:** You know, I don't -- you probably  
9 haven't done this yet but do you know if all  
10 these people are in a similar department or --  
11 or is there any consistency there? Probably  
12 not because --

13           **MR. KERR:** Not now.

14           **MR. GRIFFON:** -- groups and other, yeah.

15           **MR. KERR:** We have people that have keys to  
16 their (inaudible) and those you can -- I've  
17 looked at departments that they're out of. And  
18 they're mainly out of I think the department  
19 number for molecular nuclear --

20           **MS. MUNN:** Yes.

21           **MR. GRIFFON:** I counted up here some of the --

22           **MR. KERR:** And the other one was electrical  
23 maintenance had some people with keys and a  
24 research support group has several -- a number  
25 of people with keys. So those --

1           **MR. GRIFFON:** That's about it, yeah.

2           **MR. KERR:** -- about three departments.

3           **MR. GRIFFON:** I'm just thinking of other ways  
4 if you didn't -- I'm not sure your list is  
5 complete. Maybe you could know with  
6 departments, you know. I mean but --

7           **DR. NETON:** But nonetheless, I'm still not  
8 clear how we're going to put a bound on this.

9           **DR. MAURO:** That's what I was going to ask now.  
10 What I'm hearing is if you do go down the road  
11 and try to place a plausible up or down, what  
12 I'm hearing is you have fair measurement data  
13 to have quite a large distribution. So the  
14 handle you might have -- the only real handle  
15 you have is to somehow use that data -- and I  
16 don't know if this is (inaudible) own data or  
17 (inaudible) data but somehow come up with a  
18 number that you're going to say this is a  
19 plausible up or down and apply it to all of  
20 these workers. Is that -- one -- one thing  
21 that's --

22           **DR. NETON:** That -- That -- That would be at  
23 this point given the data that we have, that  
24 would be an option.

25           **DR. WADE:** And the other option would be to --

1           **DR. NETON:** Revise the SEC evaluation and add  
2 this cyclotron worker class.

3           **DR. WADE:** And so as we pursue this option it  
4 would be good to have discussions obviously  
5 with DOL as I'm sure the Board will have  
6 questions for DOL related to that at the next  
7 meeting.

8           **DR. NETON:** I think you know --

9           **MR. GRIFFON:** How about the other nuclides? I  
10 mean you --

11          **DR. NETON:** Yeah.

12          **MR. GRIFFON:** This is polonium, right?

13          **DR. NETON:** The story -- The story gets a  
14 little murkier --

15          **MR. GRIFFON:** Right.

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

17          **DR. MAKHIJANI:** That would be the easy part.

18          **DR. NETON:** True. At least we have some air  
19 monitoring data for the -- Now, you have these  
20 other exotics, so-called exotic radionuclides  
21 that Mel Chew and his team did a great job  
22 putting together the table. We know when they  
23 were produced now, you know, under what time  
24 frames and what they weren't. Or it pretty  
25 much covers almost the periodic table as to

1           what was produced. We found no -- we would  
2           hope that these incident reports would have  
3           fleshed those out as well. And there's nothing  
4           there. So now we don't know how to bracket  
5           those potential incidents that may have  
6           occurred. It seems unreasonable to me to  
7           believe that none occurred and that's why we  
8           don't have any incident reports. I just -- I  
9           just have trouble believing that because in the  
10          1960s we have some reports that we actually  
11          showed. That gallium is a good example of  
12          that. And we said, geez, this -- it was  
13          actually one MAC into the -- into the  
14          (inaudible). So they're out there somewhere.  
15          They may be at X-10. We don't know. I also  
16          mentioned early on that the external data for  
17          the cyclotrons are not all necessarily in the  
18          CER database. Some maybe but not all. Given  
19          that then we're in the position of -- of having  
20          to say that let's go to the Delta View  
21          database. Sound familiar? You know, we can --  
22          we can pull these data out. They may be there.  
23          They may be at X-10. So we have no way to  
24          reconstruct right now internal exposures from  
25          which I believe were fairly low doses, but we



1           have no way of proving that. And secondly the  
2           external exposures at this point are not  
3           covered by any of our existing co-worker  
4           models. So the cyclotron worker issue really  
5           looks to me to be fairly, you know, -- I don't  
6           know what word to use on that. We don't have a  
7           lot of data.

8           **DR. WADE:** Fairly clear.

9           **DR. NETON:** Not very clear.

10          **DR. WADE:** Well, it is clear. I mean our  
11          actions will be clear. That's what we're --  
12          that's what we're here to do. So look at the  
13          reality and make decisions.

14          **DR. NETON:** We have to make decisions. I'm not  
15          saying that we've -- we've made that decision  
16          at this point but you -- given the -- given the  
17          weight of the evidence that we presented here  
18          it's going to be hard for us to come up with a  
19          bound -- a plausible bounding analysis.

20          **MR. GRIFFON:** And I think part of that  
21          consideration might be the small number of --

22          **DR. NETON:** It's a small number of workers on  
23          top of that so then how much effort do we  
24          expect. I believe the reports are there  
25          somewhere.

1           **MR. GRIFFON:** Right.

2           **DR. NETON:** But do we spend a massive amount of  
3 man-hours to pull these records out to prove  
4 that those doses were small?

5           **MS. MUNN:** Has there been an effort to?

6           **MR. GRIFFON:** Because out of those --

7           **DR. NETON:** Yes, Mel mentioned that they were  
8 yesterday looking for incident reports in the  
9 library for X-10. We found the investigations.  
10 They -- They typically, the ones we've looked  
11 at, the ones that I've seen, two or three, are  
12 related to external exposure where someone  
13 walked into the area --

14           **MR. GRIFFON:** Unlocked.

15           **DR. NETON:** -- unlocked and they received an  
16 exposure. They did nice to follow up. I would  
17 have expected to see a similar level of  
18 attention paid to internal. Now, it may be  
19 because as we'll talk about later in that case  
20 study that John threw over our side, you know,  
21 the mindset in this time period was not so much  
22 let me figure out what a person's internal dose  
23 is but are we concerned at all that workers are  
24 above the maximum permissible amount at that  
25 time. Very much like TLV for industrial

1 hygiene. As long as we know workers are below  
2 X they weren't really concerned with  
3 calculating a detailed internal dose. That  
4 just wasn't the way business was done back  
5 then. And -- And this may be what we're up  
6 against. Everyone recognized that these are  
7 short liberated nuclides. Yeah, you blow a  
8 little bit into the air but it goes away so we  
9 don't have a good way to hang our -- well, it's  
10 anything to hang our hat on right now. So I  
11 cut that pretty short but that's --

12 **MR. GRIFFON:** You did.

13 **MS. MUNN:** There's nothing to argue about.

14 **MR. GRIFFON:** I was just going to ask -- I know  
15 what I was going to ask. A lot of the  
16 claimants -- I don't know if you have a way to  
17 figure this out but how many were potential  
18 cyclotron workers?

19 **MR. KERR:** I think we've been looking back at  
20 that.

21 **MR. GRIFFON:** Have you looked at that?

22 **MR. KERR:** There's two at Y-12.

23 **MR. GRIFFON:** Right. So we're talking --

24 **MR. KERR:** And I briefly looked through the  
25 (inaudible) and I wasn't able to identify

1 anybody, you know.

2 **MR. GRIFFON:** So we're talking 65 to 100 in the  
3 whole population and two in the claimants?

4 **DR. NETON:** Well, maybe in the claimant  
5 population.

6 **MR. GRIFFON:** Maybe a few more in X-10, yeah.

7 **MR. KERR:** I looked at X-10 and I -- just a  
8 quick look --

9 **MR. GRIFFON:** Right.

10 **DR. NETON:** I think there's a third which is  
11 the gallium incident one that we found in the  
12 '60s that led us down this path --

13 **MR. GRIFFON:** Right.

14 **DR. NETON:** -- thinking, oh, my gosh, look at  
15 the wealth of --

16 **MR. GRIFFON:** It is significant, yeah.

17 **DR. NETON:** We went into a detailed  
18 investigation of this gallium and we thought,  
19 well, this is great. Everybody must have some  
20 similar level of documentation and it's turned  
21 out to be --

22 **DR. WADE:** Are there cyclotron operators  
23 outside the period covered by this SEC?

24 **DR. NETON:** Yes.

25 **MR. GRIFFON:** Yes.

1           **DR. WADE:** So it's -- could re-- depending upon  
2           our judgment it could result in an identified  
3           class.

4           **MR. GRIFFON:** Expanded year class.

5           **DR. NETON:** Yeah, it would be expanded year I  
6           think.

7           **DR. WADE:** Or by us as -- as another class.

8           **MS. MUNN:** Oh, yeah.

9           **MR. KERR:** In 19-- 1960 -- 1960 and 1961 an  
10          operation of the cyclotron went entirely X-10.

11          **MR. GRIFFON:** Yeah.

12          **MR. KERR:** But it was used for us.

13          **DR. NETON:** You've got to be careful though.  
14          Under the change of geographic location, the  
15          way we're doing business right now is --

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

17          **DR. NETON:** -- is an X-10 -- it's a Y-12  
18          operation.

19          **DR. WADE:** It opens up various issues  
20          inappropriate for us to look at. It's really  
21          what is supposed to come from this process.  
22          It's a good thing.

23          **DR. NETON:** I think for purposes of this SEC  
24          for instance if we were to make a supplement to  
25          add cyclotron, I think we -- we would cut it at

1 '57 with the understanding that we would have  
2 an ongoing investigation into an additional --  
3 I just don't want to delay --

4 **MR. GRIFFON:** Right.

5 **MS. MUNN:** Yeah.

6 **DR. NETON:** -- for the effort.

7 **MS. MUNN:** Yeah.

8 **DR. WADE:** Because if you were to find  
9 claimants who would fall outside of that time  
10 frame --

11 **MS. MUNN:** Right.

12 **DR. WADE:** -- then we could work with those  
13 claimants.

14 **DR. NETON:** We could work with them through the  
15 process or whatever.

16 **MR. KERR:** System workers --

17 **MR. GRIFFON:** Did --

18 **MR. KERR:** I guess what -- maybe after this '57  
19 period we ought to walk through the monitoring  
20 data on the people who were working at the  
21 cyclotron when we go back in the early '50s  
22 which may make a difference.

23 **DR. NETON:** Example we had for gallium.

24 **MR. GRIFFON:** Right. So we could leave that  
25 open.

1           **MR. KERR:** Right.

2           **DR. NETON:** Because after '58, you know, the  
3           recommendations to work were incorporated and  
4           they were a little better about internal  
5           monitoring although I don't make any -- I don't  
6           make any predictions any more about what was  
7           done.

8           **MR. GRIFFON:** That's where we are, like you  
9           said, yeah. I think we're at -- that's the  
10          issue four and five actually. I don't think  
11          there's anything else to add on that.

12          **DR. NETON:** No.

13          **MR. GRIFFON:** The only thing, I was looking  
14          back at my questions coming into today and  
15          everything's been answered except for the  
16          question, and it's from an earlier issue we  
17          discussed but some of these memos -- all these  
18          memos that you've emailed, some of the memos  
19          have been cited by Mel and others. And can you  
20          just make sure they're on the O-drive or  
21          whatever in that directory so we can look at  
22          them?

23          **DR. NETON:** Sure.

24          **MR. GRIFFON:** And also the -- the -- I think  
25          you used some of this data from these -- these

1 reports. I emailed you on this. These reports  
2 that were under classification review, the  
3 health and safety reports. Are they available  
4 yet or not yet?

5 **DR. NETON:** No.

6 **MR. GRIFFON:** I think you said they were still  
7 under -- under review or whatever. So if they  
8 become available you'll post them, okay.

9 **DR. NETON:** As soon as we get them we'll put  
10 them out.

11 **MR. GRIFFON:** Okay. I think we're at a -- I  
12 think we need a break.

13 **DR. WADE:** To the people on the phone, so we'll  
14 break and we assume we'll come back at 2:00  
15 p.m.?

16 **MR. GRIFFON:** 2:00 p.m., yeah.

17 **DR. WADE:** We're going to break contact with  
18 the call now.

19 **MR. CHEW:** All right.

20 (Whereupon, a recess was held from 12:55 to  
21 2:10 p.m.)

**ISSUE 6: 1948 AND 1949 SALVAGE AND RECYCLING**

22 **WORKER INTERNAL DOSE**

23 **MR. GRIFFON:** Jim, we're on the record now. I  
24 guess we're going to pick up with issue six.

25 **DR. NETON:** Issue six.



1           **MR. GRIFFON:** '48 to '49 salvage and recycle  
2 worker internal dose.

3           **DR. NETON:** I don't have a real handout for  
4 this so I can just talk through it but it's a  
5 fairly straightforward issue in my mind. The  
6 issue is that we -- as people -- you recall we  
7 have no bioassay data for '48 and '49 for  
8 workers at Y-12, at least none that we have  
9 access to. I think there is some but we just  
10 don't have it. So it turns out we took workers  
11 with bioassay in 1952 and -- and used them to  
12 recon-- to -- to predict what the maximum  
13 intake could have been in '48 and '49 given  
14 what the excretion rates were in 1952. And we  
15 came up with what we believed to be some fairly  
16 generous estimates. And I think in general  
17 there was agreement --

18           **MR. GRIFFON:** Yes.

19           **DR. NETON:** -- among the working group that  
20 that seemed to be a reasonable approach with  
21 the proviso that we had to demonstrate somehow  
22 that, you know, we're the subset of workers who  
23 were called the salvage workers in 1948 and '49  
24 also present in 1952. And as importantly was  
25 their distribution similar to the overall

1 distribution of workers in 1952 or were there -  
2 - is there some subset that we should account  
3 for and -- and increase their dose? That's the  
4 story. Now, the result was that we found there  
5 were 352 workers who we had monitored data for  
6 in 1952.

7 **MR. GRIFFON:** I think you did send something on  
8 this issue.

9 **DR. MAURO:** There was something.

10 **DR. NETON:** Okay. I did. That was the -- in  
11 fact I can pass this out.

12 **MR. GRIFFON:** Right.

13 **DR. NETON:** This has actually --

14 **MR. GRIFFON:** Yeah, that's it.

15 **DR. NETON:** -- a hodge-podge of -- of  
16 information. And what's relevant is item  
17 number one here on the chart that talks about  
18 393 ID's with urinalysis data in 1952. We  
19 check the job categories or titles of those  
20 people and nine have salvage related job  
21 titles. Okay. We also went back and looked at  
22 workers -- the job titles of workers who were  
23 there in -- prior to 1950 and it turns out that  
24 there were nine people with job titles of  
25 salvage workers before 1950. So we have gone

1 back and actually looked at the distribution of  
2 the nine people who have salvage job titles at  
3 Y-12. And of the people who were listed as  
4 salvage workers the minimum bioassay was zero,  
5 the average was 24, and the maximum was 576.  
6 And these are in DPM for 24 hours. If you look  
7 at the total population of 393 workers the min  
8 was -1, the average was 33, and the max was  
9 38,000.

10 **DR. MAKHIJANI:** Where are you reading from?  
11 Sorry.

12 **DR. NETON:** I'm reading from my own private  
13 piece of paper here. I'm sorry. I didn't mean  
14 to be facetious. I -- I'm sort of elaborating  
15 on that -- that first sentence on the sheet  
16 that was just handed out that said internal  
17 bioassay review. It talks about the 393 ID's.

18 **MR. GRIFFON:** Oh, yeah. Right.

19 **DR. NETON:** We went back and looked at the --  
20 at the bioassay records for those nine salvage  
21 workers and I was just comparing the  
22 distribution -- a rough comparison of  
23 distribution. And it turns out that the  
24 average value for the overall population is a  
25 little higher than the average value for the

1           nine salvage workers. They're in -- it's in  
2           that ballpark. There doesn't seem to be any  
3           issue with -- with them being way out of whack  
4           which -- which is kind of consistent with what  
5           we were thinking is these people were pulling  
6           residual contamination of uranium off the  
7           pieces and parts. I guess one could --

8           **MR. GRIFFON:** Jim, is this -- is this salvage  
9           related job titles, what -- is there any --  
10          there was a salvage department I saw in some of  
11          the health physics reports.

12          **DR. NETON:** I actually think that they had  
13          salvage worker in their job title.

14          **MR. GRIFFON:** It did say salvage worker, yeah.

15          **DR. NETON:** Yeah, that's what Bill -- Bill  
16          Tankersley was clear on that --

17          **MR. GRIFFON:** Yeah.

18          **DR. NETON:** -- that they did have a salvage  
19          worker title.

20          **MR. GRIFFON:** Okay.

21          **DR. NETON:** So now, the other comparison was I  
22          think that there were -- of the people who were  
23          monitored, 393 who were monitored in '52, I  
24          believe, and someone help me out, is about 140  
25          -- 40 percent of workers also had -- were also

1 working in the pre-'50 period. We don't think  
2 that's necessarily an issue of attrition so  
3 much as of maybe adding new workers but  
4 nonetheless, there was a very good overlap of  
5 workers in '52 with the pre-'50. And in fact  
6 the nine salvage workers seem to match up  
7 between those two periods. So we don't have  
8 what seem -- there doesn't seem to be an issue  
9 here for us anyways that -- that what we've  
10 done is -- is a fairly reasonable approximation  
11 or if anything a claimant favorable  
12 approximation of their exposures. We do --  
13 went back and tried to identify any air sample  
14 data that may be useful in helping to also  
15 corroborate this and couldn't find it. That we  
16 did not find. It didn't pan out for us.

17 **MR. GRIFFON:** Jim, I think that's reassuring.  
18 I don't know if --

19 **DR. MAKHIJANI:** Give us the data and we'll be  
20 able to see the, write the worker numbers down.

21 **MR. GRIFFON:** That's -- That's -- That's what  
22 we asked for and, you know, it looks like  
23 you've done it so --

24 **DR. NETON:** We -- We -- The good news is we  
25 were able to track it. We've identified it and

1 we'll get you the data.

2 DR. MAKHIJANI: Good.

3 DR. NETON: Okay.

**ISSUE 7: Y-12 WORKER DATA INTEGRITY ISSUE**

**REGARDING INTAKE INCIDENT**

4 MR. GRIFFON: And I guess we're on to issue  
5 seven.

6 DR. NETON: Issue seven. That is the case  
7 study; is that right?

8 MR. GRIFFON: Right.

9 DR. NETON: Yeah, I -- I -- I looked at that  
10 case in the last conference call. I hadn't had  
11 a chance to -- to review the case. And I sent  
12 around an email --

13 MR. GRIFFON: Yeah.

14 DR. NETON: -- I thought that was about a page  
15 response to the -- what I thought the issues  
16 were and I'm still on that -- on that bent  
17 that, you know, the spectra theory looked like  
18 there was in the K-40 there. And my knowledge  
19 of that system was that they were using a -- a  
20 complex technique that I wonder -- wonder why  
21 they do that but they did it nonetheless. And  
22 certainly it's plausible that that 30 millirem  
23 contributing to the content continuing in the  
24 185 region. My guess is there's about ten  
25

1 (inaudible). I'm looking at the K-40 versus  
2 the --

3 **DR. BEHLING:** That's where I came out after I  
4 realized that I had missed the --

5 **DR. NETON:** Yeah.

6 **DR. BEHLING:** I mean I looked at that and I  
7 said, why are they squeezing all of that 1.5 in  
8 the -- into 500 channels? I expected that to  
9 be --

10 **DR. NETON:** Yeah.

11 **DR. BEHLING:** -- 4,096 channel -- multi-channel  
12 analyzer and I looked at those two peaks and I  
13 jumped to a conclusion that it wasn't -- the  
14 data wasn't there for me to say no to it. It  
15 was only after you explained it that I  
16 realized. And the striking fact is that the 93  
17 and 186 are a factor of two apart.

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

19 **DR. BEHLING:** And the 66 and the 1 -- 4.6  
20 happen to be exactly --

21 **DR. NETON:** I can sort of see how you came to  
22 that conclusion but I --

23 **MR. GRIFFON:** The energy is written over those  
24 peaks but I realize --

25 **DR. BEHLING:** Well, now, I wrote that in there

1 and there was --

2 **DR. NETON:** (Inaudible) original (inaudible)  
3 and I said there's more energies here.

4 **MR. GRIFFON:** Yeah. Yeah.

5 **DR. BEHLING:** It was intended to be an internal  
6 memo --

7 **MR. GRIFFON:** Right.

8 **DR. BEHLING:** -- which I had sent to John.

9 **MR. GRIFFON:** That's fine.

10 **DR. BEHLING:** And I had said for -- for  
11 explanatory reason I'll make the assumption.  
12 And it was an assumption that I had no qualms  
13 with because there was nothing there that says  
14 it's 2.9 KV per channel. It could have easily  
15 been .4, in which case the two peaks would have  
16 corresponded.

17 **DR. NETON:** I think that counter was used for  
18 multiple purposes and one was to do thorium  
19 measurements. And I think if 228's got a peak  
20 of 911 KPU that they would have used to  
21 quantify thorium exposures and -- and other  
22 issues. But you're right. I mean I -- I don't  
23 -- it doesn't make a lot of technical sense to  
24 measure something. I'm pretty sure this was 11  
25 by 4 inch detector. That's a pretty big --



1           **DR. BEHLING:** That's a huge volume detector --

2           **DR. NETON:** Yeah.

3           **DR. BEHLING:** -- that is not usually used for  
4 lower energy protons.

5           **DR. NETON:** And that was actually what was in  
6 the mobile counter which this may be the count  
7 from was two of those detectors. The person  
8 was sandwiched between two of those detectors.  
9 Nonetheless, you know, they did try to account  
10 for that count being scattered but the problem  
11 is variable mass people, someone like myself  
12 versus a skinny person, the peak would change  
13 even in that. And so the ability to predict  
14 how many cesium counts were in that 185 region  
15 is pretty poor.

16           **MR. GRIFFON:** Yeah.

17           **DR. NETON:** And even worse in the 6393. One  
18 thing that should have tipped you off maybe was  
19 that the 93 should have had a (inaudible) of 63  
20 because that's equally a (inaudible) that has  
21 the 93 before --

22           **MR. GRIFFON:** Yes.

23           **DR. NETON:** -- the 234.

24           **MR. GRIFFON:** Yeah.

25           **DR. NETON:** Anyway, so -- so I think that issue

1 kind of goes away with the exception that,  
2 okay, how good is mobile counter and -- and  
3 what does that really mean in terms of the  
4 overall program ability to measure dose. Oh,  
5 let me follow up.

6 **MR. GRIFFON:** Yeah.

7 **DR. NETON:** They did follow up as I said, with  
8 a urine sample which the practice --

9 **MR. GRIFFON:** Right.

10 **DR. NETON:** -- to say, okay, I see an evidence  
11 of a positive uranium intake. Let me take a  
12 urine sample. It showed up I think it was --

13 **DR. BEHLING:** 69?

14 **DR. NETON:** -- 63 or 96 DPM which was below  
15 their stated action level at that point of 90  
16 DPM per year. That 90 DPM, even as late as 19-  
17 - I had to think about this for a little bit  
18 but even as late as May 1989 DOE workers were  
19 still being monitored under the old ICRP-2  
20 requirements. So you can calculate Q, the  
21 maximum body burden that could be in the lungs,  
22 but 365 a year and not exceed 15 rem per  
23 quarter. For a lung counter they're only  
24 focusing on insoluble uranium. So that came  
25 out to be somewhere around 17 microcuries I

1 think, worked up in micrograms. And so they  
2 exceeded what they thought was over 15 rem  
3 potential exposure to lung if that were there  
4 all year. They took a urine sample and you  
5 could also calculate under the old ICRP-2  
6 concept what would be in the urine if I had 117  
7 microcuries using that old sample one model of  
8 a 120-day half-life in the lung. That comes  
9 out to around 90 DPM. So as long as I'm  
10 excreting less than 90 DPM per liter I don't  
11 have the potential to exceed the --

12 **DR. BEHLING:** Exceed 15.

13 **DR. NETON:** So -- So they took a sample. It  
14 was less than the 90. They go out. I got this  
15 issue going here. It's less than 90, it's good  
16 to go. And -- And it wasn't their practice in  
17 those days to record any dose at all for  
18 workers who were just were below the --

19 **DR. BEHLING:** You know, it seems so strange  
20 when I compare it to Rocky and then, you know,  
21 Rocky Flats, when you look at their TBD they  
22 introduced detectors. Subsequently they used  
23 high purity uranium -- detectors and they used  
24 urinalysis that would have an MDA value of less  
25 than one DPM in a 24-hour urine sample. And of

1 course, when you look at the MDA associated  
2 with Y-12, under optimum conditions 26 DPM in a  
3 24-hour period. And that's optimum; more than  
4 likely twice that realizing that you're  
5 potentially going to be looking at higher  
6 background in a -- in a proportional  
7 (inaudible). So I'm looking at that and sort  
8 of saying why did they risk, at that late date,  
9 up until September of 1989, they used gross  
10 alpha and urinalysis data that was so far out  
11 of whack with what the rest of the industry was  
12 doing.

13 **DR. NETON:** I totally agree with you. I mean  
14 that -- that's something that I -- I actually  
15 went out -- went back and pulled their -- their  
16 procedures back in that era and they were using  
17 gross alpha with proportion in there. And if -  
18 - it was electrode deposition which attributed  
19 --

20 **DR. BEHLING:** That's 20 volumes.

21 **DR. NETON:** -- that appeared to be right out of  
22 the urine sample after it may have been  
23 digested slightly. So it -- it was a very high  
24 level. I guess one -- one could speculate  
25 that, you know, it met -- it met the need at

1 the time, you know. You want workers in  
2 plutonium. Plutonium had a -- a more stringent  
3 controls on it.

4 **MR. GRIFFON:** I'm sure that was the rationale,  
5 right? I mean --

6 **DR. NETON:** Why -- Why -- Why spend, you  
7 know, I can see management saying why spend  
8 \$300 a sample when you can process it within --  
9 within the regulations for 50. I mean I don't  
10 know if that's true but that -- that certainly  
11 could be why. So, you know, that's -- that's  
12 the bottom line I think on that issue. I don't  
13 really see that there's -- I think the mistake  
14 that was made was to try to attribute the  
15 cesium P.

16 **DR. BEHLING:** No, I completely -- completely  
17 misread that spectrum.

18 **DR. NETON:** I've seen better --

19 **MR. GRIFFON:** That's interesting because that  
20 caught my eye because I've heard people down  
21 there in interviews say the same thing, that I  
22 -- I came out high on my count and they just  
23 said -- they said, oh, do I hunt deer, you  
24 know, and they -- so this isn't the first time  
25 that's -- that's come up. I never saw it in

1 writing like this but --

2 **DR. NETON:** At Savannah River it's even worse.  
3 I mean the -- the clay soil in that region for  
4 some reason binds --

5 **DR. BEHLING:** Binds cesium.

6 **DR. NETON:** -- binds cesium. So then the deer  
7 graze on the vegetation and even fallout from  
8 years and years and years ago are still  
9 available for uptake in the plants. There  
10 doesn't seem to be a kind of source for cesium  
11 for this worker and that doesn't seem to be the  
12 issue --

13 **MR. GRIFFON:** Right. Right.

14 **DR. NETON:** And I guess at the end the bottom  
15 line is that the DOE provided us every number  
16 that -- that we used to try to validate whether  
17 they did it right so in that sense we were --  
18 we were focusing on the integrity of the data.

19 **MR. GRIFFON:** Yeah.

20 **DR. NETON:** I would say that the data were not  
21 sensitive.

22 **MR. GRIFFON:** Yeah.

23 **DR. NETON:** We could argue about the  
24 interpretation that they made but they provided  
25 us all the values in order to make that

1 interpretation.

2 **MR. GRIFFON:** And I guess the other add-on is  
3 you're not relying on that data to do dose  
4 reconstructions anyway. You're using end data,  
5 right?

6 **DR. NETON:** Yeah, lower -- the 69 DPM certainly  
7 comes into play.

8 **MR. GRIFFON:** Yeah, right. It does come into  
9 play.

10 **DR. NETON:** And I think this was a TIB 2  
11 approach originally that the -- the case -- I  
12 don't want to get too much into detail --

13 **MR. GRIFFON:** Yes.

14 **DR. NETON:** -- but I think the case was non-  
15 compensable first pass.

16 **DR. BEHLING:** I think he has the second cancer  
17 which will now be valued under the revised  
18 lymphoma DCF.

19 **DR. NETON:** Exactly. So the second cancer  
20 which -- what would be a different dose  
21 reconstruction but I believe that the urine  
22 sample was bounded by the two two over-estimate  
23 approach in the first pass.

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

25 **DR. NETON:** But yeah. That was what I was

1           trying to say in my last sentence of my write-  
2           up that we need to look at this through the  
3           lens of modern interpretation and dose models  
4           which I think we're doing.

5           **DR. BEHLING:** I did look at the historical  
6           other -- I checked on data and get an  
7           understanding of just the insensitivity of that  
8           because if you look back, and I brought a few  
9           photocopies with me that are, you know, crossed  
10          out, blackened out the name I can distribute,  
11          but they had in one instance a historical  
12          whole-body count or chest count -- they really  
13          didn't distinguish between them -- where the  
14          uranium 235 was recorded as -99 micrograms  
15          negative meaning that between plus and minus  
16          100 there was really no way of determining  
17          whether or not you had anything in you.

18          **DR. NETON:** Well, the problem depends on where  
19          that -- I'm very familiar with the Y-12 mobile  
20          -- mobile counter. It was used for (inaudible)  
21          but I had -- I had on my desk data, this being  
22          for all the workers and for all that had been  
23          measured with that counter and it's very, very  
24          subject to radon fluctuations in air. You can  
25          imagine you're doing this count, and you do it



1           in the -- in the afternoon hours your  
2           background when there's a conversion --  
3           or whatever and the next thing you know it's  
4           attracting a huge amount of radon background  
5           that's not there in the situation.

6           **MR. GRIFFON:** Yeah.

7           **DR. NETON:** And you -- I can usually see  
8           getting --

9           **MR. GRIFFON:** Yeah.

10          **DR. NETON:** -- any negative numbers. My  
11          recollection -- strange I remember this but the  
12          detection limit for that system is 5.2  
13          milligrams of thorium uranium 238 and about 38  
14          micrograms reportedly in good conditions for U-  
15          235. For some reason that rings a bell because  
16          there was a lot of workers that had those  
17          notations there. Yeah, it probably was --  
18          yeah, the lung counter, we need to look at what  
19          it was about. The lung counter was not as a  
20          primary mechanism for control of exposures. It  
21          was a sort of follow up to make sure they  
22          weren't exceeding the 5 -- 15 rem lung doses in  
23          that time period. And the urine sampling  
24          program was more sensitive than the lung  
25          counter by far but were insoluble. If you

1 believe the 120-day half-life that was used in  
2 the -- I can't remember -- But interestingly  
3 enough it does -- Jerry Barber at Y-12 went  
4 back and looked at all the monitoring data  
5 historically at one point and published an  
6 article on how physics -- he came up with what  
7 he called Q-class uranium which it fit pretty  
8 well. Quarterly clearance class rather than --  
9 than monthly. And it came out about 120. Most  
10 of the uranium at Y-12 was in that -- that  
11 ballpark. Interesting -- Interesting  
12 exercise.

13 **DR. BEHLING:** Yes.

14 **DR. MAKHIJANI:** A couple of questions just for  
15 clarifying the scientific issues in my head.  
16 One would be that essentially the in vivo data  
17 has to be disregarded even as a validation so  
18 far as uranium is concerned because I mean  
19 using the subtraction from them it becomes  
20 quite variable and, you know, you have no idea.  
21 It seems from the data that Hans showed me --  
22 it seemed to be very difficult to make sense of  
23 the in vivo data and I just wanted to --

24 **DR. BEHLING:** The low doses?

25 **DR. MAKHIJANI:** -- the impressionistic idea not

1 -- not the studied idea.

2 **DR. NETON:** It's very low incidence levels I  
3 think that, you know -- this came up in the  
4 original review, the Y-12 site profile; why  
5 aren't we using the in vivo data more. And the  
6 answer was that the urine sampling was much  
7 more sensitive and would be more representative  
8 of workers' exposures. Now, it doesn't mean  
9 though you can't use the in vivo data as a  
10 bounding estimate of some point to say okay, I  
11 -- I -- my urine sample shows me a very massive  
12 intake for some reason. It is a contaminated  
13 sample. And I've got a -- and I want to see if  
14 it possibly was. And I've got a urine -- I  
15 mean in vivo count that was done and it shows  
16 that it's much lower than what you'd expect.  
17 Within certain limits one can make those  
18 comparisons and -- and -- and use it to your  
19 advantage. But -- But you're right, Arjun,  
20 you've got to be careful when you start using  
21 in vivo to do anything. In vivo normally -- I  
22 never say always anymore but you will normally  
23 use the in vitro urine data --

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

25 **DR. NETON:** -- as -- as an exposure indicator.

1           **DR. MAKHIJANI:** It -- It would seem to me that  
2           if -- if the setup of the counter, and you  
3           know, this is obviously I don't have field  
4           experience in the way that you do -- but just  
5           looking at the theory of how it was done and  
6           the -- the data that Hans showed me and your  
7           explanation, if -- if -- if the frequencies of  
8           interest from the uranium and the thorium are  
9           left and -- and -- and the counter is merely  
10          centered on the cesium peak and you've got a  
11          back stabber that you're subtracting out that  
12          would alter significantly, if you -- you would  
13          be left with a piece of data that would be  
14          extremely uncertain and -- and very unreliable.  
15          So my -- my question is how could you use -- it  
16          would seem to me that so long as the other was  
17          arranged in the way that this one seems to be  
18          that you could not use that in vivo data; that  
19          in vivo data has become unusable for uranium  
20          235.

21          **DR. NETON:** Within certain limits. I mean I --  
22          I -- I can -- I can guarantee that if you put  
23          enough in front of that detector you start  
24          seeing a photo 185. It's not insensitive. I  
25          mean the intrinsic efficiency of that detector

1 is virtually 100 percent for 185 KPU's, so  
2 thick it's got 100 percent intrinsic efficiency  
3 capturing those photons. The question is when  
4 does that intrinsic rise above his continuum  
5 there --

6 **DR. MAKHIJANI:** Right.

7 **DR. NETON:** -- amidst the noise that might be  
8 present from radon and (inaudible). There was  
9 a calculable value there and it's not  
10 worthless. I mean I wouldn't characterize it  
11 as that at all. I'd say you have to be careful  
12 because if you get somewhere above 100-and-  
13 something micrograms I'm very certain you could  
14 start to see -- you could start to see photons.

15 **DR. BEHLING:** But like I said, I -- I made a  
16 copy of some of his historical and you can  
17 certainly say one thing. Every time you see a  
18 negative value that's obviously an error  
19 because by definition that's an impossible  
20 situation. And so it lends you some  
21 understanding of the limitation of the data  
22 when you have a minus 99 there's no explanation  
23 for that other than to say it's in error.

24 **DR. NETON:** Well, it's...

25 **DR. BEHLING:** Well, it's an indication of the -

1 - of the statistics. By stripping something  
2 out you end up unfortunately at times with a  
3 negative value.

4 **DR. NETON:** It's -- It's not an error. It's -  
5 - It's -- It's a number generated as a result  
6 of this measurement process and it's -- it's an  
7 indication of variability of the process.

8 **MR. GRIFFON:** Right.

9 **DR. NETON:** It's a valid number based on the  
10 measurement. Now, how valid -- how uncertain  
11 that is and can you come up with minus 99, how  
12 does that bracket the uncertainty distribution  
13 that we're trying to measure? That's  
14 informative. It's not in error.

15 **DR. BEHLING:** Uh-huh.

16 **DR. NETON:** I mean I'm clear on that.

17 **DR. MAKHIJANI:** Looking at -- Looking at the  
18 sort of rather large amount of stripping that  
19 would have to have some value for -- for the  
20 back stabber people from cesium, that -- that  
21 would really -- I mean you'd have to have a  
22 pretty well defined instruction for dose  
23 reconstruction when they could use this because  
24 a vast majority of them -- the vast majority of  
25 this in vivo data would appear to be unusual up

1 to mid-1989.

2 **DR. NETON:** Again, I don't know unusable or  
3 not. I mean within a certain limit. Now,  
4 again we don't put a lot of -- of emphasis in  
5 using the in vivo data other than for  
6 confirmatory issues of let's say a person had a  
7 sample here and someone argues you had an  
8 incident a year ago and you -- you could have  
9 had an intake or who knows how many micrograms.  
10 Well, you can say, well, no, there's no  
11 indication in this -- this path given, you  
12 know, whatever the reliability of system.

13 **MR. GRIFFON:** I would also say we're getting  
14 into TR discussion more than SEC discussion.

15 **DR. MAURO:** I'd like to point out that just  
16 listening to this discussion, the level of --  
17 of knowledge -- experience that's reflected in  
18 this conversation. This I guess is caution.  
19 If you're in a production mode and you're  
20 moving out large numbers of cases and you have  
21 300 health physicists moving through the  
22 process, the kinds of judgments you're talking  
23 about I certainly trust what I'm hearing.  
24 Incredible health physics but I think that  
25 you're in an -- in a -- in an area now where

1           you've got to be really careful.

2           **DR. NETON:** Oh, yeah.

3           **DR. MAURO:** Because this is not just turning  
4           the crank now. There's a lot of judgment being  
5           made here.

6           **DR. NETON:** Again I don't know -- I'm not aware  
7           of any program -- could be where the workers  
8           had in vivo accounts without urinalysis. I  
9           mean we don't have any.

10          **MR. GRIFFON:** Right.

11          **DR. NETON:** It's not -- It's not like they  
12          used in vivo as a cheap way out to monitor the  
13          workforce. They are almost -- there may be  
14          instances but typically they're always on some  
15          prior assay frequency for urine and then a  
16          lesser frequency for in vivo. Almost as a  
17          safety check -- check, you know, are we missing  
18          something here big time? Matter of fact,  
19          you'll see big peaks on some people; more than  
20          likely it's because external contamination. It  
21          is possible. I -- I've seen positive counts  
22          on these -- these -- these counters and I can  
23          assure you that they are observable and, you  
24          know, there's one, granted, what we would call  
25          a standard peak search by today's technology,



1 but the detection limit is here.

2 **DR. MAKHIJANI:** Yes. I just wanted some --  
3 some clarification.

4 **DR. NETON:** I totally agree that we have to be  
5 careful in using the in vivo counter data.

6 **DR. BEHLING:** And what would be the default  
7 value for in vitro urinalysis given the fact  
8 that probably 30 to 40 DPM per 24-hour urine  
9 excretion is probably the MDA value and -- and  
10 would you be interested in looking to assign  
11 that for all instances where there is below  
12 MDA?

13 **DR. NETON:** Yeah. That's our standard  
14 practice. We've done that a lot. Most of the  
15 lung cancers that get paid on this program are  
16 the result of a missed dose calculation --

17 **MR. GRIFFON:** Right.

18 **DR. NETON:** -- for people excreting urine below  
19 -- what class below the detection limit in the  
20 measuring process. So this means that if the  
21 detection was 24 DPM we would assign not  
22 necessarily 24 DPM, probably half of the MDA,  
23 you know, if I modeled it, the uncertainty  
24 propagated on there.

25 **MR. GRIFFON:** Zero to 24?

1           **DR. NETON:** Yeah, I think so. Zero to 24 --  
2           That's been our standard approach and again  
3           we've been -- we've had many -- numbers of  
4           people go through here and never excrete a  
5           positive sample in their -- in their work  
6           histories that are coming out with lung doses  
7           that are compensable based on just that and I  
8           have no problem. That's the -- That's the  
9           technology, limit of the technology.

10          **MR. GRIFFON:** I think we're through that one.

11          **ISSUE 8: INTERNAL DOSE DATA VALIDATION**

12                 Issue eight and then we're done.

13          **DR. NETON:** Here's coffee, too if you want.

14          **MR. GRIFFON:** Don't need it now, right?

15          **DR. NETON:** We're winding down. Well, I don't  
16          know. Is issue eight the dose reconstruction?

17          **MR. GRIFFON:** Oh, issue eight I added. This is  
18          kind of an -- an add on.

19          **DR. NETON:** Oh.

20          **MR. GRIFFON:** But it's the internal dose val--  
21          it wasn't really in the conference call --

22          **DR. NETON:** That -- That actually is included  
23          in I think some of the material that I -- I  
24          sent around yesterday. There is a -- a brief  
25          mention of August of '55, the second item

1 listed speaks to an attempt at validating some  
2 of the later external data as you see back  
3 there. And the remaining one -- two -- two  
4 write-ups speak to looking at HP reports and  
5 trying to validate some of the -- some more  
6 urine data. Although I think in looking at it  
7 this morning it appears that the HP October '53  
8 report is a rehash of what's in our evaluation  
9 report. So really the only new one here that  
10 we were able to look at for the health physics  
11 --

12 **MR. GRIFFON:** '55.

13 **DR. NETON:** -- was the '55 and the '53 HP  
14 report which talks about average weekly  
15 excretion rates and DPM for 24 hours and  
16 there's very good -- ex-- perfect agreement  
17 with the exception of sample number four there  
18 where you see that the electronic database had  
19 a -- a weekly average of U32 versus -- help me  
20 out here, Tim. These columns are labeled the  
21 same.

22 **MR. GRIFFON:** Yeah, they are the same.

23 **MR. ADLER:** The one on the left is the document  
24 that the report --

25 **DR. NETON:** Okay. So the document for this

1 particular individual had a weekly average that  
2 was slightly higher but there's perfect  
3 agreement among the other samples. And I won't  
4 ascribe any value judgments in there other than  
5 that's what we can see.

6 **MS. MUNN:** We can see, yeah.

7 **MR. GRIFFON:** And similarly on the bottom  
8 table, right?

9 **DR. NETON:** Yeah.

10 **MR. GRIFFON:** Except for the 110 versus 13?

11 **DR. NETON:** Right.

12 **DR. BEHLING:** Why is there a pretty big -- been  
13 labeled as average weekly if it's at 20 DPM in  
14 the 20 -- I mean what does the weekly refer to?

15 **DR. NETON:** I don't know. These are weekly  
16 samples so -- and I didn't do this comparison  
17 so I'm not going to be able (inaudible) labels.  
18 That must have been the label on the report and  
19 that's just carried over from the report. My  
20 guess is, and I can't confirm this at this  
21 point but if you take a weekly sample, usually  
22 they had a two-day -- two-day off the work  
23 period and took a sample.

24 **DR. BEHLING:** But it's strictly a 24-hour urine  
25 sample that was?

1           **MR. GRIFFON:** It says 24 hours.

2           **DR. NETON:** Unless -- Unless this is -- I got  
3 to be careful here. This could be actually  
4 over a period of time. Do you know what I'm  
5 saying? I mean if they had 52 weeks or a  
6 quarter.

7           **MR. GRIFFON:** Uh-huh.

8           **DR. NETON:** I honestly don't know. I'd have to  
9 check --

10          **MR. GRIFFON:** That might be good.

11          **DR. NETON:** -- with Bill Tankersley on that.  
12 But it's a good question, Hans. I don't know  
13 the answer.

14          **MS. MUNN:** But in either case --

15          **DR. NETON:** Even --

16          **MS. MUNN:** The data agrees.

17          **DR. NETON:** -- the numbers appear to be fairly  
18 close.

19          **MR. GRIFFON:** And so the '55, and that would  
20 report as one of the ones hung up in  
21 classification, right?

22          **DR. NETON:** Yes.

23          **MR. GRIFFON:** That '55?

24          **MS. MUNN:** I think what we're after is  
25 agreement. The assurance that the CER is okay.

1           **DR. NETON:** And, you know, this is sort of  
2 similar to concluding the cancer with the other  
3 -- They're not perfect but they're --

4           **MS. MUNN:** No. You wouldn't expect them to be.

5           **MR. GRIFFON:** I guess there was no more of  
6 those percentile curves though.

7           **DR. NETON:** If I -- I got --

8           **MR. GRIFFON:** That's what I was hoping for.

9           **DR. NETON:** I specifically asked that question  
10 could we get these percentile curves out of the  
11 data that are still not -- haven't been  
12 reviewed for classification?

13           **MS. MUNN:** I can't conceive it myself.

14           **MR. GRIFFON:** Those reports change over time.  
15 Different authors, different, you know --

16           **DR. NETON:** Bill Tankersley assured me that  
17 there were no ones that he could locate anyway  
18 for comparisons.

19           **DR. MAKHIJANI:** There's one -- one discrepancy  
20 that's rather large.

21           **DR. BEHLING:** And it's that 110 13?

22           **DR. MAKHIJANI:** Yeah.

23           **DR. NETON:** Yeah.

24           **DR. MAKHIJANI:** Everything else looks alright.

25           **DR. NETON:** Yeah, I agree. I'm not sure. We

1           can follow up and see what -- what may be the  
2           basis of that.

3           **MR. GRIFFON:** And just follow up and tell us  
4           what these values, you know...

5           **DR. NETON:** Yeah.

6           **MR. GRIFFON:** In other words, it looks --  
7           another piece of data to fill in. I think the  
8           internal one was the stronger -- you have more  
9           strength in the case there anyway.

10          **DR. NETON:** We have three or four --

11          **MR. GRIFFON:** Right.

12          **DR. NETON:** -- forms for comparison in this  
13          case. Again, 50-year-old data is never perfect  
14          but it gives at least me a pretty good sense  
15          that we're -- we can chase it through this one.

16          **MS. MUNN:** In my experience one-year-old data  
17          is not perfect, transcribed from one thing to  
18          another.

19          **DR. NETON:** Yeah.

20          **MS. MUNN:** And any time you enter -- disperse  
21          information with human activity.

22          **MR. GRIFFON:** Well, then you probably have  
23          typos.

24          **MS. MUNN:** Yeah.

25          **MR. GRIFFON:** That's why I was impressed with

1           those percentile curves and all those graphs  
2           they did, all by hand.

3           **MS. MUNN:** Yeah.

4           **MR. GRIFFON:** A lot of work.

5           **DR. NETON:** Look at those memos on the external  
6           side. I mean they were clearly using IBM  
7           keypunch --

8           **MS. MUNN:** Hodge-podge.

9           **DR. NETON:** -- computer technology back in the  
10          early '50s.

11          **MS. MUNN:** Yep.

12          **DR. NETON:** For -- To generate punch cards for  
13          -- for the data and keeping track of them and  
14          stuff.

15          **MR. GRIFFON:** Yeah, I think there were --

16          **DR. NETON:** They were using modern technology  
17          to their advantage.

18          **MR. GRIFFON:** Yes, right.

19          **MS. MUNN:** I think --

20          **DISCUSSION OF SAMPLE DR'S**

21          **MR. GRIFFON:** And then the last thing I have on  
22          the list is just a good discussion of the  
23          sample DR's.

24          **DR. NETON:** Some of these are probably going to  
25          become not important at this point if we're



1 going to rethink our approach to cyclotron  
2 workers. I think at least one, maybe two of  
3 them are -- are in that.

4 **MR. GRIFFON:** Are related to that.

5 **DR. NETON:** In that area.

6 **DR. MAKHIJANI:** And about the plutonium one I  
7 don't think there was a question.

8 **DR. NETON:** Maybe -- Maybe I could start  
9 there, if there's any questions on these. But  
10 I -- I really -- I prefer to answer your  
11 questions rather than me just go over them.  
12 But honestly I -- I have them here in front of  
13 me. I may or may not be able to answer  
14 specific questions because I -- it's been  
15 awhile since I've -- I've refreshed my memory  
16 on some of them.

17 **DR. MAKHIJANI:** I have the same question on one  
18 and three.

19 **DR. NETON:** Okay.

20 **DR. MAKHIJANI:** Which was that it says that the  
21 highest exposed people were monitored for  
22 neutrons.

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

24 **DR. MAKHIJANI:** And I try to follow the  
25 reference trail to that statement and I went to

1 Dr. Kerr's paper from 2004 I think, the part  
2 two of that extended dose paper.

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

4 **DR. MAKHIJANI:** And that actually referred --  
5 that statement was not as strong in that paper  
6 but it was there. But it referred me to the  
7 TBD. And in the TBD I did not find a clear  
8 statement the neutron monitoring all the way  
9 back to 1949, that all the people with the  
10 highest exposure -- exposure potential were  
11 monitored. It did provide me a reference to  
12 the 1949 May health physics report which I then  
13 looked back and I did not find any statement  
14 about monitoring critical (inaudible). This is  
15 from a relatively quick survey of these  
16 documents. I might be mistaken. Let me just  
17 make that caveat. But as I understood the  
18 health physics report they -- they essentially  
19 indicated that that's when they started neutron  
20 monitoring but no (inaudible) was indicated.

21 **MR. KERR:** Actually they started monitoring  
22 earlier than that for neutrons.

23 **MS. MUNN:** Get close to a mike, George.

24 **MR. KERR:** You'll get in trouble.

25 **DR. NETON:** Okay.

1           **MR. KERR:** Here's some neutron monitoring data,  
2           a little bit like from '49. That was their  
3           first attempt. I think that it'll start adding  
4           -- they used -- earlier they used some neutron  
5           sensitive ion chambers or PIC's to get the  
6           workers. But in '52 they started printing NTA  
7           films in the badges with the beta gamma. But  
8           if you go back and look, typically what they  
9           did --

10          **DR. MAKHIJANI:** '52?

11          **MR. KERR:** '52 is when they started putting the  
12          NTA films in. If you go back and look the  
13          indications I have is that they were monitoring  
14          anybody who was in an area where they could get  
15          a neutron exposure. And I think you'll find  
16          that's stated in -- in the books. Here they --  
17          if you were in an area where neutrons were  
18          being produced you had an NTA film. Now, the  
19          one thing they didn't do is they didn't always  
20          develop those films and look at them unless the  
21          HP in that area said that these people had  
22          worked in a neutron field that week. They --  
23          Part of the reason they had some indication  
24          that he had, he was probably looking at the  
25          pocket ionization chambers. Then the films

1           were developed and read. But if you worked in  
2           a neutron area you had a neutron film in your  
3           badge. And I think in the cyclotron they  
4           probably -- anyone who went in and worked  
5           around a cyclotron that week, you know, had one  
6           of those. Now, some of the supervisors didn't.  
7           As a matter of fact if -- if you look under  
8           cyclotron crew in 1954 you'll see Alvin  
9           Weinberg's name. But I doubt if Alvin Weinberg  
10          was over there every day working at the  
11          cyclotron. Because usually it says, you look  
12          at his badge, not used.

13       **MS. MUNN:** Not used.

14       **MR. KERR:** Not used. But anyway, they did  
15          monitor. Everyone had a potential for neutron  
16          exposures. If you worked in an area where  
17          there were neutrons you had an NTA film in your  
18          badge.

19       **DR. MAKHIJANI:** That -- That's the statement  
20          that I could not find a reference for because  
21          it's made in the BR's, in both the neutron  
22          BR's. I tried to follow the paper trail so far  
23          as I could and I'm sure I didn't follow the  
24          whole paper trail.

25       **MR. RUTHERFORD:** So you're looking for like

1 something back in the --

2 **DR. MAKHIJANI:** There --

3 **MR. RUTHERFORD:** -- like an HP report or  
4 something that says all personnel and --

5 **DR. MAKHIJANI:** Right. Something like that.

6 **DR. NETON:** I have something to that effect  
7 here. I can't locate it. I can provide you  
8 that.

9 I think -- I think I just saw this in  
10 reference to one of these incidents where some  
11 people strayed into a neutron area  
12 accidentally. There was an evaluation in '51  
13 and it basically talked about who was, you  
14 know, why people were monitored for neutrons,  
15 who was monitored. We need to pull that out.

16 **MR. GRIFFON:** And this was in case one and  
17 three?

18 **DR. MAKHIJANI:** Yeah, the same statement was  
19 made in case one and three. And the reason I  
20 kind of started tracking this is -- is -- well,  
21 one reason is that it went back to 1949 when  
22 there was very little monitoring going on so I  
23 thought it was -- would be rather extraordinary  
24 and so I wanted to track down the statement.  
25 And then -- But according to what you -- I'm

1 not sure -- I'm not sure I followed everything  
2 you said but the universal monitoring from  
3 neutron exposure would have started in '52 when  
4 they put the NTA film. And before that they  
5 were giving PIC's but there was some  
6 monitoring.

7 **MR. KERR:** Yeah, they had -- they -- they used  
8 PIC's before. A cyclotron crew in '50 and '51  
9 had -- there's -- there's two kind of pocket  
10 ionization chambers you can find. One of them  
11 typically had boron in it so if you wore it on  
12 the body it was sensitive to reflected  
13 neutrons. And some of them actually had a, I  
14 want to say Teflon. I'm not sure if they had  
15 Teflon back in those days but they were some  
16 that had a some kind of a plastic in them that  
17 would give you a little better response to some  
18 fast neutrons. But I think the ones they were  
19 using mainly were the boron coated ones. And  
20 nevertheless, if you calibrated them on -- on a  
21 body and saw a reflected neutrons it's just  
22 like the albito (ph) dosimeters today. You  
23 don't see (inaudible) neutrons.

24 **DR. NETON:** I would also point out I guess that  
25 the -- the main source of neutron exposures

1           were the cyclotrons which is what we're trying  
2           to do here. And depending on the outcome of  
3           our evaluation what we're doing with cyclotron  
4           operators --

5           **MR. GRIFFON:** Oh, yeah, a moot point.

6           **DR. NETON:** This may or may not be a -- a  
7           relevant issue.

8           **DR. MAKHIJANI:** This issue might go away.

9           **DR. NETON:** This issue would more than likely  
10          go away -- would go away if we added cyclotron  
11          operators to the SEC.

12          **MR. GRIFFON:** Can I ask this one follow-up  
13          question?

14          **MR. KERR:** The only other known site was the  
15          (inaudible). That was another one where people  
16          were exposed to neutrons on a regular basis.

17          **MR. GRIFFON:** And the -- the criticality  
18          accident of '58, was there a special treatment  
19          when you'd do DR's for people that were  
20          potentially involved in that accident? Was  
21          there a --

22          **DR. NETON:** You've got the whole report, yeah.

23          **MR. GRIFFON:** Yeah, you have the whole report.

24          **DR. NETON:** It was published yesterday by...

25          **DR. MAKHIJANI:** I saw it -- I downloaded it

1           this morning.

2           **DR. NETON:** We have -- We have George's write-  
3           up which is out there for --

4           **MR. KERR:** It was just put on -- it was put on  
5           the O-drive I guess for anyone that wants to  
6           look at it.

7           **DR. NETON:** I guess what you're asking though  
8           is are dose reconstructors especially cautioned  
9           --

10          **MR. GRIFFON:** Right.

11          **DR. NETON:** -- other than through the fact of  
12          their training --

13          **MR. GRIFFON:** -- through their training.

14          **DR. NETON:** -- and the fact --

15          **MR. GRIFFON:** There's probably -- There's  
16          probably a listing of who was involved in this  
17          and --

18          **MR. KERR:** If you'll look --

19          **MR. GRIFFON:** -- and then it comes up a --

20          **MR. KERR:** If you'll look in the back of that  
21          there is a reference that says official use  
22          only. And that is the 20 -- the names and the  
23          Social Security numbers of the 23 people --

24          **MR. GRIFFON:** All right.

25          **MR. KERR:** -- that we have data on, and that's



1 on the O-drive. It's not part of the report.

2 **MR. GRIFFON:** And that listing, I've come  
3 across that and I think it only has a -- a  
4 photon disk doesn't it, or does it -- what --

5 **MR. KERR:** It's got both.

6 **MR. GRIFFON:** It's got both? Not --

7 **MR. KERR:** Neutrons and gammas both.

8 **MR. GRIFFON:** Not what I saw so maybe I -- if  
9 it's a -- it's a specific case I won't get into  
10 that.

11 **DR. NETON:** Well, the evaluation report went to  
12 great lengths to -- to figure out the neutron  
13 dose. I mean they actually irradiated a burro.

14 **MR. GRIFFON:** Yeah, I know. I know. I've seen  
15 that report, too.

16 **DR. NETON:** It's pretty -- It's pretty --  
17 Scientifically it's pretty interesting.

18 **MR. GRIFFON:** Oh, yeah. They went to great  
19 lengths to recreate it.

20 **DR. NETON:** It's not great that it happened.

21 **MR. GRIFFON:** Right. Right.

22 Now, are we going through case by case, Arjun,  
23 or can I bring up the case numbers and see if  
24 there's -- have questions on those?

25 **DR. NETON:** Might be good, yeah.

1           **MR. GRIFFON:** I mean can I -- can I go to the  
2 case numbers and ask if anybody has questions  
3 on this case?

4           **DR. NETON:** Sure.

5           **MR. GRIFFON:** I am -- case one we just kind of  
6 talked about, right?

7           **DR. MAKHIJANI:** Yeah. On case one I had one  
8 more question.

9           **MR. GRIFFON:** Okay.

10          **DR. MAKHIJANI:** We're using the neutron photon  
11 ratio and I guess for an unmonitored dose  
12 they're using the back.

13          **MR. GRIFFON:** So we've already discussed the  
14 back extrapolations. That covers that I think.

15          **DR. NETON:** I hope.

16          **MR. GRIFFON:** Yeah. I don't want to go back  
17 there.

18          **DR. NETON:** It's too late in the day.

19          **DR. MAKHIJANI:** I think on -- on number one I  
20 don't have any more questions.

21          **MR. GRIFFON:** And you what, I may have an old  
22 file here but I have one, three, five, six,  
23 seven and eight. Do you have other -- you  
24 provided different cases than that, didn't you?

25          **DR. NETON:** Yeah, there's four. There's one

1 through eleven and three and two and --

2 **MR. GRIFFON:** Should have gotten my other  
3 computer.

4 **DR. NETON:** Yeah. I left the numbers on there  
5 because it got too confusing --

6 **MR. GRIFFON:** Yeah.

7 **DR. NETON:** -- to renumber them after we started  
8 doing numbers. Four, five, six, seven, eight,  
9 ten and eleven.

10 **MR. GRIFFON:** Okay. So anyway, One -- One --  
11 Three is the next one, right?

12 **DR. NETON:** Three is the next one. That's an  
13 unmonitored neutron reconstruction.

14 **MR. GRIFFON:** Three is similar, right?

15 **DR. NETON:** Similar, very similar.

16 **DR. MAKHIJANI:** I have the same question.

17 **MR. GRIFFON:** Okay. How about four?

18 **DR. NETON:** Okay. Four is extremity.

19 **DR. MAKHIJANI:** Four -- I'm trying to open up  
20 Joyce's file here.

21 **DR. NETON:** Four is extremity.

22 **DR. MAKHIJANI:** Four. Sorry, yes. I didn't  
23 have any questions about four.

24 **MR. GRIFFON:** When you get to the recycled  
25 uranium one you have questions on that.

1           **DR. MAKHIJANI:** I want to open Joyce's file.

2           **MR. GRIFFON:** Okay.

3           **DR. NETON:** Five is a uranium dose  
4 reconstruction with enriched uranium. This is  
5 during the period when there was no monitoring  
6 data so you're looking at '48 and '49 and in  
7 '50.

8           **MR. GRIFFON:** So this is starting on the model  
9 you just described back in '52?

10          **DR. NETON:** Right. So these co-worker intake -  
11 -

12          **DR. MAKHIJANI:** I'm sorry. This takes me a  
13 minute.

14          **DR. NETON:** That's all right.

15          **MR. GRIFFON:** And I want to assume -- I'm  
16 talking about -- that one assumes no RU because  
17 of the time period, right?

18          **DR. NETON:** Correct. It's a straight -- pretty  
19 much straight out calculation if you buy the  
20 co-worker model.

21          **DR. MAKHIJANI:** Are we on five or four?

22          **DR. NETON:** Five.

23          **DR. MAKHIJANI:** Five? Yes, okay. All right.

24          **MR. GRIFFON:** Anything on five, Arjun? Are you  
25 still looking?

1           **DR. MAKHIJANI:** Yeah, co-worker model from '48  
2 to '49. I think we covered that.

3           **MR. GRIFFON:** Yeah.

4           **DR. MAKHIJANI:** Right. Right. I -- I just  
5 want to review my notes in here.

6           **MR. GRIFFON:** Okay. Yes, I had the ten times  
7 question. Yeah. No, I don't have any  
8 questions.

9           **DR. NETON:** It's not on file.

10          **DR. MAKHIJANI:** Yeah. And I don't have any  
11 questions on five.

12          **MR. GRIFFON:** Arjun, is there -- this is a  
13 little bit of a side question, more -- more DR  
14 related but for my own education. Is there a  
15 Y-12 specific like DR guideline for how when  
16 you're -- when you're back calculating some  
17 real bioassay data how that this matrix would  
18 treat LOD values, how they'll treat -- because  
19 you can either treat them less than LOD, real,  
20 and it has different implications obviously.  
21 Is there a guideline?

22          **DR. NETON:** I -- I suspect that's in one of  
23 the tools or workbooks but I --

24          **MR. GRIFFON:** Yeah.

25          **DR. MAKHIJANI:** Oh, there is a question on

1 five.

2 **MR. GRIFFON:** I'm sure that's already in that  
3 tool.

4 **DR. NETON:** I know. I can't give it to you off  
5 the top of my head but --

6 **MR. GRIFFON:** But those aren't necessarily  
7 procedures. They're --

8 **DR. NETON:** No.

9 **MR. GRIFFON:** -- tools, right?

10 **DR. NETON:** Those tools are very -- I was  
11 looking at one yesterday for the -- I forget  
12 what it was now. Extremely elaborate.

13 **MR. GRIFFON:** Yeah. And they tend to be fairly  
14 prescriptive.

15 **DR. NETON:** Yeah. PIC here, PIC there, PIC --

16 **DR. MAKHIJANI:** Joyce had a comment on number  
17 five.

18 **DR. NETON:** Okay.

19 **DR. MAKHIJANI:** She said that chronic intake  
20 was considered and the most claimant favorable  
21 way would be to calculate acute intake on the  
22 first day of work. She got a somewhat higher  
23 dose. Not very much higher for the colon but  
24 it would make significant difference for other  
25 organs. That was her comment.

1           **DR. NETON:** That's sort of a generic comment on  
2           how we're approaching this whether it's chronic  
3           or acute. I mean that -- that may be tied up  
4           in this site profile review issue that Joyce  
5           has made.

6           **MR. GRIFFON:** Probably not an SEC issue.

7           **DR. NETON:** She's made that comment in the  
8           past.

9           **DR. MAKHIJANI:** Yes, I agree.

10          **MR. GRIFFON:** That's probably not an SEC issue.

11          **DR. BEHLING:** But what -- what would be the  
12          basis for you to --

13          **DR. NETON:** We acknowledge that this is another  
14          point of issue that we need to talk about with  
15          you guys but, you know, we need to get the  
16          plausibility versus reasonable.

17          **MR. GRIFFON:** I agree.

18          **DR. MAKHIJANI:** I would agree that it's not an  
19          SEC issue. But you have Joyce's comment.

20          **DR. NETON:** I understand.

21          **MR. GRIFFON:** So are we on six then?

22          **DR. NETON:** Yeah, six is very similar in the  
23          sense that SC&A was looking for how we would  
24          handle all of these compounds and I think the  
25          various chemical forms of uranium in the

1 exposure scenario and -- and the dose  
2 reconstructor apply the more claimant favorable  
3 chemical form to come up with a dose for --  
4 this was a colon --

5 I think there may have been a one-year recycled  
6 uranium exposure here because it ended in '53  
7 which is a time period that recycled uranium  
8 came into play and it included that in the dose  
9 reconstruction so this is virtually the same  
10 dose reconstruction as number five with the  
11 exception that we had to pick the most claimant  
12 favorable solubility class.

13 **MR. GRIFFON:** And --

14 **DR. NETON:** And we had to do the recycled  
15 uranium which may get into Arjun's question  
16 about what we used for recycled uranium. I'm  
17 going to stick to your question.

18 **DR. MAKHIJANI:** No. No. Feel free to --

19 **DR. NETON:** I'm going to hang myself on my own  
20 comments. Well, I -- Let me see. I don't  
21 recall honestly what we did here other than  
22 highly (inaudible). Attention, recycled  
23 uraniums were not included until '53. They  
24 were not introduced --

25 **MR. GRIFFON:** Until what part of '53?



1           **DR. NETON:** Well, until '53 so they added all  
2           of '53.

3           **MR. GRIFFON:** Okay.

4           **DR. NETON:** I don't see here --

5           **MR. RICH:** Is there an indication of intake  
6           rate?

7           **DR. NETON:** Intake rate per day is assigned.  
8           It looks like it was assigned right out of the  
9           site profile because that -- that looks like  
10          the table that -- do you remember that table  
11          that was in -- George -- I mean Bryce?

12          **MR. RICH:** Yes.

13          **DR. MAKHIJANI:** One of the cases I think she  
14          said this was not the only argued case, right?

15          **DR. NETON:** No. I think the next one is.

16          **DR. MAKHIJANI:** The next one is, yes. Case  
17          number eight I think was the one where --

18          **DR. NETON:** Here it is.

19          **DR. MAKHIJANI:** -- she found that one?

20          **DR. NETON:** I just want to look at Bryce Rich's  
21          table real quick because I think it's got an  
22          excerpt out of --

23          **MR. RICH:** It has an excerpt out of the TBD.

24          **DR. NETON:** Yeah. Where is that, Bryce?

25          **DR. MAKHIJANI:** The 110?

1           **DR. NETON:** I thought the intakes were listed  
2           there but apparently they're not.

3           **DR. MAKHIJANI:** Not the intakes.

4           **DR. NETON:** No, you're right. There are what  
5           to assign.

6           **MR. RICH:** It just -- It's just a ratio of the  
7           uranium and (inaudible).

8           **DR. NETON:** I can't speak to what these numbers  
9           were other than they appear to be standard  
10          recycled uranium numbers. There's no  
11          indication in this dose reconstruction as to  
12          why they didn't use the upper limit. I can't  
13          speak -- does she make that comment on this  
14          example or is there another one?

15          **DR. MAKHIJANI:** She made the comment on example  
16          number eight.

17          **DR. NETON:** Okay.

18          **DR. MAKHIJANI:** But the same may be applicable.

19          **DR. NETON:** Well, let me look and see what the  
20          table -- tables may be. Number eight doesn't  
21          even list the tables. That's interesting.

22          **DR. MAKHIJANI:** Yeah, I think -- it didn't seem  
23          to me that in the case of this worker that a  
24          factor of ten reduction should be taken.

25          **DR. NETON:** Yeah, it doesn't say that anywhere

1 in here.

2 **DR. MAKHIJANI:** It doesn't say that but that  
3 was how her calculation -- when she used the  
4 ratio --

5 **DR. NETON:** Okay.

6 **DR. MAKHIJANI:** -- she got numbers that were  
7 higher than hers.

8 **DR. NETON:** Let's -- Let's make a note of that  
9 and we'll get back to you because there's no  
10 indication there's dose reconstruction. That's  
11 what they did. I trust Joyce's calculation.  
12 We just need to go back and figure out if we  
13 indeed did that why we did it and explain it.  
14 If not then maybe this -- this was improperly  
15 done. I can't -- I can't answer the question  
16 now though. It would have been nice if the  
17 table had been in here. We'll -- We'll get  
18 back to you on that. Number seven was --

19 **DR. MAKHIJANI:** Before we move, number six I  
20 think she had the same comment. It didn't say  
21 so explicitly but that I can see from her  
22 comment that there is a kind of implicit idea  
23 that there should have been some acute intakes.  
24 Application of -- I'll just read what she said  
25 instead of trying to interpret it. Application

1 of chronic intake using MDA with the  
2 (inaudible) not claimant favorable. Two sets  
3 of data should have been applied to determine  
4 the missed dose, 1/1/50 to 5/30/52 and 7/15/52  
5 to 12/31/52. I can -- I can put these in a  
6 little file --

7 **DR. NETON:** That would be good.

8 **DR. MAKHIJANI:** -- and send them to you.

9 **DR. NETON:** Just send them to us and then we  
10 can react to them.

11 **DR. MAKHIJANI:** The -- The ones that -- that -  
12 - ones that are outstanding maybe I'll just  
13 write a little memo for you.

14 **DR. NETON:** I think that would be good because,  
15 you know, these are difficult technical things  
16 to try to --

17 **DR. MAKHIJANI:** Yeah. That's why as I was  
18 reading it I realized it's not --

19 **DR. NETON:** Yeah, I'm not good enough to do  
20 these type of calculations in my head.

21 **DR. MAKHIJANI:** I'll just send you.

22 **DR. NETON:** I think that would be good. Okay.  
23 Then number seven was the -- was the -- was not  
24 a dose reconstruction. It was essentially a  
25 placeholder talking about the Paducah plant ash

1 material --

2 **MR. GRIFFON:** Right.

3 **DR. NETON:** -- and why we didn't believe that  
4 was a -- a dose reconstruction or SEC issue  
5 anyway. And then ten goes away and eleven, the  
6 polonium aspect goes away.

7 **MR. GRIFFON:** And there wasn't a nine so --

8 **DR. NETON:** Nine I dropped because -- for some  
9 reason. I think we had the general --

10 **MR. GRIFFON:** Yeah, we were --

11 **DR. NETON:** Now, eleven is a polonium and  
12 plutonium. Right, right, right. And so, you  
13 know, we're talking about the polonium exposure  
14 for the cyclotron workers and how we -- we may  
15 not be able to do those. The polonium was  
16 reconstructed right out of the -- the Delta  
17 View data center.

18 **MR. GRIFFON:** Plutonium.

19 **DR. NETON:** Sorry, plutonium. And so in my  
20 mind we took the highest values out of that  
21 data set to reconstruct them. And so I think  
22 there was some comments made that we didn't yet  
23 have a valid co-worker model but this was to  
24 serve a plausibility bounding analysis so we  
25 said, well, let's pick the highest value we

1           have of anybody exposed to plutonium in -- in  
2           that time period and use it. And that's what  
3           we did. Of course, the -- the values came out  
4           pretty high. Lung, bone and liver were all  
5           well over 90 percent. Colon, interestingly  
6           enough, though, was still less than 20 percent.  
7           Which is what you expect. I mean these were  
8           metabolic organs for plutonium and based on  
9           missed dose from any plutonium intake you're  
10          going to have them in fairly large -- large  
11          doses. And plutonium was exposed in the  
12          calutrons, right? That was --

13         **MR. RUTHERFORD:** Uh-huh. Yeah.

14         **DR. NETON:** They were -- They were separating  
15          and enriching the plutonium in some isotope I  
16          think. Interestingly enough when I -- I first  
17          started graduate school I measured plutonium in  
18          autopsy tissues of people who died in the  
19          Bowery of New York City and I got always great  
20          plutonium 242 as a tracer. It always came from  
21          Y-12. Now I know exactly how it was  
22          manufactured. I always wanted to say how do  
23          you get plutonium 242 pure as an isotope by  
24          itself? This is the way. Kind of interesting.

25         **MS. MUNN:** See? If you stick around long

1           enough you learn all kinds of stuff.

2           **DR. WADE:** And then you forget most of it.

3           **DR. NETON:** And you forget most of it.

4           **MR. RUTHERFORD:** You have a brain with the  
5           magnitude to store it all, too.

6           **MR. GRIFFON:** And that brings us through the  
7           cases, right?

8           **DR. NETON:** I think so.

9           **DR. MAURO:** I just wanted to mention something  
10          before we started getting close to the end.  
11          Joe Fitzgerald just mentioned to me that he  
12          thought this might be an -- since we're  
13          finished up early he was planning on getting  
14          Brant Ulsh on the line to talk a little bit  
15          about Rocky. Is there any interest in staying  
16          on about another half hour or so?

17          **MR. GRIFFON:** Just to do an update though.

18          **DR. MAURO:** Just an update -- just a --

19          **MR. GRIFFON:** Not a -- Not a --

20          **DR. MAURO:** -- where, you know -- sort of --

21          **MR. GRIFFON:** Not a transcribed --

22          **DR. MAURO:** Not transcribed.

23          **MR. GRIFFON:** What I think we said was an  
24          informal call.

25          **DR. MAURO:** Right. An informal, non-

1 transcribed, just to take advantage of the fact  
2 that we're all sitting around the table.

3 **DR. NETON:** That's fine. So we're going to go  
4 off the record at this point?

5 **DR. MAURO:** Close it out first.

6 **MR. GRIFFON:** Well, first make sure -- we'll  
7 close it out first, yeah, but I think -- I  
8 think we could do that, yeah.

9 **DR. WADE:** One thing I'd like to talk about --

10 **MR. GRIFFON:** I don't know how we'd get to the  
11 airport right now either with that thunder and  
12 lightning.

13 **DR. WADE:** I'd like to talk a little bit about  
14 what might unfold in our meeting in June. Now,  
15 I did allow a significant amount of time for  
16 the Y-12 SEC discussion. I guess the -- going  
17 into it is there's the possibility that NIOSH  
18 could be issuing an addendum to its evaluation  
19 report. You know, that addendum could be  
20 presented to the Board. And then the working  
21 group could present. The Board could decide to  
22 vote, to take it off the table and vote. The  
23 Board could decide not to. So I guess we need  
24 to be thinking about those things as we lead up  
25 to -- lead up to the meeting.



1           **DR. MAKHIJANI:** Dr. Wade, if an addendum is  
2 actually presented I want -- it would be good  
3 to have some sense from Wanda and Mark whether  
4 we would be doing something with that or  
5 whether we just sit back and watch the rest  
6 unfold and whether we've kind of done our  
7 support work for the Board sufficiently that  
8 you don't expect anything more of us other than  
9 the one or two cleanup items here. But I think  
10 the one on the table 45-B I think is what I'm  
11 responsible for.

12           **DR. NETON:** Yeah. Those are about the only  
13 issues I can --

14           **MR. GRIFFON:** Yeah.

15           **DR. NETON:** -- think of.

16           **MR. GRIFFON:** I mean it partially depends on  
17 what your addendum says so --

18           **DR. WADE:** But hypothetically speaking the  
19 addendum could go to the issues of calutron  
20 workers. It could go to the issue of an  
21 additional building for -- or buildings for  
22 thorium.

23           **MR. GRIFFON:** And then maybe issues where we --  
24 we as a worker Board or Board, whether we've  
25 discussed it enough with SC&A and there's no,

1           you know -- or we may get it and say, you know,  
2           depending on what we add in, we may.

3           **DR. NETON:** Lew's right. If we did --

4           **MR. GRIFFON:** Need further assistance, right.

5           **DR. NETON:** If we did add cyclotron workers --

6           **MR. GRIFFON:** Right.

7           **DR. NETON:** -- and the appropriate buildings  
8           for thorium in it seems like the technical --

9           **MR. GRIFFON:** Right.

10          **DR. NETON:** -- issues are, with the exception  
11          of the -- the co-worker model and some -- some  
12          checking of table 45-B --

13          **MR. GRIFFON:** Right.

14          **DR. NETON:** -- were pretty much --

15          **MR. GRIFFON:** I think we're there.

16          **DR. MAKHIJANI:** I think so, I just wanted to  
17          make sure.

18          **MR. GRIFFON:** I think so, too, but I don't know  
19          how you're going to come out yet and neither do  
20          you, right? So --

21          **DR. NETON:** Yeah. I -- I can't -- I don't  
22          want to --

23          **MR. GRIFFON:** The Board's unlikely, but I think  
24          --

25          **DR. WADE:** The Board might have some questions

1 for DOL at that point. We'll try to get DOL  
2 there. So depending on how it plays out it's  
3 possible the Board will be voting on the Y-12  
4 SEC petition. That's also a possibility.

5 **MS. MUNN:** I'd hope so.

6 **DR. WADE:** Well, I personally hope we do.

7 **MS. MUNN:** A lot of people hope so.

8 **DR. MAURO:** Mark, I presume we're still in a  
9 sit and wait for further directions from you  
10 and the working group on whether you'd want us  
11 to prepare any work product?

12 **MR. GRIFFON:** Well, you have the one task that  
13 Arjun mentioned --

14 **DR. MAKHIJANI:** Okay. Yeah.

15 **MR. GRIFFON:** -- with the --

16 **DR. MAKHIJANI:** And I'll -- I'll do that. I -  
17 - I need some information from NIOSH to be  
18 able to do it.

19 **MR. GRIFFON:** And then I know you guys will be  
20 keeping track of some -- small -- smaller items  
21 but -- but --

22 **DR. NETON:** I -- I will -- I'm not going to be  
23 available next -- starting Saturday through  
24 next Friday.

25 **DR. MAKHIJANI:** Me, too, so --

1           **DR. NETON:** I know time is of the essence --

2           **MR. GRIFFON:** Yeah.

3           **DR. NETON:** I'm going to try to read email but  
4 I'm going to be way far away.

5           **MR. RUTHERFORD:** I can help coordinate --

6           **DR. NETON:** So make sure anything that goes to  
7 me also is cc'd to -- to Bomber so that he can  
8 at least be aware of the issue and somehow get  
9 the message to me that I may need to do  
10 something although I'm sure he's totally  
11 capable of --

12          **MR. GRIFFON:** Some of these points -- I mean  
13 some of these things I saw you taking notes but  
14 --

15          **DR. WADE:** I got it all down I think.

16          **MR. GRIFFON:** Just putting some of these  
17 documents on the O-drive, and the faster that  
18 can happen obviously.

19          **DR. WADE:** But I don't want to hold up for  
20 example this 53-B analysis.

21          **MR. GRIFFON:** Right.

22          **DR. WADE:** I think it's important. The quicker  
23 we can get a consensus on this issue the better  
24 off we're going to be and if it takes a small  
25 phone call among ourselves again, you know,

1 we're probably willing to do that.

2 **MR. GRIFFON:** Yeah. Okay.

3 **DR. WADE:** Whatever -- Whatever it takes.

4 **MR. GRIFFON:** And I would leave open the -- if  
5 we need another informal call in between now  
6 and then. I think it's totally appropriate.

7 **DR. WADE:** We, of course, can't issue our  
8 supplement to you until we -- we issue it in  
9 general to the petitioners as well as the  
10 Board.

11 **MR. GRIFFON:** Right.

12 **DR. WADE:** But as soon as that happens we'll  
13 notify you that it's available. And I know  
14 there's going to be pressure on us if we're  
15 going to issue a supplement to get it out  
16 sooner than later. There are certainly  
17 requirements about federal register notices and  
18 just common courtesy that need to be -- be  
19 brought into play.

20 **DR. NETON:** We have our Board meeting in about  
21 three weeks out?

22 **MS. MUNN:** Yeah.

23 **DR. WADE:** Amazing.

24 **MR. GRIFFON:** Okay. I think that we're set to  
25 close out. Anybody else have anything else?

1

Then I think we can adjourn this -- adjourn

2

this work group.

3

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(Whereupon, the working group meeting was

9

adjourned at 3:15 p.m.)

10

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**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 May 18, 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 19th day of July, 2006.

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**STEVEN RAY GREEN, CCR**  
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