

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

MOUND

The verbatim transcript of the Working  
Group Meeting of the Advisory Board on Radiation and  
Worker Health held in Cincinnati, Ohio, on April 1,  
2008.

STEVEN RAY GREEN AND ASSOCIATES  
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April 1, 2008

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**TRANSCRIPT LEGEND**

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

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

-- (inaudible)/ (unintelligible) signifies speaker failure, usually failure to use a microphone.

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

(9:00 a.m.)

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22WELCOME AND OPENING COMMENTSDR. CHRISTINE BRANCHE, DFO

**DR. BRANCHE:** I am Christine Branche from the National Institute for Occupational Safety and Health. I'm the Designated Federal Official as well as the Principal Associate Director for NIOSH. I want to get a couple of things established before I let Ms. Josie Beach begin her meeting. Would the Board members please announce themselves, first those of you who are in the room?

**MR. CLAWSON:** Brad Clawson, Advisory Board member, not conflicted.

**DR. ZIEMER:** Paul Ziemer, Advisory Board, not conflicted on this one.

**MR. SCHOFIELD:** Phil Schofield, Advisory Board member, not conflicted.

**MS. BEACH:** Josie Beach, non-conflicted.

**MR. PRESLEY (by Telephone):** Robert Presley, not conflicted.

**DR. BRANCHE:** Thank you. We do not have a quorum of the Board so we can --

1                   **DR. ZIEMER:** Did you ask on phone?

2                   **DR. BRANCHE:** Oh, sorry, thank you very  
3 much.

4                   Are there other Board members on the  
5 phone?

6                   (no response)

7                   **DR. BRANCHE:** Thank you, Paul.

8                   We do not have a quorum of the Board,  
9 so we can proceed. Would the NIOSH staff  
10 please announce themselves, first those of you  
11 in the room? Excuse me, please tell us if you  
12 are conflicted with Mound.

13                  **MR. ELLIOTT:** Larry Elliott, I have no  
14 conflicts with Mound.

15                  **DR. ULSH:** Brant Ulsh with NIOSH, no  
16 conflicts.

17                  **DR. BRANCHE:** On the phone? NIOSH staff who  
18 are participating by phone and please indicate  
19 if you have a conflict with Mound.

20                  (no response)

21                  **DR. BRANCHE:** ORAU staff who are in the  
22 room, please announce your names and whether  
23 or not you're conflicted with Mound.

24                  **MS. JESSEN:** Karin Jessen, no conflicts.

25                  **MR. STEWART:** Don Stewart, ORAU team, no

1 conflict with Mound.

2 **MS. BRACKETT:** Liz Brackett, I am  
3 conflicted.

4 **MS. HOFF:** Jennifer Hoff, no conflicts with  
5 Mound.

6 **DR. BRANCHE:** ORAU staff participating by  
7 phone, please?

8 (no response)

9 **DR. BRANCHE:** SC&A staff in the room,  
10 please, announce your names and indicate  
11 whether or not you're conflicted with Mound.

12 **MR. FITZGERALD:** Joe Fitzgerald, SC&A, no  
13 conflict.

14 **MR. BISTLINE:** Bob Bistline, SC&A, no  
15 conflict.

16 **MR. BUCHANAN:** Ron Buchanan, SC&A, no  
17 conflict.

18 **DR. BRANCHE:** SC&A staff by phone, please.

19 **DR. MAURO (by Telephone):** John Mauro, SC&A,  
20 no conflicts.

21 **MS. DeMERS (by Telephone):** Kathy DeMers,  
22 SC&A, conflicted.

23 **DR. BRANCHE:** Other federal agency staff who  
24 are in the room, please.

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

1                   **DR. BRANCHE:** Those by phone?

2                   **MR. KOTSCH (by Telephone):** I'm sorry, Jeff  
3 Kotsch, Department of Labor.

4                   **MS. HOMOKI-TITUS (by Telephone):** Liz  
5 Homoki-Titus, HHS.

6                   **DR. BRANCHE:** Are there any petitioners or  
7 their representatives who are participating by  
8 phone? Would you please state your names?

9                   **MS. CORDY\* (by Telephone):** This is Maria  
10 Cordy. I'm taking notes for Karen Hatts\* who  
11 was not able to attend today.

12                   **DR. BRANCHE:** Thank you very much.

13                                 Any workers or their representatives  
14 participating by phone, please?

15                                 (no response)

16                   **DR. BRANCHE:** Any members of Congress or  
17 their representatives, please?

18                                 (no response)

19                   **DR. BRANCHE:** Anyone else who would like to  
20 mention their names?

21                                 (no response)

22                   **DR. BRANCHE:** Thank you. Before we get  
23 started I would ask that those of you who are  
24 participating in the room, if you would please  
25 mute your phones. If you're participating by

1 telephone, if you would please mute the line  
2 until you are ready to speak. It will help  
3 enhance all the quality for everyone  
4 participating being able to hear everything  
5 that's spoken. If you do not have a mute  
6 button, then please use star six to mute your  
7 phone, and then again use star six when you  
8 are ready to speak. Thank you very much.

9 Ms. Beach.

10 **WORKING GROUP CHAIR**

11 **MS. BEACH:** Good morning. I'd like to go  
12 ahead and share some thoughts for the record  
13 with regard to work group meeting ground rules  
14 before we get started.

15 First of all, to every extent  
16 possible, any white paper or any paper to be  
17 discussed should be made available to the work  
18 group, NIOSH, SC&A, a few business days in  
19 advance of the meeting. If material is  
20 provided at the table, discussion may be  
21 limited to just clarifying what has been given  
22 without actual deliberations.

23 Second, we will use work group  
24 meetings to deliberate on SEC-related  
25 questions, adequacy, completeness, integrity,

1 purely technical or historical factual issues  
2 may be better addressed on the one-on-one  
3 technical calls or meetings with notes to be  
4 taken.

5 Third, the Board's role includes  
6 independent validation of the evaluation  
7 reports, assumptions and judgment of  
8 historical facts and should not be construed  
9 as questioning the rigor behind the evaluation  
10 report. The discourse between NIOSH, ORAU and  
11 SC&A serves to inform the work board and the  
12 Board's future recommendations on Mound.

13 And fourth, the work group's process  
14 is designed to use deliberative process to  
15 narrow the scope of the SEC important issues  
16 and questions to the point where the worker is  
17 in a position to advise the broader Board on  
18 any remaining issues that should be discussed  
19 prior to a vote on a recommendation regarding  
20 the SEC.

21 And with that I'm going to turn it  
22 over to NIOSH to get started with the matrix.

23 **INTRODUCTION BY NIOSH**

24 **DR. ULSH:** This is Brant Ulsh with NIOSH,  
25 for those of you on the phone. Just to let

1 those of you know who are out there by phone  
2 who I am and my role in the process, I'm  
3 NIOSH's Technical Lead and so I was NIOSH's  
4 review authority pretty much on the evaluation  
5 report along with my managers.

6 I have several folks here from the  
7 ORAU team who actually did a lot of the  
8 legwork on the evaluation report, were  
9 intimately involved in writing it. Karin  
10 Jessen is here and Don Stewart is here. We  
11 also have Liz Brackett to help on matters  
12 dealing with internal dosimetry.

13 With that introduction then, the  
14 matrix was put together by SC&A based on their  
15 review of our evaluation report. The  
16 evaluation report was delivered to the Board  
17 at the Las Vegas meeting, and at that time we  
18 recommended, and the Board accepted the  
19 recommendation, to add a class at Mound from  
20 1949 to 1959 based on radium, actinium and  
21 thorium separations issues. And so a lot of  
22 these issues that we're going to talk about  
23 today look at the remainder of the time and  
24 activities that happened at Mound.

25 **MATRIX ISSUE ONE: EXPOSURE TO RADIUM, ACTINIUM, THORIUM**

1                   So just starting through SC&A's matrix  
2 then the first issue that was listed is  
3 exposure to radium, actinium and thorium  
4 starting March 1<sup>st</sup>, 1959. So this picks up  
5 after the recommended class.

6                   Joe, I assume you're going to be  
7 speaking for SC&A today. I don't know if you  
8 want to go through SC&A's statement of concern  
9 or Josie, do you have an opinion on how we  
10 should proceed here?

11                  **MR. FITZGERALD:** This is Joe Fitzgerald.  
12 I'm the Lead for SC&A, and we have Bob  
13 Bistline and Ron Buchanan here also. This  
14 being the first exchange, and it really is the  
15 first exchange on any of the issues relative  
16 to the evaluation report, I think the key  
17 thing that we were looking for is to clarify  
18 in some cases the basis for the conclusions in  
19 the ER.

20                  And again, this is our first read, and  
21 first read of the supporting documents. So we  
22 understand that you have spent a great deal of  
23 time looking at these materials. And we just  
24 want to certainly take the opportunity to  
25 clarify more than anything else at this stage.

1 Did we understand the point being made in the  
2 ER accurately? And if so -- and we have some  
3 questions regarding the basis of the  
4 conclusions.

5 So really in the context it's  
6 clarification more than anything at this  
7 point. I think clearly there'll be  
8 opportunities to get into these issues in a  
9 more in-depth way. So I guess I see a certain  
10 exchange back and forth. Did you mean this?  
11 Do we understand it correctly? Did we read it  
12 correctly? Is there more data than we were  
13 able to discern from the supporting  
14 documentation? If so, what is that data? I  
15 think that's kind of where I would see it.

16 **DR. ULSH:** Well, the first issue as I  
17 mentioned was radium separations or dealing  
18 with the actinium material after the  
19 designated class, so after the '49 to '59  
20 period. And I think Josie raised this  
21 question at the Advisory Board meeting as  
22 well.

23 And I guess a point that I need to  
24 maybe clarify is the reason that we  
25 recommended the class from '49 to '59 would

1 not extend to these other actinium separations  
2 is not that those activities didn't happen.  
3 We know that they did happen. For example, we  
4 have interviewed a former worker who was in  
5 charge and intimately involved with the  
6 actinium work that happened in 1964.

7 I think that's the one you asked  
8 about, Josie.

9 He had a very clear recollection of  
10 what was done, and in his recollection there  
11 were several points that he made that I think  
12 are relevant to our discussion today. First,  
13 those separation activities happened in a  
14 different facility from the one that was used  
15 during the '49 to '59 time period. 'Forty-  
16 nine to '59 was done in the old cave, known as  
17 the old cave at Mound. And by all accounts it  
18 was a very, very dirty operation. And we even  
19 have air sampling results that indicate that  
20 there was spread of contamination outside of  
21 the old cave facility.

22 And that really impacted our decision  
23 to recommend an SEC class. In contrast the  
24 activities that happened in 1964 were very  
25 limited in scope. In fact, the worker that we

1 interviewed said, I think, yeah, said there  
2 were about four people involved in that  
3 activity, and it was done in the new cave, not  
4 the old cave.

5 And the new cave had a hot cell  
6 inside. And for those of you who are not  
7 familiar with a hot cell, the picture that I  
8 have in my mind of a hot cell -- and I  
9 confirmed this with the individual that we  
10 talked to -- several inches of leaded glass,  
11 remote manipulators, totally isolated  
12 environment. And when I say that what I mean  
13 is the activities that are happening inside  
14 the hot cell, when the hot cell is operating  
15 correctly, are completely isolated from the  
16 outside environment.

17 And so the reason that we didn't  
18 include this activity in the recommended SEC  
19 was because there was no exposure potential.  
20 This was inside the hot cell. And he did  
21 mention that what they did was they opened up  
22 a couple of capsules of the actinium material  
23 inside the hot cell. And the first one that  
24 they opened spread a little bit of, spread  
25 some contamination inside the hot cell. But

1 he indicated that nothing escaped and the next  
2 capsule didn't have that problem.

3 And so we didn't see any exposure  
4 potential for that material unlike the period  
5 in '49 to '59 when there was widespread  
6 contamination.

7 **MR. FITZGERALD:** Just a clarification if I  
8 could. There were later operations, I guess  
9 the one that comes to mind is the Cotter  
10 concentrate extraction process where actinium  
11 showed up as an almost contaminant in some of  
12 the production material. So that kind of  
13 explains why you tend to, I guess over the  
14 history of Mound, that you found some sources  
15 of actinium contamination and different D&D  
16 processes picked it up and certainly in the  
17 final D&D it was picked up.

18 I guess what we were most interested  
19 in was the bioassay capability and the ability  
20 to actually monitor for it. And post-'59 I  
21 guess our concern was establishing when the  
22 actinium bioassay, for example, was available  
23 and actually being used for workers that were  
24 potentially exposed. And Cotter was one  
25 example, but I think in some of the D&D there

1 were other examples.

2 In looking at the King report you can  
3 sort of establish, yeah, it was a constituent  
4 here, there, different places. I wouldn't say  
5 it was ubiquitous, but certainly it tended to  
6 show up in more places than you would expect.  
7 And, of course, the new cave was the most  
8 obvious operation, but there's other  
9 operations like Cotter.

10 So I guess my question is trying to  
11 track, and I think a lot of the issues kind of  
12 follow the same pattern, just trying to  
13 understand what the timeline for bioassay  
14 availability and capability was versus the  
15 source terms in different locations. It's  
16 almost if you took the King document and the  
17 Meyer document, the Meyer document, of course,  
18 being sort of a world map of bioassay, and  
19 track that could you establish coverage over  
20 time and where were the gaps.

21 And that's probably the common theme  
22 that runs through a lot of this and runs  
23 through this as well. Was there, in fact,  
24 bioassay being done for in this case actinium  
25 across the various activities that where

1 actinium would show up. And so in other words  
2 you were getting monitoring when the source  
3 term was identified. And that, again, we're  
4 picking up some gaps, but we're not sure  
5 whether we're seeing all the data, but it  
6 appears to be some gaps of actinium.

7 **DR. ULSH:** Let me make a couple of points  
8 from that. 'Forty-nine to '59 was when the  
9 major campaigns took place as SC&A indicated  
10 in the statement there. And in 1959 they  
11 D&D'd the old cave. And at that time they did  
12 identify, I mean it's reasonable to assume  
13 that they did identify other areas where  
14 actinium had escaped. And they -- as you know  
15 since you were involved, Joe, in a lot of the  
16 D&D activities at a number of sites -- it's  
17 common to D&D a facility by locating areas of  
18 surface contamination, immobilizing those with  
19 a seal and a painting over them.

20 And what happened in the case of the  
21 actinium, the issue that we're concerned about  
22 in 1990-ish, the early '90s, the R corridor  
23 job, they encountered an area that had  
24 previously been, I understand, decontaminated  
25 or D&D'd in that way. They had a spot of

1 surface contamination of actinium that had  
2 been sealed over. When they went in to tear  
3 down the facility, there was scabbling, and  
4 that re-exposed that area of contamination.

5 But I don't think that you can draw a  
6 straight line between that incident and '49 to  
7 '59 and say that that indicates that there  
8 were actinium operations happening the entire  
9 time or actinium exposures happening the  
10 entire time. Now the one program that you  
11 mentioned, the Cotter Concentrate Program, the  
12 goal of that program was to isolate  
13 protactinium and I believe ionium, Thorium-  
14 230. There might have been some small  
15 concentrations of actinium and on that I would  
16 have to look. I can't really say.

17 But the goal wasn't to separate the  
18 actinium out, it was to get those other two  
19 elements. And that also happened in the new  
20 cave in the hot cell. We interviewed the  
21 individual who was in charge of that program  
22 and involved with it. And again, he indicated  
23 that there were maybe five people involved.  
24 They had 22 drums, well, they had a number of  
25 drums stored in a building onsite, but they

1 processed about 22, maybe 23 drums of that  
2 material inside the hot cell. So again, our  
3 point is limited exposure, actually no  
4 exposure potential for that material.

5 The Cotter concentrate was stored in  
6 Building 21 starting in 1974, I believe, after  
7 the Thorium-232 residue had been cleared out.  
8 And so I don't know that if you were concerned  
9 about exposure to Cotter concentrate that you  
10 would actually monitor for actinium. You  
11 would probably monitor for some of the thorium  
12 isotopes or protactinium. I'm looking at Liz  
13 to let her correct me if I'm wrong, but she's  
14 looking --

15 **MR. FITZGERALD:** Just a comment, I  
16 appreciate your comment on the not drawing a  
17 straight line because that's certainly, having  
18 been directly involved in the issues in the  
19 early '90s on the actinium flap, I understand  
20 where that came from. But more looking at  
21 operational sources, and I'll be the first to  
22 admit, again, I'm looking at documentation  
23 such as the King report that's, which is the  
24 roadmap of sorts in talking with different  
25 former rad people at the site trying to

1 understand whether or not the bioassay tracked  
2 with those source terms. And I think what  
3 you're saying is except -- and correct me if  
4 I'm misinterpreting -- except for trace  
5 contaminants in various operations, in this  
6 case actinium was handled in a hot cell that  
7 would not have been a very likely potential  
8 for exposure. Now that's still, I guess in  
9 our own mind begs the question, well, if you  
10 have workers working in a hot cell actinium,  
11 would they have been on a bioassay schedule  
12 for actinium or not. And certainly we can't  
13 find documentation that suggests that they  
14 were, post-'59. Now maybe there is some  
15 documentation on that. That would be the  
16 question in my mind. Post-'59 until the D&D  
17 era in the '90s, was there routine bioassay  
18 for actinium for workers that may have been  
19 operators or associated with operations where  
20 actinium was in excess of a trace quantity for  
21 example? And I guess I'm not sure either on  
22 the Cotter concentrate whether that  
23 necessarily was trace. Of course, that's a  
24 subjective call, but nonetheless, that would  
25 be my question. Where it wasn't a trace

1           quantity and where you had a source term where  
2           one would look for routine bioassay, was it  
3           being done post-'59 because there seems to be  
4           a bright line there. And I understand that  
5           from the ER, but it sort of raises questions  
6           about did that sort of, because it wasn't a  
7           main operation, did the bioassay sort of  
8           recede and not get taken up again until the  
9           D&D or not. And from the documentation it  
10          seems suggestive that it wasn't being done in  
11          that era. And if it was simply a question of  
12          handling in a hot cell because actinium is a  
13          bad actor, then that would certainly be one  
14          explanation for why you don't see a --

15           **DR. ULSH:** Again, we're talking in somewhat  
16          vague terms, but in terms of major operations  
17          the ones that I'm aware of are '49 to '59 and  
18          that one in '64. Now they did, Mound did have  
19          a history of working with small sources  
20          determining half lives, determining heat  
21          generation, determining a bunch of basic  
22          physical characteristics.

23           **MR. FITZGERALD:** Yeah, batch scale lab.

24           **DR. ULSH:** Exactly, very small sources of --

25           **DR. ZIEMER:** I have a couple of questions

1                   that Brant or Joe or maybe Liz could answer.  
2                   Tell me the makeup of the Cotter concentrate  
3                   is what?

4                   **DR. ULSH:** The Cotter concentrate started, I  
5                   believe as airport residues from St. Louis.  
6                   They were then shipped down to --

7                   **DR. ZIEMER:** So they came from Monsanto.

8                   **DR. ULSH:** They were shipped then down to  
9                   the Cotter Corporation in Canyon City,  
10                  Colorado, where there was some further  
11                  processing done on them. And then they were  
12                  shipped to Mound in 1974. And the makeup --

13                  **DR. ZIEMER:** Roughly, I'm --

14                  **DR. ULSH:** Yeah, perhaps during the break I  
15                  can pull up a document that will give you a  
16                  more specific answer. But it had reasonable  
17                  quantities of Protactinium-231, Thorium-230.  
18                  I'm not sure about actinium. I'd have to  
19                  look, but those were the isotopes that they  
20                  were interested in. So it was those St. Louis  
21                  airport residues.

22                  **DR. ZIEMER:** Now the other question, if you  
23                  could clarify, any hot cell work you do pull  
24                  samples in and out from time to time. Were  
25                  you suggesting all the drumming is also done

1 in the hot cell before it's removed?  
2 Obviously, there's not zero probability of  
3 some outside contamination; therefore,  
4 external exposures were potential internal  
5 stuff.

6 What was the nature of the things that  
7 were transferred in and out of the hot cell?  
8 I got the idea from what you said that  
9 everything was drummed in there and then  
10 removed, and you pretty well had it contained  
11 before it ever came out. Is that correct?

12 **DR. ULSH:** I believe the latter part of your  
13 question is true. They had it pretty well  
14 contained before it came out. In terms of the  
15 drumming operations I can tell you that the  
16 Cotter concentrate was shipped to Mound in  
17 drums, and it was stored in Building 21 in  
18 drums. Those drums were taken into the hot  
19 cell where the processing occurred.

20 **DR. ZIEMER:** So it was at least removed from  
21 the drums in the hot cell.

22 **DR. ULSH:** I believe that's the case, Dr.  
23 Ziemer, but I can double check that.

24 **MR. PRESLEY (by Telephone):** Hey, Brant,  
25 this is Bob Presley.

1                   **DR. ULSH:** Yes, Bob.

2                   **MR. PRESLEY (by Telephone):** The drums, did  
3 they have any type of pig in them or was this  
4 material just stuffed into a 55-gallon drum?

5                   **DR. ULSH:** I don't know, Bob. I can check  
6 on that for you.

7                   **MR. PRESLEY (by Telephone):** That would be a  
8 great help to know exactly how that stuff was  
9 packaged.

10                  **DR. ULSH:** Okay, we can get you some more  
11 information on that or at least try to.

12                  **MR. CLAWSON:** Let me bring up one thing  
13 before we go on with Paul. One of the things  
14 that I want to bring up was, yes, these were  
15 brought in in a drum. The drums and so forth  
16 were opened up in there. But once you opened  
17 up those inner containers and so forth, is  
18 when you get everything going out. Usually in  
19 a hot cell you can take them in there but then  
20 you have to make manned entries to be able to  
21 go in there and retrieve these things back  
22 out. So you're basically going back into that  
23 environment that you now have a potential for.

24                                 Now, it may not have been as bad as  
25 the old cell, but you still, to be able to say

1           there's zero possibilities, I think that I  
2           differ a little bit. Because even when  
3           they're shipped in like that, they're shipped  
4           in an internal pig which you have to open up,  
5           break open. And once you break those things  
6           open, you've got all the contaminants and  
7           everything else that's going to be coming out  
8           of there that you've got to go back in and  
9           retrieve that drum back out, too.

10           **DR. ULSH:** I think it's important to keep a  
11           couple of operations separate and distinct in  
12           your mind. One is the 1964 work with the  
13           actinium, the two capsules. Those were  
14           smaller. I mean physically small. And then  
15           the Cotter operations that occurred '74 to  
16           '79, on a slightly larger scale, and we're  
17           talking 22 drums. And there I think our point  
18           would be that if you were concerned about  
19           exposure to that material, actinium was not  
20           what you would sample for. It would be some  
21           of the other radiological ^.

22           **MR. FITZGERALD:** Yeah, but if I could sort  
23           of recap on this one. I think we've kind of,  
24           as I said, our intent is to clarify a little  
25           bit better. I think it's clearer from what

1           you've said is that because of the '64 hot  
2           cell operation, which was the main actinium  
3           extraction, and how the other operations were  
4           handled, there was a means limits exposure.

5                         However, I think what's still in  
6           question was the bioassay program itself. The  
7           availability and use of that tracked the  
8           source terms that were, in fact, beyond trace  
9           quantities. And I think that's not something  
10          that would be difficult to establish, but I  
11          don't know if we can do that right now.

12          **DR. ULSH:** Well, I can tell you -- I forgot  
13          to address this -- actinium bioassay is very  
14          difficult to do. It's not common to routinely  
15          have that capability. And that was part of  
16          the problem in the earlier years. They had to  
17          measure it indirectly. There was a lot of  
18          interpretation involved.

19                         And that was, I think, also part of  
20          the problem in the early '90s because Mound  
21          didn't have the capability or the desire to do  
22          that routinely onsite. And so they contracted  
23          the offsite laboratories to do it, and that's  
24          where some of the problems came in. So it is  
25          certainly true that actinium bioassay is not

1 the standard routine type of thing that you  
2 would see all over the place. It's very  
3 difficult to do.

4 I think it's also true that for those  
5 middle years we don't have in our possession  
6 actinium bioassay results. And I understand  
7 your question about I'd indicate no exposure.  
8 Does that indicate something that was missed.

9 **MR. FITZGERALD:** Yeah, again, the only  
10 concern looking through the King report and  
11 looking at some of the activities is that at  
12 this point we're not clear that there weren't  
13 beyond trace quantities, the operations, that  
14 way that would have elicited some need for  
15 bioassay. And again, looking at what we can  
16 look at it doesn't appear that there's  
17 necessarily a match up with that. So that  
18 would be the question we have at this point.

19 **MR. BISTLINE:** This is Bob Bistline. And  
20 I'd like to get some clarification, too, along  
21 those lines, Brant. We know that there was  
22 leakage from the old cave taking place for a  
23 considerable time after its supposed D&D  
24 activity. And so undoubtedly some of this  
25 material may have, was it just sprayed on or

1                   were there other isotopes that were getting  
2                   into the areas. And since there was no  
3                   bioassay being done, were these people being  
4                   exposed during that period of time that there  
5                   was no bioassay taking place. And up until  
6                   the '90s when the D&D activity found traces of  
7                   activity present where people might have  
8                   gotten exposed.

9                   **DR. ZIEMER:** So there's no bioassay or no  
10                  bioassay for actinium? There's bioassay for  
11                  other things?

12                 **MR. BISTLINE:** For actinium.

13                 **DR. ZIEMER:** Just actinium. But there was  
14                  other bioassay which if there were uptakes of,  
15                  I mean, you have a mix of stuff so if there  
16                  was, it's hard to envision they would have  
17                  uptakes of actinium without other things.

18                 **MR. FITZGERALD:** The third comment to look  
19                  for an indicator rate^.

20                 **DR. ULSH:** It is certainly true, Bob, what  
21                  you mentioned that there was leakage of radon  
22                  from the old cave. I think there's any  
23                  indication that there was leakage of actinium.

24                 **MR. STEWART:** What they were doing was some  
25                  workplace measurements, you know, smearing for

1                   contamination in that area. We certainly kept  
2 track of that. We don't have those data to  
3 hand at this moment; however, the old cave was  
4 very effectively remediated or at least very  
5 thoroughly remediated. There was leakage of  
6 radon, no doubt about that because that's  
7 going to suffuse through the capping materials  
8 that they used.

9                   **DR. ULSH:** So is it fair to state, I mean,  
10 we've talked about the 1964 operation that  
11 Josie had asked about.

12                   **MR. FITZGERALD:** Right.

13                   **DR. ULSH:** Is it fair to say you'd like to  
14 see maybe a summary of what other activities  
15 were done with actinium?

16                   **MR. FITZGERALD:** Yeah, I think really just a  
17 map that would clarify because there wasn't  
18 bioassay, and I think you hit the issue. We  
19 do see some evidence of operations,  
20 intermittent as they were, that involved  
21 actinium as a constituent. But I think your  
22 comment's fair as well. Was this simply trace  
23 and were other nuclides predominating as far  
24 as exposure issues or not. And if so, then I  
25 think the issue tends to diminish.

1                   But because of the difficulty in  
2 bioassaying actinium plus the, you know, it's  
3 a bad actor radiologically, I think that would  
4 be useful. We felt there wasn't, there was  
5 some more basis that could be applied there.

6                   And let me add just on this particular  
7 item, this being our first cut, we did  
8 indicate one other item in here which was the  
9 Thorium-229. This could have went somewhere  
10 else actually on the matrix chart, but since  
11 it was a thorium isotope, we indicated it  
12 here.

13                   And this again, based on our first  
14 read of the documentation, again we didn't see  
15 evidence of bioassay for that isotope as well.  
16 And during that timeframe where it was being  
17 handled and, again, there's a lot of  
18 documentation on this. And I know Liz is  
19 probably as close as you have to an expert on  
20 internal, but that was, that particular issue  
21 also struck us as one where the mapping of the  
22 bioassay didn't seem to coincide with the  
23 actual operation.

24                   And again, it's a clarifying question  
25 because everything we could get our hands on

1                   didn't suggest that there was, but there may  
2                   in fact be something somewhere.

3                   **DR. ULSH:** I think that the thorium bioassay  
4                   that was done was not necessarily specific,  
5                   isotope specific. And as is typical, I mean,  
6                   we would assign whichever isotope from among  
7                   the reasonable possibilities would be the most  
8                   claimant favorable. We do have a history of  
9                   thorium bioassay in the history of the site,  
10                  but in terms of which specific activities  
11                  involved Thorium-229, I don't have that at my  
12                  fingertips.

13                  **MR. FITZGERALD:** It's actually the 233  
14                  operation so we're kind of looking at that and  
15                  saying, okay. And we have a separate question  
16                  on uranium. So we're coming at it from  
17                  different angles, but just to understand  
18                  whether we read correctly that it doesn't  
19                  appear to be bioassay during that timeframe  
20                  what the implications are. And if, in fact,  
21                  it's being captured with a broad thorium  
22                  bioassay and you're assigning a bounding, you  
23                  know, sort of a claimant favorable estimation.  
24                  And that's a reasonable response.

25                  **DR. ULSH:** Well, also gross alpha. I mean,

1 they did a lot of gross alpha.

2 Liz, did you have a question?

3 **MS. BRACKETT:** No, I looked at the timeframe  
4 that you were talking about --

5 **MR. FITZGERALD:** It's just in the matrix.  
6 Actually, it is the reference that we have  
7 there from '66 to the late '70s on the U-233.

8 **MR. BISTLINE:** Fourth line up on that first  
9 paragraph.

10 **MS. BRACKETT:** 233 monitoring.

11 **MR. FITZGERALD:** Yeah, this is the 229,  
12 thorium.

13 **DR. ULSH:** Right, the extraction of Thorium-  
14 229 from U-233, and your matrix says occurred  
15 from '66 through the late '70s.

16 **MR. FITZGERALD:** Right.

17 **DR. ULSH:** And, Liz, are you saying that U-  
18 233 would have been what you would have  
19 monitored?

20 **MS. BRACKETT:** Well, I'm not fully familiar  
21 with what went on, but I mean if it was  
22 Uranium-233, that could be done. There is  
23 some thorium monitoring specifically in 1966  
24 without a particular isotope list, but they  
25 did do thorium monitoring at that time.

1           **MR. BISTLINE:** If we could get some  
2 clarification on that it would be helpful.

3           **MR. FITZGERALD:** It's the same question,  
4 whether or not coverage existed. If not, what  
5 would constitute then the means of monitoring.  
6 Obviously, these are all first order questions  
7 at this stage.

8           **DR. ZIEMER:** If there was, what was the  
9 extent of that monitoring in terms of the  
10 personnel and so on.

11           **MR. FITZGERALD:** And this also gets down to  
12 I think you mentioned earlier the number of  
13 workers. We haven't gone to that depth to  
14 figure out is this two workers, eight workers,  
15 20, 30 workers. And I think for U-229  
16 extraction probably was in small numbers.

17           **DR. ULSH:** Yeah, that's the context that we  
18 can't really get from King; that's not  
19 provided in the count document.

20           **MR. FITZGERALD:** So some of this may end up  
21 being, you know, it's true that it existed,  
22 but maybe it was a very small number.

23                           With that I just think that -- that's  
24 only 1-A.

25           **MS. BRACKETT:** I was just thinking that.

1           **DR. ULSH:** Well, it's actually 1A and 1B,  
2 isn't it?

3           **MR. FITZGERALD:** Yeah, we actually got into  
4 Cotter a fair amount, but really I think on 1A  
5 it's sort of the same theme that we'll hit a  
6 number of times. It's just the mapping and  
7 understanding whether, what the implications  
8 of the apparent absence of bioassay would be  
9 in terms of those operations.

10          **MS. BEACH:** And, Brant, for the record, I  
11 would like a copy of the Cotter Concentrate  
12 Program you offered to Paul as well just for  
13 an understanding of it.

14          **DR. ULSH:** Yes, sure.

15          **MS. BEACH:** Thank you.

16          **MR. FITZGERALD:** So before leaving 1A is  
17 that, I guess in terms of mapping, I guess  
18 that's maybe one term that'd be popular.

19          **DR. ULSH:** So the ones that we're concerned  
20 about in particular are Actinium-227.

21          **MR. FITZGERALD:** Right.

22          **DR. ULSH:** Thorium-229 --

23          **MS. BEACH:** And U-233, at least that's what  
24 I have.

25          **MR. FITZGERALD:** Well, actually 230 because

1 we got into -- I'm sorry, not 230. That was  
2 229, 229, yeah, 229 and Actinium-227.

3 **DR. ZIEMER:** The 1B's about the same issues,  
4 isn't it?

5 **MR. FITZGERALD:** Actually, no. This is  
6 where you get into Thorium-230. It's related  
7 because we're talking about Cotter.

8 **DR. ZIEMER:** You're still wondering what  
9 bioassay's available for that.

10 **MR. FITZGERALD:** Yeah, and that's what I'm  
11 saying that the theme tends to be a repetitive  
12 theme because, again, in this case I think the  
13 ER indicated that there was some limited  
14 bioassay available, but that could be  
15 supplemented by air sampling data for  
16 uncovered years. I think that was the  
17 phraseology that was in the ER. And again, as  
18 far as clarification to understand that sort  
19 of combination of the limited bioassay data  
20 plus the available air sampling data that  
21 would get you there. I think there's  
22 agreement that the thorium bioassay data was  
23 more limited than you would like in terms of  
24 coming up with coworker, I guess, models or  
25 what have you. In this case if you

1                   supplemented that with air sampling data that  
2                   would be available for thorium, would that  
3                   give you a sufficient basis for estimating  
4                   dose for that activity.

5                   **MR. BISTLINE:** Yeah, I think that would --  
6                   the representativeness of the air sampling for  
7                   the use, for supplementing bioassay.

8                   **DR. ULSH:** Well, we've already talked about  
9                   it in terms of the Cotter Concentrate Program  
10                  that was done inside the hot cell. But I  
11                  understand Brad's point about the whole point  
12                  about the exposure comes from not necessarily  
13                  being absolutely zero there, but I would say  
14                  that it's pretty limited.

15                  I do want to state though that I don't  
16                  think that we're ready to conclude that  
17                  there's absence of bioassay data, period.  
18                  There may not be bioassay data for actinium  
19                  for that operation or maybe for 230, Thorium-  
20                  230, although I'd have to look. But we  
21                  certainly have the capability to do gross  
22                  alpha at the site. And it's certainly  
23                  possible that we look like Don said, surrogate  
24                  radionuclides, and we will check that.

25                  **MR. FITZGERALD:** This is on B?

1           **DR. ULSH:** Yes.

2           **MR. FITZGERALD:** Yeah, I think that's the  
3 root of our question. What would be the  
4 strategy for coming up with dose estimation  
5 for that particular period since there isn't  
6 any direct bioassay apparent.

7           **DR. ULSH:** And again, in B the Cotter  
8 Concentrate Program was all of four or five  
9 people, but it's important for the four or  
10 five people, so we'll check it out.

11          **MR. FITZGERALD:** Now, just before we leave  
12 that, the four or five people were the ones  
13 that were doing the extraction I guess. But  
14 would there not be more people that would have  
15 been involved with handling, I mean,  
16 obviously, a lot of drums and packing,  
17 repacking, and some of what Brad was talking  
18 about I think.

19          **DR. ULSH:** Right, and with the Cotter  
20 Concentrate Program keep in mind the source  
21 material, the Cotter Concentrate itself would  
22 have had on a per week basis much, much lower  
23 concentrations of the Thorium-230 and the  
24 protactinium. That's why they had to separate  
25 it out. So in that case I would say that

1                   there's almost certain to be other  
2                   radionuclides that you would be sampling for  
3                   if you were interested in exposure to the  
4                   concentrate, the B material itself.

5                   **MR. STEWART:** The major constituents of the  
6                   Cotter Concentrate were thorium, Thorium-232  
7                   rather, 10,000 parts per million; Uranium-238,  
8                   60,000 parts per million; Thorium-230 and  
9                   Protactinium-231 were present at 300 parts per  
10                  million and 0.5 parts per million,  
11                  respectively.

12                  **DR. ULSH:** What document are you reading?

13                  **MR. STEWART:** This is a reevaluation of the  
14                  Cotter Concentrate that was performed in ^.

15                  **DR. ULSH:** This is a document that we'll  
16                  need to get to Josie and Paul, actually, the  
17                  whole working group.

18                  **MR. FITZGERALD:** I'm sorry. What was the  
19                  document again?

20                  **MR. STEWART:** It is a white paper that was  
21                  done by the Mound site, and it's a relatively  
22                  new capture for us.

23                  **DR. ZIEMER:** It is already on the O drive or  
24                  do you know?

25                  **MR. STEWART:** It is not currently on the O

1 drive.

2 DR. ULSH: Does that indicate MDS or SRDB?

3 MR. STEWART: Well, I do actually. This is  
4 an SRDB document.

5 DR. ULSH: Yeah, it's in the SRDB.

6 MR. STEWART: Captured by Brant Ulsh.

7 DR. ULSH: Oh, no wonder it sounded  
8 familiar.

9 MS. BEACH: Does it have a number, Don?

10 MR. FITZGERALD: What's the SRDB number?

11 MR. STEWART: It is -- oh no, that's not  
12 going to help you. That's the data captured  
13 section number.

14 DR. ULSH: On the break we'll give you a  
15 copy of this.

16 MR. FITZGERALD: If I can understand then,  
17 you're saying at least from a standpoint of  
18 how this material was monitored probably gross  
19 alpha possibly, but that in terms of air  
20 sampling information with what seems to be  
21 some thorium bioassay. But it's not clear how  
22 many samples would have been the basis for  
23 doing the dose estimation is to work going  
24 backwards I guess.

25 MR. STEWART: Certainly look for the

1 Thorium-232 which was the haystack rather than  
2 the needle.

3 **DR. ULSH:** Well, and uranium which was  
4 60,000 --

5 **MR. STEWART:** And uranium and/or.

6 **MR. FITZGERALD:** Yeah, the one thing that  
7 just as sort of a back drop -- and this came  
8 as much out of the interviews as -- and this  
9 is not specific to Mound but actually a kind  
10 of generic issue across the AEC at the time  
11 was the natural -quotation marks- source terms  
12 like thorium or uranium even radon weren't  
13 considered in the same vein as the other  
14 materials and were handled that way as well.  
15 But they were downplayed, not considered  
16 particularly a radiological threat.

17 So I think again our concern is in  
18 looking back did that sort of attitude or take  
19 at that time diminish the kind of monitoring  
20 that would have been done sort of in the later  
21 years, and what are the implications of that.  
22 Can we go back and somehow either take later  
23 measurements and use them retroactively or  
24 take what was done, limited as it may have  
25 been, and somehow knit that together and come

1 up with some basis for doing dose  
2 reconstruction.

3 And so in the early period I think  
4 that would be our concern for uranium, for  
5 thorium and for some of these so-called  
6 natural constituents as to whether they were  
7 monitored really from a radiological context  
8 in a way that would provide sufficient basis  
9 for doing dose reconstruction.

10 **DR. ULSH:** I don't know. I can't recall  
11 what's coming up in the matrix. So I think  
12 the ones that you mentioned here, uranium and  
13 Thorium-232, I think we --

14 **MR. STEWART:** And radon.

15 **DR. ULSH:** -- and radon, do we get to those  
16 later in the matrix?

17 **MR. FITZGERALD:** Yes. I'm just saying as  
18 sort of our concern just to sort of tie this  
19 together is that with that kind of  
20 understandable attitude, I mean, I'm just  
21 saying that back in the '50s and '60s -- and  
22 Fernald's another example and some of the  
23 other sites -- the low level, low enriched  
24 uranium, thorium.

25 I mean, it was just again considered

1 pitchblende, sort of considered the natural  
2 sources, oftentimes were not monitored as if  
3 they were of radiological concern more of  
4 heavy metal. And so we're particularly  
5 concerned about is there a way to look at that  
6 time period from the data that's available and  
7 still come to a conclusion on the doses that  
8 might have been associated with this  
9 operation.

10 **MR. STEWART:** Yeah, in fact, Mound had a  
11 procedure for 232, Thorium-232, bioassay in  
12 1950 so it's clear that they at least were  
13 looking at that as passable.

14 **MR. FITZGERALD:** Okay, for this one really  
15 being able to understand then the amalgam of  
16 what bioassay data for 232 in this case might  
17 have been available, 230. And if it's gross  
18 alpha from air sampling, how would you go from  
19 that then to coming up with some upper bound  
20 estimation for these workers. That would help  
21 us understand how that would be done.

22 **DR. ULSH:** It's also important to recognize  
23 that the Cotter concentrate material was  
24 stored in the same building that had  
25 previously housed the Thorium-232 sludges,

1 Building 21. That was an unoccupied storage  
2 building and was located at a remote part of  
3 the site, the south end of the site.

4 So in terms of 1B here, the Cotter  
5 concentrate material, I don't, yeah, sure,  
6 there would have been some transfer  
7 activities. You take the 22 drums from  
8 Building 21 over to the hot cell. I don't  
9 know how much exposure potential would be  
10 involved there. I don't know. But in terms  
11 of material sitting inside Building 21, I'd  
12 say it's almost nil. It was just so removed  
13 from the rest of the site, and it's not  
14 accessed routinely.

15 **MR. FITZGERALD:** And for the Cotter versus  
16 the monazite material, there wasn't as, the  
17 degree of redrumming because it wasn't as  
18 corrosive, as I understand it. So I think for  
19 the Building 21 storage issues I'd be more  
20 concerned about the next issue because you did  
21 have, I think, a lot of handling because of  
22 the redrumming, constant redrumming. So  
23 unlike Cotter -- correct me if I'm wrong --  
24 where you didn't have the corrosivity, you  
25 didn't have to do as much direct handling of

1                   that material; and therefore, the exposure of  
2                   site maintenance workers doing redrumming  
3                   would not be there as much as the other ones.

4                   **MR. STEWART:** It had been neutralized.

5                   **MR. SCHOFIELD:** Are there records of  
6                   personnel going in there and monitoring the  
7                   drums, checking for leakage, these type  
8                   problems on a regular basis?

9                   **MR. STEWART:** Checking for leakers of the  
10                  Cotter Concentrate?

11                  **MR. SCHOFIELD:** Yeah, there's a, make sure  
12                  that the integrity of the drums are still in  
13                  place.

14                  **MR. STEWART:** It is apparent that they  
15                  detected when drums were failing associated  
16                  with the other materials. So I would assume  
17                  that they were making the same sorts of  
18                  checks. We don't have that at hand right now.

19                  **DR. ULSH:** Well, now to answer your  
20                  question, are there records. We don't have  
21                  those kinds of records in our hand, but here's  
22                  a couple things to consider. We compared the  
23                  Cotter concentrate material versus the  
24                  Thorium-232. The Cotter concentrate materials  
25                  were neutralized so you didn't have those

1 kinds of issues. The other important thing to  
2 keep in mind is that the Cotter concentrate  
3 material was on site for only a very limited  
4 period of time. I think five or six years.

5 Am I right, Bob?

6 **MR. BISTLINE:** I think so.

7 **DR. ULSH:** So and we don't see any  
8 indication, as Joe mentioned, that they had  
9 the same kinds of issues that required  
10 repacking, constantly redrumming the material  
11 with the Cotter concentrate material. That's  
12 not the case for the hydroxide sludges. They  
13 did have a problem there before it went into  
14 Building 21. Does that answer your question?

15 **MR. SCHOFIELD:** Kind of. I mean, obviously  
16 if they've got a program going to monitor  
17 these drums, make sure they're not leaking,  
18 make sure there's no problems, and there would  
19 have been a group of workers who went in there  
20 on some kind of basis, whether it's weekly,  
21 monthly, quarterly, I don't know. So there's  
22 potential for those people to be going in. I  
23 was wondering if they actually kept a logbook  
24 or something saying these were leaks on such-  
25 and-such a date.

1           **DR. ULSH:** If there is such a logbook, we  
2 don't have it in our hands. That's not to say  
3 it couldn't be looked for.

4           **MR. FITZGERALD:** So for 1B then, it sounds  
5 like there are perhaps some gross alpha air  
6 sampling records or maybe, maybe not. I don't  
7 --

8           **DR. ULSH:** I don't necessarily want to go  
9 that far. I don't know for sure. And I  
10 wasn't necessarily, when I said gross alpha, I  
11 wasn't necessarily talking about just air  
12 monitoring.

13           **MR. FITZGERALD:** Right.

14           **DR. ULSH:** I'm talking about bioassay as  
15 well. I'm saying that it's possible.

16           **MR. FITZGERALD:** So it's just the issue of  
17 clarifying then how, what bioassay exists for  
18 232 plus this other additional information  
19 would clarify then what one could do for that  
20 period of time then.

21                           One C?

22           **MS. BEACH:** We're on to C. And I'm  
23 wondering if there's a way to be more general  
24 in, this is SC&A's what they see. This is  
25 what you understand. If there's any way, I'd

1                   like to get through this today if possible so  
2                   that everybody understands. I know these are  
3                   hard.

4                   **MR. STEWART:** They get faster.

5                   **DR. ZIEMER:** Well, one thing we need to keep  
6                   in mind is that on all of these I think Joe is  
7                   just raising what their issue is. I don't  
8                   think we should expect NIOSH to have the  
9                   answers necessarily today or to get into deep  
10                  discussions about the options --

11                  **MS. BEACH:** Just the understanding of what  
12                  they're asking for is all we're looking for  
13                  today.

14                  **DR. ZIEMER:** What and why and so that if you  
15                  say, well, you're asking the wrong question,  
16                  that's fine. But otherwise --

17                  **MR. FITZGERALD:** This is very helpful. I  
18                  think one thing I wanted to clarify is kind of  
19                  what we're looking for to clarify or  
20                  substantiate so that there's no going in the  
21                  wrong direction or misunderstandings or that  
22                  kind of thing.

23                  **MS. BEACH:** No answers, we don't need  
24                  answers today unless you have something  
25                  quickly.

1                   Before we move on we did have two  
2 additions to the room. We'd like to go ahead  
3 and state who they are for the record.

4           **MS. JERISON:** I'm Deb Jerison. [identifying  
5 information redacted] was a Mound worker.

6           **MS. BEACH:** Thank you.

7           **MS. RAMSEY:** My name is Ann Ramsey, and I'm  
8 a friend of Deb's. And I've been following  
9 this issue, and she's been working with it the  
10 last few years.

11          **MS. BEACH:** Thank you.

12          **MR. FITZGERALD:** One C. Well, actually, we  
13 sort of got into this to some extent. I think  
14 I was just pointing out you'd like to have the  
15 bottom line all the way at the bottom, but in  
16 this case I think it's sort of two-thirds of  
17 the way down. And our concern here is that  
18 for these drums it wasn't clear from the ER  
19 how the limited samples -- and we agree that  
20 samples were intermittent in some cases and  
21 somewhat limited, actually, very limited.

22                   How the representatives of the samples  
23 taken, we point out the 25 urine samples  
24 that's in the ER for the 7279, how that's  
25 going to be taken together, how that would be

1 representative of the span of time that we're  
2 talking about -- and this is a much longer  
3 time than the Cotter, you know, how that was  
4 going to be the basis for coming up with a  
5 dose estimation. I can see the data points,  
6 but given the length of time, it's a little  
7 harder to see how one can use that to cover  
8 that time period and be sure that it's  
9 representative of the kind of, because of the  
10 more extensive handling that was going on.

11 I mean, to re-drum the entire  
12 collection of drums three times over is a  
13 relatively large amount of activity for a lot  
14 of workers. So I think that's the standpoint  
15 that our concern comes from. Is that a  
16 sufficient basis by itself to give you that  
17 distribution of, or upper bound of the kind of  
18 exposures that these workers doing hands-on  
19 re-drumming, dirty stuff, whether that would,  
20 in fact, be sufficient.

21 **MR. STEWART:** In fact, there are a limited  
22 number of samples for that activity. However,  
23 it's clear from reading Meyer, and I'm sure  
24 you're familiar with it, that he will talk  
25 about perform the thorium samples for the

1 summer re-drumming campaign.

2 It is, once again, I would agree with  
3 Brant in that you wouldn't necessarily draw a  
4 straight line. We would see a flat graph and  
5 then a peak. You wouldn't necessarily expect  
6 to see ongoing bioassay, routine bioassay for  
7 this. This is an activity that they performed  
8 when they could, when they had resources, and  
9 when the weather was consistent with the  
10 operation.

11 So I don't know that you would see a  
12 routine bioassay program that would go from  
13 1960 to 1974 for re-drumming. And it's  
14 obvious that they competed for resources to do  
15 this, and they're saying these drums are  
16 getting pretty bad. We need to get out there,  
17 and we need to re-drum.

18 **DR. ULSH:** Just to, in the spirit of your  
19 suggestion to keep things brief today, we'll  
20 provide more details later. But as Don  
21 mentioned, the thorium bioassay that we have  
22 for that time period when the drums were  
23 stored outside and they were doing the re-  
24 drumming, many -- I don't want to say all --  
25 but many of the thorium bioassays that we have

1 from that period are specifically marked as  
2 re-drumming, related to the re-drumming in the  
3 logbook that covers that operation.

4 At a certain period of time in the  
5 '60s -- I don't have the exact year at my  
6 fingertips -- those drums were emptied into  
7 Building 21. And so the re-drumming  
8 operations ceased at that point. It sat in  
9 Building 21 until it was removed from the site  
10 in 1974-ish. And it was removed from the site  
11 by a subcontractor that was hired to come in.  
12 They did their own health physics monitoring  
13 material off site.

14 **DR. ZIEMER:** So let me twist the question a  
15 little bit. Are there re-drumming operations  
16 for which we don't have bioassay?

17 **DR. ULSH:** Not to my knowledge.

18 **DR. ZIEMER:** I don't know if that was clear  
19 or not.

20 **MR. FITZGERALD:** Oh, no, I think that is the  
21 issue. If --

22 **DR. ZIEMER:** Again, if you can correlate the  
23 bioassay fully with the re-drummings, I think  
24 that's helpful. If there are re-drumming  
25 operations for which there is no bioassay, are

1                   they pretty much similar to those, can we use  
2                   the other bioassay as surrogates for that? It  
3                   would be that kind of question.

4                   **MR. FITZGERALD:** Yeah.

5                   **DR. ZIEMER:** And then after this final  
6                   deposition that you described, then what do we  
7                   have beyond that?

8                   **MR. FITZGERALD:** Yeah, I think that's  
9                   exactly it. It's sort of two questions  
10                  embedded in there which is clearly the amount  
11                  of data, bioassay data, is limited. I think  
12                  that's acknowledged. But my question would be  
13                  the same question. Does that data --

14                  **DR. ZIEMER:** Would it be sufficient?

15                  **MR. FITZGERALD:** -- it may be sufficient if  
16                  the data is on the, focused on the re-  
17                  drumming, and whether there's enough data for  
18                  the re-drumming to characterize what the facts  
19                  from exposure to a worker re-drumming might  
20                  be. It wasn't possible to delineate that from  
21                  the ER from the site profile. But certainly  
22                  if that's where the data sits, that would help  
23                  answer that question. So I'll leave it at  
24                  that.

25                  **MR. CLAWSON:** This is Brad, one more thing.

1           You said that they were in competition for  
2           resources. So these bioassays of all the same  
3           people aren't going to be in bioassay because  
4           they're going to be different. You said they  
5           were in competition for resources so a lot of  
6           times like that you might end up with  
7           different operators performing these because  
8           they're not able to. So we want to make sure  
9           that kind of have a good representative that  
10          people were being monitored.

11          **DR. ZIEMER:** Well, the resource issue must  
12          have to do with the campaign itself. Bioassay  
13          would be a small increment I would think.

14          **MR. CLAWSON:** Well, a lot of things with  
15          personnel power is you may not have the same  
16          people doing the same process through there.  
17          You may have another operation going on,  
18          another slows down so you bring in a whole new  
19          group of people to be able to perform --

20          **DR. ZIEMER:** Sure, cannibalizing on  
21          something else.

22          **MR. CLAWSON:** -- and it's a normally used  
23          event to do that.

24          **MR. FITZGERALD:** Which is the related  
25          question to the question of what data exists.

1 Can that be tied to the cohort of workers that  
2 were, in fact, doing the re-drumming and it  
3 sounds like that would be in the data.

4 **DR. ULSH:** Yeah, the bioassay samples that  
5 exist for Thorium-232 for that period I  
6 believe are marked regarding operations. It's  
7 related to that.

8 **MS. BRACKETT:** And most of those people have  
9 multiple samples. It looks like there are at  
10 least three samples for each person doing the  
11 thorium re-drumming.

12 **MR. FITZGERALD:** And there was three cycles  
13 so --

14 **MS. BRACKETT:** This is for the '59 to '65.

15 **MR. FITZGERALD:** Right, okay.

16 **MR. BUCHANAN:** I had a question and  
17 clarification. This is Ron Buchanan, SC&A.  
18 In the SEC for 1949 to 1959, does that include  
19 all workers or is that just the people -- the  
20 way it's worded here it sounds like in item  
21 one there it's just people that worked with  
22 these certain isotopes and D&D. Is it all  
23 workers, external and other type isotopes,  
24 internal, external also?

25 **DR. ULSH:** The basis for the class was the

1           radium, actinium, thorium separations. But we  
2           recognized that during that period there was  
3           an escape, there was contamination occurred in  
4           other areas of the plant other than just the  
5           old cave. And so it's plausible that people  
6           could have been exposed to that and not  
7           monitored. So for '49 to '59 it includes all  
8           workers on site based on the radium, actinium,  
9           thorium separation activities included for  
10          everyone.

11          **MR. BUCHANAN:** Okay. They didn't have to be  
12          directly involved?

13          **DR. ULSH:** No.

14          **MR. BUCHANAN:** Okay, thank you.

15          **MR. FITZGERALD:** I think that would satisfy  
16          us as far as being able to understand that a  
17          little bit better.

18          **MATRIX ISSUE TWO: INDOOR RADON AIRBORNE CONCENTRATIONS**  
19          **IN SW AND OTHER BUILDINGS**

20                        Okay, radon.

21          **DR. BRANCHE:** Issue number two?

22          **MR. FITZGERALD:** Issue number two.

23          **DR. BRANCHE:** Before you do, for those of  
24          you participating by phone, if you would  
25          please mute your phone. If you do not have a

1           mute button, then please use star six to mute  
2           your phone. And then when you're ready to  
3           speak, then please use the same star six. We  
4           appreciate it. Thank you so much.

5                       Go ahead, Joe.

6                       **MR. FITZGERALD:** Just to tee up this  
7           particular issue, we raised this in the site  
8           profile. This is sort of reflective of the  
9           same issue we had there. Our concern is  
10          really pre-venting pre-1980. And a concern  
11          there is the, I guess to put it in a general  
12          term, lack of characterization of what the  
13          radon values, radon daughter values, were.  
14          And this is both Radon-222 as well as the  
15          actinon and the thoron in the SW workspace.

16                      We have the one sampling exercise that  
17          was done there with the perm, and we have  
18          talked to Phil Jenkins. And the issue is just  
19          simply with the one measurement and using what  
20          we can get from his notes, his own calibrated  
21          instrument, we're just concerned that it's not  
22          clear what the levels would have been over  
23          time in these workspaces. And we know for  
24          that one week the measurement was between 90  
25          and 160, something like that, maybe 67 and

1 160.

2 But Jenkins indicates that the  
3 measurement that he took was to rule out radon  
4 actually because they were picking up in one  
5 of the workers an elevated lung count. So his  
6 role wasn't to go characterize what the radon  
7 concentrations were in the SW workspace but  
8 was simply to rule out radon.

9 It's kind of interesting. They rule  
10 out radon because there was some concern that  
11 the individual was exposed to something else,  
12 and as it turns out, they didn't rule it out,  
13 in fact, established that it was the likely  
14 and primary source of that, the high alpha  
15 count.

16 And the concern that I think we have  
17 is that's one measurement. It doesn't  
18 characterize necessarily what the activity  
19 levels would have been in those workspaces  
20 pre-1980, pre-venting. And given the fact  
21 that you had since the D&D of the old cave  
22 roughly 20-some years where you would have had  
23 potential venting of radon into that  
24 workspace, I think you're talking about a  
25 fairly sizeable potential for exposure to

1                   whoever would have occupied that workspace.

2                   Now, we didn't know what the occupancy  
3                   numbers were for that workspace, but  
4                   certainly, if nothing else as I think Jenkins  
5                   indicated, it was a heck of a lot of radon.  
6                   And he called it an ideal radon production  
7                   example because you had enclosed space. You  
8                   had negative pressure. You had a hole. We  
9                   talked to during the site profile a number of  
10                  rad techs that, one rad tech said he measured  
11                  something similar on a crack in the R Building  
12                  which is sort of, you know, it's a contiguous,  
13                  next door to SW. And again, I think most  
14                  would attribute that from the tunnel that was  
15                  underlying the building.

16                  So I guess in a nutshell our concern  
17                  is that it was a source, fairly productive  
18                  source, of radon of various species, not just  
19                  Radon-222, but thoron and actinon as well.  
20                  And whoever would have occupied those areas  
21                  would have been exposed to some level,  
22                  relatively high level, of radon daughters, but  
23                  in our view not something that is easily  
24                  characterized because there's essentially that  
25                  one measurement.

1           **MR. STEWART:** There are data available for  
2 this. They weren't discussed in detail in the  
3 TBD because at the time the TBD was written we  
4 did not get to that level of detail. The goal  
5 of the TBD was a little different than it is  
6 now. However, we are evaluating these data.

7           It is clear that Mound understood that  
8 they had a short-lived alpha problem in SW,  
9 and there were also measurements in R  
10 Building. We have not currently completed a  
11 database of these data, but we are in the  
12 process of analyzing them.

13          **DR. ULSH:** And it's true, I mean, SC&A's  
14 statement here mentions a couple of different  
15 radon sources, the first being the tunnel that  
16 you mentioned, Joe. I want to make sure that  
17 everyone understands that this tunnel, that  
18 people weren't walking through this tunnel.  
19 It was maybe two feet tall, but it was the  
20 source of the radon that leaked into SW-19.  
21 And they did measure the high radon next to a  
22 worker's desk, and we know who that worker  
23 was. Of course, I'm not going to say his  
24 name.

25                           And the second source in your

1 statement in the matrix mentioned was Building  
2 21 where the thorium material was stored. And  
3 I've already mentioned, we've already  
4 discussed that, where it was in relation to --

5 **MR. FITZGERALD:** That was a fully ventilated  
6 building so I think that was just a case of  
7 whoever was handling would have been exposed  
8 to the radon there as well. But those are the  
9 only two sources that we felt were technically  
10 enhanced were potential sources of  
11 occupational exposure that would have been,  
12 you know, because of Mound's high background,  
13 natural background, for radon, clearly there  
14 was an issue of radon at the site. But these  
15 two were above and beyond those natural  
16 sources.

17 **DR. ULSH:** All right, Don. For those of you  
18 on the phone, Don has drawn a pretty picture  
19 here that I'm sorry you're not going to be  
20 able to see, but let's just keep it brief  
21 though, Don.

22 **DR. ZIEMER:** Don is now drawing the bushes  
23 around the building.

24 **MR. STEWART:** Just a little bit of talk  
25 about the tunnel itself. What it appears to

1           be, it is labeled on the construction drawing  
2           for the foundation of SW building is a duct.  
3           It is, in fact, two foot-three inches tall.  
4           So that is the place where they got the 88,000  
5           picocuries per liter measurement. And I know  
6           that they went down there to make those radon  
7           measurements.

8                        What is not clear to me in that  
9           drawing -- and I continue to research this --  
10          it appears that this tunnel went from about  
11          here to the corner of R Building where it  
12          terminated. So underlying R Building is not  
13          really something that we can see at this time.  
14          If we have additional data about that, we'd  
15          like to see it.

16                       This appears to be a ventilation  
17          shaft, and I think what they were doing is  
18          venting the stuff up here. Later, in SW-11,  
19          this is where they added an additional stack  
20          with the radium venting. They got it vented  
21          out of the ceiling there. This is SW-19, the  
22          infamous old cave area. In fact, what you've  
23          got is some office space on top of the cap.  
24          You have a small staircase there to get up on  
25          top of the cap where they put some gloveboxes

1 and some other stuff.

2 Just another quick drawing here, SW-  
3 19, old cave, drain trenches, they put some  
4 shielding and some other materials from the  
5 old cave. They laid it down, then they filled  
6 it with gravel, compacted it, and then put  
7 another pad on top of that. This is a  
8 concrete pad, just have a short staircase. So  
9 that's why there's four or five steps in that  
10 room there at the time it was demolished.

11 So I know that they did samples around  
12 here to see if they had anything coming  
13 through. And this is the area again where the  
14 high measurement was made at that gentlemen's  
15 desk.

16 So if anyone has any additional data  
17 about the tunnel, I'd like to see that because  
18 I was trying to understand from partial data.

19 **DR. ULSH:** So to summarize I understand your  
20 concern about measuring radon concentrations  
21 relative to the source and where it might have  
22 impacted in the SW Building and maybe the R  
23 Building. And Don says we have some data in ^  
24 that we're currently analyzing. We'll be back  
25 in touch with you on that.

1           **MR. FITZGERALD:** That's fine and the focus  
2 again is location, whether, again, we have to  
3 collect the information as well for R. But  
4 where this was in fact located, the issue of  
5 the contribution of the other radon daughters  
6 because the amount of activity involved, just  
7 given the spot measurement that was made, even  
8 though they're short-lived, at those levels  
9 they, it's possible that 219 might have  
10 actually been on a par with Radon-222.

11           That part of it we've gotten some  
12 guidance from people that have dealt with  
13 radon. So that would be useful to understand  
14 just from a dosimetric standpoint even though  
15 typically those are discounted because of the  
16 short-lived nature. Because of the 100,000  
17 picocuries per liter that was pouring in, they  
18 might actually be on par. So that's another  
19 issue.

20           **DR. ULSH:** You mentioned that you had  
21 conducted some interviews with several rad  
22 techs during the TBD review.

23           **MR. FITZGERALD:** We talked to a rad tech  
24 during the TBD review who indicated that he  
25 had an alpha counter over an alpha meter over

1 a crack in R Building. And that was certainly  
2 a source of concern. Because again, I think  
3 we couldn't find it, and we looked hard to see  
4 if there was any information about where that  
5 tunnel ended up. And we asked, I guess in  
6 this last round of interviews, and got  
7 conflicting information again. I think Phil  
8 Jenkins thought maybe it was under R Building  
9 as well, but it doesn't sound like there's any  
10 definitive documentation on it.

11 **DR. ULSH:** Could we get copies of your  
12 interviews?

13 **MR. FITZGERALD:** Yeah, they're --

14 **DR. ULSH:** Or do we already have them?

15 **MR. FITZGERALD:** -- no, no, no, of course,  
16 and what we're trying to do though is cycle  
17 those through in our DOE in terms of security  
18 review first in the ongoing effort to be  
19 conservative about that.

20 **DR. ZIEMER:** When was Phil Jenkins' first  
21 sample? Was it '89 or --

22 **MR. FITZGERALD:** 'Seventy-nine.

23 **DR. ZIEMER:** 'Seventy-nine.

24 **DR. ULSH:** Just prior to the venting.

25 **DR. ZIEMER:** And then there weren't any

1 prior to that?

2 **MR. STEWART:** We're still analyzing that  
3 data. We have information ^ supports. It's  
4 clear that they knew that there was a short-  
5 lived alpha problem in SW Building and in R  
6 Building. So once again, we're still  
7 compiling the amount of new data that we have.

8 **MR. FITZGERALD:** And that's going to be the  
9 answer to our concern I think. Because when  
10 you have the one data point that gives pause  
11 because, for radon in particular, the  
12 variabilities involved would make that a  
13 number that you couldn't hang your hat on I  
14 think because of the variabilities you'd  
15 expect at locations and the conditions and  
16 everything else. And Phil's the first one who  
17 since he did the measurements we're going to  
18 admit that it wasn't a characterization  
19 measure as much as a swat sample.

20 **MATRIX ITEM THREE: EXPOSURE TO TRANSURANIUM**  
21 **RADIONUCLIDES**

22 Item three, do you want to summarize  
23 that for Brant, number three?

24 **MR. BISTLINE:** Yeah, I guess the big issue  
25 on this number three is the lack of, well,

1 very limited data for americium and Curium-244  
2 bioassay samples and concern for the lack of  
3 data and wondering how you were going to  
4 approach this in terms of assessing the doses  
5 of these individuals. And one of the issues  
6 that comes up is with regard to Americium-241  
7 levels, variability of the amount of americium  
8 that may be present in areas.

9 **DR. ULSH:** I'm wondering if this is a type-o  
10 -- the SC&A statement says exposures occurred  
11 while working with Americium-241 sources and  
12 while working with highly enriched plutonium.  
13 Should that be highly enriched uranium or --

14 **DR. ZIEMER:** No, doesn't make sense.

15 **MR. FITZGERALD:** Circle that.

16 **DR. BRANCHE:** You agree it's not plutonium.  
17 You're not sure what it is.

18 **DR. ZIEMER:** You wouldn't describe plutonium  
19 that way?

20 **DR. ULSH:** Right, but americium would be  
21 associated with plutonium.

22 **MR. STEWART:** They're purifying this  
23 americium.

24 **DR. ULSH:** Well, anyway, you can get back to  
25 us later on that.

1           **MR. STEWART:** During some operations they  
2 were purifying Americium-241 for, as I  
3 understand it, for neutrons.

4           We looked at, there are a number of  
5 rooms identified in King. Of these rooms,  
6 plutonium's a dominant element in most of  
7 these processes. I talk a little bit about  
8 the rooms. I don't need to go into a lot of  
9 detail. But it is important to keep in mind  
10 that the bioassay procedure used prior to 1981  
11 or through 1981, I don't recall which, is  
12 gross alpha. And the method that they used  
13 would have brought down all actinides.

14          **DR. ULSH:** Including americium.

15          **MR. STEWART:** Including americium. Any  
16 alpha activity in a sample would assume to be  
17 plutonium. I think, and I very much welcome  
18 the opportunity to talk to you people in the  
19 program there. It seems to me they considered  
20 most of their processes to be plutonium  
21 essentially.

22          **MR. BISTLINE:** I guess the concern is the  
23 high end specific activity of americium versus  
24 plutonium.

25          **DR. ULSH:** Well certainly, we would treat

1 Mound no differently than any other site where  
2 if we had a gross alpha result, and there were  
3 several different alpha emitters that were,  
4 could have been the cause of the activity that  
5 you see in that result, we would assign it to  
6 the most claimant favorable one on a case-by-  
7 case basis. That would be the same as we do  
8 anywhere else.

9 But I think what Don is trying to say  
10 though is that when you don't see americium-  
11 specific bioassay, but because they didn't do  
12 americium-specific bioassay, instead they used  
13 the gross alpha.

14 **MR. FITZGERALD:** Which gets us back to what  
15 we said before. In this one we're just trying  
16 to clarify because it's not as explicit  
17 perhaps as we need to have, and I understand  
18 the ER was a summary document. So really in  
19 this one, given the admitted limited sampling  
20 of bioassays, if it's gross alpha, just  
21 mechanically how would that be used? And  
22 process information is mentioned as a  
23 supplement as well. So this is similar to  
24 what we said before.

25 It's understandable with limited

1 bioassay that you would go to perhaps gross  
2 alpha, maybe to process information, and that  
3 combination would possibly get you there. And  
4 we would just want to clarify how that's going  
5 to work so we can understand it better. It's  
6 mentioned that way in the ER, but there's no  
7 details of how that would actually be done.

8 **MS. BRACKETT:** I just wanted to mention here  
9 --

10 **DR. BRANCHE:** Please speak up.

11 **MS. BRACKETT:** -- one item that I just  
12 wanted to mention was that this notes that  
13 americium ^ plutonium, and that ^ take into  
14 account there would be ^ plutonium that the  
15 bioassay would assume to be plutonium, and  
16 then americium is added as a fraction of a  
17 particular --

18 **MR. STEWART:** To grow in, yeah, yeah.

19 **MS. BRACKETT:** -- so it is accounted for in  
20 that particular circumstance.

21 **MR. STEWART:** In accordance with the TBD.  
22 Americium was neglected as part of the E-  
23 source plutonium source term.

24 **MS. BRACKETT:** Two thirty-eight --

25 **MR. STEWART:** Two thirty-eight.

1           **MS. BRACKETT:** -- specifically weapons grade  
2 plutonium.

3           **MR. BISTLINE:** This also begs another  
4 question that I've got, and I want to be as  
5 general as possible on this because of the  
6 sensitivity of ^. The concern is that the  
7 ratio of americium to plutonium, or your  
8 ratios of the isotopes of plutonium, vary.  
9 There was a time period when the U.S. was  
10 using some British material, and that I'm very  
11 well acquainted with and had a very high, or  
12 had a much higher PU-241 content which added  
13 to the in-growth and created problems for  
14 dosimetry, external exposures to the workers.

15                   And I'm wondering whether any of that  
16 kind of material was handled at Mound and  
17 whether that's being taken into consideration  
18 on the part of you folks because it is, it did  
19 really create some problems in some of the  
20 other facilities.

21           **MR. STEWART:** It does not currently compose  
22 a part of the Mound Technical Basis Document.

23           **DR. ULSH:** But how about if we talk a little  
24 later, and you give me some details, and we  
25 can check that out.

1           **MR. BISTLINE:** Yeah, I don't want to get in  
2 too deep.

3           **DR. ULSH:** I know.

4           **MR. BISTLINE:** But I think it needs to be  
5 clarified.

6           **DR. ULSH:** Again with, similar to what we  
7 would do with other sites if there are a  
8 variety of isotopes present, we would pick the  
9 most claimant favorable one.

10          **MR. BISTLINE:** And there's a specific time  
11 period involved here, too. We can talk  
12 offsite.

13          **MR. FITZGERALD:** So for the curium, and we  
14 also bring up neptunium and less so the  
15 americium because I think it sounds like again  
16 americium was recognized and equated in the  
17 plutonium estimations. But for the curium and  
18 for the neptunium just to understand better  
19 what the dose estimation approach would be for  
20 those given sort of all the above process  
21 information, perhaps gross alpha, perhaps some  
22 limited bioassays. But we couldn't find  
23 anything for neptunium. And again, this is  
24 just based on what we examined. That seems a  
25 little puzzling but if there is any neptunium

1 data, that would be helpful as well.

2 **MS. BRACKETT:** I'm not aware of any.

3 **DR. ULSH:** So before you do, it sounds like  
4 what you're asking for is just similar to what  
5 we've talked about with the previous ^, some  
6 details on what they were doing --

7 **MR. FITZGERALD:** Clarification as to how you  
8 would actually get this together given the  
9 available sources of information. It's a  
10 little bit of A plus B plus C. Does that get  
11 you where you need to get given the fact that  
12 maybe the bioassay data itself is either  
13 lacking or limited.

14 **MR. STEWART:** Once again, it would have  
15 precipitated all of the other actinides, plus  
16 alpha, gross alpha.

17 **DR. ULSH:** We'll be providing detailed  
18 responses, and we'll assume that kind of a  
19 discussion.

20 **MR. FITZGERALD:** That's fine.

21 **DR. ZIEMER:** Isn't the issue partially if  
22 you assume it's all plutonium does that still  
23 bound it. Are you asking that or are you  
24 thinking that it might not bound it? Well,  
25 you want them to demonstrate that it does I

1                   guess.

2                   **MR. FITZGERALD:** I think that's the notion,  
3                   you know, we don't have any prejudgment on  
4                   this. It's just that the ER points to a  
5                   number of sources of information that could be  
6                   used but nothing that would actually show us  
7                   how it would be done.

8                   And that's all we are looking for is  
9                   clarification that if it's a combination of  
10                  the alpha bioassay, gross alpha, plus perhaps  
11                  some of these assumptions regarding growth of  
12                  plutonium plus maybe a couple of bioassay  
13                  points here and there. That's fine, but right  
14                  now we don't really understand how that would  
15                  be done. The data is limited in some cases  
16                  and lacking in others, so there must be a  
17                  strategy that you'll be using to come up with  
18                  those estimations. We don't know at this  
19                  point.

20                  **MR. STEWART:** Neptunium work was rare. We  
21                  typically, and under ER from Mound, we  
22                  typically don't get that level of detail in  
23                  the cases. Sometimes we do get some very good  
24                  detail, and we can go back and we can say, I  
25                  mean, hypothetically, if a person described in

1 detail the process that he performed with  
2 Neptunium-237, we would look, keep that in  
3 mind when we looked at his bioassay records.  
4 And we would assess, okay, well, if I assume  
5 this gross alpha measurement is Neptunium-237,  
6 is it a higher dose or is it lower to the  
7 particular organ.

8 **MR. FITZGERALD:** And that's all you can do  
9 at this point is you're looking at the King  
10 document that identified neptunium as one of  
11 the lot trace elements, something that would  
12 be significant source term for a particular  
13 facility in a certain time period, and there's  
14 no bioassay. So we get to the next question  
15 and say, okay, were people monitored for this,  
16 and, if so, where's the data. If not, what  
17 would be the work around in terms of using  
18 other sources there. That's pretty much the -  
19 -

20 **MR. STEWART:** What change to the TBD would  
21 be necessary to --

22 **MR. FITZGERALD:** Right, right. And this may  
23 end up being a site profile issue, but I think  
24 it does affect the question of how dose  
25 reconstruction will be done for those

1 operations that might have neptunium as a, I  
2 won't call it a major constituent, but  
3 certainly one that you wouldn't want to  
4 ignore. So you might want to tweak the  
5 algorithm perhaps to take that into  
6 consideration or do an upper bound. I don't  
7 know how that would be done, but that would be  
8 just the question on that.

9 **MR. STEWART:** Once again, we're talking  
10 about a process that affects a small number of  
11 individuals. Mound is one of the many sites  
12 that had diverse research programs and very  
13 small operational programs.

14 **MR. FITZGERALD:** And that would be an  
15 important qualifying statement that wasn't  
16 clear in a lot of these cases. The King  
17 report doesn't get into numbers so again, this  
18 is the first order.

19 **MS. BEACH:** Are you ready for a break?

20 **DR. ULSH:** They're rumbling about a break  
21 down here, Josie.

22 **DR. BRANCHE:** We're going to put the phone  
23 on mute for these ten minutes, and we'll  
24 unmute when we return.

25 (Whereupon, the working group took a break.)

1           **DR. BRANCHE:** For those of you participating  
2 by phone, if you could please mute your phone.  
3 If you don't have the mute button, then if you  
4 would please use star six to mute your phone,  
5 then when you're ready to speak, you can use  
6 that same star six to begin speaking. And we  
7 appreciate your cooperation with this whole  
8 mute business.

9           Ms. Beach.

10          **MS. BEACH:** Josie Beach here. We are going  
11 to go ahead and switch gears and move to  
12 number 14 on the matrix. We're going to work  
13 through 14, 15 and 16, all the way through 19,  
14 and then go back to where we left off after  
15 those items have been covered.

16                 If you're ready, did you want to  
17 start, Ron?

18          **MATRIX ISSUE FOURTEEN: EXTERNAL ISSUE, NEUTRON DOSE**  
19          **RECONSTRUCTION**

20          **MR. FITZGERALD:** Yes, Ron Buchanan, who  
21 actually addressed a lot of the external  
22 issues, provided the details but these issues  
23 are actually kind of familiar issues because  
24 they're generic to a lot of DOE sites. This  
25 question of NTA film use and sort of the how

1 does one address the energy dependence issue,  
2 and application of n/p ratios, all these sort  
3 of play a role in the proposed approach in the  
4 evaluation report. So we have several  
5 specific issues that we've identified which  
6 Ron will summarize.

7 **MR. BUCHANAN:** Ron Buchanan, SC&A. We're  
8 looking at the neutron -- one of the external  
9 dose issues was the neutron dose  
10 reconstruction. And at Mound they used the  
11 NTA film up until about '77 I believe. And  
12 the main issues that we had, they did have  
13 pretty good records in the NTA results. If  
14 you look at the database system, they did  
15 monitor some of the workers and that data is  
16 there.

17 Our concern as far as being able to do  
18 the correct dose reconstruction is with the  
19 NTA film. Like at any of the sites, they  
20 recognized after they had used it awhile that  
21 it was missing some of the lower energy  
22 neutrons. And going through the Mound data,  
23 as far as SC&A could find, is that they did do  
24 a fairly good job of calibrating the NTA film  
25 in the lab and counting the number of tracks

1           depending on the type of source they had, and  
2           realized in about '63 that the lower energy PU  
3           sources were not, or any plutonium source was  
4           of lower energy and was giving a lower amount  
5           of counts on the tracks as opposed to the old  
6           polonium sources. And so they did recommend a  
7           change at that time on some of the  
8           calibration.

9                     And our problem that we would like to  
10           see clarified or additional data or issue  
11           addressed is the fact that when they did the  
12           calibrations, they did it in the lab. But I  
13           could not find anywhere in the documents where  
14           they went out in the actual work environment.  
15           I would think that to be able to use that NTA  
16           film to make corrections to the results, we'd  
17           have to have some documentation of where they  
18           took the NTA film out into the work  
19           environment, compared to an absolute neutron  
20           dose measurement to determine how many tracks  
21           were being missed so to speak.

22                     Now, we have two issues with this  
23           period between -- now that the SEC covers  
24           1959, we'd be covering 1960 through '77 when  
25           they switched over to -- whenever the official

1 date was they switched over to TLDs -- was if  
2 there was any documented evidence showing that  
3 they actually took the NTA film into the work  
4 environment, compared it with an actual  
5 neutron dose equivalent measurement and used  
6 those calibration factors as opposed to doing  
7 it in the laboratory, we didn't have the  
8 moderated neutrons.

9 You have two factors here. You have  
10 that the NTA film was lacking in response to  
11 below a certain energy of neutron, plus, it  
12 would fade faster if it was exposed to the  
13 lower energy neutrons. And this was addressed  
14 kind of haphazardly. I wouldn't say it was  
15 address haphazardly, but the documents that I  
16 found address -- in Meyer especially --  
17 address the issues, but you can't really tie  
18 it all together like Joe was saying earlier, a  
19 thread to link them all together.

20 And I could not find where they  
21 actually went in the work environment. I  
22 would think that it had been necessary to go  
23 in the work environment, expose the NTA film  
24 to some absolute neutron and some absolute  
25 neutron measurement device to get a

1 calibration factor for different locations as  
2 moderations and sources changed over the  
3 years. Now, I did find evidence that they do  
4 the calibration in the lab.

5 There was a few neutron energy  
6 spectrum measurements done in the work  
7 environment, but there was no comparison of we  
8 need to adjust the NTA film for these  
9 particular locations in these particular  
10 years. Now, these calibration sources were  
11 about 1.3 MeV, and the average neutron energy  
12 out in the field during this period from say  
13 '60 to '77 from what I can find averaged  
14 around 0.8 MeV. There was 0.7, a few 0.5s,  
15 some 0.9s, but it's around something under 1  
16 MeV.

17 And this might be considered not much  
18 difference than the calibration source of an  
19 unmoderated 1.3. But it is important because  
20 it drops off very rapidly, the NTA response  
21 does to energy. And so my concern here  
22 whether you're talking about the polonium  
23 sources or the plutonium sources, my concern  
24 is out in the actual work environment where  
25 they were located, and the NTA film hung on

1 the workers' chest, that that NTA film was  
2 being exposed to a lower energy neutron source  
3 than what was being used to calibrate them in  
4 the lab and assign doses.

5 Even though fading was compensated for  
6 some in later years, I don't see a real  
7 correlation between the work environment and  
8 the calibration facilities that were used to  
9 assign doses.

10 **DR. ULSH:** Well, as you know, this is an  
11 ongoing, living-type process, and we  
12 anticipated that this might be an issue  
13 because it has been at other sites as well.  
14 And in anticipation of that we worked with the  
15 Department of Energy Legacy Management folks  
16 to locate -- would I be overstating if I said  
17 a vast treasure trove -- a large body of  
18 paired neutron and gamma measurements from SM  
19 Building, from PP Building, from R --

20 **MR. STEWART:** Actually, I kind of broke it  
21 into five different exposure regimes, and that  
22 is: T Plant for polonium processing; SM  
23 building early, no shielding; SM Building late  
24 with the addition of shielding; PP Building;  
25 and a Californium-252 facility. We have

1 paired neutron gamma results for each of those  
2 regimes.

3 **DR. ULSH:** And there are spectral  
4 measurements, neutron spectral measurements.  
5 We're currently in the process of capturing  
6 this data, uploading it, and we'll certainly  
7 make it available to you as soon as we have  
8 it.

9 **MR. FITZGERALD:** Are the spectral  
10 measurements also from the same treasure  
11 trove?

12 **MR. STEWART:** They are part of the data that  
13 exists.

14 **DR. ZIEMER:** What was the time frame on the  
15 spectral measurements? Did they use  
16 monitored?

17 **DR. ULSH:** Yes, they used long counters,  
18 didn't they?

19 **MR. STEWART:** They had several different  
20 instruments that they used. Our principal  
21 internal dosimetrist, Jack Fix, is familiar  
22 with each of these. This is our principle  
23 internal dosimetrist.

24 **MR. FITZGERALD:** I guess you were asking  
25 about time frame though?

1           **DR. ZIEMER:** Yeah, time frame will tell you  
2 a little bit about what might have been  
3 available, whether it's long counters or --

4           **MR. FITZGERALD:** Because that's one issue.

5           **DR. ZIEMER:** -- monospheres or -- I know  
6 these early spectrum measurements are a little  
7 crude, but they can at least separate, tell  
8 you what's below the threshold and that's  
9 helpful. I think in most cases the high  
10 energy stuff was still a bigger contributor to  
11 dose when you make the conversions usually.  
12 In terms of numbers of neutrons per unit area  
13 per second, it takes a lot of thermals to give  
14 you the same dose.

15          **DR. ULSH:** Well, and I do want to make it  
16 clear here --

17          **DR. ZIEMER:** Talking about, well, okay.

18          **MR. FITZGERALD:** Yes, some of these are a  
19 little --

20          **MR. BUCHANAN:** Yeah, 1 MeV is where you  
21 start dropping off so quick, and so you still  
22 get 25, 45 percent, so, you know, it depends  
23 on the moderation.

24          **DR. ULSH:** Well, and we did recognize that.  
25 I mean, your statement says that SC&A

1           questions the assumption that only high energy  
2           neutrons existed at Mound around polonium  
3           material. We never made that assumption. In  
4           fact, in Section 5.4.3 of the ER we state that  
5           neutrons in the workplace would be expected to  
6           include a continuous spectrum of energies  
7           below the maximum emission energies, and it  
8           goes on.

9                        So we never made that assumption. We  
10           recognize what you're saying that there would  
11           be some moderation occurring in the workplace.  
12           And like I said, we're in the process of  
13           getting this data into a, you know, we're  
14           uploading it now. And we know that you guys  
15           are keenly interested in that, too, so we'll  
16           make that available to you.

17                   **MR. BUCHANAN:** Can I, are you heading  
18           towards the direction of using just NP values  
19           for neutron assignment or are you going to use  
20           NTA results modified?

21                   **DR. ULSH:** We'll use NTA results where we  
22           have them with appropriate adjustment to  
23           account for exactly what you're talking about,  
24           the fraction of the neutrons that are below,  
25           for instance, the threshold detection limit of

1 the NTA film and also for the track fading  
2 issue. Now, keep in mind, I would have to go  
3 back and look in detail about how they  
4 calibrated these things, but if you handle the  
5 calibration films the same way that you  
6 handled the films that people were wearing,  
7 then the track fading issue comes out in the  
8 wash.

9 **MR. BUCHANAN:** Right, track fading was  
10 addressed later on.

11 **MR. STEWART:** Nineteen sixty-eight.

12 **MR. BUCHANAN:** Right, but they weren't,  
13 well, they was kind of corrected sometimes,  
14 but they didn't go back before that. When  
15 they recognized that, they said, okay, we're  
16 going to do the correction, but they did not  
17 go back to 1960 on track fading. Is that  
18 correct?

19 **DR. ULSH:** I think that's because the fading  
20 issue was dominant in the PP Building with the  
21 plutonium. They didn't go back into the  
22 earlier years into the SM Building where they  
23 were primarily worked on the polonium because  
24 it was, I think it was anticipated that the  
25 fading issue would be less of an issue because

1                   you had higher energy neutrons.

2                   **MR. STEWART:** That's correct, and the memo  
3                   that discusses that says that the factor of  
4                   two is likely not applicable or not applicable  
5                   to doses prior to the time that he stated, and  
6                   I forget the exact date. And it's clear that  
7                   in their own mind at least, that they did not  
8                   need to correct any additional data. We may  
9                   come to a different conclusion when we  
10                  evaluate this.

11                  **MR. FITZGERALD:** One thing I picked up in  
12                  some of the supporting documentation -- I  
13                  think it was Meyer -- but there was some also  
14                  problem with interference from, was it gamma  
15                  or something. It was some interference that  
16                  was making it difficult to read.

17                  **MR. STEWART:** Correct, and at that time what  
18                  happens is NTA film is sensitive to photons as  
19                  it is to proton recoil. So you're counting  
20                  the tracks, and if you have a lot of gamma  
21                  background, it will darken the film so that  
22                  it's more difficult to see the tracks. And we  
23                  often see this comment -- well, not often --  
24                  we have occasionally seen the comment that the  
25                  film was too black to read.

1           **MR. ELLIOTT:** I'm sorry, do they call it  
2 fogging? Is that fogging?

3           **DR. ULSH:** Gamma fogging.

4           **MR. STEWART:** And, in fact, it makes it more  
5 difficult. And the Mound site operated their  
6 microscopy equipment so that they could more  
7 easily distinguish the proton tracks.

8           **MR. FITZGERALD:** So really, to sum it up,  
9 given those limitations, the neutron-photon  
10 pairs are going to be the backstop to some of  
11 the issues where you can't rely on the NTA.  
12 Is that --

13           **MR. STEWART:** I don't know that we're going  
14 to state that we can't rely on NTA. NTA, you  
15 know, we have a high average energy for the  
16 Mound operations for the most part. Mound  
17 claims a threshold of between 0.5 and 0.7 MeV  
18 for neutron detection. So I don't know that  
19 we're going to totally throw out the NTA  
20 results for any particular era.

21           **DR. ULSH:** It would just be in situations,  
22 if there are any, where you have someone who  
23 might have been exposed to neutrons but wasn't  
24 monitored for it. Now, I'm, let me be quick  
25 to state I'm not saying that there are

1 situations like that. But that's typically  
2 where you would use the n/p ratio methodology.

3 **MR. FITZGERALD:** And also, I guess, where  
4 you might, if you do, in fact, have some work-  
5 site-specific spectral measurements that were  
6 reflective of certain time periods, if you  
7 showed a component in the middle range, you  
8 know, 7, 600 KeV or whatever, you would have  
9 the basis for making an adjustment. I guess  
10 our issue is just that might work if you had  
11 enough spectral or some measurements that were  
12 site specific rather than sort of broad. I  
13 think -- am I right in terms of neutron  
14 degrading we've gone through this at other  
15 sites. Depending on the circumstances it's  
16 going to be almost building to building or  
17 site to site. So in a way you almost need  
18 some understanding of how that bears on.

19 **DR. ULSH:** Well, if you think back to our  
20 discussion with, our discussion on this issue  
21 at Rocky Flats, the way that they calibrated  
22 the neutron films there was they looked at  
23 both an unmoderated source and then a fully  
24 moderated with, I can't remember of how many  
25 centimeters of polyethylene. I'm not sure

1 about Mound, but I would have to check to see  
2 if they did something similar. But what they  
3 did at Rocky is a fairly good --

4 **MR. FITZGERALD:** I think this is a case of  
5 throwing in some of that information as to  
6 whether or not there's a basis for making  
7 adjustments I guess.

8 **MR. BUCHANAN:** Yeah, Mound, if I recall  
9 right, didn't do moderation until later on the  
10 calibration. I don't know that they did a lot  
11 of moderation to begin with. But from what I  
12 could find I don't see that that's connected  
13 in the TBD. The TBD gives one, on two  
14 subjects an n-over-p ratio they suggest a  
15 factor of two, I believe, that's all that's  
16 really addressed in the TBD.

17 **MR. STEWART:** I'll just point out real  
18 quickly that we cannot use that for dose  
19 reconstruction.

20 **MR. BUCHANAN:** Okay. Because, you know, I  
21 felt that was too general, and I didn't really  
22 see a good basis for that. And so you're  
23 proposing that perhaps you're going to  
24 generate a more specific n-over-p for people  
25 that did not have neutron monitoring or you

1 can't read them.

2 **DR. ULSH:** If there are people like that,  
3 yes.

4 **MR. BUCHANAN:** And also, the TBD did not  
5 give an adjustment really for the missing, the  
6 lower energy neutrons for workers that had NTA  
7 results. They gave an adjustment of 14  
8 percent for the lower limits of detectability  
9 in the looking at missed dose, but the way I  
10 read the TBD, they really don't give an  
11 adjustment for lower energy neutrons. For  
12 people that were monitored, they got 100  
13 millirem or 200 millirem. I could not go back  
14 and doing a dose reconstruction see where that  
15 was applied.

16 **DR. ULSH:** Yeah, we recognize that  
17 limitation, and that's going to be, that's one  
18 of the topics that we're addressing with the  
19 data that we --

20 **MS. BEACH:** Brant, how soon do you think  
21 you'll have that data uploaded and out to us?

22 **MR. STEWART:** Well, we had 28-41 special  
23 dosimetry files done as of Friday. I believe  
24 that that probably will be done pretty  
25 quickly, and that's in a spreadsheet. The

1 other data I can't really say right now when  
2 we would have that available. A lot of those  
3 are already in the SRDB, but I'll need to go  
4 back and index those in order to make it  
5 obvious what we're looking at.

6 **DR. ULSH:** We'll put that down as an action  
7 item, too. Anything that we've already got in  
8 the SRDB we'll point it out to you.

9 **MS. BEACH:** Okay.

10 **MR. FITZGERALD:** The essential new  
11 information that we haven't probably seen  
12 though is the paired neutron information and  
13 the additional spectral measurements. Those  
14 are two key pieces.

15 **DR. ULSH:** Yes, we just got that recently,  
16 in a recent data capture.

17 **MR. BUCHANAN:** And how that's going to  
18 actually be used in dose reconstruction.

19 **MR. STEWART:** Right.

20 **MR. BUCHANAN:** How that's going to be  
21 applied. And if we do have neutron energy  
22 spectrum measurements, I mean, that's good,  
23 but I'd like to see how that's going to be  
24 used to make the corrections. Because in the  
25 documentation it says in '63 they got an

1 average energy of 0.7, but I didn't see that  
2 really applied anywhere. And so I would like  
3 to see how we're going to use any neutron  
4 spectrum information that was done, how that's  
5 going to be applied to correct any dose  
6 assignment.

7 **DR. ULSH:** Right, that's one of the standard  
8 things we do when we get information like this  
9 is talk about if you've got a particular  
10 neutron dose measurement and applied  
11 correction factor whatever. And we don't  
12 anticipate doing anything different here.

13 **MR. BUCHANAN:** Assumption as a function of  
14 building and time, and I don't know how much  
15 detail you have, but from what I get I  
16 couldn't gather too much, but --

17 **MR. FITZGERALD:** I think Brant's been there,  
18 done that, so we know the fire drill.

19 Anyway, I think that Josie would be  
20 taking care of 14. I guess that is 14 and 15.

21 **MR. BUCHANAN:** I separated those out because  
22 I wanted to indicate that we did that on SEC -

23 -

24 **MATRIX ISSUE SIXTEEN: BETA LOW ENERGY PHOTON**

25 **MR. FITZGERALD:** So we're up to 16. This is

1                   actually moving from neutrons to beta low  
2                   energy photon.

3                   **MR. BUCHANAN:** On beta and low energy,  
4                   originally from the documents I could read  
5                   beta was a problem initially when they'd get  
6                   slugs from Hanford and stuff, but most of that  
7                   was covered under the SEC period.

8                   And then we had plutonium come to the  
9                   site in the late '50s, at least according to  
10                  Meyer, and then that took over from the old  
11                  operation they had. And what you had is some  
12                  lower energy photons. So we went on to look  
13                  at shallow dose, really beta low energy  
14                  photons. And from the records I could see was  
15                  we really didn't have this calibrated up until  
16                  say '79 or even into the '80s before they  
17                  actually got to where they passed some  
18                  accreditation for shallow dose.

19                  And so to me I see a blank period now  
20                  between '60 and say '80 being able to assign  
21                  beta dose on a calibrated basis other than  
22                  just subtracting the difference between the  
23                  windows but as far as having a documented  
24                  calibration and procedure for low energy and  
25                  being able to separate out that from the rest

1 of the dose.

2 Where do we stand on providing any  
3 dose reconstruction for shallow dose?

4 **DR. ULSH:** First of all we stand corrected.  
5 You did catch us in a typo here. We're not  
6 going to use n-to-p ratios to do that. So  
7 that's a typo in the ER.

8 Don, do you want to --

9 **MR. STEWART:** Sure. We've been looking at  
10 Meyer's history to go back and see where we  
11 actually do have data results. We know when  
12 they show up in the records and the  
13 information is conflicting, you know, the TBD  
14 I believe says that we don't have any prior to  
15 '79. I've seen a number of documents where  
16 there were documented beta measurements.

17 So we're in the process of going back  
18 and seeing whether those are actually are  
19 taken, whether they are building-specific or  
20 whether they're general. They are aware, I  
21 mean, as most of us at the table know, if you  
22 have a shallow dose, you will see it as a film  
23 processor because that area of the film will  
24 be darker than the gamma portion of the film.

25 And I know that Meyer talks about

1                   this. In particular, I believe, one of the  
2                   supervisors there said we have noticed some  
3                   darkening of the open-window portion of the  
4                   dosimeter. To that point Mound felt they  
5                   didn't have a beta or a low energy dose  
6                   fraction, but they started to evaluate it.  
7                   These bits of data, I need to go back and look  
8                   at them in detail and make sure that the TBD  
9                   adequately addresses them.

10                  **MR. BUCHANAN:** Have you found anything that  
11                  you could, if they did notice or they recorded  
12                  the difference in the open and shielded and  
13                  such, have you found any calibration  
14                  information that we could say how much dose  
15                  that is? How can we equate that dose if we  
16                  don't have a calibration for it?

17                  **MR. STEWART:** We would expect the low energy  
18                  photons to be overestimated to a very  
19                  significant degree. There is calibration  
20                  information in there. I can't locate the time  
21                  frame right now. So that's why I wanted to go  
22                  back, put together a roadmap and say what I've  
23                  got and when.

24                  **MR. FITZGERALD:** It sounds like you're part-  
25                  way into that.



1 potential for any cohort badging in the early  
2 years, that kind of thing. And again, this is  
3 an issue that we'd like to dispel at the  
4 beginning before we get into data integrity  
5 and the other issues.

6 **DR. ULSH:** I think we can go a long ways  
7 towards dispelling that. In Meyer's history,  
8 this is a direct quote from Meyer's history,  
9 "In general, all personnel who enter a  
10 radiation area are monitored for possible  
11 exposures to external penetrating radiations."  
12 He goes on with some details about how often  
13 those are evaluated. He does say that even  
14 occasional visitors to the risk areas are  
15 monitored by the use of film badges which are  
16 evaluated the day following usage. So  
17 certainly Meyer is indicating what you  
18 summarized, Joe, that people, when they went  
19 into radiation areas, they were monitored.

20 **MR. BUCHANAN:** What page is that? Do you  
21 have a page number?

22 **MR. STEWART:** I have the page number as  
23 "Meyer's History", Volume One, page number 1-  
24 6-6.

25 **DR. ULSH:** Now as you mentioned, this is an

1 issue that we discussed at many other sites as  
2 well, but the cohort badging issue seems to  
3 keep coming up. We don't have any -- well,  
4 first of all, we don't have any indication  
5 that cohort badging occurred at Mound. We see  
6 nothing that suggests that.

7 But secondly, as at other sites -- I  
8 mean, our response is going to be the same  
9 here -- if cohort badging did occur, that's  
10 not necessarily the kiss of death in terms of  
11 being able to use that data. If it was  
12 focused on the people at highest exposure, it  
13 should be okay. If it's focused randomly, it  
14 should be okay. It's only if it was focused  
15 on people who had the lowest exposure  
16 potential that we would have problems using  
17 it.

18 But again, I think it's a moot issue  
19 here because we don't have any indication that  
20 they did cohort badgings.

21 **MR. FITZGERALD:** Well, I think that  
22 clarification helped because I think the  
23 statement's made in the ER, but it wasn't  
24 clear where that statement was derived, and I  
25 think what you're saying is that, and in what

1 we also have tracked, is it's from  
2 contemporary histories of this site, in this  
3 case Meyer's, and the fact that in your dose  
4 reconstructions that have been done and other  
5 means you have not seen any evidence that  
6 there was unbadged personnel that were clearly  
7 in radiological areas. I mean, I'm just  
8 trying to get a --

9 **DR. ULSH:** That's an accurate summary of --

10 **MR. FITZGERALD:** -- okay, there's been  
11 comments made, but it wasn't clear from what  
12 we've seen.

13 Now in looking at the usual  
14 distribution data and MESH and everything  
15 else, we'll probably, in looking at data  
16 integrity and what have you, validate that  
17 from another source as well. But I think this  
18 particular issue we just wanted to clarify  
19 what the basis for the statement was.

20 **MR. BUCHANAN:** Yeah, I did have an  
21 additional question. Is there any company  
22 policy, I mean, do they have a health physics  
23 manual that outlines badging requirements and  
24 that sort of thing?

25 **MR. STEWART:** This policy's restated at

1 various points in health physics documents,  
2 and this, in fact, is something, is from a  
3 document called "The Mound Laboratory  
4 Radiation Exposure Records System". We didn't  
5 cite that because there's no date on that  
6 particular document in Meyer's history.  
7 However, when we respond we will have a number  
8 of citations from Meyer that will show us  
9 where that is, that policy is restated.

10 **MR. BUCHANAN:** Is this outside of Meyer? I  
11 mean, do we have something from the company,  
12 management or --

13 **MR. STEWART:** Meyer, as you know,  
14 incorporates a number of, a disparate number  
15 of documents within his history, and those are  
16 Mound documents. Currently, we haven't gone  
17 outside to verify those documents as yet.

18 **MR. FITZGERALD:** To the best of your  
19 knowledge though there wasn't any groups of  
20 workers that weren't either (A) rad operators  
21 in radiological zones, or (B) site-wide  
22 workers that were badged or monitored when  
23 they went into a radiological zone. The  
24 reason I'm raising this is that looking at the  
25 various cohort of workers that might have been

1 onsite.

2 The only one that to me is a little  
3 ambiguous, and I haven't seen anything that  
4 ices it, but for example, security guards  
5 would be a group that wouldn't be considered  
6 radiological workers, would not be doing  
7 routine maintenance site wide, but nonetheless  
8 would be able to have access site wide. So  
9 just looking at the different worker  
10 population, just establishing that it was a  
11 rather rigid and universally applied thing  
12 that, yeah, you were monitored if you went to  
13 a rad zone or if you worked in a rad zone of  
14 course you were monitored.

15 **DR. ULSH:** Yeah, I don't think it was based  
16 specifically on -- I'm trying to think of a  
17 clear way to say this. I don't think there  
18 was a judgment made about you, Joe Fitzgerald.  
19 You're a security guard, and so you get a  
20 badge. It was more access specific. To get  
21 into these areas you needed to have a badge.

22 So if you were a security guard and  
23 you made rounds in the cafeteria and the  
24 administration building, you may not be  
25 wearing a badge. But when you went into FM

1 Building, you picked up your badge before you  
2 went in.

3 **MR. FITZGERALD:** And that's sort of our  
4 perspective as well so far in terms of looking  
5 and talking to people and looking at the  
6 documentation. So we have nothing that would  
7 dispute that. And it sounds like the, your  
8 dose reconstruction information as well as the  
9 Meyer's history supports it. So I think  
10 that's where we stand. We'll probably --

11 **DR. ZIEMER:** Are you looking for additional  
12 policy statements by the company as to outside  
13 of the Meyer's thing or does Meyers cite those  
14 policies?

15 **MR. STEWART:** We have not to date looked  
16 outside.

17 **DR. ULSH:** Well, Meyer does cite a number of  
18 external documents. I mean, it's not just  
19 stuff that Meyers --

20 **MR. FITZGERALD:** We'd like to go beyond the  
21 history to get specific --

22 **DR. ZIEMER:** Yeah, here's a document that  
23 the company says this is the requirement.

24 **MR. FITZGERALD:** That plus sort of looking  
25 at it as NIOSH has done with dose

1 reconstructions and as we would look at it in  
2 terms of data integrity. Just see if there's  
3 any instances that would pop up that would  
4 suggest lack of monitoring for someone that  
5 should have been monitored if it's true.

6 We don't pick up any instances and  
7 there's the Meyer's history as well as  
8 hopefully some company documentation. I think  
9 that puts the whole thing to bed. We're not  
10 coming into this prejudging that there's an  
11 issue for badging at all. And I agree that  
12 doesn't mean necessarily there's a problem  
13 with that per se. But I think just to put  
14 that behind before we get into other issues  
15 would be useful. So anyway, that's how we  
16 would leave it.

17 **MS. BEACH:** Before we get started with the  
18 next issue, we have two new people that joined  
19 us.

20 If you would speak to the microphone  
21 and state what your name is.

22 **MS. RUSSELL:** (inaudible)

23 **MS. BEACH:** Thank you. If you can speak  
24 loud enough that would be great.

25 **MS. RUSSELL:** My name is Mary Russell.

1                   **MR. RUSSELL:** And I'm Larry Russell, her  
2                   husband.

3                   **MS. BEACH:** Thank you.

4                   **MATRIX ISSUE 18: INTEGRITY OF RECORDS**

5                   **MR. FITZGERALD:** We're on 18, and here's a  
6                   series of issues that deal with the integrity  
7                   and completeness of records. And I'm not sure  
8                   we need to spend time talking about that.  
9                   This is something I think as a matter of  
10                  course that the work group would expect an  
11                  hour to go through, in this case, the MESH  
12                  database and PORECON, PURECON, and what else  
13                  to look at that from the standpoint of  
14                  completeness and accuracy.

15                  But we certainly wanted to make sure  
16                  that we framed the issue as an issue anyway.  
17                  And if there's anything that we can get from  
18                  you all as far as whether the framing may  
19                  raise questions of accuracy or if we're  
20                  missing something, certainly we're  
21                  interpreting this. I don't think we're going  
22                  to do anything different than, for example, we  
23                  did at Rocky Flats.

24                  I think we're going to look at the  
25                  records from the standpoint of do we find any

1                   discrepancies as far as missing records. Do  
2 they agree electronic to paper, that kind of  
3 thing. So these would be part and parcel to  
4 that.

5                   Ron, do you want to add anything to  
6 that?

7                   **MR. BUCHANAN:** Yeah, I have two additional  
8 questions on that. The way I read the TBD you  
9 really don't, there is not a coworker database  
10 for gamma at this time. Is that correct?

11                  **MR. STEWART:** That's correct.

12                  **MR. BUCHANAN:** You gave some ranges in  
13 there, but there's no numbers that a DR can  
14 really use to assign to a monitored dose.

15                  And, let me see, that was my first  
16 question.

17                  **MR. FITZGERALD:** The range is the second I  
18 think.

19                  **MR. BUCHANAN:** Yeah, he said that, too, just  
20 gave ranges. I forgot the second question.  
21 I'll talk about that later.

22                  **DR. ULSH:** Well, I think there's some things  
23 that --

24                  **MR. BUCHANAN:** Was there any quality check  
25 of the, have you uncovered, we have not been

1           able to uncover, and Meyers did not state any,  
2           a quality check of transferring the database  
3           from one database to another. Have you come  
4           across any of that? Did they do any, other  
5           than the PURECON and PORECON?

6           **DR. ULSH:** Well, to clarify, PORECON and  
7           PURECON are for bioassay data. And MJW did  
8           extensive validation on that dataset. I don't  
9           have documentation at my fingertips that would  
10          suggest that a similar level of detail has  
11          been done on the external data.

12                 I mean, it's standard across the  
13          complex, and we've seen this numerous times at  
14          other sites, that when you're migrating from  
15          one system to another there's QA/QC involved.  
16          But in terms of a real in-depth description of  
17          it like we have from MJW's dose reconstruction  
18          project, I don't know that I've got that  
19          specifically. But we haven't looked  
20          necessarily specifically for it.

21                 And if it's an issue that the working  
22          group decides they want to pursue, then we can  
23          go look. I think, however, that this would be  
24          an issue for the working group to discuss and  
25          perhaps give us some guidance on what you'd

1           like to see before we leap into a project of  
2           the scale of what we did at Rocky Flats for  
3           data integrity, data completeness.

4                        Because this is almost a repeat of  
5           what I said before we did it at Rocky. That  
6           is an enormously resource-intensive effort,  
7           enormously. And at the end of the process at  
8           Rocky Flats, what we found was not the smoking  
9           guns that indicated that there were vast  
10          numbers of missing records. In fact, we found  
11          almost complete data completeness records. We  
12          found it verified the integrity of those  
13          records.

14                       Now, there were some statements in  
15          passing and listed in the evaluation report  
16          that voiced some concerns about the rad data  
17          system. I'm assuming that that means the  
18          records systems at Mound. But it was a  
19          central tenet of the Rocky Flats ER that the  
20          dosimetry records were unreliable. So that's  
21          why I think the working group felt obligated  
22          to go into a great level of detail examining  
23          that issue. It's worth discussing among you  
24          guys what your priorities are here, I mean the  
25          work group members, before we engage in a

1 project on that scale.

2 **MR. FITZGERALD:** Just a clarification,  
3 you're saying at least for the external -- I  
4 agree on the internal. MJW did quite a bit on  
5 the QA side for those databases. But for the  
6 external you're not aware of any reliability  
7 check --

8 **DR. ULSH:** I really don't want to say that  
9 none have been done. I'm just saying that  
10 it's not, it wasn't a source of documentation  
11 that we went after specifically. I'm making  
12 the assumption that, you know, they were the  
13 typical types of QA/QC. But if the working  
14 group and you guys want verification of that,  
15 that's something that we're going to have to  
16 go look for in particular to find out exactly  
17 what measures they took.

18 **MR. FITZGERALD:** Well, I guess the first  
19 thing that we were actually raising was how  
20 reliable the external database happens to be  
21 and whether either the site or NIOSH or ORAU  
22 had done any look in that regard. And then  
23 the secondary question is there any evidence  
24 that would suggest otherwise. And I don't  
25 disagree. I haven't seen anything that would

1 suggest problems with, in this case, the  
2 external database.

3 **DR. ULSH:** And, you know, you can always  
4 slice and dice this up pretty thinly, but we  
5 took some comfort from the fact that MJW found  
6 a high level of data integrity in the internal  
7 dose records. Now, of course, you could say,  
8 well, that's not external. But if we look at  
9 external, you could say, well, that's not beta  
10 or that's not gamma or that's not neutron or a  
11 particular time periods, particular buildings.  
12 It just depends on how in depth the working  
13 group decides that they want to go on this  
14 issue.

15 **MR. FITZGERALD:** Well, to give you some  
16 examples, addressing the neutron issue that  
17 would be, I think, instructive as to whether  
18 the fact that database were reliable before  
19 one got to the point of deciding if the dose  
20 assessment strategy was sufficient. You have  
21 a ^ issue for that perhaps. I wouldn't say  
22 that you would have to do everything. I'm  
23 just saying that for certain instances you  
24 might want to at least validate that you're  
25 dealing with a reliable database.

1           I don't know on external if I've seen  
2 anything that suggests that the site  
3 historically has done that kind of a QA check  
4 on at least external. I think the internal I  
5 feel, you know, I think MJW did a quite  
6 extensive look at QA for what was there in  
7 '96, so that's a slightly different story.  
8 But external, I don't think that was done, and  
9 again, our point of raising this was to verify  
10 that that was your understanding, too, that  
11 there wasn't really that kind of retrospective  
12 look at the reliability of all those years of  
13 data.

14           **DR. ULSH:** No, well, I'm not aware of  
15 anything on the scale of what MJW did with the  
16 internal data. I'm not aware of something on  
17 that scale with the external data. That's not  
18 to say that there was not QA when they  
19 migrated from one system to another.

20           **MR. STEWART:** That is documented in Meyer's  
21 history.

22           **MR. FITZGERALD:** Yeah, and it seems to me  
23 that maybe the interim step. And I don't  
24 disagree that one should launch into something  
25 that's broad without some kind of indication

1 we'd need to look at. But information may  
2 exist in terms of this QA in terms of  
3 evolution, one system to another and over  
4 time. Since you have such a long history on  
5 this site, see if there is anyway one could at  
6 least qualitatively say it looks like, looking  
7 at what they did do, there doesn't seem to be  
8 any evidence that there were discrepancies or  
9 gaps or problems with the database as it  
10 stands.

11 The other thing, and we've talked  
12 about this in the past, is to be able to look  
13 at the MESH database in terms of being able to  
14 not just simply draw from the information  
15 that's there, but also to do some comparisons  
16 that would indicate that the information in  
17 there is complete. I think there's certainly  
18 a charter, if I'm reading the SEC procedures,  
19 to be able to provide a basis for judging  
20 reliability of the database to the Board so  
21 that question can be answered.

22 I think I'd be open to how one could  
23 do that through the working group in a cost-  
24 efficient, readily ready way. So that might  
25 be something to explore as far as,

1 particularly on the external side. Is there  
2 any way one could establish for the working  
3 group's sake what the reliability of, in this  
4 case, the external database is?

5 **DR. ULSH:** All I can say is we're not aware  
6 of any disuse with the external data at this  
7 point in time. We can certainly, without an  
8 inordinate amount of resources being expended,  
9 go through Meyer and pull out qualitative  
10 descriptions of what kind of QA/QC was done.  
11 To go beyond that I'd really like to hear a  
12 discussion and consensus opinion from the  
13 working group because that has the potential  
14 at least to be a really big project.

15 **MR. ELLIOTT:** I would like for us to talk a  
16 little bit about how, the question at hand  
17 here is the databases and how they were  
18 developed and how they were transferred or  
19 transported into other databases over time.  
20 Is that right?

21 **DR. ULSH:** Uh-huh.

22 **MR. ELLIOTT:** And how do, I think it's  
23 worthwhile to spend some time here talking  
24 about how we use those databases if we use  
25 them in dose reconstruction. Because it's my

1           understanding that we take the dose of record  
2           that comes from the DOE point of contact at  
3           Mound for each claim and reconstruct a dose  
4           and whenever we have gaps or deficiencies in  
5           that data, we would bridge those gaps using a  
6           coworker database distribution which we don't  
7           have here. We have not developed that. So to  
8           question the reliability of databases I think  
9           we have to look first at how often do we use  
10          the databases.

11          **DR. ULSH:** Well, in a collective way we  
12          really don't here at Mound with the exception,  
13          we do have a coworker model for polonium and  
14          plutonium. We don't have the external  
15          coworker model because it's our position that  
16          we don't need it. Everyone was monitored.  
17          There are no unmonitored people for whom you  
18          have to apply coworker data which, like I say,  
19          in a collective way that's what we typically  
20          use the database for is to generate coworker  
21          models.

22          **MR. BUCHANAN:** But you go back, when you do  
23          a DR, you go back to the MESH database. I  
24          mean, that is where they're getting, the DOE's  
25          getting their information. I mean, that's

1                   what is actually printed out. When you do a  
2                   DR, the DR uses a MESH database summary to  
3                   assign dose to that worker.

4                   **MR. ELLIOTT:** That's correct.

5                   **MR. BUCHANAN:** And so if the end result is  
6                   the MESH database, now that might have been  
7                   the fact --

8                   **MR. ELLIOTT:** The source of the information.

9                   **MR. BUCHANAN:** Right, it might have been  
10                  back in 1962 that it was originally entered,  
11                  handwritten or entered on punch cards or  
12                  whatever. And that went from that database  
13                  through several databases up until it got to  
14                  MESH. And our question is, is the original  
15                  handwritten information or whatever it was,  
16                  punch card or whatever that said the guy got  
17                  120 millirem for that quarter, does that  
18                  appear in the MESH database. I mean, do we  
19                  know that that got transferred over and wasn't  
20                  any of it dropped through the cracks or it got  
21                  transferred correctly. That's, and we have  
22                  not --

23                  **MR. ELLIOTT:** That's the root of the  
24                  question, the root of your question.

25                  **MR. BUCHANAN:** Yes, the root of the

1 question. And Meyer's, I have looked through  
2 his notes, and he doesn't give any details.  
3 It's more like this was transferred or at this  
4 time these were transferred or such. And  
5 there is no detail on how it was transferred  
6 like the internal dose was very well  
7 documented. Whether you agreed with it or not  
8 is a different point, but it was very well  
9 documented.

10 Well, the external, the guy that  
11 actually does the dose reconstruction in 207,  
12 he uses those printed forms from DOE, but how  
13 accurate are they? And I'm not saying they're  
14 not. I just don't know, my question was have  
15 you done anything? Because I didn't want to  
16 re-plow the same grounds. If you've done  
17 anything, I'd like to know about it. If you  
18 haven't, do we want to do anything about it?

19 **DR. ULSH:** Well, I think that's a good  
20 summary. No, we haven't gone back and done  
21 the scale of the review that was done at Rocky  
22 Flats where we took original logbooks and went  
23 through to look at -- gee, I've forgotten  
24 already. Whatever the name of the database  
25 was out there. HIS-20, that's right. How can

1 I forget that?

2 **MR. STEWART:** I don't know but it shows up  
3 at Fernald, too.

4 **DR. ULSH:** And again, we don't have any  
5 indications. I guess fundamentally it gets  
6 down to the assumptions that you carry into  
7 this process. Do you look at the data and  
8 say, well, we've done similar exercises at  
9 other sites, and we've not found indications  
10 of endemic problems here, maybe some specific  
11 situations, but nothing system wide. And so I  
12 come into this saying that we don't have any  
13 obvious indications. There's not big gaping  
14 holes that there are missing data. So in the  
15 absence of indications otherwise, I'm using  
16 the data.

17 **MR. ELLIOTT:** Or corrupted data. I mean, we  
18 do look for that. We look for CEP data. We  
19 look at CEP, a corrupted entity at a point in  
20 time, so if they provided data we throw it  
21 out.

22 **DR. ULSH:** Right, and we have done I don't  
23 know how many dose reconstructions, 500 or so?

24 **MR. STEWART:** Several hundred.

25 **DR. ULSH:** At Mound, and in the experience

1 of doing those dose reconstructions, no  
2 problems have jumped out at us. But in terms  
3 of going back and comparing original logbook  
4 entries to the current database, I mean, is  
5 that something that we're going to be doing at  
6 every site, de facto? Are we going to go in  
7 and assume that it's bad unless we --

8 **MR. FITZGERALD:** No, I don't think,  
9 certainly from our standpoint I wouldn't  
10 suggest that strategy which ended up being the  
11 case at Rocky would be appropriate here at  
12 all. I think that was a case where you didn't  
13 have much else to turn to, and there was an  
14 indication, as I recall, at Rocky from the  
15 union that the logbooks would be the source of  
16 whatever you could do to verify.

17 In this particular case I think what  
18 we're suggesting here is consistent with the  
19 SEC procedures that the Board has adopted  
20 which is to look at the reliability of the  
21 database, the records that are being used as  
22 part of the dose reconstruction process in  
23 support of the SEC. And certainly, we don't  
24 want to duplicate any validation that's been  
25 done whether it be by MJW for some of the

1 internal or for whatever the site might have  
2 done historically.

3 But where there's no evidence that  
4 anybody has validated the reliability of the  
5 database, it seems like you have to start with  
6 that. Because if the database itself can't be  
7 validated in some sense, I'm not saying  
8 there's any set way of doing it, I don't know  
9 if you could have the confidence, the only  
10 confidence you would have is we haven't  
11 thought had any problems to date. But I have  
12 to go back to Rocky when I think we identified  
13 the '69-'70 issue, for example. I don't think  
14 anybody was aware that there were a couple  
15 years of missing information.

16 **DR. ULSH:** No, no, no, it wasn't missing.

17 **MS. BEACH:** Let's not re-do Rocky.

18 **MR. FITZGERALD:** Right, I'm just saying that  
19 certainly the rationale for looking at or  
20 sampling for the purposes of supporting this  
21 procedure or this intent I think is one we're  
22 looking at. Now how you do that I think is  
23 completely open and something that the work  
24 group I think would be in the best position to  
25 decide. But it is an understanding in the

1 procedures that we would at least start with  
2 reliability and integrity as a starting point  
3 before getting into the later issues of dose  
4 reconstructability and some of the other  
5 questions.

6 **DR. ULSH:** Would it be a reasonable first  
7 step to put this on the table for everyone to  
8 consider for us to summarize what has been  
9 done by this site? You know, we'll go look  
10 for that kind of information. We'll  
11 specifically make data requests to find out  
12 that information and to present that to SC&A  
13 and the working group as a first step. From  
14 there maybe you can decide --

15 **MS. BEACH:** I think that's reasonable.

16 **DR. ZIEMER:** If we can establish that they  
17 had a process in place to do that I would be  
18 quite satisfied with that. If they had a  
19 QA/QC process. You're sort of asking did they  
20 even have that. Do we know that they had  
21 that. I think you are.

22 **MR. FITZGERALD:** Well, certainly one  
23 question is on a continuing basis was there a  
24 QA/QC process which I think most sites do have  
25 something of that order.

1           **DR. ZIEMER:** Yeah, but I mean specifically  
2 on transferring from one database to another.  
3 Isn't that the question you're asking? Are  
4 the numbers that the person got in the  
5 original record the ones that show up years  
6 later on the big spreadsheet?

7           **MR. FITZGERALD:** Right.

8           **DR. ZIEMER:** Because if there's a QA/QC  
9 process that looked at that during the  
10 transfer times, then that's at least a first  
11 step. In the absence of that then you say,  
12 well, how do we know that they did transfer it  
13 correctly.

14           **MS. BEACH:** Well, I think I read there was a  
15 ^ percent error rate or -- correct me if I'm  
16 wrong, but it seemed like their 21 percent  
17 error rate in the data transfer.

18           **DR. ULSH:** I don't know.

19           **MS. BEACH:** I've read it. No, I don't  
20 recall.

21           **MR. STEWART:** We read in documents here  
22 something like 21 percent error ratio in the  
23 database or something.

24           **DR. ZIEMER:** That seems awfully high.

25           **MS. BEACH:** I would be satisfied with the

1 summary as a first step to start with.

2 **DR. BRANCHE:** Just to give you a heads up,  
3 first of all you're going to get a quality  
4 control --

5 **MR. STEWART:** Quality Assurance, Quality  
6 Control presentation.

7 **DR. BRANCHE:** Thank you

8 -- next week at the Board meeting as  
9 well as SC&A, John Mauro will provide some  
10 information about how, given the number of SEC  
11 petitions that you are going to see for the  
12 remainder of this year, how findings from  
13 previous sites might be helpful in the current  
14 sites, how there might be some ability for you  
15 as a Board to entertain some information from  
16 sites that have some similarities. And so I  
17 would just caution that you're going to hear  
18 about that at next week's meeting.

19 And I've discussed this with Dr.  
20 Ziemer, we anticipate quite a few SEC  
21 petitions to come before you the rest of this  
22 year.

23 **MS. BEACH:** How specific will that be from  
24 site to site? I'm curious.

25 **DR. BRANCHE:** A great question for you to be



1 don't know if there were regimented guidelines  
2 established when each site said, hey, we're  
3 going to establish an Oracle database here and  
4 include everything that we have assembled in  
5 our dose information in the database. I know  
6 that was done at several sites. Oracle was,  
7 you know, came into being and then it went out  
8 within about two or three years, and they had  
9 to do all of that over again.

10 I don't know. Have we ever looked for  
11 those kinds of documents that say you're going  
12 to create a database using these documents or  
13 these items, and this is what we expect as far  
14 as the quality. I don't know if we've ever  
15 seen that. Have we ever looked for that?  
16 Maybe that's something you want us to look  
17 for. Maybe it's something SC&A might want to  
18 look for or say that it doesn't exist. You  
19 can take it from there. I don't know. It's a  
20 hard thing to prove, Joe, as you know.

21 **MR. FITZGERALD:** No, I agree. I think it's  
22 instructive, and I have gone through  
23 everything MJW did for the internal side. And  
24 I think that's both an appropriate and an  
25 important thing to do before getting into

1           trying to assimilate bioassay information.  
2           I'm just looking for any indication, whether  
3           it be process related QA/QC, substantiation  
4           from Meyers of the world, or any ability just  
5           to demonstrate that there are no issues  
6           associated with the error rates, whatever. At  
7           this point on the external side I think we're  
8           drawing a bit of a blank as to how that comes  
9           out, that's all.

10           **DR. ULSH:** So I think I hear the concern is  
11           focused more on the external data?

12           **MR. FITZGERALD:** No, we haven't got the  
13           internal, but external would be my focus area  
14           right now because I think other than what MJW  
15           didn't do isn't very big. I mean, I think  
16           that covered a lot of ground in the '96  
17           review. So I think the concern about  
18           validation is much less.

19                        The external, I'd feel better if we  
20           found some contemporary evidence that the  
21           QA/QC was examined. Someone went back and  
22           looked at reliability. That's not really  
23           clear, and it's sort of an open question of if  
24           you have confidence, is there anything beyond  
25           not having seen a problem crop up that would

1 give us some of that substantiation. And I  
2 think that's pretty much it.

3 We're not coming in saying that we  
4 have allegations, concerns or anything. It's  
5 just that we couldn't find that  
6 substantiation. We're asking you if you have  
7 it as well. The last thing I want to do,  
8 having lived it in real time, is go through  
9 what we went through before.

10 On the other hand, there's a  
11 responsibility I think to be able to account  
12 for the reliability, both internal and  
13 external, to the work group, and that's kind  
14 of what I'm looking for if we can somehow do  
15 that.

16 **DR. ULSH:** So we'll focus on the years this  
17 data was collected. We'll get back to you on  
18 that.

19 **MR. ELLIOTT:** Some related QA/QC of the  
20 transport or development of the database.

21 **MR. FITZGERALD:** Right.

22 **MR. CLAWSON:** And I understand I guess  
23 basically back to what I'm kind of used to,  
24 we've gone through several evolutions of it is  
25 whenever we change over to a different program

1 or whatever, they have somebody basically  
2 over-check it again. That's just what it's  
3 getting down to. And I've seen an awful lot,  
4 and that's one of the big reasons why we don't  
5 like to change databases because of this issue  
6 of the millions and millions of things that  
7 are in it.

8 **DR. ULSH:** It only gets bigger over time.

9 **MR. CLAWSON:** One other question I have.  
10 Who is MJW? I've heard this --

11 **DR. BRANCHE:** Thank you.

12 **MR. ELLIOTT:** The ORAU team is composed of  
13 teaming partners. And if I may, MJW is one of  
14 those partners. It's a consulting agency, a  
15 corporation out of Buffalo. The other one is  
16 Dave Moeller, Incorporated, out of Richland  
17 and then the ORAU is the mother ship, if you  
18 will, that completes the partnership. MJW had  
19 done dose reconstruction work separate from  
20 this program and separate from their  
21 association with ORAU and Dave Moeller on  
22 Mound.

23 **MR. CLAWSON:** Well, the reason why this ^  
24 personal information because I've seen MJW  
25 appear in interviews and so forth like that,

1 and Mutty, yeah, I think he works for that.  
2 And I was just getting the impression also,  
3 too, that MJW had worked at Mound previously  
4 before it closed. They did some work for  
5 Mound. I guess --

6 **MR. ELLIOTT:** They did some dose  
7 reconstruction for Mound.

8 **MS. BRACKETT:** They did a large dose  
9 reconstruction project, just internal dose, of  
10 people who had the potential to have greater  
11 than 20 rem committed effective doses. That  
12 was in the late '90s. And then we also, after  
13 that we did do some technical basis  
14 documentation work for them. We went in and  
15 helped them write a technical basis document  
16 and procedures that was probably around 2000  
17 that we did that. And Mutty, actually he's  
18 only been employed with us during this  
19 project. A lot of the people that you saw  
20 listed, they currently work for MJW, but they  
21 were actually employed by Mound.

22 **MR. CLAWSON:** Yeah, I was just trying to  
23 draw a clear line because it's kind of  
24 interesting. I kind of go back and forth.

25 **MS. BRACKETT:** Right, there are a number of

1 people who did actually come from Mound. I  
2 never worked for this site myself. I just  
3 worked on the dose reconstruction project.

4 **MR. CLAWSON:** Was that dose reconstruction a  
5 part of the legal issue that was there?

6 **MS. BRACKETT:** Yes.

7 **MR. CLAWSON:** I'm just trying to draw myself  
8 a picture of how everything fell in.

9 **MS. BRACKETT:** I believe it came about as a  
10 result of the legal work. Part of the  
11 settlement I believe was to do that dose  
12 reconstruction. And so we came in and worked  
13 on that. And I think that's where the greater  
14 than 20 rem came in. That was what they  
15 decided --

16 **MR. CLAWSON:** I read that, and I was just  
17 trying to make a clarification of where this  
18 was all coming from.

19 **MS. BRACKETT:** That's why you keep hearing  
20 our name. We did that. And that's why we're  
21 so familiar with, or why I'm so familiar with  
22 the data because we did a lot of digging into  
23 the old records to find data.

24 **MR. CLAWSON:** I appreciate that  
25 clarification. Thanks.

1           **MR. BUCHANAN:** I had a question. You said  
2 you was a dose reconstructor for Mound, right?

3           **MR. STEWART:** Yes.

4           **MR. BUCHANAN:** When the DR does a dose  
5 reconstruction, does he take this information  
6 from the MESH database, say for external. Or  
7 does he look to compare that to any of the old  
8 DOE files? I mean, maybe this is a way we'd  
9 see if there was any problems with that and  
10 completeness integrity.

11          **MR. STEWART:** Those records are present only  
12 in a small number of cases. And I believe --  
13 this is my own opinion here -- I believe that  
14 those are those cases who had termination  
15 dates prior to 1959 or 1960 when they migrated  
16 to the first computer database called Excess.  
17 They used a Form 1015-X to record personal  
18 meters, film meters as they called them, and  
19 neutron dose rates or neutron doses, Q and  
20 neutron doses.

21                   All those pieces of information would  
22 have been on these cards. We find those quite  
23 useful because we can estimate the missed dose  
24 more accurately when we have those data. When  
25 it goes to the MESH database, then we no

1 longer have cycle information so we have to  
2 overestimate the missed doses. But we see  
3 that those are consistent with the data entry  
4 for MESH.

5 **MR. BUCHANAN:** MESH is consistent with the  
6 old original cards.

7 **MR. STEWART:** Right.

8 **MR. BUCHANAN:** And you haven't found a  
9 problem.

10 **MR. STEWART:** We have not found a problem.

11 **MR. BUCHANAN:** Did you check that?

12 **MR. ELLIOTT:** That's what I was going to  
13 ask. Is that standard practice? You get the  
14 DOE submitted data for the client, and then  
15 you look at that. Do you go to the MESH  
16 database and match that up and say, oh,  
17 they're all here or, hey, we've got one or two  
18 missing. I don't see this guy.

19 **MR. STEWART:** No, that's not a standard  
20 practice for dose reconstruction. Because I'm  
21 the lead dose reconstructor I would tend to  
22 look at that in a little more detail, make  
23 sure that things are happening the way they're  
24 supposed to happen.

25 **MR. BUCHANAN:** But they would use the MESH

1 printout as the primary dose reconstruction  
2 document?

3 **MR. STEWART:** That is correct. That is what  
4 is used for, actually, check that. They will  
5 enter cycle data when those data are present  
6 in the file. So if I got a data entry file  
7 from our data entry people, I would have cycle  
8 information through '59 when those data are  
9 available, and then they would go to the MESH  
10 data.

11 **MR. BUCHANAN:** And if there's a discrepancy  
12 they would use the highest between the MESH  
13 and the original?

14 **MR. STEWART:** I don't know that that's the  
15 case. I would have to check that piece of  
16 information.

17 **MR. BUCHANAN:** But they do, they do look at  
18 the other database.

19 **MR. STEWART:** Yeah, they do go back and they  
20 pull the actual doses from the cards when  
21 those cards are available. As I said, some of  
22 those people who terminated early, and my  
23 opinion, just a theory, is that those data  
24 cards went to their files, were entered into  
25 Excess and then put in a separate file

1                    somewhere so they were no longer in the  
2                    employees' personal records. And that's why  
3                    we don't see the personal records any more.

4                    **MR. FITZGERALD:** What part and partial to  
5                    the request that we sent through Brant for a  
6                    POC? We want a contact on some of these  
7                    questions I guess it sounds like.

8                    Next question?

9                    **MR. BUCHANAN:** Yes, I'd sent a couple case  
10                    reviews, and I could not find, I found the  
11                    neutron data in the double neutron on the  
12                    MESH, but I couldn't find the gamma data on  
13                    the MESH that was used in the dose  
14                    reconstruction. Apparently, there's a file in  
15                    there I can't identify that has a lot of the -  
16                    -

17                    **MR. FITZGERALD:** We can follow up. This was  
18                    something we hadn't cycled through you, and  
19                    we're asking if there's somebody that might  
20                    know that.

21                    **MR. BUCHANAN:** I need to get in contact with  
22                    somebody to point me in the right direction.

23                    **MR. FITZGERALD:** We can do this offline.

24                    Anyway, just to recap then, certainly  
25                    we support looking at this as an interim

1 question that would be picked up at the next  
2 meeting. Now, I've been working with Jack  
3 Gibson in terms of trying to solve the various  
4 IT issue respecting MESH to make it searchable  
5 from our standpoint. Is that something that's  
6 being held in abeyance on this issue of being  
7 able to at least look at the MESH, or search  
8 the MESH database. We're trying to get a  
9 search capability.

10 We have access to the MESH database in  
11 terms of downloading tables and what have you,  
12 but in terms of being able to do any searching  
13 because it's a Sequel database, Jack was the  
14 person that you put me to. He was working on  
15 the front end to make that searchable online,  
16 and that would give us at least the capability  
17 of being able to get our way through it.

18 **DR. ULSH:** So that hasn't been resolved yet.  
19 You guys still don't have --

20 **MR. FITZGERALD:** No, but that wouldn't be  
21 subject to this issue, in other words being  
22 able to look at that database. We're still  
23 going to be able to look at the database quite  
24 apart from the question of looking at the  
25 completeness question which is what we're

1 talking about here.

2 **DR. ULSH:** I guess I'm not following you.  
3 If you're asking if there's --

4 **MR. FITZGERALD:** We made a request to be  
5 able to get into the MESH database. You put  
6 the MESH database up, and we were able to  
7 certainly download useful, relevant tables.  
8 But because of the way the software's set up,  
9 we couldn't actually sort anything.

10 **DR. ULSH:** And that's still the case now?

11 **MR. FITZGERALD:** And that's still the case,  
12 but that's sort of a typical, classic IT issue  
13 which I can't, I'm sure that's a difficult  
14 situation. But that seems to be a separate  
15 question than this one here which is a more  
16 systematic review of data integrity-slash-  
17 completeness. I just want to make sure, you  
18 know, we're going to be looking at the  
19 database, but we're not going to make any  
20 decision on how systematically to sample that  
21 until we've had this dialogue next time.

22 **DR. ULSH:** Right, I will check the status of  
23 ^.

24 **MR. FITZGERALD:** Yeah, he was very  
25 encouraging for the first week or so, but got

1 progressively discouraging and sort of like  
2 after a couple of weeks you realize, okay, I  
3 guess it wasn't that easy.

4 **DR. ULSH:** Okay, I'll check on that.

5 **MR. FITZGERALD:** Thank you.

6 **MS. BEACH:** So does NIOSH go in and search?  
7 Do you have the capability to go into the MESH  
8 data and search out certain items that you're  
9 looking for at this point or do you --

10 **MS. BRACKETT:** I think we have the same  
11 problem. There's been discussions of trying  
12 to contact who's the expert from Mound. I  
13 don't remember her name.

14 **DR. ULSH:** Let's just say we're trying to  
15 contact the expert.

16 **MS. BRACKETT:** Okay, because we have the  
17 same problem.

18 **MR. FITZGERALD:** Okay, well, that's  
19 comforting.

20 **MR. STEWART:** As far as DRs, we take the  
21 printout that's supplied by Mound from the  
22 database.

23 **MR. FITZGERALD:** Ron, do you have any --

24 **MR. BUCHANAN:** No.

25 **MR. FITZGERALD:** -- you're the short

1 traveler here so I want to make sure that you  
2 have your opportunity. Ron has a four o'clock  
3 flight so he should be leaving here shortly.

4 **MS. BEACH:** That takes us through 19 or...

5 **MR. FITZGERALD:** Well, I think we've been  
6 discussing 18, and I think what we're saying  
7 in terms of adequacy and completeness, that  
8 combination, I certainly prefer to see what  
9 NIOSH can come up with in terms of just sort  
10 of this historic QA/QC and any other  
11 substantiation on the reliability on the  
12 external side that would shed some light on  
13 this that would inform any discussion we have  
14 next time on this data reliability issue, sort  
15 of a decision forward.

16 **MR. BUCHANAN:** And the adequacy, we haven't  
17 really formed an opinion.

18 **MR. FITZGERALD:** No.

19 **MR. BUCHANAN:** We haven't determined whether  
20 there's adequate data for dose reconstruction  
21 one way or the other at this point. I have  
22 not found a thing that says there isn't or  
23 checked enough to say that there is, but  
24 that's the Board's decision.

25 **MS. BEACH:** How do we feel about lunch

1 break? Is everybody ready for that?

2 **DR. BRANCHE:** All right, we're going to  
3 actually turn this phone off, and I'll just  
4 redial at 12:45 p.m., Eastern time. Thank  
5 you.

6 (Whereupon, a lunch break was taken.)

7 **DR. BRANCHE:** We're going to start the Mound  
8 meeting again. Again, if those of you who are  
9 here in the room, if you could please mute  
10 your phones. And if those of you on the  
11 phone, if you're participating by phone, if  
12 you would please mute the phones while you're  
13 listening. If you do not have a mute button,  
14 then please use star six to mute your phones.  
15 And then when you're ready to speak, you can  
16 use star six again to unmute your phones.  
17 It's very important that we mute the phones  
18 for participants on the phone so that our  
19 court reporter can hear everything and that we  
20 have an unobscured line. So thank you so  
21 much.

22 Ms. Beach.

23 **MATRIX ISSUE FOUR: URANIUM ISOTOPES**

24 **MS. BEACH:** We are on number four of the  
25 matrix.

1                   And, NIOSH, if you're ready to  
2                   proceed.

3                   **DR. ULSH:** Number four, this issue deals,  
4                   well, it's similar to our discussions earlier  
5                   this morning about some of these other type  
6                   radionuclides. This one in particular deals  
7                   with the particular isotopes of uranium. And,  
8                   Joe, do you want to go through --

9                   **MR. FITZGERALD:** Yeah, I think you're right.  
10                  I think this is similar to what we raised  
11                  earlier on some of the internal emitters as  
12                  far as mapping the availability of bioassay  
13                  for uranium is different forms during the  
14                  history of Mound. And just basically in our  
15                  reading of the usual sources, King, Meyer, so  
16                  forth, there does seem to be some gaps that  
17                  would suggest some issues that would have to  
18                  be addressed in any dose estimation strategy.

19                  And we just are raising some questions  
20                  as to whether given what seems to be a  
21                  relatively small amount of bioassay data for  
22                  certain periods of time, whether that can't be  
23                  bridged or not with the information that's  
24                  available. I think it is very similar to what  
25                  we've raised for some of the other source

1 terms.

2 **DR. ULSH:** Yeah, and our response would  
3 probably be somewhat similar in that if you're  
4 looking for uranium isotope specific bioassay,  
5 you may not find that. But you would expect  
6 to see more total uranium bioassay and to some  
7 extent gross alpha. And just like with the  
8 other sites, when we don't have a specific  
9 bioassay, in other words, isotope specific,  
10 we'll pick from among the possibilities and  
11 assign the most claimant favorable.

12 But I did want to ask a question here  
13 about the SC&A statement in the matrix. You  
14 talk about you have some concerns whether we  
15 can bound exposures to uranium based,  
16 particularly given the inherent limitations of  
17 fluoroscopic analysis techniques used during  
18 the '50s to '85. And I was just wondering  
19 what you were thinking of when you said that.  
20 What are your concerns on that?

21 **MR. FITZGERALD:** Actually, that was a  
22 concern that was raised, I think raised the  
23 question of whether fluoroscopic, the  
24 techniques in the early days were very  
25 accurate at all in order to establish doses.

1                   And I think the only question there was given  
2                   the techniques available, what kind of  
3                   confidence in the actual measurements would  
4                   you have from the early days?

5                   **DR. ZIEMER:** What would be an issue on the  
6                   detection limits are not as good, but then you  
7                   have a way of handling that for any whatever  
8                   the lower limit of detection --

9                   **DR. ULSH:** Right, it could very well --

10                  **DR. ZIEMER:** I guess that's the question,  
11                  isn't it?

12                  **MR. FITZGERALD:** Yeah, going back to the  
13                  early techniques what kind of confidence do  
14                  you have in terms of the actual measurements  
15                  themselves. This gets into radiochemistry,  
16                  radio analysis.

17                  **MS. BRACKETT:** Yeah, It's beyond  
18                  radiochemistry. It's not my area of  
19                  expertise. I know that fluoroscopy is used to  
20                  current day. I don't know that the technique  
21                  has really varied over the years. And since  
22                  it's still in use, I --

23                  **DR. ZIEMER:** I wonder if John Mauro may  
24                  know. I think the procedure is reliable for  
25                  identifying uranium.

1                   **MS. BRACKETT:** Right.

2                   **DR. ZIEMER:** That's isotopes, but uranium  
3 per se --

4                   **DR. MAURO (by Telephone):** Paul, this is  
5 John. We were just engaged to look at this  
6 very issue on Blockson where the analyses ^  
7 and gross alpha analyses for uranium samples  
8 in urine. And we were asked to look into the  
9 protocols. And this was the 1950s, I believe,  
10 that were used. And we did some tracking, and  
11 we tracked it back to the Health and Safety  
12 Laboratory in New York City which was an AEC  
13 lab at the time.

14                                 And those are very formal protocols.  
15 They're well established, and one of our  
16 radiochemists ^ and guess we walked away  
17 saying that at least that far back the  
18 standard protocol for doing fluorometric  
19 analysis and gross alpha analysis for urine  
20 samples were very scientifically sound and  
21 defensible. I don't know if that answers your  
22 question.

23                   **MR. FITZGERALD:** Well, that would be  
24 certainly another QA check on the question of  
25 how reliable fluoroscopic would be in the

1 '50s.

2 **DR. MAURO (by Telephone):** The reason we  
3 said it was mainly because it was the Health  
4 and Safety Lab, and that had a lot of good  
5 pedigree.

6 **DR. ULSH:** I seem to recall seeing in one of  
7 the documents kind of a timeline where it  
8 talked about the major programs at Mound and  
9 the corresponding bioassay techniques as given  
10 in particular MRM reports. We'll go look  
11 there to see if there's something like that  
12 for either gross alpha or uranium, whatever  
13 the case is here. So we can do I think  
14 similar to what John described. Kind of look  
15 at what technique they used --

16 **MR. FITZGERALD:** The technology pedigree as  
17 to what was used and --

18 **DR. ULSH:** And we'll do that. From where  
19 we're sitting right now though, I'll readily  
20 grant as Dr. Ziemer mentioned, that some of  
21 the MDAs in the earlier days were higher than  
22 they are now. You had progressive lowering of  
23 the MDAs, but that doesn't pose an SEC issue  
24 to us, and we'd just assign a high missed  
25 dose. So we'll check out what exactly the

1 technique that they used.

2 **MR. FITZGERALD:** So maybe the more pertinent  
3 question going back to this sort of common  
4 issue is given the number of apparent bioassay  
5 samples for some of these isotopes, what would  
6 be the basis then for coming up with the  
7 actual dose reconstruction value. What  
8 strategy would be used. It wasn't explicit in  
9 the site profile I don't believe or the ER,  
10 but that's not to say there isn't a way you  
11 can do that. So I think this is similar, very  
12 similar to some of the other questions that  
13 we've raised.

14 **MS. BRACKETT:** I don't think that Mound used  
15 fluoroscopy, did they? All the results are in  
16 units of activity ^ mass for fluoroscopy, I  
17 don't --

18 **DR. ZIEMER:** Unless they converted.

19 **MR. STEWART:** I don't recall.

20 **MS. BRACKETT:** I don't think that was a  
21 technique that they used.

22 **MR. STEWART:** It is described in the TBD as  
23 being applicable through '98.

24 **MS. BRACKETT:** I have not -- and I've seen  
25 the calculational sheets that they did their

1 uranium samples on, and they're all activity.

2 **MR. STEWART:** I agree.

3 **MS. BRACKETT:** That's not fluoroscopy.

4 **MR. STEWART:** The results I have seen have  
5 been in activity.

6 **MR. FITZGERALD:** Have been in activity.

7 **MR. STEWART:** Yes.

8 **DR. ULSH:** Well, we'll check. We'll find  
9 out what they used.

10 **MR. FITZGERALD:** Well, I think that's where  
11 the reference and the time period came from  
12 the TBD.

13 **MS. BEACH:** Brant, I missed what you were  
14 going to provide for that.

15 **DR. ULSH:** We're going to go back and see if  
16 we can get details on the techniques that  
17 Mound used for uranium bioassay particularly  
18 in the earlier years.

19 **MS. BEACH:** Thank you.

20 **MR. FITZGERALD:** Would there be any  
21 perspective though on how you would actually  
22 apply that information in terms of a dose  
23 reconstruction strategy? I think that was the  
24 question we're trying to get to is you say  
25 maximum or best estimate doses can be

1 determined.

2 **DR. ULSH:** I think it would be similar to  
3 what we do everywhere else and that is if  
4 someone could have been exposed to -- just to  
5 make up an example -- Uranium-238 or -235 or  
6 several different isotopes of uranium, and all  
7 we have is a total uranium bioassay result,  
8 we'll assign it to the one that is the most  
9 claimant favorable among those that are  
10 possible.

11 I mean, obviously, if a particular  
12 isotope's not even at Mound, we wouldn't  
13 consider that among the possibilities. But I  
14 thing generally it goes to 234, right, just  
15 because that's the most claimant favorable.

16 **MR. STEWART:** Yeah, almost without  
17 exception.

18 **MATRIX ISSUE FIVE: OTHER ISOTOPES POSSIBLY DISCOUNTED**

19 **MR. FITZGERALD:** Number five, you know,  
20 there's a statement that the other isotopes of  
21 239 weren't dosimetrically significant and can  
22 be discounted, in particular 241. I think we  
23 understand 240, 242 are much less so. But for  
24 241 there's a numbers of tables and treatments  
25 that are in the Mound documentation that, one,

1                   they were aware that they had to account for  
2                   241 and factor that in.

3                   So I guess on one hand I think it can  
4                   be enveloped as far as a dose estimation. But  
5                   I guess our concern was this question of  
6                   whether it could be discounted. I don't think  
7                   it appears that even the site was discounting  
8                   241.

9                   And then there's this other question  
10                  which I'll defer to Bob on which is sort of  
11                  uncertainties about what the isotopic  
12                  concentrations were of 241 that might have  
13                  come onsite in different ways. And I think  
14                  certainly in the Mound documentation there  
15                  were higher isotopic values than the 0.3  
16                  percent. There was just variations in terms  
17                  of the 241.

18                  I think what Bob raised earlier about  
19                  the possibility of higher concentrations is  
20                  something that was raised in a planning  
21                  document that we read, and I think we  
22                  highlight in here where the oxide feed might  
23                  have been higher. And I think Bob was  
24                  mentioning the possibility of a foreign feed  
25                  as well.

1                   So just a question of how, one, sure  
2                   are we of the isotopic concentration of 241  
3                   and is it, in fact, discountable or negligible  
4                   as a dose reconstruction issue. And we're not  
5                   sure about that given what I think we read in  
6                   some of the literature.

7                   **DR. ULSH:** Well, let's be clear what we're  
8                   talking about when we're talking about  
9                   discounting. We're not throwing away dose.  
10                  What we're doing is, as with our earlier  
11                  discussions, among the possible isotopes we're  
12                  going to assign the one which is most claimant  
13                  favorable which is almost always...

14                  **MR. STEWART:** For the weapons grade mix we  
15                  would use a mixed radionuclides.

16                  **MS. BRACKETT:** (inaudible)

17                  **DR. BRANCHE:** Please speak up.

18                  **MR. STEWART:** Weapons grade mix we are, and  
19                  the plutonium is considered to a hundred  
20                  percent Pu-238.

21                  **MR. FITZGERALD:** We're talking I think more  
22                  239.

23                  **MS. BRACKETT:** And that would be added on  
24                  top of the Plutonium-239 in a ratio to the  
25                  Plutonium-239, right?

1           **DR. ZIEMER:** Are you talking about ^ source  
2 or --

3           **MS. BRACKETT:** No.

4           **MR. FITZGERALD:** No, the 239, weapons grade.

5           **MR. BISTLINE:** It's understandable. The  
6 239, 240 alpha emitter which is, you can't  
7 separate anyway with alpha spectroscopy with  
8 the 241 is a beta emitter, but it leads to the  
9 production of Americium-241 which is an alpha  
10 emitter.

11          **MS. BRACKETT:** Right, but both of those are  
12 added to. You calculate the intake of  
13 Plutonium-239 and then you have a table that  
14 says, okay, if you have 20 percent of that  
15 would be Plutonium-241 and a certain percent  
16 of that in addition to --

17          **MR. FITZGERALD:** Yeah, and I tend to agree.  
18 I mean, we had a sort of a two-part issue, and  
19 after having several additional weeks of  
20 reading, I agree that actually I did find  
21 tables where the site was able to, by virtue  
22 of the age of the plutonium, factor in what  
23 the 241 ratio was.

24                   I was kind of, I don't know, maybe  
25 misunderstanding this discounted part because,

1           again, I don't think it was discounted. It  
2           was actually factored in and was something  
3           that was considered as a dosimetrically  
4           significant albeit something that could be  
5           estimated and factored in.

6           **MR. STEWART:** Claimant favorably  
7           overestimated.

8           **MR. FITZGERALD:** Right. But the second part  
9           again is whether the input concentrations were  
10          well enough known and there's a couple of  
11          examples where it seemed like the  
12          concentrations could be double what's in the  
13          Meyer or King document. And those we haven't  
14          been able to pin down. One is the proposal  
15          that, in fact, higher feed material were used  
16          from Savannah River.

17                 Another is, I guess, the UK material.  
18          I don't think this is like one of these,  
19          compared with some of these other issues, is a  
20          fundamental roadblock. This issue of whether  
21          or not you can -- again, the word discount  
22          kind of threw me I guess -- discount this as  
23          part of dose reconstruction. I don't think  
24          that's the case, but I don't think that's what  
25          you meant. Is that what you're saying?

1           **DR. ULSH:** Yes.

2           **MR. FITZGERALD:** Okay.

3           **DR. ULSH:** And in terms of the two specific  
4 examples that you mentioned, we're going to  
5 look into the UK. The other one that you  
6 mentioned and the report that you cited here  
7 in your statement, the Mound report, I've got  
8 it here. And this report clearly talks about  
9 a sample that they were looking at to see if  
10 they could make microspheres from some unusual  
11 material that they got from Savannah River.  
12 They were just evaluating it for whether or  
13 not they could even do it. They didn't use  
14 this on a routine basis.

15           **MR. FITZGERALD:** I guess the only question  
16 was whether or not that proceeded to  
17 application. So that's the only question we  
18 have on that one.

19           **DR. ULSH:** It didn't. Because I contacted  
20 the author by e-mail and asked them. There's  
21 two authors, and he contacted the other one.  
22 And both of them had no recollection of ever  
23 using this material beyond this --

24           **MR. FITZGERALD:** Beyond the one sample.

25           **DR. ULSH:** And furthermore, they wouldn't

1 use it because as you know the purpose of the  
2 heat source program was for space  
3 applications. So you're looking for the  
4 highest energy output per unit weight you can  
5 get. And so to lower the Plutonium-238 from  
6 the feed stock wouldn't make sense for that  
7 application. And so that was their  
8 recollection that they had never used it  
9 beyond this particular sample.

10 **MR. FITZGERALD:** So I guess the recap on  
11 that one is basically to understand whether  
12 the input parameters, the UK stuff --

13 **MR. BISTLINE:** And just to raise a flag,  
14 there may be something here that we need to  
15 look into that isn't evident to a lot of  
16 people.

17 **MR. STEWART:** The UK feed material?

18 **MR. BISTLINE:** Yeah.

19 **MR. STEWART:** Do I understand correctly that  
20 that is a complex-wide issue versus a Mound  
21 issue?

22 **MR. BISTLINE:** I don't know how complex-wide  
23 it was. I know it was a big issue at Rocky in  
24 the weapons material that we used at Rocky.  
25 It was a big issue in the '60s.

1                   **MR. FITZGERALD:** I think you can take the  
2 rest of it offline.

3                   **MR. BISTLINE:** It's just something that you  
4 need to look into.

5                   **DR. ULSH:** We'll check it out.

6                   **MATRIX ISSUE SIX: STABLE TRITIUM COMPOUNDS**

7                   **MR. FITZGERALD:** Number six is the stable  
8 tritium compounds. And generally, we've  
9 raised this at almost every site that handled  
10 tritium just because most sites did have some  
11 form of particulates. And the question is, I  
12 guess, the same as we've had in the past  
13 whether it's Savannah River or the other sites  
14 which is the extent to which dose estimation  
15 can be done with the information at hand.

16                                 And the ER does point in a couple  
17 directions here, but I think we didn't find a  
18 definitive basis for how you were going to do  
19 this. And I think that's something that it  
20 would be useful to have that dialogue perhaps  
21 separately but just get into how the mechanics  
22 of estimating dose with the varieties of STCs  
23 how that would be worked.

24                                 How that relates to OTIB-0066,  
25 certainly we grappled with that at Savannah

1 River, how that would apply as a means to get  
2 to a dose from STCs. There's a number of  
3 documents that were produced in the 2000 time  
4 frame. I guess 2003 the Department of Energy  
5 came out with a manual, and before that Mound  
6 had come up with some material.

7 So there's a number of things that  
8 speak to it, but I think we just need a  
9 clearer idea for the Mound-specific case. How  
10 one gets from what may have existed in  
11 operations to a dose contribution from that  
12 component.

13 **MR. BISTLINE:** And I guess one of the  
14 particular points that I was concerned with is  
15 the fact that it appears that there was quite  
16 a bit, I mean, of all the sites around the  
17 tritides were probably the most prevalent at  
18 the Mound, most any of the other sites. It  
19 appears that there were quite a number of  
20 different tritides, different chemical forms.

21 **DR. ZIEMER:** Let me make a comment. I don't  
22 think a tritide is a compound. I believe it's  
23 simply tritium absorbed into a metal --

24 **MR. BISTLINE:** You're right; you're right.

25 **DR. ZIEMER:** -- and so you can ask behavior-

1 wise, I think -- maybe somebody can clarify  
2 this. I don't think tritides behave as  
3 compounds. The tritium comes off as tritium.  
4 You get this with accelerator targets like  
5 titanium tritide. What you end up with the  
6 contamination is always tritium. It's just as  
7 you heat that stuff up or even at ambient  
8 temperatures, it just diffuses off as tritium  
9 gas. So I'm not sure why it would behave any  
10 different than any other tritium.

11 **MS. BRACKETT:** It behaves differently in the  
12 lungs. It gets retained in the lungs unlike  
13 normal --

14 **DR. ZIEMER:** You mean adhere, you're  
15 inhaling the particles?

16 **MS. BRACKETT:** Yes.

17 **MR. STEWART:** ^ matrix with the ^ of the  
18 metal --

19 **MS. BRACKETT:** That's right. So it could be  
20 --

21 **DR. ZIEMER:** It's still not a compound I  
22 don't believe. It's simply absorbed on the  
23 surface of the metal.

24 **MR. STEWART:** Technically, it's called a  
25 matrix, but when it's in that form from a

1                   biochemical standpoint, the retention  
2                   properties are different depending on what it  
3                   is adhering to. So it acts like --

4                   **DR. ZIEMER:** So if the metal is vaporized,  
5                   you mean, and then --

6                   **MR. STEWART:** It's one versus another the  
7                   solubility would be perhaps different.

8                   **DR. ZIEMER:** In terms of how it diffused off  
9                   from the metal. I understand what you're  
10                  saying.

11                  **MR. STEWART:** Some are more soluble than  
12                  others.

13                  **DR. ZIEMER:** But they're not handling things  
14                  like tritiated thymidine or something --

15                  **MR. STEWART:** Well, we don't want to get  
16                  into the specifics, but the different  
17                  compounds would have different solubility  
18                  dissolution rates. And those rates would --

19                  **DR. ZIEMER:** Well, if they were handling  
20                  organic compounds that had tritium labels,  
21                  that would be very different.

22                  **MR. BISTLINE:** And they did some of that,  
23                  too.

24                  **DR. ZIEMER:** Oh, okay.

25                  **DR. ULSH:** Well, we understand your concerns

1 on this issue, and as you mentioned, we've got  
2 OTIB-0066 out. There's also a couple of  
3 articles in the general scientific literature.  
4 But we hear what you're saying.

5 **MR. FITZGERALD:** Yeah, I don't think this is  
6 a new issue, but for Mound in particular our  
7 interest is knowing how that would work in  
8 relation to the OTIB and specific information  
9 is available.

10 **MR. STEWART:** There's just a couple of  
11 issues here that we could put to rest. Real-  
12 time monitors were not affected. Spare  
13 monitoring data are not used to assign dose  
14 typically. In some special cases that  
15 happens. Transfer efficiency of insoluble  
16 particles to swipes has not been studied.  
17 Contamination data are not used to reconstruct  
18 internal dose. Surface contamination  
19 measurements same issue, and the monitoring  
20 instruments for field measurements of swipes,  
21 et cetera, again, we don't use that for dose  
22 reconstruction.

23 **MR. FITZGERALD:** Yeah, and I think this was  
24 just a contemporary, '96 snapshot, from a  
25 Mound individual who was express, this is

1 really from his memo. He was raising  
2 questions. Actually, I think his questions  
3 may have prompted -- I don't know. You can  
4 step in -- but may have prompted some of the  
5 work at Mound to come up with some onsite  
6 guidance which then informed the DOE manual  
7 that was generated in the early 2000.

8 So in a way these frustrations or  
9 these considerations I think prompted some  
10 attention to how do we actually do dose  
11 estimation with this stuff because it's a  
12 problem. And that then surfaced into a  
13 department-wide issue. So I don't think it's  
14 a new issue. It's a generic issue.

15 I think it's just a question that if  
16 there's a way to address that at a site with  
17 this kind of history certainly would be of  
18 interest to us. Because I think it's going to  
19 be tougher than perhaps some other sites where  
20 it was more limited.

21 **MR. BISTLINE:** It's only new in that the  
22 recognition of tritides has only come about in  
23 the last ten, 15 years of history and the  
24 problems associated with trying to monitor for  
25 it. It's the same question we've had before.

1           **MR. FITZGERALD:** So as far as an outcome I  
2 guess I would suggest that we deal with it as  
3 a technical issue. We're talking about these  
4 technical issues that perhaps we can deal one-  
5 on-one on. I think that might be a way to  
6 sort of since it is a, it is in a sense as  
7 Paul is pointing out, a very big technical  
8 question revolving around biochemistry and  
9 dissolution rates and specific --

10           **DR. ZIEMER:** Have any groups done studies on  
11 --

12           **MR. BISTLINE:** There's been some studies on  
13 it.

14           **MR. FITZGERALD:** LANL has looked at it.

15           **MR. BISTLINE:** Hanford's looked at it.

16           **MR. FITZGERALD:** LANL has written a paper.  
17 Particularly since the mid-'90s there seems to  
18 be a much bigger consciousness and a lot of  
19 write ups. So really there's a lot of  
20 analyses. But maybe the hardest thing is the  
21 context of retrospective dose reconstruction  
22 on the issue. I think the operational issues  
23 have been grappled with but not so much the  
24 retrospective.

25           **MR. BISTLINE:** Yeah, going back in time

1 because all the analysis was done using or  
2 assuming that to be water vapor over gaseous  
3 form.

4 **DR. ULSH:** Okay.

5 **MS. BEACH:** And these technical meetings  
6 will be set up by; are you going to take the  
7 lead on that, Joe, or Brant?

8 **DR. ULSH:** How about if Joe and I get  
9 together after this and we'll work something  
10 out and let you know.

11 **MATRIX ISSUE SEVEN: REACTOR FUELS AND BYPRODUCTS**

12 **MR. FITZGERALD:** Okay, number seven. This  
13 one really speaks to the early period at Mound  
14 where they dealt with the reactor fuels and  
15 byproducts of that. And looking at the  
16 feasibility of actually being able to dose  
17 reconstruct against fission activation  
18 products, without the SEC period it would have  
19 been, I guess, a more pronounced issue since  
20 all this took place in the '50s. But there  
21 are some, certainly, fission products that  
22 existed post-'59 that we're looking at here.

23 And looking at the King report,  
24 particularly in the 1960 up to '71 time frames  
25 in some of the labs in R building and some of

1 the labs in T Building, specifically R-167 and  
2 169 and T Building, T-237 are places where  
3 fission products figured in what was  
4 identified. And again, it's unclear, in some  
5 cases King wasn't clear on what was the most  
6 pronounced. These may be very small amounts.  
7 Who knows? But that's the general question is  
8 whether or not the capability to estimate dose  
9 due to fission activation products for the  
10 reactor-related programs existed.

11 **DR. ULSH:** I'll let Don address the  
12 specifics, but something you just mentioned  
13 about how it's not ^ has been an issue in  
14 early years due to the SEC class. That's not  
15 necessarily the case which is making my road a  
16 little harder. Because even though we've said  
17 that we can't reconstruct radium, actinium,  
18 thorium, we still have a case of people who  
19 don't qualify for the class due to not having  
20 one of the SEC cancers or not having long  
21 enough employment, whatever. So there's still  
22 going to be some people for whom that class  
23 doesn't affect them. And the main fission  
24 product program I think occurred in the time  
25 period. So --

1           **MR. FITZGERALD:** Okay, I stand corrected.  
2           Yeah, I think again though it's a question  
3           based on the ER wasn't clear whether or not  
4           that capability and that data existed. It  
5           didn't appear to, but --

6           **MR. STEWART:** We don't currently have a  
7           table of concentrations of that material in  
8           the TBD. However, we do have ^ in  
9           contemporary Mound reports. And we have it  
10          available as radiochemical analyses for the  
11          most part. And that program is well  
12          documented. So we have, you know, our problem  
13          is to identify the people ^ and guys working  
14          on the process oftentimes, name by name. They  
15          talk about their processes sometimes to the  
16          literal degree of the amounts that they were  
17          working. And so we didn't talk about that in  
18          detail in the ER, but we have that source term  
19          information.

20          **MR. FITZGERALD:** Would you explain plutonium  
21          as an indicator? I guess it was unclear when  
22          we read that in the ER what that meant or what  
23          technique was being used because that seems to  
24          suggest that you would have to have plutonium  
25          monitoring information as a tag of some sort.

1           **MR. STEWART:** Yeah, certainly plutonium's  
2 going to be a part of it. I think that we  
3 primarily worried about plutonium. These are,  
4 this example is second cycle crib waste from  
5 Hanford and there will be plutonium as part of  
6 that mix.

7           **MR. FITZGERALD:** So the assumption of how  
8 much might be related to the plutonium if you  
9 picked up plutonium, which is the indicator,  
10 then the assumption would be you'd be getting  
11 a contribution of so much from the related  
12 fission products?

13           **MR. STEWART:** Right. We may not end up  
14 doing that. We may end up going some other  
15 way because we haven't had a chance to  
16 evaluate this in sufficient detail as yet.  
17 But certainly that's one resource that we can  
18 look at.

19           **MR. FITZGERALD:** And you don't believe  
20 there's any instances where -- well, okay,  
21 you're saying you may not stick with that.  
22 But the other question, of course, would be  
23 were there instances where there wouldn't be  
24 plutonium necessarily to be an indicator. I  
25 really don't have a good answer for that, but

1 instances where the fission product itself,  
2 whether it's just the yttrium or strontium,  
3 you know, whatever is the --

4 **MR. STEWART:** Titanium. You know, at this  
5 point we may find this process information  
6 itself may be the better bounding methodology  
7 for the few people involved. I would say that  
8 they would consider this with ruthenium and  
9 likely consider it as an external hazard  
10 primarily. It was very high dose rates from  
11 this material. And there is indication that  
12 that was one of the controlling hazards for  
13 this process.

14 **MR. FITZGERALD:** So really just to recap  
15 that then you were, this goes back to what  
16 you've done before looking at some analyses  
17 that you can provide us, I guess, at some time  
18 in the future that would kind of frame this  
19 up.

20 **MR. STEWART:** Things that were not captured  
21 in detail in the early days that we to ^  
22 evaluating.

23 **DR. ULSH:** So we'll get back to you with our  
24 evaluation of whether or not, to what extent  
25 there's exposure potential from this process,

1 who was involved, and how we would handle dose  
2 reconstructions where we have a possible  
3 exposure for this.

4 **MR. STEWART:** This is applicable to the '49  
5 to '53 time frame. We have to go to those  
6 things for some of these other radionuclides.

7 **MR. FITZGERALD:** And this question going  
8 back to progress reports, is that still  
9 pertinent to this approach you're talking  
10 about? There were some descriptions here in  
11 terms of bioassay results. A progress report  
12 can be used to determine maximum dose. That  
13 seemed to imply the progress reports must have  
14 had some kind of measurements for --

15 **MR. STEWART:** For doses?

16 **MR. FITZGERALD:** Yeah. I was just curious  
17 about the progress reports that were cited in  
18 the ER as far as the fission products.

19 **MR. STEWART:** The title of this one is --  
20 and I'm looking at some radiochemical  
21 analyses.

22 **DR. ULSH:** Well, the progress reports have  
23 the source term information, right?

24 **MR. STEWART:** Right.

25 **MR. FITZGERALD:** That was the implication

1 from looking at this that the progress reports  
2 actually were a key document that would frame  
3 the dose estimate. And that was kind of where  
4 we're questioning. Saying, okay, you don't  
5 have bioassay results. You've got progress  
6 reports. And the progress reports must  
7 contain source term information.

8 **MR. STEWART:** That is correct.

9 **MR. FITZGERALD:** So what we can hear from  
10 you is maybe some more definitive information  
11 as to how those, what's contained in those  
12 reports and how that would be carried forward  
13 and used.

14 **DR. MAURO (by Telephone):** This is John. I  
15 just had a couple of observations regarding  
16 the number seven that might be helpful.  
17 Regarding the fission products, the strategy  
18 that's identified here is similar to the one  
19 that was adopted in OTIB-0054 where you come  
20 up with a mix for different kinds of  
21 activities.

22 In OTIB-0054 the emphasis was on  
23 reactors and different kinds of reactors and  
24 the fact that just gross beta or gross beta-  
25 gamma analysis of urine samples were

1 available. And so I think in principle what's  
2 being described here is compatible and  
3 consistent with that approach which we found  
4 to be an appropriate approach.

5 We just wanted to point out that one  
6 area that might be difficult is knowing which  
7 workers you would assume should have been, if  
8 they weren't but perhaps should have been  
9 exposed, should have been monitored, let's  
10 say, gross beta, gross beta-gamma urine  
11 samples, and would therefore be assigned. The  
12 fission product exposure that you judge is  
13 appropriately to be assigned. So it's not so  
14 much, given that you have the data what mix do  
15 you use, I think that's tractable. The  
16 difficult problem is knowing what workers  
17 should fall within that category.

18 **DR. ULSH:** John, this is Brant. I think  
19 there's a fair degree of detail about who was  
20 involved in these programs in the  
21 documentation that we've got --

22 **MR. STEWART:** In some cases, yes.

23 **DR. ULSH:** -- but that's not to say that we  
24 can give you a definitive, all-inclusive list  
25 of everybody.

1           **DR. MAURO (by Telephone):** Oh, no, I just  
2 bring it up because it's come up before, and I  
3 think it's, if we it on our mind, then we can  
4 think about that at the same time.

5           **MR. FITZGERALD:** Yeah, we cite that in our  
6 statement that how many and what workers may  
7 have had such bioassays.

8           **DR. ULSH:** It's a small group, right?

9           **MR. STEWART:** Yes.

10          **MR. FITZGERALD:** There was a need for  
11 research, the returns from Hanford. So it's  
12 just a question of can one have a fairly good  
13 idea of what workers may have worked both.  
14 Were they the same workers? I don't know if  
15 they were or not, but I think that's worth  
16 mentioning.

17          **MR. STEWART:** Yeah, it was a process that  
18 actually set up a small process ^ site. And  
19 that activity was suspended and no further  
20 feed materials.

21          **MR. FITZGERALD:** So that might have actually  
22 turned out to be a simplifying situation where  
23 you had a common facility and potentially  
24 maybe the same cohort of workers that may have  
25 supported that facility even though it was

1 different campaigns.

2 **MS. BEACH:** And prior to John speaking we  
3 were talking about the programs. Is that a,  
4 can you explain that a little bit more and  
5 does SC&A have access to that?

6 **DR. ULSH:** Programs.

7 **MS. BEACH:** Yeah, you guys were speaking --

8 **DR. ULSH:** Program evaluation? Progress  
9 reports?

10 **MS. BEACH:** Is that what it was, progress  
11 reports?

12 **MR. STEWART:** It's in the SRDB.

13 **MR. FITZGERALD:** Yeah, I think the only  
14 thing we're looking for is to tie the specific  
15 progress reports that you're looking at and  
16 referencing here to the approach you're going  
17 to take. And I think that's similar to what  
18 we've talked about before and get a better  
19 understanding of how that's actually going to  
20 be working.

21 **MATRIX ISSUE EIGHT: MULTI-PURPOSE LABORATORY**

22 Number eight, we're dealing with again  
23 a familiar topic just trying to deal with a  
24 multi-purpose laboratory over fifty years.  
25 Once you get past the primary source terms you

1 do have this periodic table of other elements  
2 some which were understandably trace, others  
3 which were more substantial.

4 And I think for any of the weapons  
5 laboratories I think there's a challenge to  
6 understanding and validating that there was a  
7 means to encompass those that were in fact  
8 consequential in terms of dose. And that's  
9 what we're raising here is that it was not  
10 clear from the ER how the bioassay data or  
11 other information would be applied for -- and  
12 this is just an example list -- of just some  
13 of the constituents that were handled in the  
14 various labs and processes at Mound over that  
15 time frame.

16 And looking at the King document, I  
17 mean, it's pretty clear that, whether it's the  
18 T labs or the R labs, they did do a lot of R  
19 and D over a lot of different things. And  
20 just being able to envelope that history with  
21 some means to estimate what workers would have  
22 been exposed to and monitored for in those  
23 labs would be, I think, what we're looking for  
24 here.

25 **DR. ULSH:** Well, this is a multi-part

1 question.

2 **MR. FITZGERALD:** Yeah, that was a preamble  
3 without getting to A or B.

4 **DR. ULSH:** I think there's a cut-paste error  
5 here in your NIOSH ER position-SC&A reading.  
6 You quote us as saying that we, both  
7 demonstrated that employees with the greatest  
8 potential for internal intake were monitored  
9 and determined that we can, that available  
10 bioassay data can be used to reconstruct or  
11 bound potential internal radiation doses for  
12 those employees -- here's the problem part --

13 **MR. FITZGERALD:** Okay.

14 **DR. ULSH:** -- with the exception of those  
15 who may have been exposed to Actinium-227 --  
16 that's okay -- Thorium-230 -- it should be  
17 228. And you said Thorium-232, but we said  
18 that we can do Thorium-232. We also said we  
19 can do uranium and --

20 **MR. FITZGERALD:** Yeah, I see what you're  
21 talking about. This should be the actinium-  
22 radium-thorium which is the basis for the SEC.  
23 I don't know how that got in there.

24 **DR. ULSH:** That's a cut-paste I'm sure.

25 **MR. FITZGERALD:** Yeah.

1           **DR. ULSH:** So, yeah, I think this is very  
2 similar to the previous issues except that  
3 here you say, you know, earlier we talked  
4 about this straight line thing and how they  
5 D&D'd from the radium-actinium-thorium  
6 separations in 1959. And then it's at least  
7 our impression that you don't see a whole lot  
8 in terms of actinium exposure up until the R  
9 Corridor job.

10                   And I think -- now, I'm making some  
11 assumptions here and maybe the wrong  
12 assumptions. But you're saying that assumes  
13 the bioassay data during one time period can  
14 be used to bound or estimate exposures during  
15 unmonitored times. Also indicated that for  
16 other potential exposures that D&D,  
17 decommissioning and decontamination, took  
18 place and no further significant exposures  
19 occurred.

20                   Yet 20 years later it is documented  
21 that further exposures were occurring to those  
22 radionuclides thus indicating that D&D at the  
23 time most likely was not likely effective or  
24 complete. Are you thinking of the actinium  
25 there or is that something else?

1           **MR. FITZGERALD:** No, I think it speaks to, I  
2 think we addressed actinium elsewhere. It  
3 speaks to the R and D program primarily but  
4 not exclusively. And this exotic other  
5 nuclides that any multi-purpose lab would have  
6 handled over the early years when they were  
7 doing active research and how this presents  
8 itself in later contaminations and D&Ds.

9           But the exposure potential existed  
10 both during the actual R and D and afterwards  
11 when different facilities were being D&D'd.  
12 And what we're looking for is how -- and this  
13 is a general question. How did the site  
14 actually do monitoring? Meaning that --

15           And this question is not exclusive to  
16 Mound. We've had the same issue at Los Alamos  
17 and Livermore where you're dealing with the  
18 periodic table the first 20 or 30 years and  
19 monitoring was a state-of-the-art that was  
20 progressing at the same time that you were  
21 handling these nuclides understandably.

22           So the question was how did the site  
23 monitor or bioassay or whatever for these  
24 various species of nuclides as time  
25 progressed, and where in terms of gaps that

1           may have existed for certain radionuclides.  
2           And I think the point's made in the ER very  
3           well.  Either it was negligible, in other  
4           words it wasn't something that you would go  
5           forward and monitor.  Or it was more  
6           substantial but there was a way you could  
7           bridge gaps by using data from other periods  
8           of time or maybe indicator radionuclides.

9                     There was different techniques you  
10           would use, but there's ways you could actually  
11           get some kind of a dose estimate, but that was  
12           all, I think, a compensatory approach to the  
13           fact that they did not have bioassay  
14           techniques for every single nuclide or would  
15           they need one.

16                    But certainly there was a need to  
17           envelope what was a large spectrum of  
18           radionuclides that were handled some of which  
19           were not trace quantities, some of which were  
20           more substantially used.  We include for  
21           actinium in that as well as cobalt and some of  
22           these other species, but that's the general  
23           question.

24                    **MR. BISTLINE:**  And I think that also in  
25           addition to that, Brant, it gets us into the

1 area of taking data from bioassay data from  
2 1955 through '59, for instance, there were  
3 said can be used to bound doses over all  
4 operational time periods. There were back in  
5 those early days a lot of that Mound data  
6 indicates very poor efficiency in recovery in  
7 the bioassay program, ten percent recoveries  
8 and so forth. And then trying to apply data  
9 from that point on as a bounding issue and the  
10 concern as to whether that can legitimately be  
11 done from early data that is suspect data in  
12 terms of its quality to later periods.

13 **DR. ULSH:** Well, I understand what you're  
14 saying. And I think we would always be  
15 cautious about applying data from one time  
16 period to another. I mean, not to say that we  
17 never do it, but of course, there are issues  
18 we all know about doing that. In terms of the  
19 efficiencies, low efficiencies, there again,  
20 that would impact your MDA.

21 **MR. BISTLINE:** Yes.

22 **DR. ULSH:** But the efficiencies aren't zero.  
23 So that would indicate to me that this is more  
24 of a TBD issue than an SEC issue in terms of  
25 that particular part of what you said. Now,

1           that's not to say about applying data from one  
2           period to the other. There's a lot of other  
3           issues involved there.

4                        But I would point out that during the  
5           D&D years, which I'm loosely defining as  
6           roughly the '90s, there are bioassay results  
7           for a number of different radionuclides:  
8           Protactinium-231, there's Polonium-210,  
9           Cobalt-60, Curium-242. There's a few. So I  
10          think for some of these, and obviously the  
11          major radionuclides at Mound are going to be  
12          your plutoniums, polonium in the earlier  
13          years, actinium in the earlier years, uranium  
14          to a lesser extent, thorium to probably a  
15          lesser extent and tritium. Those are the big  
16          ones.

17                       You're right, Joe, certainly, I mean,  
18          who's going to monitor for whatever  
19          radioactive mercury is, or just as an example.  
20          But I don't, I guess I'm still not clear on  
21          when you say here 20 years later it's  
22          documented that further exposures were  
23          occurring, what situations you're referring to  
24          there. The implication there is that it was  
25          occurring the whole time.



1 worked in T lab, one of the T labs, for 25  
2 years, they weren't, Cotter concentrate, they  
3 weren't messing with the plutonium, but they  
4 were simply working in the lab itself but were  
5 handling over time the kinds of nuclides that  
6 you would handle in a lab by just doing active  
7 R&D.

8 How would you go about giving credit  
9 to the potential for exposures if, in fact,  
10 very little bioassay information existed for  
11 much of these because they were other nuclides  
12 or more exotic nuclides? And that wasn't  
13 evident from the ^.

14 **DR. ULSH:** Let's start with what we know.  
15 We know that for some of the radionuclides  
16 that were present at Mound as listed in King,  
17 they did not do bioassay for them. I don't  
18 think bioassay existed for them. We know  
19 that. But there's a couple of steps before we  
20 can conclude that we have an issue here.

21 One is what were the quantities  
22 involved. What was the dosimetric  
23 significance of that material? I mean, if  
24 they're making a standard in a lab, that's a  
25 whole lot different than doing a major

1 program. So that's something that we've got  
2 to consider and also the dosimetric  
3 significance.

4 There's some elements that,  
5 radionuclides that you can get a whole  
6 spoonful, and it's not going to make a hill of  
7 beans difference in terms of dose. So I guess  
8 the question would be then are there any gaps.  
9 Are there those radionuclides where there was  
10 a potential for a problem here and there's no  
11 bioassay, what do you do then?

12 **MR. STEWART:** I'll just point out that King  
13 mentions in a number of locations that labs  
14 used for one purpose are decontaminated ^ used  
15 for process are disassembled and disposed of.  
16 So they've got an ongoing program to utilize  
17 the space that they've got. And it seems to  
18 me, and he talks about this, this lab was  
19 decommissioned and used for cold work from  
20 1981 to 1996, and there's a number of rooms  
21 where he talks about that. So I don't think  
22 we should assume, and once again it's a  
23 straight-line exposure down the line. Once  
24 we've used this in R-149, then it's going to  
25 be available for uptake in significant

1 quantities compared to everything else that's  
2 available for uptake for perpetuity.

3 **MR. FITZGERALD:** Again, what was provided in  
4 the site profile in the ER just speaks to the  
5 fact that the capability exists to, I think,  
6 bound these doses. And the only question we  
7 have it's not clear given the history and  
8 given diversity and not knowing sort of the  
9 relative significance and practicalities  
10 involved, how you would do dose reconstruction  
11 for somebody who may have been exclusively a  
12 lab worker that might have gone through these  
13 evolutions of different R&D programs.

14 And it may very well be that you make  
15 judgments as to which, you know, there's no  
16 bioassay, assume that for most of the stuff,  
17 not all of it but a lot of it, that you make  
18 assumptions that certain of these isotopic,  
19 these radionuclides, are in fact  
20 radiologically significant. There's enough of  
21 it. There's maybe enough contact or potential  
22 for contact and maybe even some instances  
23 involved where you have events where people  
24 were exposed.

25 And you key in on those and perhaps



1 talk to some of the people that were there and  
2 so forth like that because the process here  
3 was just ripping out only dealt with this that  
4 in re-suiting it or whatever you'd want to  
5 call it, it brought up some other objects.

6 **MR. PRESLEY:** Hey, Brad, Bob Presley. Did  
7 anybody ever bring up any information that  
8 might pertain to what they found when they  
9 went back in and redid this?

10 **MR. CLAWSON:** As far as radionuclides?

11 **MR. PRESLEY:** Yes.

12 **MR. CLAWSON:** A little bit, but some of it  
13 was I don't know if we can talk about.

14 **MR. PRESLEY:** Oh, yeah, okay, I agree with  
15 that. But I mean, if that information is  
16 available, then they can go back and get it.

17 **MR. CLAWSON:** Well, this is just, what I'm  
18 trying to paint is the picture that I saw from  
19 it. Granted I wasn't at Mound or anything  
20 else like that, but in some of the interviews  
21 and so forth like that, there were a lot of  
22 corrective actions and from what I look at as  
23 Mound is like a lot of our facilities. They  
24 kind of build facilities on top of facilities  
25 and use different rooms and so forth, go

1 different directions. And it's, there was  
2 kind of a legacy of stuff in there.

3 **MR. PRESLEY:** Right.

4 **DR. ULSH:** Well, there were some specific  
5 instances. I want to see if I can take a shot  
6 at what you're talking about, Brad. When they  
7 D&D'd the old cave as Don mentioned earlier,  
8 the way that they D&D'd it was to pour  
9 concrete on top. And then they had office  
10 space and what, labs on top? So that's  
11 certainly one example of I think maybe what  
12 you're talking about.

13 **MR. CLAWSON:** Also, too, you know, it's a  
14 site-wide practice to be able to use paint or  
15 epoxies or whatever to be able to just cover  
16 up. We still use that today. Part of the  
17 issues even we are getting into today is that  
18 we're D&Ding these buildings. We're looking  
19 for certain things but part of our history  
20 comes out.

21 **DR. ULSH:** And that was certainly the case  
22 in the R Corridor job for instance. When they  
23 went in to scabble that, then they uncovered  
24 that spot of actinium contamination. So I  
25 understand what you're saying there. I guess

1 I'm looking around here for a path forward on  
2 this issue.

3 We can certainly take a look at this  
4 list of radionuclides that you've got listed  
5 here and do our best to figure out a little  
6 more details on what was going on at the lab.  
7 At least get our arms around the scale of it.  
8 If there's a couple chemists in a lab with a  
9 test tube, that's a different issue.

10 **MR. FITZGERALD:** Yeah, I think very clearly  
11 from a pragmatic level if you're dealing with  
12 laboratory, with a history that's going to go  
13 over a number of decades in terms of handling  
14 material, how would you actually dose  
15 reconstruct for an individual that was in  
16 those laboratories understanding that you're  
17 not going to deal with the negligible source  
18 terms.

19 You're not going to deal with  
20 situations where it's a sealed source. You're  
21 not going deal with situations where it's, we  
22 talked about a hot cell earlier where the  
23 proximity wasn't there. But certainly if  
24 there's potential for some of the other items,  
25 and there's no bioassay I guess I'm at a loss

1 to how you would actually manage to do any  
2 kind of estimation unless you had some  
3 bounding assumptions or something about what  
4 the people could have been exposed to.

5 **MR. BISTLINE:** Yeah, kind of going along  
6 with that, the issue, they found equipment  
7 that had been used and was contaminated. A  
8 year later they found a contaminated  
9 equipment. How are you going to bound that I  
10 guess is the question, the exposures to things  
11 like this.

12 **DR. ULSH:** I think that issue is going to  
13 come up in a later matrix issue, the  
14 contaminated equipment part. But it seems to  
15 me that King has done, King has done part of  
16 the job here loosely. I mean, he says these  
17 are the major radionuclides of concern, these  
18 are the raw maybes and these are the, no,  
19 never minds. I'm paraphrasing here. We'll  
20 see what we can do about explaining on that.

21 **MS. BEACH:** So I basically have you're going  
22 to investigate the issue and get back to us --

23 **DR. ULSH:** Yes.

24 **MS. BEACH:** -- what you found and how to get  
25 a possible path forward.

1           **MR. CLAWSON:** And maybe I didn't make myself  
2 clear. I know that the painting and so forth,  
3 but the individuals that spoke to us during  
4 the interviews were basically talking about  
5 that they went in and yanking power cables --

6           **DR. BRANCHE:** We have an individual on the  
7 phone who needs to mute their phone, please.  
8 If you don't have a mute button then please  
9 use star six. We can hear all parts of your  
10 conversation. Thank you.

11           **MR. CLAWSON:** -- he was actually in a clean  
12 area, but they were pulling conduit, pulling  
13 wires, cracked himself up, opened himself up.  
14 He wasn't part of the monitored group so forth  
15 like that da-da-da, and this is what brought  
16 up some of these issues with pulling stuff in  
17 from it. On the other side, you know, it was  
18 sealed off okay like you do in any kind of  
19 situation, but the electrical conduit and so  
20 forth and it brought up the issue of his  
21 monitoring and so forth like that. And  
22 basically it can contaminate himself and his  
23 colleagues and so forth. And this is kind of  
24 an underlying issue of the questions. And  
25 this is what I was just trying to bring out.

1           **DR. ULSH:** Yes, and we'll take a look at the  
2 interviews that you all conducted, what, last  
3 week.

4           **MR. FITZGERALD:** Two weeks ago.

5           **DR. ULSH:** We'll take a look for that.

6           **MR. CLAWSON:** No, this was actually at a  
7 Fernald work group meeting, but the guy that  
8 worked was asking me because he knew I was on  
9 this, and so I was discussing with him what  
10 his concern was. And he says this is what I'm  
11 looking at because he had looked at the Mound  
12 TBD and so forth, and he was issued, he just  
13 discussed with me are they looking at this  
14 because this is what we got into, how they  
15 added on the facilities and so forth like  
16 that. He says it wasn't an uncommon practice  
17 to be able to get into situations like this.  
18 So that was kind of where my concern was  
19 coming and so forth.

20           **MR. SCHOFIELD:** I think that's true of just  
21 about any of these facilities because they  
22 could be up there with electrical trades.  
23 They could be out there in the nooks and  
24 crannies of unistrut\* and stuff that they use  
25 for mounting equipment, glove boxes to the

1 walls. So they do a quick paint job, cover up  
2 what they could find loose and then somebody  
3 sits in that office, and they use that for  
4 different purposes yet there is this loose  
5 contamination in the nooks and crannies where  
6 people couldn't reach.

7 **DR. ULSH:** Right, and actually that -- okay,  
8 talk ahead just a little bit. It goes back to  
9 your issue, Bob, about the instances where  
10 they found contaminated equipment in what were  
11 supposedly clean areas. And we interviewed a  
12 few people, a couple of people about that and  
13 one was particularly helpful, a rad tech.

14 And he described situations like that  
15 where they would survey the exterior surface,  
16 the accessible surfaces, of the equipment,  
17 find nothing and send it to different areas  
18 inside the plant for shipment offsite. Well,  
19 when they went to disassemble that equipment,  
20 then they found some contamination on some of  
21 the inner surfaces of the equipment.

22 And that certainly happened. I don't  
23 want to say it happened all the time, but it  
24 was not uncommon. I mean, it happened more  
25 than once. But the question you've got to ask

1                   yourself is, well, if this contamination was  
2                   on the inner surfaces that were not  
3                   accessible, what was the exposure potential.  
4                   Until you pop it open and find the  
5                   contamination, there really isn't much of an  
6                   exposure potential there.

7                   **MR. BISTLINE:** It depends on the equipment.

8                   **DR. ULSH:** Right, it depends on the specific  
9                   situation.

10                  **MR. STEWART:** I think Health Physics  
11                  practice has been pretty consistent in that  
12                  when you're entering an unknown condition that  
13                  you characterize the conditions in the area  
14                  prior to conducting work, and then you assign  
15                  the personnel monitoring based on those  
16                  conditions.

17                                 And a lot of facilities have signs  
18                                 that say overhead areas are unsurveyed.  
19                                 Contact radiation protection prior to entry.  
20                                 I think you're going to have that situation in  
21                                 all these legacy facilities. And I would  
22                                 think that Health Physics surveys are a  
23                                 necessary first step when entering the  
24                                 facility.

25                  **MR. FITZGERALD:** Yeah, I think that's

1 underscoring by King who speaks to these  
2 overhead areas in some of the labs that were  
3 contaminated even into the '90s with actinium  
4 and what not.

5 **DR. ULSH:** But I don't want to confuse the  
6 issue in some of these, you know, like you  
7 said, the alphabet soup or Periodic Table of  
8 Elements to indicate that they were spread all  
9 over and you were constantly running into  
10 surprise situations where you encountered  
11 them. They did run into some surprise  
12 situations for some of the major  
13 radionuclides. You know, find the plutonium  
14 where you didn't expect it maybe or finding  
15 actinium where you didn't expect it. There  
16 was an example of that. But it's not like you  
17 were going to find Mercury-203 or, is that  
18 Scandium-46 all over the place. It wasn't  
19 like that.

20 **MR. FITZGERALD:** No, I think again we're  
21 just responding to the reference in the ER.  
22 And we didn't read this, but it's set to the  
23 point from technical and published reports,  
24 process data such as proportions of exotic  
25 radionuclides -- this is under (b) -- in

1 process material can be determined and the  
2 maximum dose estimated.

3 So essentially that's the work around  
4 when you don't have bioassay for somebody  
5 saying that you have to go to your source term  
6 information and try to come up with a  
7 estimate. The situation is somebody's in that  
8 environment and that would be probably your  
9 avenue. I guess our only question is in a  
10 practical way would you need to do that for  
11 the kinds of things we're talking about here.  
12 And if so, --

13 **MR. STEWART:** Not in all cases. A number of  
14 these are external hazards only, Krypton-85.  
15 Zn-65 and Iron-59, those are in summary -- and  
16 correct me if I'm wrong because they were a  
17 constituent of the aluminum cans used for the  
18 polonium processing. Is that how they ended  
19 up in here?

20 **MR. FITZGERALD:** I can't remember exactly  
21 now.

22 **MR. STEWART:** It would be dealt with  
23 separately, and I think that it's probably not  
24 inaccurate to say the Mound considered them  
25 primarily external dose --

1           **MR. FITZGERALD:** I think in this case we're  
2 just talking about maybe another level of  
3 explanation. I think this gives us an  
4 indication of where you're headed, but we  
5 couldn't go much further than this reference,  
6 one-sentence reference.

7           And I certainly wouldn't recommend  
8 anything that would be comprehensive, not this  
9 massive matrix with a hundred nuclides on one  
10 side, no. Just really some sense of that,  
11 what matters, how you would, in fact, use the  
12 process information to come up with a bounding  
13 dose. I think that would help us understand  
14 that this balance of radiological source terms  
15 is being addressed adequately because there  
16 was quite a bit.

17           And this has been an issue at other  
18 multipurpose laboratories just because there  
19 was so much, so little bioassay that was  
20 keeping pace. There were some questions for  
21 certain nuclides but not all. Some of it was  
22 tracer quantities and not significant  
23 radiologically anyway.

24           **MR. STEWART:** Yes, and it is certainly true  
25 for some of these as well.



1 data for '55 through '59, and yet, obviously,  
2 the program or the exposure for protactinium  
3 existed after '59 as well. So without  
4 bioassay could you extend that information to  
5 use it in a way that would give you a bounding  
6 analysis?

7 **MR. STEWART:** You're talking about the  
8 Cotter concentrate?

9 **MR. FITZGERALD:** Yeah, on (a), 8(a).

10 **DR. ULSH:** I don't think that we would  
11 necessarily try to apply the Protactinium-231  
12 data from the '50s into the Cotter  
13 concentrate. Don mentioned the makeup of the  
14 Cotter concentrate earlier, and that was  
15 60,000 ppm uranium, so much -- what was the  
16 next one, thorium?

17 **MR. STEWART:** Thorium-232, 10,000 ppm.

18 **DR. ULSH:** So those might be the things that  
19 you're looking for rather than --

20 **MR. FITZGERALD:** Is that the process  
21 information that you're talking about here?  
22 That term kind of throws me a little bit. The  
23 process information would be those indicators  
24 --

25 **MR. STEWART:** Constituents.

1           **MR. FITZGERALD:** -- constituents --

2           **DR. ULSH:** The makeup of the source term and  
3 also the facilities that they were doing it  
4 in, the hot cell again. And we'll certainly  
5 make sure that you get a copy of this document  
6 that we keep talking about.

7           **MR. FITZGERALD:** Right, right. That's what  
8 I'm saying. I think we backed into this a  
9 little earlier. But when you talk process,  
10 you're talking about this specifically then.

11          **DR. ULSH:** Yes.

12          **MR. FITZGERALD:** Okay, well, I think this  
13 doc's going to help us on that one then.

14          **MR. STEWART:** Well, it's just information  
15 that to me is information about the  
16 radionucleic makeup.

17          **MR. FITZGERALD:** Right, okay.

18          **MR. STEWART:** It's a word. It's a word.

19          **MR. FITZGERALD:** Well, it actually helps  
20 because I looked at process and was thinking  
21 the production process or the operations as  
22 opposed to the necessarily the radionuclitic  
23 makeup.

24          **MR. STEWART:** And the process is concern as  
25 well because the stuff is capturing the

1 concentration cell with no human presence.  
2 That would also be something that we could use  
3 to reconstruct the dose.

4 **MR. FITZGERALD:** And again, this document is  
5 -- what's the name of it again?

6 **MR. STEWART:** We'll get you a copy of this.  
7 It's called "White Paper, Re-evaluation of the  
8 Cotter Concentrate". It's not a white paper  
9 that we generated, but --

10 **DR. ULSH:** BWST, right?

11 **MR. STEWART:** Yeah, it's a USCPA document.

12 **MR. FITZGERALD:** I think that would probably  
13 satisfy this issue as well once we have a  
14 chance to look at that.

15 **MR. STEWART:** August 1998.

16 **MR. FITZGERALD:** August 1998.

17 **MS. BEACH:** And you said it was an EPA or --

18 **MR. STEWART:** BWST.

19 **DR. ULSH:** A CPA?

20 **MR. STEWART:** CPA?

21 **MS. BEACH:** Maybe I just heard you wrong.

22 **MR. STEWART:** USCPA ID number -- it may have  
23 been done by somebody under contract to CPA.

24 **MR. FITZGERALD:** So we'll take a look at  
25 that when it's available and offer any

1 feedback to NIOSH or to the Board.

2 **MATRIX ISSUE NINE: HIGH-FIRED ISSUE**

3 Number nine, this one is kind of  
4 another clarification issue because, again,  
5 we're aware as you are that they ceramatized  
6 Plutonium-238 oxide is a high-fired issue.  
7 And we didn't see any really treatment,  
8 treatment meaning sort of an explanatory text  
9 in the ER or the site profile. The site  
10 profile does mention pure -238.

11 So this is really just an open  
12 question as to how you're addressing that  
13 particular high-fired question at Mound.  
14 Because a lot of it was handled and certainly  
15 going through the King report it's fairly  
16 extensive as you can expect. It really was  
17 everywhere Plutonium-238 was practically  
18 because of the way it was handled. And we  
19 think it obviously has implications for how  
20 one monitors for it, and we ran up against it.

21 And sorry for the obscure reference  
22 here, [name redacted]. We interviewed [name  
23 redacted] at Los Alamos as far as site profile  
24 review and he kind of waxed eloquent about the  
25 problem he had when he had an event involving

1           PU-238 oxide at the lab and how difficult it  
2 was to find it. And he just went on and on as  
3 to, it was a fascinating story, but it  
4 certainly informs this whole thing that, yeah,  
5 it's certainly a different beast when it comes  
6 to trying to monitor for it and makes perhaps  
7 follow up on events harder unless you know how  
8 to do it.

9           And so I guess our question is we  
10 didn't see a whole lot to explain the approach  
11 being taken. So it's just an open question.  
12 We just wanted to frame the issue up and sort  
13 of leave it to you to tell us what you think  
14 you're going to do with it.

15           **DR. ULSH:** There's a few issues. You  
16 mention in here OTIB-0049, which is the Super-  
17 S TIB. And that relates to Plutonium-239.

18           **MR. FITZGERALD:** Right.

19           **DR. ULSH:** And that was developed in support  
20 of the Rocky Flats. But that is not going to  
21 be applied to Plutonium-238 because we've not  
22 seen any evidence that Plutonium-238 behaves  
23 in any way like Super-S Plutonium-239. In  
24 fact, it's specifically mentioned in that TIB  
25 that it's not going to be used for anything

1 other than -239. And the reason is because  
2 the high specific activity of -238 tends to  
3 break up that ceramic matrix.

4 And so what you see, at least in the  
5 short time that I've spent trying to locate  
6 references on this -- I found about ten dating  
7 all the way back to the '70s by someone named  
8 Bob Bistline -- this is an issue that's, I  
9 mean, health physicists have been aware of  
10 since at least 1970 and probably earlier, that  
11 Plutonium-238 behaves a little differently  
12 than Plutonium-239. But I've not seen any  
13 evidence whatsoever that it behaves like high-  
14 fired, in other words, highly, strongly  
15 retained.

16 Now, let me clarify a little bit.  
17 There's some evidence, a fair body of  
18 evidence, that at first it can be strongly  
19 retained. But that as time goes by, within a  
20 short period of time, those alphas from that  
21 high specific activity -238 break up the  
22 ceramicized matrix and it starts to be  
23 excreted. So certainly there are data  
24 available. There are data available from  
25 Mound cases of people exposed to some

1 ceramicized Plutonium-238.

2           There's also some data from the USTUR,  
3 Transuranium Registry, about people exposed to  
4 this material. So it's not an unknown. And  
5 some have even looked at whether or not the  
6 ICRP models adequately can handle the behavior  
7 of Plutonium-238. And the conclusion, at  
8 least from this one in 2003 -- this is from  
9 the general literature, this is general health  
10 physics -- is that they can indeed handle that  
11 kind of material, just have to appropriately  
12 designate the solubility class which we do on  
13 a routine basis.

14           I mean, every time you do an IMBA run  
15 you designate the solubility class. So we're  
16 aware of the differences here about Plutonium-  
17 238. We don't see it as an SEC issue. I  
18 mean, it's not unknowable. The models that we  
19 have with appropriate parameter selections can  
20 handle that. And we are currently considering  
21 putting together a TIB on this.

22           Maybe you can speak a little bit more  
23 about that, Liz.

24           **MS. BRACKETT:** Well, you mentioned the [name  
25 redacted] interview being --

1                   **MR. FITZGERALD:** Well, just as an  
2 illustrative --

3                   **MS. BRACKETT:** Right. You said it was  
4 obscure, but really one of the papers is based  
5 on that case, and that's what we're looking at  
6 to develop the OTIB from. And, in fact, when  
7 MJW did the Mound dose reconstruction we did  
8 come across several cases where it was pretty  
9 clear that if the people had a lot of bioassay  
10 samples, and you could see it increasing over  
11 time, and we did special ^. So in the case  
12 where a person has enough data, you can just  
13 take their data and adjust the parameters in  
14 IMBA to get a good fit.

15                   In the case of people not having that  
16 kind of data, adequate data, then what we're  
17 looking at doing is taking that paper from the  
18 Lawrence data, and I think there's six other  
19 cases that were looked at in there. They  
20 mention seven cases. Only one was a  
21 Transuranium Registry case, but looking at  
22 that and coming up with a model, and it's  
23 similar to what we did with uranium aluminide.

24                   What we would do is try to compare it  
25 against the other material types to see if it

1 would ever give you a more living value. If  
2 not, then we would just stick with our default  
3 and use whichever one gave you the largest  
4 dose. But if it turns out that this  
5 particular model would give you a larger dose,  
6 then we would use that in that particular  
7 case.

8 **MR. BISTLINE:** How about the situation where  
9 it's, Plutonium-238 is in a matrix with  
10 another zirconium, something like this. There  
11 seems to be some difference showing there as  
12 far as solubility in some of the studies that  
13 I've seen.

14 **MS. BRACKETT:** Would that be the one, the  
15 paper that you wrote? Is that the --

16 **MR. BISTLINE:** No, this comes out of some  
17 studies that Los Alamos showed me on some rat  
18 studies that they did with zirconium oxide.  
19 And very highly insoluble particles lodged in  
20 the lungs and just stayed there.

21 **MS. BRACKETT:** And that would be Plutonium-  
22 238?

23 **MR. BISTLINE:** It's -238.

24 **MS. BRACKETT:** I guess that would be  
25 something we'd have to look at. Is that

1 something Mound would have also?

2 **MR. BISTLINE:** As I recall I think there  
3 were a couple of cases where they, a couple of  
4 compounds like that which were ceramicized  
5 particles that were made.

6 **MS. BRACKETT:** And yet it's different than  
7 the other material that --

8 **MR. BISTLINE:** It appears to be somewhat  
9 different from what you see in --

10 **MS. BRACKETT:** Then I guess that would be  
11 something we'd have to look at.

12 **MR. BISTLINE:** Yeah, it may, certain  
13 ceramicized conditions made for different  
14 durometers.

15 **DR. ULSH:** Is that something you could  
16 provide to us? These citations where we could  
17 go get it?

18 **MR. BISTLINE:** I'll try to see if I can dig  
19 it up somewhere. It's all in my file.

20 **MS. BRACKETT:** You wouldn't happen to know  
21 if that was in the Health Physics Journal or  
22 not, do you?

23 **MR. BISTLINE:** I can't remember where that  
24 was published, but I was down there visiting  
25 and they were showing me pictures of the

1                   zirconium oxide particles. On one of my trips  
2 down there back a number of years ago, they  
3 were showing me pictures of the zirconium  
4 particles in the lungs of the rats.

5                   **DR. ZIEMER:** Well, the plutonium, is it a  
6 plutonium oxide mixed with the zirconium  
7 oxide?

8                   **MR. BISTLINE:** Yeah, it's a zirconium and  
9 it's ceramicized together and real ^ stable  
10 mixture that the zirconium particles just  
11 stayed there. They had a lot of ^.

12                   **MS. BEACH:** Bob, where was this study from?

13                   **MR. BISTLINE:** This was done at Los Alamos.  
14 It was a study being done out at Los Alamos a  
15 number of years ago.

16                   **MR. FITZGERALD:** Going back to what you were  
17 saying, Liz, so if you have enough data as I  
18 understand it, you can go back to somebody who  
19 has a urinalysis record for plutonium and fit  
20 a curve depending on the solubility class that  
21 you would assign to that particular worker in  
22 that particular location, whatever work they  
23 were doing. Is that how you would make the  
24 adjustment for that contribution?

25                   **MS. BRACKETT:** No. Well, if you mean in

1                   general, do you mean have enough data for the  
2                   person?

3                   **MR. FITZGERALD:** If you have enough data for  
4                   the person, he was exposed to plutonium, you  
5                   know, he's got some data in there, urinalysis  
6                   data, say, from the '70s or '60s or whatever.  
7                   Are you talking about adjusting that dose to  
8                   reflect the high-fired solubilities that you  
9                   know now that weren't reflected --

10                  **MS. BRACKETT:** So it would be taking the  
11                  data and making adjustments in IMBA so that  
12                  you fit that data. You don't take any  
13                  knowledge of anything they were exposed to  
14                  that would fit their individual data.

15                  **DR. ULSH:** Which is what we always do.

16                  **MR. FITZGERALD:** Right.

17                  **MS. BRACKETT:** Well, not to this extent.  
18                  This would involve modifying parameters that  
19                  you didn't normally modify, but if it  
20                  exhibited that --

21                  **MR. FITZGERALD:** But you need dissolution --

22                  **MS. BRACKETT:** Right, in that case that  
23                  would only be done if a best estimate were  
24                  required for the person. Oftentimes an  
25                  overestimate or an underestimate. If we

1 needed to go to that level of detail, it would  
2 come probably to me or Tom LaBone to do that.

3 **MR. FITZGERALD:** How would you assign the  
4 solubility class in a circumstance where even  
5 in the Mound documentation it's sort of across  
6 the board depending on the actual process  
7 involved?

8 **MS. BRACKETT:** Well, the way it's typically  
9 done, and this is pretty much for all sites,  
10 is that the dose reconstructor runs all the  
11 possibilities. Well, ICRP assigns plutonium  
12 to M and S. We're talking -238, the dose  
13 reconstructor would run the -238 to both M and  
14 S, whichever gave the larger dose, that would  
15 be assigned. And then for -239 they'd run M,  
16 S and Super-S, whichever gave the largest dose  
17 would be the one that was assigned.

18 **MR. FITZGERALD:** And you wouldn't have any  
19 instances where sort of similar to what was  
20 established at Rocky and the OTIB-049 thing  
21 where you have something that's even more  
22 insoluble than what would be in a class, I  
23 guess, in this case?

24 **MS. BRACKETT:** Super-S?

25 **MR. FITZGERALD:** Well, yeah, Super-S.

1           **DR. ULSH:** Now we're estimating.

2           **MR. FITZGERALD:** Not the -238, really, the S

3           --

4           **MS. BRACKETT:** Right, well, that's what  
5 we're talking about developing an OTIB to see  
6 if that would give you more dose than M or S  
7 would and under what circumstances. I'm  
8 guessing it would be limited in time as to  
9 when it would be more limiting since you get  
10 the dip down, and then it's back up. I think  
11 it's probably going to fall in between the  
12 others except in certain circumstances. And  
13 that's what we'd look at to see what  
14 circumstances there would be that it would  
15 give you the largest dose.

16           **MR. FITZGERALD:** So I guess in sum this is,  
17 you would consider this a very tractable  
18 issue?

19           **MS. BRACKETT:** Yes.

20           **MR. FITZGERALD:** Okay.

21           **DR. ULSH:** Well, before we leave the, issue  
22 nine, it still mentioned uranium and thorium  
23 compounds in terms of Super-S.

24           **MR. FITZGERALD:** Yeah, any -- this is sort  
25 of a question. Given the processes involved

1 is there any evidence of any of that, I guess,  
2 in terms of the effects that would be not as  
3 pronounced perhaps with plutonium but where  
4 high-fired would have some bearing on those?

5 **DR. ULSH:** Well, I think if I recall  
6 correctly, you also raised this question in  
7 terms of the Rocky Flats things when we were  
8 handling Super-S plutonium there. You asked  
9 about uranium and thorium. Our answer  
10 wouldn't be much different from there. And  
11 that is that we have never, we're not aware of  
12 any worker who's ever observed Super-S  
13 behavior for the uranium or thorium.

14 Now in answer to your question we  
15 specifically talked about the microsphere  
16 project where they draw small particles  
17 through a plasma torch, and they did do that  
18 with thorium oxide. I know that, at least on  
19 one occasion. I don't know how many times.

20 **MR. FITZGERALD:** I think only briefly. I  
21 think it was only a couple --

22 **DR. ULSH:** I think so, too. But we're not  
23 aware of anything that suggests you should  
24 treat uranium and thorium as Super-S material.  
25 This question keeps coming up, and if you guys

1 are aware of something that we're not, we'd  
2 love to see it. But we haven't addressed that  
3 question; we'll see if it comes up.

4 **MR. FITZGERALD:** On this particular one  
5 though, on Super-S, I think it would be Super-  
6 S now, high-fired oxides, it would be helpful  
7 to, I think we'll take it upon ourselves to  
8 give you a review just to raise some questions  
9 on that. We don't have to take the time now,  
10 but just to sort of put this to bed in terms  
11 of some of the technical questions associated  
12 with the approach. And I think we can deal  
13 with it as a technical issue and just kind of  
14 cross the T on that one.

15 **MS. BEACH:** And I also have Bob to try to  
16 provide NIOSH with the study from Los Alamos  
17 if possible.

18 We're on to number ten. Does anybody,  
19 do you want to take a five-minute break? We  
20 have about an hour and 15 minutes left.

21 **MR. FITZGERALD:** Are we going too fast now?

22 **MS. BEACH:** My question is would you like to  
23 take a break or would you like to continue?

24 **MR. FITZGERALD:** For those who have to  
25 drive, I guess that would be one issue. Do we

1 want to keep going and get this done early?

2 **DR. ULSH:** Let's take five.

3 (Whereupon, the working group took a break.)

4 **DR. BRANCHE:** We're ready to get started  
5 again. We don't have much time left, and I  
6 would just ask again for those of you who are  
7 on the phone, at the risk of sounding like a  
8 broken record, if you could please mute your  
9 phone, then when you're ready to speak you can  
10 unmute your phone. If you do not have a mute  
11 button, then please dial star six. Thank you  
12 so much.

13 **MATRIX ISSUE TEN: D&D ERA**

14 **MS. BEACH:** Are we ready to move on to  
15 number ten?

16 **MR. FITZGERALD:** Yeah, number ten I think is  
17 more or less a place holder. I think the ER  
18 is pretty clear that the D&D era is being  
19 investigated still. And I think certainly we  
20 believe it's an important era to look at. So  
21 there's nothing, I don't think there's  
22 anything unless you have any new developments  
23 that --

24 **MR. STEWART:** Well, there is one observation  
25 I'd like to make. And that is that DAC-hour

1 tracking was not used in the dose  
2 reconstruction project. The site may use it  
3 to assign doses, but we don't use site-to-site  
4 doses in the ER.

5 **DR. ULSH:** And that kind is a good lead into  
6 a concern that I have on this particular  
7 issue. I'm not sure if there's any  
8 significance to be read into the bold  
9 statements down there. I mean SC&A goes  
10 through a couple of issues that they see as  
11 problems like lapel sampling, DAC-hour  
12 tracking being used to track internal dose  
13 rather than routine bioassay.

14 I think reliance on cohort lapel air  
15 sampling and samples randomly assigned to D&D  
16 workers, and then as I read the statement,  
17 SC&A agrees that issues like these associated  
18 with internal exposure during D&D for special  
19 consideration. That tends to imply that that  
20 was NIOSH's concern, too, and that you're  
21 agreeing with it. And that's not the case. I  
22 mean, we never mentioned a concern about lapel  
23 sampling or DAC-hour tracking.

24 In fact, it's our understanding that,  
25 yes, they certainly did use those for more

1 real-time sampling, but that was laid on top  
2 of routine bioassay like at other D&D sites.  
3 So we never made that an issue. The cohort  
4 sampling we've already talked about. So I  
5 just want to make it clear that -- and if you  
6 guys want to raise those issues, that's fine,  
7 but it's not issues that we're raising.

8 **MR. FITZGERALD:** I agree. I think that  
9 wording needs to be certainly changed, and we  
10 will do that.

11 **DR. ULSH:** Our concerns with the D&D era  
12 relate to the Price-Anderson Act violations,  
13 specifically the R Corridor job with regard to  
14 the handling of the actinium bioassay samples  
15 and how broad of an impact or narrow that  
16 might have on the reliability of the bioassay  
17 data for that time period. That's what we're  
18 concerned about.

19 **MATRIX ISSUE ELEVEN: ADEQUACY OF INTERNAL DOSE RECORDS**

20 **MR. FITZGERALD:** I think we just go to  
21 number 11. This 11 and 12, actually 11, 12  
22 and 13 get into the data completeness,  
23 integrity question that we got through  
24 earlier. And I think what I had said earlier  
25 was certainly we're impressed with and feel

1           that the MJW QA process for what was done on  
2           bioassay was, at least from what we've read --  
3           again, we haven't done anything more than just  
4           read what was in the file, but it seemed  
5           fairly complete and would mitigate some of the  
6           concerns that we would normally have.

7                     The issue number 11 just gets to  
8           concerns over the basic radiochemistry,  
9           radioanalysis going back to the early years.  
10          And I guess this is just a question for Liz  
11          and for others who have looked at this. Has  
12          anyone kind of examined the radiochemistry or  
13          just the analysis itself to determine whether  
14          or not there's validity in that quite apart  
15          from the bioassay per se?

16                    **MR. STEWART:** Sorry, Liz. I guess we had a  
17          radiochemist in the bunch and there was a  
18          concern over that issue. And I don't have a  
19          good answer to that either. It just didn't  
20          seem like I could find anything that spoke to  
21          the confidence on that early radiochemistry  
22          radioanalysis.

23                    **MS. BRACKETT:** Are there particular nuclides  
24          or you're just questioning --

25                    **MR. FITZGERALD:** It's just a broader

1 question. I think I kind of pushed the  
2 individual for some examples, and that's what  
3 these are, but just to illustrate what we're  
4 talking about. But could you point in the  
5 direction as to where that information or  
6 analysis could have been done so that we have  
7 a clearer idea of whether -- because I keep  
8 getting feedback that certainly in the early  
9 years -- it's not specific to Mound -- that  
10 was a big limitation to the reliability of  
11 some of the data that was being collected was  
12 just that it was very primitive time for a lot  
13 of the radioanalysis that was being done.

14 And I don't have a good answer to that  
15 because I looked through the documentation and  
16 couldn't find anything that per se. And this  
17 is almost a QA/QC issue in a way, but it gets  
18 to the data reliability.

19 **MS. BRACKETT:** Well, the polonium, for  
20 example, that was reviewed in more recent  
21 times. You've probably seen the papers for  
22 the New York University study where they  
23 reproduced the polonium measurements and  
24 determined that the recovery was less than  
25 what they believed that they had at the time.

1                   So I think my interpretation of that was that  
2                   the method's fine as long as you use ten  
3                   percent recovery because that's what they were  
4                   able to obtain.

5                   **MR. ELLIOTT:** That's [name redacted]report?

6                   **MS. BRACKETT:** No, well, he was involved  
7                   later, but it was New York University, [name  
8                   redacted] did his Ph.D. on that I think.

9                   **DR. ZIEMER:** [name redacted] ^ was involved.

10                  **MS. BRACKETT:** Yeah, there were a lot of  
11                  people involved in that.

12                                 The plutonium, I mean, a lot of it was  
13                                 just standard gross alpha kind of thing. I  
14                                 don't know the details about plutonium. Some  
15                                 of these key other radionuclides as we call  
16                                 them, the primary reason for proposing the SEC  
17                                 in the early years was because of the  
18                                 interpretation of those data.

19                   **DR. ULSH:** The radium, actinium, thorium.

20                   **MS. BRACKETT:** Right, because that was, it's  
21                   very complicated, and I'm sure at the time  
22                   they knew what they were doing. But in going  
23                   back and looking at the records it's very  
24                   difficult to see all. They were plotting  
25                   radium and making assumptions about the time,

1 and it was just very complicated. So we don't  
2 feel that we can use that now.

3 **DR. ULSH:** The one example you give here  
4 about thorium urinalysis data for insoluble  
5 forms of thorium have been shown to be  
6 ineffective in detecting thorium uptakes. I  
7 don't know that we would agree with that. I  
8 think we would go back to the characterization  
9 that Paul gave earlier in another context.  
10 And that is that the MDA is high, and we would  
11 certainly agree with that. But that just  
12 leads to high missed doses. We don't see that  
13 as an example of an SEC-type issue.

14 **DR. ZIEMER:** That is true in (a) I think if  
15 you're getting low recovery, it just affects  
16 your sensitivity.

17 **MS. BRACKETT:** Right.

18 **DR. ZIEMER:** Actually, for a claimant, given  
19 two people with the same numbers, it probably  
20 helps them because the uncertainty in the  
21 missed dose is higher.

22 **DR. ULSH:** Yes, I think that's right.

23 **DR. ZIEMER:** But you used the ten percent  
24 figure. Very few uncompensated lung cancers.

25 **DR. ULSH:** Joe, I can maybe provide a little

1 more -- I'm trying to recall. I think the  
2 Meyer document, the history of the internal --  
3 at least Don told me this is where I saw it.  
4 There's a table in there. It shows the major  
5 programs, and then underneath it shows the MLM  
6 report that talks about the bioassay method  
7 that they used to cover those programs. I'm  
8 going to go try to find that again and get  
9 that to you or at least find out where it is.  
10 But that might provide more details about  
11 exactly what kind of analysis they did. That  
12 would help.

13 **MR. FITZGERALD:** Yeah, it would help. And I  
14 think from what I understand is that other  
15 than the actinium, radium, thorium, that  
16 process in terms of analysis, the confidence  
17 on the other analytical techniques in terms of  
18 the time frames involved is sufficient with  
19 adjustments necessarily for polonium. The ten  
20 percent, it's reliable enough for dose  
21 reconstruction.

22 **DR. ULSH:** That's certainly our impression  
23 at the moment. Yeah, we don't see any issues  
24 with the exception of the radium, actinium,  
25 thorium that they're insufficient. And, Joe,

1 if you want to write this down, that reference  
2 is "The History of Bioassay" by Meyer. It's  
3 on page --

4 **MR. FITZGERALD:** Oh, yeah, I think we have  
5 that.

6 **DR. ULSH:** -- page 21 --

7 **MR. FITZGERALD:** In a certain volume, right?

8 **MR. STEWART:** Yeah, the bioassay's a single  
9 volume, 990 pages.

10 **DR. ULSH:** This is on a PDF, page 21.

11 **MR. BISTLINE:** What page?

12 **DR. ULSH:** Twenty-one. And it lists the  
13 report. It has like a, well, I think these  
14 are report numbers: MD-20738. I think that's  
15 --

16 **MR. STEWART:** This is an internal dose  
17 procedure.

18 **MS. BRACKETT:** I was just going to note that  
19 there's been a bioassay conference that's been  
20 going on for around 50 years. I don't  
21 remember exactly where we're at now with it,  
22 but that was something that was started within  
23 the AEC complex for the sites to get together  
24 and develop bioassay techniques and discuss  
25 what was going on. And Mound was a very early

1 participant in that. In fact, they gave  
2 papers almost every year, so they were very  
3 involved with the latest techniques and all in  
4 keeping up with what was going on.

5 **MR. FITZGERALD:** Okay, well, we'll take a  
6 look at the reference and decide whether did  
7 we solve this issue the next go around on  
8 that.

9 **MATRIX ISSUE TWELVE: INTEGRITY AND COMPLETENESS OF**  
10 **INTERNAL DOSE RECORDS**

11 The next two issues are really getting  
12 into something we talked about earlier which  
13 was how to handle the data integrity,  
14 completeness and whatever validation the work  
15 group believes we ought to do in the databases  
16 themselves. And I guess I would probably go  
17 ahead and defer to the interim -- I don't even  
18 know what you would call it -- sort of an  
19 interim approach that you offer with certainly  
20 our awareness of the 1996 QA that MJW did on  
21 internal.

22 So we're acknowledging that, but just  
23 grappling in the internal and external and  
24 address that maybe in more detail next work  
25 group session. It would be helpful I guess if

1 possible to get that before we actually sit at  
2 the table if there's any way to take a look at  
3 that.

4 I think that would inform whatever  
5 strategy the work group would want to go ahead  
6 and take as far as the data integrity and  
7 completeness. Because I think at this point  
8 there must be a happy medium using Rocky as  
9 one extreme and using, and not doing anything  
10 on the other but just simply being able to  
11 come up with an assessment of data reliability  
12 that would be suitable for the Board.

13 **DR. ZIEMER:** What's going to happen then  
14 when this thing is --

15 **MR. FITZGERALD:** I think what we're saying  
16 is that these next two items speak to the data  
17 integrity and completeness on the internal  
18 side. I think what Brant was offering earlier  
19 was to provide the work group a path forward  
20 based on what QA/QC is available in the Mound  
21 literature.

22 And I was just proposing in maybe  
23 internal plus external we could do it in one  
24 piece. But then that would require a work  
25 group session to decide what the strategy

1                   ought to be as far as any further review on  
2                   that subject.

3                   **MS. BEACH:** Part of our number 18  
4                   discussion.

5                   **MR. FITZGERALD:** Yeah.

6                   **MS. BEACH:** Is there any idea, Brant, of  
7                   time? How long it's going to take you guys to  
8                   come up with some kind of summary? And I'm  
9                   not putting any specific dates down, just --

10                  **DR. ULSH:** I don't know, Josie, because  
11                  we're going to have to go, I've got a couple  
12                  of things that I'm going to do. I'm going to  
13                  talk to the Mound folks that I'm in touch with  
14                  for leads on where you can find some of this  
15                  information. We might include this in our  
16                  next key word search to D&D Legacy Management.  
17                  So I'm not sure how long that particular item  
18                  might take.

19                  **MR. ELLIOTT:** Are we talking about item 13  
20                  here or --

21                  **DR. ULSH:** No, 12.

22                  **MR. ELLIOTT:** Just 12.

23                  **DR. ULSH:** Well, I don't know. You can  
24                  answer that, too.

25                  **MR. FITZGERALD:** Well, I think 13 is a

1 related issue, a different issue. Well, maybe  
2 we should treat 13 differently.

3 **MR. ELLIOTT:** I was going to say if the two  
4 you're talking about is 12 and 13, then 13, I  
5 think we've already got some information on  
6 13.

7 **MS. BEACH:** We haven't got to 13 yet.

8 **MR. FITZGERALD:** That's all right. I was  
9 completing 12 and 13. I think you're right,  
10 12 is different than 13. So we're talking 12  
11 and 18?

12 **MS. BEACH:** Eighteen.

13 **MR. FITZGERALD:** Twelve and 18.

14 **DR. ULSH:** So without knowing how readily  
15 available this data is, I can't really say.  
16 But if it's going to take a long time, I'll  
17 let you know.

18 **MS. BEACH:** Fair enough.

19 **MATRIX ISSUE THIRTEEN: MOUND EMPLOYEES RECORDS**

20 **MR. FITZGERALD:** I guess on 13 this is  
21 certainly more of a petitioner issue and again  
22 I would defer to the work group, but there  
23 were questions raised about what was in fact  
24 scanned, what was actually the criteria for  
25 choosing what came out of the records. Some

1 of those questions of -- we don't have  
2 anything more than what's in the ER.

3 And the question before the work group  
4 is in terms of validating that particular  
5 question that's been raised in the petition  
6 process whether or not that's sufficient or  
7 not. I think there could be some further  
8 information gathered or it could be left as  
9 is. I mean, I don't, again, I think it is  
10 what it is. At this point whether or not  
11 there's any need to review that information in  
12 terms of what was imaged, I don't know. But I  
13 don't know if NIOSH has information -- we just  
14 simply have what's in the ER at this stage.

15 **DR. ULSH:** Well, there's the ^ record? When  
16 I say the ^, it's called the History of --

17 **MS. BEACH:** I'm looking it up right now.

18 **DR. ULSH:** It's got a 2000, I think, page  
19 document.

20 **MS. BEACH:** Let me get you the number for  
21 it.

22 **DR. ULSH:** That certainly describes that  
23 situation. I would also refer you to our  
24 interviews with Ms. Brackett and Ms. Kirkwood  
25 who are intimately familiar with that whole

1 situation. To briefly summarize, and I --  
2 Feel free to fill in.

3 There's a number of reasons why we  
4 don't believe that the --

5 **MR. STEWART:** Before you go on, this is not  
6 an O drive issue. It's been on the O drive.  
7 There are some DOE documentation, a record  
8 transfer decision, making documents on what  
9 went where. Why these boxes were pulled aside  
10 and sent to Los Alamos to be buried. And in  
11 those decision-making documents it explains  
12 what our belief is that there are other  
13 documents that replicate or duplicate the  
14 information that has been buried.

15 **DR. ULSH:** Right, and I know that those were  
16 presented to the Board. I don't know whether  
17 they are --

18 **MR. STEWART:** They were presented to the  
19 Board. I don't remember which meeting it was,  
20 but we can resurrect those documents. And  
21 that's the basis of our position that we have  
22 not lost anything here because we can  
23 reproduce other sources.

24 **DR. ZIEMER:** Isn't there an index or  
25 something that was in the other boxes?

1           **MR. STEWART:** It included an index of all of  
2 the records that were so contaminated and not  
3 scanned or put to CD.

4           **DR. ULSH:** Just going back to first  
5 principles there's no reason to assume that  
6 the types of data that we use in dose  
7 reconstruction, so we're talking film and TLD  
8 results, bioassay results would have been  
9 included in this records collection because  
10 it's a classified records collection. It's  
11 not dosimetry records. And that was confirmed  
12 by -- I guess now that she works for ORAU I  
13 can say -- Cheryl Kirkwood, if that was the  
14 case.

15                       So you wouldn't expect to find primary  
16 dosimetry records in that collection in the  
17 first place. And then it was sent down to Los  
18 Alamos. This was right around the time MJW  
19 was doing their pre-'89 dose reconstruction,  
20 and Liz and I don't know, a few others, Liz  
21 and one other person went down just to make  
22 sure that there wasn't anything in that  
23 collection that they would need for their dose  
24 reconstruction process. And she identified a  
25 number of boxes that required further



1 polonium, nothing other than that.

2 And then there was the identification  
3 of a larger number of boxes, and those were  
4 returned. There were 43 I believe is what it  
5 said. Those got returned to Mound later on.  
6 And those were all reviewed. Although to be  
7 honest as I told them in my interview, my  
8 memory is not that good.

9 I really don't recall what we might  
10 have found there or why the particular boxes  
11 were identified. What I do recall though is  
12 that for the large part we found that we had  
13 already looked at these logbooks in microfilm  
14 form. That they were still in existence  
15 onsite but just in a different format.

16 **MR. ELLIOTT:** I think it important to note  
17 for the working group, for the full Board, for  
18 SC&A and members of the public that under the  
19 moratorium that DOE established on destruction  
20 of records each time one of the sites comes  
21 forward and says here's a series of records  
22 that we are proposing to destroy, they turn  
23 around to us and ask us if there's any  
24 epidemiologic or compensation interest in  
25 retaining those records. In fact, today some

1 of the, you've seen me busy on my Blackberry.  
2 I've been dealing with two of these requests  
3 right before me today on should we throw away  
4 records or not. And so we look at those very  
5 carefully when asked to do so.

6 **MS. BEACH:** So we never did get back to on  
7 what you suggested, the records transfer  
8 information decision. Can we have somebody  
9 put that on the O drive so it's --

10 **MR. ELLIOTT:** It's on there.

11 **MS. BEACH:** It is on there.

12 **MR. FITZGERALD:** It's on there. I think we  
13 have looked at that. And I think the only  
14 question, and this gets to -- that's why I'm  
15 saying I kind of conflated this one with the  
16 previous one because it gets to whether the  
17 work group wants any validation of the  
18 transfer of some of this information or not.  
19 And the information is strong in some  
20 respects, but it's the issue of whether or not  
21 the records are complete. It gets to the  
22 completeness question.

23 I don't have a good answer for it, but  
24 I think this notion of what's a measured  
25 response to establishing the reliability of

1 the data is an ongoing question that we've  
2 grappled with from site to site to site. And  
3 we kind of indicate that Rocky's is extreme.  
4 And I believe that was an extreme, but what is  
5 that middle road that allows the work group  
6 and the Board to feel that the database is  
7 reliable including the records that were  
8 implicated in that situation at Los Alamos.

9 And that measured response I think is  
10 what we're trying to grapple with. And I'm  
11 quite comfortable waiting, I think, to hear  
12 from Brant and NIOSH as far as strategy but  
13 then trying to weigh that. I think it's a  
14 similar issue we're going to have at many  
15 sites where you don't have necessarily an  
16 alleged deficiency or gap per se, but still  
17 there may be some questions about how reliable  
18 is the data going into the dose reconstruction  
19 and being able to put the Board in position to  
20 independently answer that question.

21 And in this case I feel that there's  
22 been a fair amount of corroboration. We  
23 talked to Liz about it, and ten years is a  
24 long time to remember those details. I can't  
25 remember back in those days much either. So

1 the question is, is there a way, and I think  
2 the DOE is one way. We're going to go to OSTI  
3 as another way. I feel confident we can  
4 probably corroborate if the work group, sort  
5 of the judgment on the reliability, for  
6 example, this issue.

7 The other issue I think we would want  
8 to wait and see what comes out of the thing  
9 that Brant's putting together. But I think in  
10 general all these issues we're trying to come  
11 up with whatever the measured response would  
12 be that would give sufficient confidence that  
13 the database can be relied upon. And I'm open  
14 to different approaches on that, having lived  
15 through some of the other approaches.

16 **DR. ZIEMER:** Well, on this particular issue,  
17 Joe, were you asking whether or not there  
18 might have been some records that we don't  
19 have that are in there in the other boxes that  
20 didn't get in. What is being asked --

21 **MR. FITZGERALD:** I think the premise is, you  
22 know, I think Liz touched on it that the  
23 notion was were the relevant records scanned,  
24 in other words, recovered from the boxes that  
25 would be, whether it be bioassay operation

1 information, not necessarily everything that  
2 was there. A lot of it was not particularly  
3 relevant. And is there a way without  
4 prejudging it that you could sample to come up  
5 with that information or not. Or, as Larry's  
6 suggesting, if you have enough corroborating  
7 references to this information, you know, it  
8 was scanned and here's what was scanned, and  
9 here's what came out of it. Or here's --

10 **DR. ZIEMER:** Or here's, they still exist  
11 elsewhere.

12 **MR. FITZGERALD:** -- they exist elsewhere,  
13 then I think that could be a way forward on  
14 that. I guess the way we wanted to couch this  
15 was you could sample. You could do something  
16 to verify. The verification I think is  
17 something that we'd like to provide the work  
18 group just so that question can be answered in  
19 the end. Whether it's this issue or the other  
20 issues that the database itself is, has been  
21 looked at and is reliable.

22 Perhaps on this one, even though it's  
23 a not the same specific issue as the other  
24 data completeness, integrity issues, if the  
25 gold standard is the DOE transfer

1 documentation, perhaps that would be one way  
2 to establish that this is probably going to be  
3 the basis for judging the reliability as it  
4 stands now for this question of the boxes.  
5 I'm just thinking out loud that that might be  
6 the path forward to --

7 **DR. ULSH:** That's certainly one piece of  
8 important information. But I would also  
9 encourage you to, well, when you talk to Liz,  
10 look at her interview with Cheryl Kirkwood as  
11 well on this topic, and then ^ those three  
12 documents. Those together form the set of  
13 documents and interviews that we've used to  
14 address this issue.

15 **MS. JESSEN:** I think you'll find that ^  
16 document pretty thorough.

17 **MR. ELLIOTT:** How far does 13 go to be, to  
18 relating to database reliability though?  
19 That's not clear to me. Do we have any sense  
20 of that? I mean --

21 **DR. ZIEMER:** If the issue is, were records  
22 destroyed that we don't have independently,  
23 I'm not sure you'll ever quite answer that.  
24 But --

25 **MR. ELLIOTT:** I'm not aware if these records

1                   ever were a part of what was assembled into a  
2                   database. That's the question I'm raising.

3                   **MR. FITZGERALD:** Yeah, the logbooks, for  
4                   example, would not have gone to the database,  
5                   but they would have been mined, I would  
6                   assume, for bioassay information that would  
7                   have been perhaps --

8                   **MR. ELLIOTT:** On cards probably.

9                   **MR. FITZGERALD:** So the scanned logbooks are  
10                  essentially the only information that has been  
11                  saved from all that file.

12                 **MR. ELLIOTT:** It's one thing to ask the  
13                 question have we lost something here that's  
14                 critical for dose reconstruction, and it's  
15                 another question to say did something happen  
16                 in these set of records that confounded the  
17                 reliability of the database. And maybe both  
18                 questions are appropriate, maybe not. I don't  
19                 know.

20                 **MS. BRACKETT:** Well, when we went looking, I  
21                 think the reason we looked was because for  
22                 polonium, we were the ones who created the  
23                 database. And we noticed -- and people were  
24                 pretty routinely sampled weekly. It was  
25                 pretty constant for a number of years. And we

1           could look and see that there seemed to be  
2           some gaps maybe months at a time here and  
3           there. And we said, well, maybe there's some  
4           data missing and that was when we started  
5           looking at other records. And we did retrieve  
6           a few logbooks that filled in those gaps. And  
7           so I think that we are relatively confident  
8           that we have, that we did retrieve all of the  
9           polonium records because, like I said, you  
10          could, I think one of the final reports  
11          addresses that that said there were gaps here,  
12          and we found the data that went there. We  
13          didn't identify gaps for any other time, and  
14          those were from the '40s. We didn't find  
15          anything from really later times that we  
16          didn't already have, so very old data.

17                 One thing I should point out is that  
18                 when we were looking at the records, we were  
19                 strictly focused on internal dosimetry. So we  
20                 would not have looked, we wouldn't have  
21                 identified any external dosimetry records as  
22                 part of that. But I think we only found a few  
23                 that we didn't have anywhere else, and they  
24                 did fill in some gaps. And that was having  
25                 through looked at lists of what were in the

1 boxes and saying okay, likely in these boxes.  
2 And we did find what we were looking for in  
3 those boxes.

4 **MR. FITZGERALD:** Now, we haven't gotten to  
5 the scanned logbooks. I guess this  
6 information sits in the records file at Mound.  
7 We haven't done any data retrieval there at  
8 all yet. So there's at least some way of  
9 examining that and adding that to, I think,  
10 some of this corroboration as to what was  
11 pulled and what it actually was. We have  
12 descriptions but we actually haven't seen the  
13 specific pieces of information. I assume that  
14 those scanned documents are in the, I assume  
15 they're not classified, and they were in the  
16 repository. I think they are.

17 **DR. ULSH:** I think they're in OSTI.

18 **MR. FITZGERALD:** Yeah, and we're going to  
19 OSTI, too. So I guess I would say we have a,  
20 we certainly have a concern, but I think maybe  
21 we're talking a little bit more data review,  
22 document review and not coming to any  
23 conclusion as much as trying to find a path  
24 forward as to how one could perhaps provide  
25 some validation, whether by using these

1 various pieces of information or looking at  
2 all the records at OSTI, but just coming to an  
3 aggregate that we can offer the work group and  
4 say that given all these sources we feel  
5 pretty confident on the reliability of this  
6 information per se.

7 **MS. BEACH:** Hopefully, we'll get to that  
8 point.

9 **MR. FITZGERALD:** Well, you know, this is  
10 early; this is early. But, yeah, so we'll  
11 follow that course with this particular piece,  
12 and we'll have to come back and advise the  
13 work group on where that is.

14 **DR. ULSH:** Nineteen? Is that where we are?

15 **MS. BEACH:** Yeah. I think we actually got  
16 through it.

17 **DR. ZIEMER:** Twenty.

18 **MATRIX ISSUE TWENTY: AMBIENT ENVIRONMENTAL INTERNAL**  
19 **RADIATION DOSE CONTRIBUTION**

20 **MR. FITZGERALD:** Now, on the original  
21 matrix, which has lost its headers, there used  
22 to be a header right here that said that  
23 everything above the line we thought was a --  
24 I forget the term now --

25 **MS. BEACH:** Potential SEC -- it's in small

1 print.

2 **MR. FITZGERALD:** Okay, the print has  
3 changed. It was about ten inches high before.

4 So these are ones that we have more  
5 questions with how the phraseology was in the  
6 ER. And I guess we had one of these former  
7 Mound environmental folk who raised questions  
8 about the comment about the environmental  
9 ambient contamination. So that, I think, is  
10 less an SEC issue and more of leaning towards  
11 a site profile question as to whether the  
12 ambient environmental sources would have been  
13 contributors or not.

14 And I think what we're saying there is  
15 we feel this number of sources that would have  
16 been contributors -- certainly the radon was  
17 what we talked about today, but there's other  
18 sources as well. But I think we would offer  
19 that as more -- since we're drawing a line of  
20 sorts -- more the commentary maybe with a site  
21 profile context about the contribution of  
22 environmental sources, onsite environmental  
23 sources.

24 **DR. ULSH:** Yeah, I mean, you might be  
25 talking semantics here in terms of our

1 statement. I mean, at Mound we do just like  
2 we do at other sites. We do assign a greater  
3 than zero ambient environmental dose, and we  
4 do that at Mound, too.

5 But when we say that they generally  
6 didn't experience site-wide ambient  
7 contamination, I wouldn't be opposed to  
8 removing that statement. But the examples  
9 that you've got here, the contaminated canal,  
10 that was offsite and that was contaminated  
11 sediments which workers were not routinely  
12 exposed to. So that's not an example of site-  
13 wide contamination.

14 The leaking storage drums I assume  
15 relate to the Thorium-232. We've already  
16 talked about that, that that was one area, the  
17 southern part of the site, remote again, not  
18 site wide. The leaking waste lines were  
19 underground so that's not site wide. Radon,  
20 we need to talk about radon.

21 **MR. FITZGERALD:** Now on the underground pipe  
22 I think there was an event. I can't recall,  
23 it was a D&D. They were working on the pipe  
24 and were exposed or something. I seem to  
25 recall that being a --

1           **DR. ULSH:** Yeah, they dug it up to remediate  
2 it.

3           **MR. STEWART:** Several people.

4           **DR. ULSH:** But again, that's localized.  
5 It's not site wide.

6           **MR. FITZGERALD:** Without getting into trying  
7 to come up with a list to substantiate the  
8 comment, I think the concern was that there  
9 were ambient sources that already factored in.  
10 I don't think you're disagreeing with that.  
11 It's just that it wasn't clear from this  
12 whether it was going to be not addressed. I  
13 think what you're saying is it's going to be  
14 addressed. That's one reason I put it down  
15 below the line. Seeing the comment I just  
16 wanted to clarify what your intent there was.

17           **DR. ULSH:** Now there was one thing here in  
18 SC&A's statement. It says given that the  
19 officially estimated source terms for air  
20 emissions at other DOE sites have been shown  
21 to be incorrect in the past, often in the  
22 direction of significant underestimation by  
23 independent investigations, we wouldn't  
24 necessarily posit that as a given without  
25 knowing the specifics that you're referring

1 to.

2 **MR. FITZGERALD:** Okay, well, we can provide  
3 examples, but I'm not sure it changes, but  
4 we'll go ahead and provide the examples just  
5 to expand that a little bit.

6 **DR. ULSH:** I agree with you. I think that  
7 this should be included in dose  
8 reconstructions, and it is at Mound. So like  
9 I said, I'm not so wedded to this comment that  
10 it causes heartburn for anybody if you would  
11 take it out.

12 **DR. ZIEMER:** But you're saying it's not  
13 necessarily the same value for each part of  
14 the site; and therefore, it's not a site-wide  
15 value. Or are you --

16 **DR. ULSH:** No, we do have --

17 **DR. ZIEMER:** -- you are going to assign a  
18 site-wide value for ambient --

19 **MR. STEWART:** We'll take the maximum value.

20 **DR. ZIEMER:** Whatever it turns out to be.

21 **MR. STEWART:** Yes. Typically. We have the  
22 provision to scale those back if we know a  
23 particular work location, but we rarely do it.  
24 I don't know if we've ever done it.  
25 Typically, would be in a minimizing case.

1                   **MR. FITZGERALD:** I think that's all we have.

2                   **DR. ULSH:** Only one we agree.

3 Investigation's ongoing.

4                   **MS. BEACH:** How's that going by the way?

5                   **DR. ULSH:** That's another one of those 2000  
6 pagers so we're plowing our way through that  
7 as well. Yeah, maybe I should wait until I've  
8 --

9                   **MS. BEACH:** I think that's a good idea.

10                  **MR. FITZGERALD:** To be done.

11                  **MS. BEACH:** Does anybody have anything  
12 further?

13                  **DR. ULSH:** Actually, I've got something to  
14 just mention.

15                                 Joe, I know I told you about this. I  
16 hope I told you about this, but we have been  
17 working, the ORAU team and NIOSH ^ Museum  
18 Association to access their collection of the  
19 MLM reports. It's been represented to us that  
20 they represent about 85 percent of all of the  
21 MLM reports.

22                                 Just for those of you who don't know,  
23 like most national labs, I think, Mound  
24 documented pretty much the results of all  
25 their research in these technical reports.

1                   These are MLM reports. I'm not sure what the  
2                   acronym stands for. So we're in the process  
3                   of working with the Museum Association to  
4                   first create an index of that collection,  
5                   which once that's completed, we will share it  
6                   with SC&A and the working group.

7                   And if you will let us know which ones  
8                   you want us to go retrieve, we can go to the  
9                   Museum Association and copy those, capture  
10                  them. And that effort is ongoing. We  
11                  estimate it will take about maybe a month to  
12                  index that collection. It's quite large. But  
13                  that should help us.

14                  I mean, I know that like a lot of  
15                  folks, DOE is facing some resource  
16                  limitations. So to the extent that we can  
17                  lighten the load on what we ask for from them  
18                  by getting it through the Museum Association,  
19                  that might be helpful to all involved. So  
20                  we'll get that to you as soon as the index is  
21                  complete.

22                  **MS. BEACH:** Can you give us enough time to  
23                  be able to give you a list of what we'd like  
24                  to have also?

25                  **DR. ULSH:** Yes.

1           **MS. BEACH:** Because I know there was a  
2 little glitch on the last time you retrieved  
3 records. Or SC&A didn't have enough time to  
4 give you their list of four boxes.

5           **MR. FITZGERALD:** That was sort of a train  
6 passing at the same time that we were  
7 beginning to think about how to coordinate it.  
8 I guess I would comment that we're more than  
9 likely going to need to do a data review or  
10 document review at the Dayton Center at some  
11 point, maybe at the end of ^ early May. And  
12 we'll share pretty much what you have  
13 essentially already, but we may augment that a  
14 little bit and go offsite with the  
15 understanding that, again, if there's anything  
16 to withdraw for you, we'll go ahead and do  
17 that.

18                         But that won't happen for awhile. I  
19 think the last time I was there, they were, I  
20 think they had plenty of visitors and weren't  
21 looking for visitors for at least another  
22 month and a half. So I have a feeling that  
23 we'll probably get there sometime in May.

24           **DR. ULSH:** We're talking about three  
25 separate things. One is the Museum

1 Association. There won't be really any time  
2 pressures with that. I don't anticipate that  
3 collection going anywhere. So we'll provide  
4 you with the index and --

5 **MR. FITZGERALD:** Yeah, this is separate.

6 **DR. ULSH:** -- take the time that you want  
7 with that index.

8 Secondly, there are situations that  
9 you just mentioned about the records. These  
10 are ones that we had requested back at the end  
11 of last year, and they just came in. And this  
12 is where we're implementing, as Joe said, the  
13 coordination-type thing. I think we're still  
14 holding those boxes.

15 **MR. FITZGERALD:** We just missed that. We  
16 had sent them back. We just missed it by a  
17 day or so. So again, it wasn't the building  
18 specific. I can't remember the building, but  
19 it wasn't those boxes. It was the rad boxes  
20 that were relevant. But we'll probably go  
21 back in when they're ready to host us again  
22 and take a look.

23 **DR. ULSH:** Anyway, I just wanted to let you  
24 know that was going on.

25 **MR. ELLIOTT:** Don't forget, if they say they

1 have no money to support your visit, let me  
2 know. Because that's not supposed to be  
3 happening right now. And for your OSTI visit  
4 please don't pay for any documents down there.  
5 They should provide those. That's their  
6 responsibility.

7 **MR. FITZGERALD:** What we're going to try to  
8 do with OSTI is in spring there's going to be  
9 an Oak Ridge visit, and we're going to try to  
10 dovetail that visit and also look in OSTI.  
11 And I'm sure that we'll again share what we're  
12 going to ask OSTI for in case there's anything  
13 from that file that you would want to add  
14 onto. I think that's going to happen toward  
15 the end of April. I'm not sure. We just  
16 talked a little bit about it. So a couple  
17 things in the works on that. Anyway.

18 **MR. CLAWSON:** I just had one other question.  
19 You know, we keep falling back in the lawsuit  
20 that you guys got involved with. Is that part  
21 of the CEP issue that come up with those  
22 bioassays? Was that totally different?

23 **MS. BEACH:** That's a separate issue.

24 **MR. CLAWSON:** You said in this that any data  
25 that CEP had provided, bioassay or so forth,

1                   you basically ignored?

2                   **MR. ELLIOTT:** I said that.

3                   **MR. CLAWSON:** You said that.

4                   **MR. ELLIOTT:** I said we'd look at it in the  
5                   time frame when we know that CEP data was  
6                   corrupt. I'm not sure that we can say all CEP  
7                   data is corrupt.

8                   **MR. CLAWSON:** I just, I know this is --

9                   **MS. BEACH:** That's the stance that we're  
10                  taking though.

11                  **MR. ELLIOTT:** Yeah, that it's all corrupt?

12                  **MS. BEACH:** Yes. That's what I was told.

13                  **DR. ULSH:** That was the CEP data -- sorry --  
14                  the CEP Laboratory was involved in the  
15                  actinium situation in the early '90s, the  
16                  Price-Anderson Act. That was one of the labs  
17                  that they sent the samples to -- I think that  
18                  was the problem -- which were determined to be  
19                  unreliable.

20                  **MR. ELLIOTT:** I say what I say because we've  
21                  recently run into some new CEP data that we'd  
22                  have -- Stu would know this. I don't know.  
23                  And we raised the question is this considered  
24                  corrupt or not. And once we looked at it we  
25                  said yes. But we had heretofore recognized

1 CEP data attributed to that site.

2 **MS. BEACH:** And is it fair to ask for a  
3 report on the CEP data and what years are  
4 corrupt, not corrupt? Because I know this  
5 came up a couple of meetings ago, and it's  
6 going to come up for NUMEC and now --

7 **MR. ELLIOTT:** All of NUMEC.

8 **MS. BEACH:** Right, well, I guess I would  
9 just like something real standard if that's  
10 possible. I don't know, Larry, if it is.  
11 That's why I asked if it was fair to ask.

12 **MS. BRACKETT:** I mean, it's basically all  
13 CEP data where we are not using any CEP data,  
14 and they operated from the '70s to the '90s.

15 **MR. CLAWSON:** Now this is maybe where we're  
16 going to take care of it, the Board finding  
17 out how many sites this actually affected  
18 because we're seeing bits and pieces of it  
19 coming along.

20 **MS. BRACKETT:** I don't think that we know  
21 that because there are some facilities used  
22 them as just a minor part and they were one of  
23 several labs that were used at a time. And we  
24 seem to keep coming across data that is from  
25 CEP. It's not, I don't think it's a large

1 issue for most of the large DOE facilities.

2 **MR. ELLIOTT:** A-W-E's that had other work  
3 for AEC or DOE, Department of Defense work.  
4 That's what CEP was primarily supporting.

5 **MS. BRACKETT:** At Mound it was only 30  
6 samples. That's all that they ever sent to  
7 CEP.

8 **MS. BEACH:** And those are totally discounted  
9 at this time.

10 **MS. BRACKETT:** Right.

11 **DR. ULSH:** The site ^.

12 **MS. BRACKETT:** Right. Because the site at  
13 the time they sent them it was just before it  
14 all came out that there were problems, and so  
15 they were aware at the time that shortly after  
16 getting it done that it was a problem.

17 **MS. BEACH:** NIOSH, anything else?

18 **DR. ULSH:** No.

19 **MS. BEACH:** SC&A? Joe?

20 **MR. FITZGERALD:** No, I think that's it.

21 **MS. BEACH:** The working group?

22 Deb, you've been so quiet. Do you  
23 have anything you want to ask since we have a  
24 minute?

25 (no response)

1  
2  
3  
4  
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8

**MS. BEACH:** And we did talk about notes.  
You're going to send notes to me. I'm going  
to share them with Joe, and then we'll get out  
a copy to the entire work group.

Thank you.

(Whereupon, the working group meeting was  
adjourned at 3:15 p.m.)

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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 April 1, 2008; 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 8th day of July, 2008.

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**STEVEN RAY GREEN, CCR, CVR-CM, PNSC****CERTIFIED MERIT COURT REPORTER****CERTIFICATE NUMBER: A-2102**