

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

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ADVISORY BOARD ON RADIATION AND  
WORKER HEALTH

+ + + + +

WORK GROUP ON LINDE

+ + + + +

FRIDAY  
NOVEMBER 12, 2010

+ + + + +

The Work Group convened via teleconference at 10:00 a.m. Eastern Daylight Time, Genevieve S. Roessler, Chair, presiding.

PRESENT:

GENEVIEVE S. ROESSLER, Ph.D., Chair  
JOSIE BEACH, Member  
MICHAEL H. GIBSON, Member  
JAMES E. LOCKEY, Member

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## ALSO PRESENT:

TED KATZ, Designated Federal Official  
DAVE ALLEN, DCAS  
BOB ANIGSTEIN, SC&A  
TERRIE BARRIE, ANWAG  
ANTOINETTE BONSIGNORE, Linde Petitioner  
CHRIS CRAWFORD, DCAS  
MONICA HARRISON-MAPLES, ORAU  
EMILY HOWELL, HHS  
JENNY LIN, HHS  
LINDA LUX, Linde Petitioner  
JOHN MAURO, SC&A  
JAMES NETON, SC&A  
STEVE OSTROW, SC&A  
MUTTY SHARFI, ORAU

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1 P-R-O-C-E-E-D-I-N-G-S

2 (10:02 a.m.)

3 MR. KATZ: This is the Advisory  
4 Board on Radiation and Worker Health, Linde  
5 Work Group. My name is Ted Katz and I am the  
6 Designated Federal Official of the Advisory  
7 Board, and let us begin with roll call  
8 beginning with Board Members, with the Chair.

9 CHAIR ROESSLER: Gen Roessler, no  
10 conflict.

11 MR. KATZ: Please speak to  
12 conflict. Thank you.

13 MEMBER LOCKEY: Jim Lockey, no  
14 conflict.

15 MEMBER BEACH: Josie Beach, no  
16 conflict.

17 MEMBER GIBSON: Mike Gibson, no  
18 conflict.

19 MR. KATZ: And I think Bill Field,  
20 we've invited Bill Field. Are you with us?  
21 Gen, have you --

22 CHAIR ROESSLER: Yes, this is Gen.

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1 I got an email from him yesterday when I  
2 reminded him about the call. He said he had a  
3 conflict he was trying to get out of, so I'm  
4 hoping that he does -- that he is able to join  
5 us. I haven't heard anything this morning.

6 MR. KATZ: Okay. Well, let's carry  
7 on with the roll call, and then at the very  
8 end I'll check again before we get started.  
9 NIOSH ORAU team.

10 DR. NETON: Yes, this is Jim Neton,  
11 NIOSH, no conflict.

12 MR. ALLEN: Dave Allen, NIOSH, no  
13 conflict.

14 MR. CRAWFORD: Chris Crawford,  
15 NIOSH, no conflict.

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

18 MS. HARRISON-MAPLES: Monica  
19 Harrison-Maples, ORAU team, no conflict.

20 MR. KATZ: Very good. Welcome all  
21 to you. SC&A team?

22 DR. MAURO: John Mauro, SC&A, no

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1 conflict.

2 DR. OSTROW: Steve Ostrow, SC&A, no  
3 conflict.

4 DR. ANIGSTEIN: Bob Anigstein,  
5 SC&A, no conflict.

6 MR. KATZ: Welcome to you. Federal  
7 officials and contractors to the feds, HHS or  
8 otherwise?

9 MS. HOWELL: Emily Howell, HHS.

10 MS. LIN: Jenny Lin, HHS.

11 MR. KATZ: Okay. Members of the  
12 public?

13 MS. BONSIGNORE: Antoinette  
14 Bonsignore, Linde petitioner.

15 MS. BARRIE: Terrie Barrie with  
16 ANWAG.

17 MS. LUX: Linda Lux, petitioner.

18 MR. KATZ: Welcome to all of you.  
19 Let me now just check again. Bill Field, have  
20 you joined us? Okay, Gen, it doesn't -- it  
21 doesn't sound like he's with us yet, but I  
22 don't think Zaida is on the line.

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1                   Nancy, are you with us? No, okay.

2           I wonder if someone might give Bill a call  
3 just to check. The time difference sometimes  
4 ends up being an issue for people, too.

5                   Okay. Very well, then. Let me  
6 just remind everyone on the line. Please mute  
7 your phones except when you're speaking to the  
8 group. If you don't have a mute button, press  
9 \*6, and then press \*6 again to take it off of  
10 mute, and, Gen, it's your agenda.

11                   CHAIR ROESSLER: Okay, I have --

12                   MR. KATZ: The agenda was posted.

13                   CHAIR ROESSLER: Pardon?

14                   MR. KATZ: I'm sorry. I just  
15 mentioned the agenda is posted to the website,  
16 as well.

17                   CHAIR ROESSLER: And I think  
18 everybody has received it, also. On the  
19 agenda, I mentioned background information.  
20 On that, the first thing I'll mention is that  
21 last night I sent a draft of some PowerPoint  
22 slides that I propose to use at the Board

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1 Meeting next week, depending on what we decide  
2 today.

3 I'd appreciate it if everyone  
4 would go through them and see if you think  
5 they are appropriate and that they are self-  
6 explanatory or will be when I speak. I've  
7 already gotten a response from Steve Ostrow,  
8 very helpful, on that, so I'd appreciate it if  
9 others would look at them.

10 As far as other background  
11 information, we have a couple papers that we  
12 have received since our last Work Group  
13 meeting, the first one by Dave Allen, Follow-  
14 Up Evaluation of Radon in the Tunnels at Linde  
15 Ceramics, dated October 27.

16 I hope you have that and then the  
17 one that came through just the other day on  
18 November 10, which is SC&A's response to  
19 Dave's paper, and that's called Review of the  
20 Follow-Up Evaluation.

21 The other thing that we have  
22 that's very helpful is something put together

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1 by Steve Ostrow. It came through early in the  
2 week called Linde SEC Petition 00107 Issue  
3 Resolution Summary, and he's taken all of our  
4 meetings. This Work Group has had four  
5 meetings when we talked about the Site Profile  
6 and then, I think, eight meetings dealing with  
7 the SEC Petition, and Steve has done a very  
8 good job of summarizing the things we've  
9 discussed and the issues that we've resolved.

10 It would be helpful, too, on that,  
11 especially for the Work Group, to go through  
12 that and make sure that you agree with what is  
13 stated in there, because I'll be using that as  
14 substance for the PowerPoint and have for the  
15 PowerPoint presentation. Also, in the back of  
16 that summary Steve has a listing of pertinent  
17 papers related to Linde, so you should take a  
18 look at that and make sure you have them.

19 So I think the first thing I'd  
20 like to do is ask the Work Group if you have  
21 looked at particularly Steve's summary paper,  
22 and if you have had a chance, do you accept

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1 what he has summarized there? Is there  
2 anybody out there?

3 MEMBER BEACH: Yes, Gen, I'm here.  
4 I did get a chance to review it yesterday,  
5 and I thought he did a great job on it.

6 MEMBER LOCKEY: This is Jim Lockey.  
7 I reviewed it, also, and I would concur with  
8 that.

9 CHAIR ROESSLER: Mike?

10 MEMBER GIBSON: I've looked through  
11 it. I think it's, you know, a very thorough  
12 document. I don't know that I'm ready to  
13 commit that I'm in favor of all it says, but  
14 I'll just stay neutral on that right now.

15 CHAIR ROESSLER: Okay. Sounds  
16 good, Mike. Then I think at this point the  
17 remaining item that we have to talk about  
18 today is the radon in tunnels, and since the  
19 last meeting, we received the two papers I  
20 referred to, the first one, the October 27 one  
21 by Dave Allen and then the November 10  
22 response. I would like to start by asking

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1 Dave, if you have any summary comments or  
2 anything you'd like to state on your paper.

3 MR. ALLEN: No, I think it spoke  
4 for itself.

5 CHAIR ROESSLER: And the points  
6 will be covered, I'm sure, when SC&A responds  
7 to it.

8 MR. ALLEN: That's what I'm  
9 thinking.

10 CHAIR ROESSLER: Okay, then. I  
11 think we could move, Ted, if you think this is  
12 appropriate, to the SC&A response to Dave  
13 Allen's tunnel paper and suggestions.

14 MR. KATZ: Yes, absolutely. Steve?

15 DR. OSTROW: Okay. I think I'll  
16 yield the floor to Bob Anigstein, since he  
17 prepared most of the paper. He did the review  
18 of Dave Allen's work. Bob, are you ready to  
19 talk?

20 DR. ANIGSTEIN: Sure. Well, I  
21 guess, in a nutshell, we feel two things. One  
22 is that the -- I mean, I give a lot of

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1 details, a sort of point-by-point comment on  
2 everything in Dave Allen's paper, but I think  
3 in summary the important points are that the  
4 radon measurements, I mean, for --

5           Okay, for someone who hasn't read  
6 through the summary, what Dave Allen  
7 presented, to substantiate the radon model,  
8 which was discussed at the Work -- at the last  
9 Linde Work Group meeting in October, presented  
10 data on measurement in a conveyor tunnel which  
11 is under Building 30, which is quite different  
12 than the utility tunnels which are in between  
13 the buildings and they're big enough to walk  
14 through.

15           The point was, well, if there was  
16 spilled ore -- there was a memo from March  
17 1944, internal memo within the government from  
18 a medical officer simply making an observation  
19 among many other things, a four-page memo. He  
20 devotes one sentence to saying that men who  
21 work in the -- who clean up spilled ore in the  
22 conveyor tunnel should be equipped with

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1 respirators, so that indicates that such  
2 activity did take place.

3           However, that memo referred to an  
4 inspection made on March 2, 1944. Then the  
5 facility went on standby in the summer of  
6 1946, I think June or July, and then October  
7 22, 1946, there was a survey, a radiological  
8 survey, a sort of limited radiological survey.

9           They made some measurements of  
10 radon levels in the conveyor tunnel and the  
11 argument presented by Dave was that, since the  
12 highest measurement was 44 picocuries per  
13 liter, this could be considered bounding and  
14 within the range, actually, a little lower,  
15 than was predicted by the model, and  
16 therefore, the model should be a good one for  
17 the utility tunnels.

18           The observation we make is there  
19 was a lapse of time and that, since the  
20 facility wasn't shut down, there is no  
21 indication that there was spilled ore still in  
22 the tunnel three months after cessation of

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1 operations and the additional observation I'd  
2 like to make, which is not put in writing into  
3 this report, sort of an afterthought, was that  
4 the Linde operation -- AEC was meticulous, I  
5 might even use the word obsessive, about  
6 getting -- recovering every last bit of  
7 uranium ore.

8 In an earlier study, we found that  
9 the ore came in burlap bags. I mean, this is  
10 just an aside, but an illustration. The ore  
11 came in burlap bags from Africa, so, of  
12 course, they would -- the Belgian Congo.

13 So, of course, the bags were  
14 empty, but then to make sure they got all the  
15 dust out, they had beaters put in to shake the  
16 bags to get every -- because burlap is of  
17 course, porous material -- so that every bit  
18 of ore dust would come out of the burlap bags.

19 Then, on top of that, they sent  
20 the bags to a laundry and recovered any  
21 sediment from the washing because, again,  
22 there might be a little bit of additional ore

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1 that escaped the beating but would come out in  
2 the laundry and if that's not enough, they  
3 burned the bags and recovered any remaining  
4 uranium ore in the ash.

5 This just gives you an idea of the  
6 degree to which they were insistent on getting  
7 every bit of uranium, so, therefore, it does  
8 not seem likely that they would have left  
9 spilled ore in the bottom of the tunnels.

10 Particularly, one of the  
11 recommendations in the memo by this Dr.  
12 Cranch, the 1944 memo, was that the -- that at  
13 least part of those areas be washed down, be  
14 flushed, that a sump should be put in with a  
15 drain and to flush the area to get rid of the  
16 dust.

17 So, when you put all these  
18 together, it does not seem conclusive that  
19 there was ore in the tunnels at the time the  
20 radon measurement was made. If anything, the  
21 opposite conclusion would be more tenable, and  
22 that's really the main point.

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1           The other points are in terms of  
2 the soil concentration of radium, which would  
3 be the source of the radon. We did a -- we  
4 actually got a --

5           (Telephonic interference.)

6           CHAIR ROESSLER:       I think he  
7 disappeared. Anybody else there?

8           MEMBER BEACH:   Yes, I'm here, Gen.

9           DR. MAURO:       I'm still here. I  
10 think we might have lost Bob. Bob, are there?  
11 I think we lost Bob. My guess is he's  
12 probably calling back in to try to get back on  
13 line.

14           He was about to move in and  
15 discuss the other part of the contribution  
16 that might have come from the radium-226 is in  
17 the soil, outside the tunnel, but I'd rather  
18 let him speak to that. I'm not sure if he's  
19 aware that he is not on the line anymore.

20           CHAIR ROESSLER:       He's probably  
21 still talking.

22           DR. MAURO:       That's what I am

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1     afraid of. I can try to call him on his home  
2     number just to let him know that he's -- just  
3     in case -- so I am going to see if I can give  
4     him a call and --

5                     DR. ANIGSTEIN:         This is Bob  
6     Anigstein.

7                     DR. MAURO: Oh, good, you're back.  
8     Great. Okay.

9                     DR. ANIGSTEIN: I got disconnected  
10    somehow. I believe I was saying about the  
11    washing down of the -- oh, yes, about the  
12    radium concentration in the soil. So we found  
13    this Oak Ridge report from 1978 which was a  
14    part of the FUSRAP program and this was a  
15    report on a survey done in 1976 and we now use  
16    that as it gave a detail. There was a map  
17    with all the -- with the details of the  
18    borehole locations and they mostly were in the  
19    vicinity of Building 30, but because the  
20    tunnel, at least two branches of the tunnel --  
21    one ran in the north-south direction east of  
22    Building 30. Another one -- then there was a

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1 junction and another tunnel ran south of  
2 Building 30, east-west direction.

3 We were able to find a number of  
4 boreholes, about 15, that surrounded the  
5 tunnel, on either side of the tunnel and  
6 consequently those would be good indications.

7 Now, there were other tunnels where we did  
8 not have those boreholes, but at least these  
9 two sections were a good indication of the  
10 radium environment, soil environment of the  
11 tunnels.

12 Then, in the same study, so it was  
13 good to compare, comparing apples and apples,  
14 also drilled boreholes under, through the  
15 floor of Building 30, so that would be  
16 representative of the environment of the  
17 conveyor tunnel. As it turns out, the radium  
18 concentrations in the vicinity of the utility  
19 tunnels were actually higher than under the  
20 Building 30.

21 We used the same consistency of  
22 the same measures that Dave Allen had used and

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1 took the mean -- median 96<sup>th</sup> percentile of the  
2 strata, the first for the zero- to one-foot  
3 stratum, the one- to five-foot stratum, and  
4 then the combined zero- to five-foot stratum,  
5 and with only one exception, these were higher  
6 and in many cases significantly higher in the  
7 vicinity of the tunnels, utility tunnels close  
8 to -- under Building 30. I don't know exactly  
9 where the conveyor tunnel was. I just took all  
10 the boreholes under Building 30.

11 So that's, again, another area of  
12 disagreement, but, again -- then, the final  
13 disagreement is simply just the character of  
14 these tunnels. They're different sizes, so  
15 they would have different surface-to-air  
16 ratios, surface-to-volume ratios and they were  
17 used for different purposes.

18 It stated that there was some air  
19 turnover. I don't know that it was actually  
20 measured. There was the assumption that the  
21 contractor, Bechtel, had made an order to run  
22 RESRAD, the computer code, one-tenth of a

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1 turnover per hour, whereas, we know nothing --  
2 and there were ventilation paths there, and we  
3 know nothing about the air turnover or the  
4 ventilation in the conveyor tunnel.

5 So, to make a long story short, we  
6 do not feel -- SC&A does not feel that the two  
7 tunnels are comparable and therefore that the  
8 radon measurement in the -- basically only two  
9 measurements in that tunnel, but the other  
10 four points were less than certain  
11 concentrations. The measurement wasn't more  
12 than that, so that they were just not  
13 comparable to the utility tunnels.

14 CHAIR ROESSLER: Okay, Bob. This  
15 is Gen. Do you -- does that complete your  
16 discussion?

17 DR. ANIGSTEIN: I think so. I'd be  
18 happy to answer questions or answer comments.

19 CHAIR ROESSLER: Well, I think I  
20 have some questions that are more quantitative  
21 about the differences you see, but I think it  
22 probably would be appropriate first to let the

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1 DCAS group respond to your findings.

2 DR. ANIGSTEIN: Sure.

3 MR. ALLEN: Okay. Hi, Gen. This  
4 is Dave Allen. We disagree with Bob's  
5 analysis of this for, you know, a number of  
6 reasons. I guess I want to start with, even  
7 though Bob gave a lot of indications that the  
8 plant was cleaned up quite a bit, I think the  
9 surveys later on kind of disagree with that.

10 The conveyor tunnel, we actually  
11 don't have to guess. If you look on Figure 2  
12 of Bob's write-up, it's a map of Building 30,  
13 and in the middle towards the south side there  
14 is a word. It's just sand, S-A-N-D, in the  
15 middle of the building.

16 According to the text of that  
17 survey, that was actually a sample from the --  
18 a sludge sample from the conveyor pit, is what  
19 they called it. That was taken in 1978, and  
20 the result of that analysis was 162 picocuries  
21 per gram, which makes it one of the higher  
22 samples they found and that's inside the

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1 tunnel some 20, 30 years after the MED  
2 operations, so I don't think you can make the  
3 case that it was, you know, immaculate or  
4 anything to that effect. There was quite a  
5 bit of material left in there.

6 As far as the soil samples, Bob  
7 mentioned, but I think it might have gone by  
8 everybody, if you also look on Figure 2, you  
9 see a lot of those sample numbers, the south  
10 side of Building 30 and the east side of  
11 Building 30, and you'll see that they are  
12 actually considerably closer to Building 30  
13 than they are to the utility tunnels.

14 Also, I wanted to point out that  
15 there was more than just the 1978 survey.  
16 That was just the one that Bob centered in on  
17 for this analysis, but that analysis was not a  
18 random sampling. It was biased.

19 They went around the site with  
20 some sort of gamma survey meter and picked  
21 spots above background to sample, and that  
22 analysis, you would see that there's not a lot

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1 of samples located very near the utility  
2 tunnels. They're all 15 feet or more away  
3 from it and that makes perfect sense once you  
4 start digging through all the information and  
5 you find out that the ore was brought in on  
6 the railroad spur and then drug over to  
7 Building 30 and that soil was likely  
8 contaminated.

9 What it appears or I speculate is  
10 the reason they didn't find a lot of high  
11 gamma readings right near the tunnel was  
12 because the tunnels were built after the MED  
13 period, after that soil would have been  
14 contaminated.

15 Digging up that soil and building  
16 the tunnels and then backfilling probably  
17 disturbed that soil and you wouldn't have  
18 found a lot of radium there, but you find it  
19 15 feet or so away, about the size of the area  
20 you would dig up to build this tunnel.

21 DR. MAURO: This is John. You  
22 know, to sort of contribute to the dialogue, I

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1 think the observation that you've made when I  
2 was, you know, working with Bob and Steve on  
3 this, the idea that -- in my mind, having ore  
4 in the tunnel, this conveyor tunnel, is very  
5 important. That, in a way, sort of trumps a  
6 lot of the other concerns.

7           You know, if you do have ore at  
8 fairly high concentrations of, you know,  
9 whatever, especially with this Congo ore,  
10 that, in my mind, that's going to be an  
11 important driver of the radon levels in the  
12 conveyor tunnel.

13           And I think we gave a lot of  
14 importance, as Bob had pointed out, based on  
15 the, I guess you would call, indirect evidence  
16 that it was likely that the radon measurements  
17 were made at a time when there really wasn't  
18 any ore in the conveyor tunnel, and we gave a  
19 lot of importance to that.

20           What you just said is very  
21 important. If, in fact, there was a  
22 considerable amount of residue ore with

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1 relatively high rating concentrations, that's  
2 an important perspective that in my mind has a  
3 great -- we give a lot of weight to.

4           So I just wanted to pass that on  
5 that this is information that, I guess, we did  
6 not see, and we were under the impression that  
7 it's likely that that conveyor tunnel was  
8 relatively clean. So I just want to pass that  
9 on to the rest of the group on the phone and  
10 also elicit any comments from others if you  
11 feel that that does change our perspective a  
12 little bit.

13           DR. ANIGSTEIN: John, I'd like to  
14 add. This is Bob. I didn't -- I didn't  
15 assert that it had been cleaned up. I said it  
16 might have been, you know, because they were  
17 anxious to recover the ore, it seems logical  
18 that they would have gotten the ore out.

19           Now, if there was some other  
20 radium-barium residue sand, that I was not  
21 aware of. You know, I'm not familiar with it.

22 I can't comment on it.

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1 DR. OSTROW: Well -- this is Steve.

2 I think that what we had in our report and  
3 what we looked at, not that -- we don't say  
4 definitively there wasn't any ore in the  
5 tunnel when they did the measurement.

6 What we're saying, it's not  
7 demonstrated that there was any ore in the --  
8 in the tunnel when they took the measure.  
9 It's not clear, you know. It's speculation  
10 whether the tunnel was cleaned up or not  
11 cleaned up when they took the measurements.

12 CHAIR ROESSLER: This is Gen. I  
13 would ask -- I think I know the answer to  
14 this, but what would have been the motivation  
15 for cleaning up the ore: to actually use it  
16 because it was valuable or do you think they  
17 had some safety in mind about it?

18 DR. OSTROW: Probably both. Bob  
19 went through the beginning, and we read --  
20 we've seen this in a lot of the Linde  
21 documents.

22 CHAIR ROESSLER: I can't hear

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1     whoever is talking.

2                   DR. OSTROW: Oh, this is Steve.  
3     The answer is both, really, both, based on  
4     Linde documents and what we know from other  
5     sites.     They were really careful about  
6     recovering all the uranium ore, especially the  
7     Congo ore, because it's high quality.

8                   The other point is also they must  
9     have cleaned it up every now and then, because  
10    they have to send people down there with  
11    respirators, and, you know, it was a hazard to  
12    the workers in the tunnel.

13                  DR. ANIGSTEIN: And this Dr. Cranch  
14    specifically recommended washing down the --  
15    there was a sump going to be installed, and he  
16    recommended that it be flushed and drained,  
17    so, assuming that his recommendation was  
18    carried out --

19                  DR. OSTROW: Yes, so the point is,  
20    though, I think we don't -- we don't know for  
21    sure one way or the other if they cleaned it  
22    up or not.

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1 DR. MAURO: Well, David, this is  
2 John Mauro. The residue sand that was  
3 detected, what was the picocurie per gram  
4 level again?

5 MR. ALLEN: One hundred and sixty-  
6 two picocuries per gram.

7 DR. MAURO: Okay, that's not an  
8 insignificant level of radium. I just -- you  
9 know, that was residue of some sort. By the  
10 way, anybody off the top of their head know  
11 what the picocurie per gram is in typical ore,  
12 especially Congo ore?

13 (Simultaneous speaking.)

14 DR. MAURO: It would be enormous,  
15 okay.

16 DR. NETON: I don't necessarily  
17 think that this was Congo we're going through  
18 here the entire campaign. I mean, they did a  
19 lot. They processed a number of types of  
20 ores. This is Jim Neton.

21 I'd just like to point out one  
22 thing. That survey that was taken was -- I

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1 think in the body of the memos attached to the  
2 survey talked about they were surveying it  
3 because it had been placed in stand-by mode, I  
4 think, or something to that effect.

5           The radon survey was taken because  
6 it was in stand-by mode, and to me that sort  
7 of indicates that, you know, they were taking  
8 a survey because they were still concerned  
9 there may have been some residual materials in  
10 there that would affect workers if they were  
11 going to leave it idle for a period of time.

12           It wasn't a sort of post-  
13 contamination survey to see if it was  
14 releasable to the general workers or  
15 something. At least, that's the impression I  
16 got from looking at that, and, yes, I don't  
17 know if there were bucketfuls of radium there,  
18 you know, because they did go in and clean it  
19 up periodically, but clearly I don't know that  
20 they would have gone in there with a pressure  
21 washer and cleaned out that entire tunnel at  
22 that time.

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1           So I think the whole point was  
2           that the levels of contamination on the  
3           surfaces or at least the flooring of that  
4           tunnel would certainly exceed that that would  
5           be present from infiltration of groundwaters  
6           outside. At least, that's our opinion.

7           DR. ANIGSTEIN: One other -- one  
8           further observation which I haven't made yet  
9           about the last paragraph in our report, and  
10          that is characterizing -- I just happened to  
11          run across it in one of the documents, the  
12          characterization of the soil, which is not  
13          really soil, at Linde, and there is this  
14          quotation. It's from the Bechtel report. It  
15          says, Linde is generally covered by a thin  
16          veneer of coarse-grain fill material, zero to  
17          1.2 meters, with localized pits and a  
18          building foundations that contain fill to  
19          depths as great as five feet. Then,  
20          undisturbed sediments that underlie the  
21          surface fill material are composed primarily  
22          of clay and clay sand. Now, the conclusion we

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1 draw from this is that this debris, this  
2 coarse-grain material, when you do a  
3 calculation of radon transport and you have  
4 coarse-grain material, the transport is almost  
5 entirely due to convective flow and diffusion  
6 plays a very significant role.

7           When you go deeper into the clay,  
8 which is highly impermeable, then diffusion  
9 becomes the primary mechanism, but since the  
10 model that was -- the diffusion model that was  
11 promulgated, as reported last month, deals  
12 only with diffusion.

13           Only it would really not be -- if  
14 the tunnels are near the surface, utility  
15 tunnels, and they were in -- they're partly  
16 surrounded, maybe even entirely surrounded by  
17 this coarse fill material, because I would  
18 imagine that the tunnels are not -- you know,  
19 they don't go in there and excavate them with  
20 boring machines. I would assume they just cut  
21 and cover, you know, cut the tunnels and then  
22 cover them up, and then, living in Manhattan,

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1 I know that's how they build subway tunnels.

2 Then, it would be the coarse-grain  
3 material, and therefore the model, regardless  
4 of what the actual, you know, comparative  
5 measurements are, the diffusion model is just  
6 not applicable here.

7 DR. MAURO: The diffusion or the --  
8 or you mean the molecular diffusion --

9 DR. ANIGSTEIN: Right.

10 DR. MAURO: -- as opposed to  
11 invective transport.

12 DR. ANIGSTEIN: Right.

13 DR. MAURO: Okay. Let me ask a  
14 question, Bob. When you were looking at this,  
15 is it your sense that this fill or whatever  
16 this material was, which was not the native  
17 material -- you were saying that when you went  
18 deeper, the native material is more like a  
19 clay barrier of sorts.

20 DR. ANIGSTEIN: Yes.

21 DR. MAURO: Were both tunnels  
22 sitting, whether we're talking utility tunnel,

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1 were more --

2 DR. ANIGSTEIN: I don't know.

3 DR. MAURO: Okay.

4 DR. ANIGSTEIN: My guess is, yes,  
5 there would be both.

6 DR. MAURO: There were both in the  
7 same time frame.

8 DR. ANIGSTEIN: That would be just  
9 my guess.

10 DR. MAURO: Okay.

11 DR. ANIGSTEIN: My guess is that  
12 they would have dug up, dug a trench, then  
13 installed the tunnel, covered it over, covered  
14 it over with -- you know, they covered over  
15 the trench with dirt and what they would be  
16 using to fill in the edges and these things  
17 would most likely be this.

18 I mean, this is just -- I mean,  
19 I'm not a structural engineer, but, I mean, it  
20 just makes sense that they would -- that they  
21 would use -- you know, they would backfill  
22 with whatever is handy, and that's how this

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1 debris -- it's not native to that site. The  
2 debris came as a result of the construction.  
3 They dug up basements. They dug up things and  
4 this is what they brought to the surface and  
5 used as fill. So it may apply to both, to  
6 both of them, but from a strictly scientific  
7 standpoint, the diffusion model just does not  
8 apply here.

9 DR. MAURO: This difference, this  
10 100 -- I think you said about picocuries per  
11 gram of material. That sand-like material  
12 that was in the conveyor tunnel, is there  
13 anything comparable to that in the utility  
14 tunnel?

15 If I recall, the utility tunnel  
16 had just -- they did some beta -- they did  
17 some surveys, but did they have a similar kind  
18 of situation, or was it -- I guess the better  
19 term would be, was it cleaner than that?

20 DR. NETON: That's a good question,  
21 John. I don't know if any of us have those  
22 numbers off the top of our heads.

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1 DR. MAURO: I've got to tell you,  
2 we're almost like dealing with a weight of  
3 evidence kind of, you know, the reasonableness  
4 of using the radon measurements in the  
5 conveyor tunnel as a bounding surrogate for  
6 the utility tunnel, and --

7 DR. NETON: I'd like -- I'd like to  
8 go back briefly to what Bob had just talked  
9 about with this fill material that they  
10 brought in. They actually did -- you know,  
11 when they --

12 At one point, and Dave Allen can  
13 fill in where I'm missing some information,  
14 but at one point there was concern by Linde --  
15 not Linde but the Army Corps that the fill  
16 material might have been the contaminated soil  
17 that was from the site.

18 So they actually drilled core  
19 samples through the bottom of the tunnels or  
20 some section of the tunnels and sampled them  
21 and it turns out that the material came back  
22 less than one picocurie per gram radium, which

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1 would indicate it was some kind of fill  
2 material was background material that was  
3 used.

4 So it seems like when they put  
5 these tunnels in after the MED project was  
6 over, they did cut and fill, as Bob suggested,  
7 and they filled with relatively clean material  
8 --

9 COURT REPORTER: This is the court  
10 reporter. Could the last speaker identify  
11 himself, please?

12 DR. NETON: This is Jim Neton.

13 COURT REPORTER: Thank you.

14 DR. NETON: -- which is why Dave  
15 suggested you don't see a lot of contamination  
16 identified, surface contamination identified  
17 very near the tunnels like you do at sort of  
18 the roadways or in between the building and  
19 the tunnels, that sort of thing, where they  
20 actually, you know, move the ore material.

21 CHAIR ROESSLER: This is Gen. It  
22 seems like we're talking about a lot of

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1 different issues here. We're kind of  
2 intertwining the radon contribution from the  
3 materials in the two types of tunnels. We're  
4 talking about the radon contribution from  
5 radium in the soils around the tunnels and, as  
6 John said, we're looking for weight of  
7 evidence here.

8 I wonder if there's a systematic  
9 approach that we can take to this. Let's  
10 discuss maybe one item and try and get some  
11 sort of conclusion from it and then perhaps  
12 the other item. I don't know. What do you  
13 think about that, John and Steve and Jim?

14 DR. MAURO: Along those lines, the  
15 measurements of the radium contamination that  
16 was above background, taking in the soil or  
17 this fill material in the vicinity of these  
18 tunnels, you know, what levels were we talking  
19 about, tens of picocuries per gram? Was that  
20 -- I forget the number.

21 DR. ANIGSTEIN: The radon -- the  
22 radium levels?

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1 DR. MAURO: Yes, in the soil that  
2 was --

3 DR. ANIGSTEIN: They were -- they  
4 were -- let's see. The 95<sup>th</sup> percentile in the  
5 top in the first foot around the utility  
6 tunnels is 391.

7 DR. MAURO: Okay, so it's  
8 relatively high compared --

9 DR. ANIGSTEIN: Yes. Now, that,  
10 again, the caveat on that is that's done  
11 parametrically, so it's simply based on one  
12 very high reading, but even the mean is 84,  
13 which, again, is influenced by one very high  
14 reading, whereas the median is 2.75.

15 DR. MAURO: Oh, okay. That's good.

16 DR. ANIGSTEIN: So you have a few.  
17 You know, the mean, the 95<sup>th</sup> percentile are  
18 influenced by the high readings. The mean --

19 DR. MAURO: And then we have this  
20 100 picocurie per gram number actually inside  
21 the conveyor tunnel. Who knows how much  
22 material that is? My goodness.

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1 DR. ANIGSTEIN: Also, Dave, do you  
2 have any date of when that was taken?

3 MR. ALLEN: That was a 1978 survey.  
4 I don't think I have the --

5 DR. ANIGSTEIN: Oh, it was much  
6 later.

7 DR. MAURO: Much later, yes.

8 DR. ANIGSTEIN: Okay, yes. By the  
9 way, to answer Jim's observation, I just  
10 looked up the Linde Site Profile and during  
11 those period of time from the `43, `44 to `46,  
12 it seems to be about half-and-half African ore  
13 and domestic ore. In one case, they actually  
14 give it -- they actually give a breakdown: 48  
15 percent, 52 percent.

16 DR. NETON: Right.

17 DR. ANIGSTEIN: It does say one  
18 period African ore, another period pre-  
19 processed ore, domestic ores.

20 DR. MAURO: Okay.

21 DR. ANIGSTEIN: So --

22 DR. NETON: I think what it was,

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1 they had finished processing all those ores,  
2 so they had put the facility in standby mode,  
3 which was the --

4 DR. ANIGSTEIN: Right. December --  
5 July 31, '46, it says African ore and pre-  
6 processed ash.

7 DR. NETON: Right, so it --

8 DR. ANIGSTEIN: And that was the --  
9 then from 8/1/46 to 9/14/47: standby, and then  
10 rehabilitation starts.

11 DR. NETON: Right, so essentially  
12 all the ore that was processed through that  
13 building went through this tunnel, and then  
14 they put it in standby mode.

15 DR. MAURO: Was this tunnel of a  
16 size that people went in it?

17 DR. NETON: Yes. There were people  
18 in there shoveling.

19 DR. MAURO: Oh, so the conveyor --

20 DR. ANIGSTEIN: If men were sent in  
21 to clean it up, they must have -- there must  
22 have at least been a crawl space if not an

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1 upright.

2 DR. MAURO: And was there -- during  
3 the use of that tunnel with the ore coming in  
4 through there, was this something that was  
5 like a mechanical thing where ore was moving  
6 through?

7 DR. ANIGSTEIN: It was a conveyor.

8 DR. MAURO: It was a conveyor with  
9 people in it, or was it just -- and the reason  
10 I'm asking --

11 DR. NETON: I don't think it was  
12 routinely occupied, John.

13 DR. MAURO: It was routinely.

14 DR. NETON: No, it was not.

15 DR. MAURO: It was not.

16 DR. ANIGSTEIN: They dumped the --  
17 they dumped the -- there was a hatch. There  
18 was a vertical hatch.

19 DR. MAURO: Okay.

20 DR. ANIGSTEIN: They would open up  
21 the ore bag, dump it in. The conveyor takes  
22 it. It was both a horizontal and a vertical

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1 conveyor, and it takes it to that ball mill, I  
2 believe. I believe that's how it went, and it  
3 was removed.

4 DR. MAURO: Okay. It may not have  
5 been ventilated, I guess. That's where I was  
6 heading.

7 DR. ANIGSTEIN: They would send in  
8 -- no, apparently not. They would send in men  
9 to clean it up, and it was recommended that  
10 they wear respirators because of the dust  
11 level --

12 DR. MAURO: The dust level, yes.  
13 Yes. Geez. Okay.

14 DR. ANIGSTEIN: -- which, of  
15 course, would not protect them from radon.

16 DR. MAURO: No, no, I was just  
17 trying to get at sense where in the utility  
18 tunnel where there was some air turnover  
19 deliberately with some type of fan, you know,  
20 that .1 air turnover per hour.

21 DR. ANIGSTEIN: One-tenth.

22 DR. MAURO: One-tenth of an air

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1 turnover per hour, right, and whether or not  
2 we had a comparable circumstance in the  
3 conveyor tunnel, but it sounds like we really  
4 have no way of knowing that.

5 MEMBER LOCKEY: This is Jim Lockey.

6 Can I just ask a basic question? When I read  
7 one of these reports it said that some of the  
8 tunnels were constructed in `57 and other  
9 tunnels were constructed in `61. Is that  
10 correct, the utility tunnels?

11 MR. ALLEN: Yes, there is a  
12 junction box number six between Building 30  
13 and 31, about halfway down north- and south-  
14 wise. On the NIOSH report that we sent, you  
15 hopefully could see that. There's a figure.  
16 It's got junction box two, junction box six  
17 very close together.

18 From two north and around the  
19 north side of Building 31 was constructed in  
20 1957. From junction box six south and the  
21 tunnel area south of Building 30 was  
22 constructed in 1961.

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1                   MEMBER LOCKEY:   Okay,   so   it's  
2   constructed in `57 and `61, and when they --  
3   when the Corps of Engineers went back and did  
4   bore samples to make sure that the backfill  
5   was not contaminated, that's where you came up  
6   with your one picocurie measurement.  Is that  
7   right?

8                   MR. ALLEN:  Yes, they did do bore  
9   samples through the bottom of the tunnels.  I  
10  believe -- I don't have it in front of me, but  
11  I believe that was from junction box six  
12  south.  I think the tunnels north of that were  
13  already removed before that time.

14                  MEMBER LOCKEY:  So were there any  
15  utility tunnels -- when was the earliest time  
16  that these utility, any utility tunnel was  
17  present?  Do we know?

18                  MR. ALLEN:  We know around Building  
19  30 was 1957 and 1961.  We don't know for sure  
20  around the lab, but we do know the soil  
21  samples around the lab didn't show an increase  
22  in radium.  There was uranium in the soil but

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1 not an increase in radium. They were handling  
2 ore concentrates, domestic ore concentrates in  
3 the lab for the pilot plant.

4 DR. NETON: Yes, there could -- we  
5 don't know about when the -- there's a tunnel  
6 that went from the boiler plant, or the power  
7 plant they called it, to past the laboratory  
8 building.

9 We don't know the age of that one,  
10 but like Dave said, that part of the site  
11 really did not process the Belgian Congo ore  
12 or the high radium-bearing ores to any large  
13 extent. There may have been laboratory grade  
14 quantities, but it wasn't a processing plant  
15 like Building 30 was.

16 MEMBER LOCKEY: So, Jim Lockey  
17 again. To go back to the utility tunnel  
18 issue, then. It's really an issue from '57 on  
19 and '61 on; is that correct?

20 MR. ALLEN: Yes.

21 MEMBER LOCKEY: Am I reading this  
22 right?

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1 DR. NETON: Primarily, yes.

2 MR. ALLEN: Fifty-seven to some  
3 point. The tunnels built in '57 were removed  
4 before 2005, and the other ones are either  
5 removed or in the process of being removed  
6 now, I think.

7 MEMBER LOCKEY: And this was during  
8 -- this was -- this is after the plant was  
9 shut down. This is during the remediation  
10 period, right?

11 MR. ALLEN: Right.

12 MEMBER LOCKEY: Okay.

13 MS. BONSIGNORE: This is Antoinette  
14 Bonsignore. Can I ask a quick question here?  
15 This issue about when the tunnels were  
16 constructed around Building 30, 1957 and 1961,  
17 I actually had a discussion with LaVon  
18 Rutherford about this issue this morning and  
19 the workers are disputing that, those dates.

20 Two -- I spoke with three workers  
21 last night who worked there, worked at Linde  
22 starting in 1951 and 1953, and they say that

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1 all of the tunnels around Building 30 and  
2 other areas existed when they were working  
3 there in 1951 and 1953 and that, if there were  
4 tunnels being constructed in 1957 and 1961,  
5 they would have known about it. One worker  
6 actually said that he specifically remembers  
7 using those tunnels in 1951.

8 CHAIR ROESSLER: Antoinette, this  
9 is Gen. Were they distinguishing between the  
10 conveyor tunnels and the utility tunnels when  
11 they --

12 MS. BONSIGNORE: Yes, they were  
13 talking about the utility tunnel, not the  
14 conveyor tunnel. They were -- they were --  
15 they were saying that their -- I received the  
16 ER for Linde SEC-154 yesterday, and there was  
17 a note in there that the tunnels that were --  
18 where was it? -- that the tunnel sections near  
19 the ceramics plant, which is Buildings 30, 31,  
20 37 and 38, were constructed in 1957 and 1961.  
21 What I'm saying is that I spoke with three  
22 workers last night who worked there in 1951,

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1 started working there in 1951 and 1953 and  
2 they dispute that.

3 CHAIR ROESSLER: This is Gen. Then  
4 my question would be of Dave or the DCAS  
5 people, where did the '57 to '61 dates come  
6 from?

7 MR. ALLEN: It comes from the Army  
8 Corps of Engineers. They had specific  
9 locations, like I said, from junction box six  
10 through -- between six and seven and between  
11 seven and nine built in 1961 and the junction  
12 or the Building 31 tunnel set, as I described,  
13 built in 1957, and if you look at the junction  
14 boxes you'll see they kind of go  
15 chronologically in order.

16 You see junction box one, two,  
17 three and four around Building 31, and six,  
18 seven, eight and nine encompass a big chunk of  
19 the rest of the site. No information about  
20 the one going from the power plant to the lab.

21 That may have been there during the MED  
22 period. That may even be what the workers are

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1 talking about. I don't have any way to know.

2 MS. BONSIGNORE: I'm going to get  
3 some clarification from these three workers  
4 this weekend, but I just wanted to raise the  
5 issue because, if there are certain decisions  
6 that are being made or, you know,  
7 interpretations of the issues being made based  
8 upon that fact about when those tunnels were  
9 constructed, I just wanted to raise the issue  
10 that the workers are disputing this, and they  
11 have -- they were interviewed by SC&A during  
12 the Niagara Falls Board meeting, and those  
13 workers provided very detailed information,  
14 very precise recollections of the tunnels and  
15 you can -- you can review SC&A's notes about  
16 those interviews to see that, so I certainly  
17 hope that this issue will be evaluated  
18 properly, considering that they are disputing  
19 this.

20 I have not seen the documents that  
21 -- there is one document that's referred to,  
22 that's cited stating that the tunnels were

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1 built in 1957 and 1961. It's actually one  
2 particular document. I have not seen this  
3 document, so I'm still waiting to receive a  
4 copy of it.

5 DR. MAURO: From the -- this is  
6 John Mauro. From the perspective of what's  
7 before us right now, it's my understanding  
8 that the issue is that 1954 is the start  
9 period for this particular SEC issue that we  
10 are discussing. Am I correct with that date?

11 CHAIR ROESSLER: January 1, 1954.

12 DR. MAURO: Okay. Now, I believe  
13 that is generally -- we all agree that the  
14 utility tunnels were present at that time, and  
15 there, of course, was some potential for  
16 airborne radon within those tunnels due to  
17 both the residual activity of radium that  
18 might have been in the soil around that  
19 tunnel, the tunnels, and, of course, they  
20 measured on the internal surfaces in this  
21 survey.

22 Now, where we're at --

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1 MEMBER LOCKEY: John?

2 DR. MAURO: Yes?

3 MEMBER LOCKEY: John, Jim Lockey.  
4 Let me interrupt. I mean, I'm not sure that  
5 the tunnels were there in 1954. There's some  
6 discrepancy about that.

7 DR. MAURO: Okay, that's important,  
8 because, I guess, I've been operating under  
9 the premise -- we've been operating under the  
10 premise that those were tunnels that could  
11 have been occupied from '54 onward and  
12 therefore become part of the dose  
13 reconstruction for the workers that might have  
14 been exposed to MED material in those tunnels,  
15 you know, as a result of the MED activities  
16 prior to '54.

17 DR. NETON: John, this is Jim. I  
18 don't think the argument really changes. I  
19 mean, if anything, it would just change the  
20 beginning date when exposures were  
21 reconstructed.

22 DR. MAURO: Yes. Yes. Yes.

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1 DR. NETON: Whether that's '54,  
2 '57, '61 is maybe the subject of some  
3 discussion, but what the fundamental argument  
4 is, can --

5 DR. MAURO: Right.

6 DR. NETON: Whenever they were  
7 there during the residual period, can we bound  
8 the exposures inside those tunnels?

9 DR. MAURO: I agree, and then along  
10 comes this conveyor tunnel as a place where we  
11 have radon data. I mean, this is really -- we  
12 have some radon measurements and the question  
13 is when those were made.

14 Now, I understand that those radon  
15 measurements in the conveyor tunnel were made  
16 in 1946. Is that what was said? No. When  
17 were those radon measurements made?

18 DR. ANIGSTEIN: October 22, 1946.

19 DR. MAURO: Well, obviously, that  
20 tunnel was there.

21 DR. ANIGSTEIN: The conveyor tunnel  
22 was there.

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1 DR. MAURO: The conveyor tunnel,  
2 yes. Okay, good, so I got it. So now we've  
3 got -- so we've got some radon measurements  
4 made in 1946 in a conveyor tunnel, and how far  
5 away is that conveyor tunnel from the utility  
6 tunnel? Are we talking a half a mile or 100  
7 meters?

8 DR. ANIGSTEIN: More like -- more  
9 like that.

10 DR. MAURO: More like 100 meters?

11 DR. ANIGSTEIN: Yes.

12 DR. MAURO: Oh, okay.

13 DR. ANIGSTEIN: If it's in the  
14 center of Building 30, the nearest one is,  
15 yes, exactly, according -- this is in feet.  
16 Yes, 100 meters is about it.

17 DR. MAURO: And the material that  
18 surrounds these tunnels is -- the sensibility,  
19 you know, is that it's really not native  
20 material. It's this fill because of the way  
21 in which they were constructed.

22 Obviously, the conveyor tunnel

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1 might have been constructed at one point in  
2 time, maybe the utility tunnels at another,  
3 but in all cases, the sense is, as best we can  
4 tell, that it was -- that it was -- that there  
5 was this other -- there was this kind of fill  
6 material that is surrounding the area, and  
7 that's important.

8 DR. ANIGSTEIN: At least some of  
9 it.

10 DR. MAURO: Yes.

11 DR. ANIGSTEIN: Again, I'm just --  
12 I'm sure it's speculation. I mean, like how  
13 would I dig a tunnel? You dig a trench, and  
14 then you line it with concrete, and then you  
15 backfill it with whatever is handy, so some of  
16 the --

17 If the -- you know, at least the  
18 roof of it would be covered with the fill  
19 material, and whether the trench had -- if the  
20 trench had somewhat sloping sides, because we  
21 can't dig straight down -- it would cave in --  
22 they might have had to fill in some of the

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1 sides.

2 DR. MAURO: You see --

3 DR. ANIGSTEIN: That's just, you  
4 know, just sort of the engineering judgment,  
5 shall we say.

6 DR. MAURO: In thinking about this  
7 -- this is John Mauro again. We've got these  
8 tunnels, as best we can tell, probably in the  
9 same more or less type of material, both of  
10 which are inside this fill material that has  
11 various levels of radium-226 residue that was  
12 remaining there because of the MED activities  
13 that took place much earlier. We also have  
14 some radium inside the tunnel itself.

15 Certainly, we know that there is  
16 something inside the conveyor tunnel on the  
17 order of 100 picocuries per gram but not how  
18 much, and, of course, the last question -- I'm  
19 trying to just get this picture in my head --  
20 is the tunnels -- both tunnels breathe, and  
21 here's where it would be nice to hear a little  
22 bit from Bill on this. They're going to

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1 breathe because of, you know, for reasons we  
2 all understand.

3 In one case, we have a fan that  
4 was being ventilated. In the other one, we  
5 don't, I guess, we don't know if there was a  
6 fan or not, but, of course, there is some air  
7 turnover just from the, you know, normal  
8 breathing that occurs inside a tunnel,  
9 something that, you know, you run across, but  
10 I don't know the extent to which that occurs.

11 I'm trying to develop the degree  
12 of parity we have here and the weight of  
13 evidence and which ways it's sort of leaning,  
14 and I am giving some importance, now, to this  
15 new piece of information that David just gave  
16 us that you have this sand on the order of 100  
17 picocuries per gram but not knowing how much  
18 of it.

19 That becomes another piece of  
20 weight that, you know, I'm putting into this  
21 balance I have in my head right now that I do  
22 give some importance to, and that sort of

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1 changes my perspective a bit related to, you  
2 know -- because in my mind, that sort of  
3 trumps a lot.

4 That is, if there was, in fact,  
5 residual ore, that would have been in my mind  
6 very important, sitting in the conveyor  
7 tunnel, but it sounds like it wasn't ore, but  
8 it might have very well been some residue,  
9 which was -- which as on the order of 100  
10 picocuries per gram.

11 I'm trying to put out on the table  
12 in front of myself and perhaps everyone on the  
13 phone all the different elements that go into  
14 this judgment and the weight of evidence and  
15 the degree to which we're going to say that,  
16 you know, it's not unreasonable or it is or  
17 isn't unreasonable to use the radon  
18 measurements in the conveyor tunnel, and right  
19 now I'm doing this balancing in my head.

20 It's a tough one to say. You  
21 know, I would be the first to say it's not  
22 unreasonable, but does it meet a threshold of

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1 sufficiency, you know, and this is a tough  
2 call.

3 DR. ANIGSTEIN: I would also like  
4 to point out that, at least, in Dr. Cranch's  
5 1944 memo, he recommends close-fitting wooden  
6 covers, and obviously they can't keep the dust  
7 in the conveyor tunnel from going into the  
8 building.

9 Now, obviously, while it's in  
10 operation you would have to open them to dump  
11 the ore in, but it also calls into my mind now  
12 that you're talking the possibility that when  
13 they had these covers made, some, you know,  
14 pieces of plywood that would just be slapped  
15 on, it would not be illogical that they would  
16 have, before walking away, they would have put  
17 these covers in place.

18 So you could have had now a  
19 tightly sealed space, and then when they walk  
20 in, when they come to take the measurement --  
21 actually, we're giving the other side, but  
22 that's okay. I'm being honest.

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1           So if it was open, it was the  
2 other way. If it was open from both ends and  
3 it's a relatively short tunnel -- can anyone  
4 describe for me exactly what it's like? I  
5 don't have a good picture.

6           I have an idea of a shaft going  
7 down, a horizontal tunnel and then, I guess, a  
8 conveyor belt rising up at the other end,  
9 because you have to -- ore goes in by gravity  
10 and comes out on the conveyor, but if it's  
11 open on both ends, there could be a lot of  
12 ventilation. It's short, and it's open to the  
13 building air, so the air turnover might have  
14 been greater than one-tenth of a turnover per  
15 hour or not. We don't know.

16           CHAIR ROESSLER: I think -- Bob,  
17 this is Gen. I think your first picture is  
18 probably more accurate, that they closed them  
19 and it was a very unventilated space.

20           DR. ANIGSTEIN: Yes, it could be.  
21 It could be either way, or once the building  
22 was no longer occupied, they may have had no

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1 motivation for keeping it closed. It can go  
2 either, but the thing is it could go either  
3 way.

4 DR. OSTROW: This is Steve. I  
5 agree with Bob's assessment that you can make  
6 a case for either and the problem is we just  
7 don't have the evidence to that.

8 MR. ALLEN: This is Dave Allen. I  
9 think the bottom line for us is we have two  
10 tunnels that are, you know, 100 feet or so  
11 apart.

12 One was used to transport ore,  
13 and, yes, the ore was cleaned out of there to  
14 some extent, but I think we got a sample  
15 basically saying it wasn't cleaned up  
16 immaculately or anything to that effect, the  
17 other being a utility tunnel that seems to  
18 have been built after the MED period, and  
19 there was some contamination found on the  
20 walls, but it's not gross material found in  
21 there. The utility tunnels also had -- we  
22 know they had forced ventilation versus the

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1 conveyor tunnel likely didn't have any.

2 DR. NETON: Well, I want to correct  
3 something, too. This is Jim Neton. The  
4 utility tunnels were largely unventilated. A  
5 minority of the sections had some mechanical  
6 ventilation.

7 DR. MAURO: Oh, okay.

8 DR. NETON: So there were -- and  
9 it's in the FUSRAP analysis. It said they  
10 were largely unventilated, but there were some  
11 sections that had mechanical ventilation,  
12 which amounted to this .1 air changes per  
13 hour, but largely they were what we would  
14 consider to be naturally ventilated.

15 DR. MAURO: So, in many respects,  
16 at least from that perspective, there is some  
17 parity, then.

18 DR. NETON: And if you look at the  
19 openings -- we have pictures of the openings  
20 to the utility tunnels -- there are sort of  
21 like these man-openings, like three-by-six-  
22 foot holes in the ground with stairwells going

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1 down, and there are about nine of those.

2 So I think that's what -- you  
3 know, it's similar to that in the sense that  
4 the conveyor tunnels were open on each end, as  
5 well, and I think it's reasonable to assume  
6 that during standby mode there would have been  
7 no active ventilation going on in those  
8 tunnels. It would have been naturally  
9 ventilated just like the utility tunnels.

10 MEMBER LOCKEY: This is Jim Lockey.

11 DR. ANIGSTEIN: But the shorter --  
12 the shorter the tunnel, the more, you know,  
13 the larger the opening in relationship to the  
14 volume.

15 DR. MAURO: Yes.

16 DR. ANIGSTEIN: Does anybody know  
17 how long the conveyor tunnels were?

18 MEMBER LOCKEY: I thought I read 80  
19 feet or something like that. Was that --

20 DR. OSTROW: I don't know the exact  
21 number.

22 DR. NETON: I wouldn't quote me on

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1 that.

2 DR. OSTROW: It's in that. It's in  
3 that. I've heard anywhere from 60 to 90 just  
4 based on where the equipment was.

5 DR. ANIGSTEIN: Whereas the utility  
6 tunnels were hundreds of feet, thousands of  
7 feet, actually. You can get the scale.

8 DR. NETON: Maybe 2,000 feet, but  
9 there were nine, nine if you count them, nine  
10 fairly large -- I don't know if they were all  
11 exactly the same, but the pictures we have of  
12 at least the one opening near a building, the  
13 lab building, was essentially a fairly large  
14 opening. I mean, they aren't, like, closed by  
15 doors or anything like that. They're just  
16 openings inside the building with a handrail  
17 going down.

18 DR. MAURO: Jim, I think that's  
19 important.

20 DR. ANIGSTEIN: Excuse me. Inside  
21 the building? The junction boxes seem to be  
22 outside the buildings, between the buildings.

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1                   MR. ALLEN: Well, the junction  
2 boxes generally weren't the opening to get in.

3                   They had openings under the lab and under a  
4 few other buildings and some outside covered  
5 with a shed.

6                   DR. NETON: There was one shed  
7 opening, but the picture from the Building 14  
8 is just an opening in the floor of the  
9 building, I mean, just like a three-by-six-  
10 foot -- I'm guessing, but it looks like about  
11 a three-by-six-foot aperture with a handrail,  
12 just like you'd go down into a basement.

13                   DR. MAURO: And this is along --  
14 this is along this utility tunnel.

15                   DR. NETON: Yes. Yes.

16                   DR. MAURO: With a number of --

17                   DR. ANIGSTEIN: Within the  
18 building.

19                   DR. MAURO: There were a number of  
20 these types of stairwells?

21                   DR. NETON: I believe so, yes. I  
22 mean, there's nine entrances into these

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1 utility tunnels by our rough count.

2 MR. ALLEN: From the maps that one  
3 of the former workers gave you guys, I believe  
4 it was, he listed a bunch of different  
5 openings, including one under the lab or in  
6 the basement of the lab and some that look  
7 like they're outside. They're not associated  
8 with the building, and he wrote a shed over  
9 the opening of the ladder.

10 DR. MAURO: This is John. This is  
11 important to me. I'm just thinking it  
12 through, because what this means is that when  
13 air is coming, when you're -- when the vent  
14 fan is on, it's likely that it's clean air  
15 that's coming in.

16 You see, when you -- when I think  
17 about my basement and any radon that might be  
18 coming into my home and into my basement, it's  
19 either the air is coming through the  
20 foundation from the pore spaces in the soil  
21 around my basement, or it's coming in through  
22 my windows, you know, if my windows are open.

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1                   So if there is a negative pressure  
2     in my, you know, in my basement, let's say,  
3     due to a chimney effect or just the diurnal  
4     variation in pressure, the air is going to  
5     come in through the location of least  
6     resistance.

7                   You just said something very  
8     important. That means that when air is coming  
9     into this tunnel, if you've got all these  
10    stairwells and they're open, that's where it's  
11    going to come in, you know, so, I mean, the  
12    weight --

13                  I've got to tell you, I mean, I'm  
14    listening to this and trying to just be --  
15    find the line that gives me some comfort as to  
16    where do I come down on this, and I would say  
17    as we're talking about it, it's unfortunate  
18    it's happening real-time right here on the  
19    phone thinking this one through, but you put  
20    the 100 picocuries per gram type of material  
21    inside the conveyor tunnel.

22                  You have a utility tunnel that's

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1 got all these stairwells in it with a fan, and  
2 in both cases you've got soil outside of the  
3 tunnel, both tunnels, that have some residue,  
4 anywhere from background up to as high as 300  
5 picocuries per gram and the location of it is  
6 almost like it's difficult to say exactly  
7 where it is relative to it.

8           What I'm -- what I'm getting to,  
9 and everyone is going to come to their own  
10 place on this, I'm getting to there, and it  
11 ain't bad. The parity seems to be, you know,  
12 within the realm of reason. The radon  
13 measurements made in the conveyor tunnel are  
14 not a bad surrogate, certainly not a perfect  
15 surrogate, but what did it for me, Jim, was  
16 these stairwells, because I was concerned, to  
17 tell you the truth.

18           I was concerned that, you know,  
19 you've got an exhaust fan on a tunnel, and  
20 it's sucking air in from the pore space,  
21 bringing -- and it's a lot of -- we all know  
22 that the radon concentration in the pore space

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1 is, even natural soil with only one picocurie  
2 per gram, is very, very high, and if the -- if  
3 that -- if that radon --

4 In a funny sort of way, the issue  
5 is not, you know, even the radium  
6 concentration. That might be, you know, ten  
7 here, 20 here, one here. That's not really  
8 the -- you know, that's in play here, but the  
9 real problem is that you've got very high  
10 concentrations of radon in pore space.

11 Is that stuff, is that getting  
12 into the -- that's in the pore space in the  
13 fill material, is that getting into the  
14 utility tunnel in a way that's substantially  
15 different than what's getting into the  
16 conveyor tunnel? I mean, that's what we're  
17 really getting at.

18 In other words, do we have a  
19 mechanism where we're going to start sucking  
20 that radon in in a way that is substantially  
21 different than the way the radon is getting  
22 into the tunnel in the conveyor tunnel, and

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1 the -- and I was always concerned.

2 In fact, I was the one who brought  
3 it up from the very beginning that once you  
4 put a negative pressure fan, exhaust fan,  
5 you're creating the circumstance where you  
6 might be doing that. That means you're  
7 pulling this radon in the pore space in, but  
8 now you tell me you've got these stairwells,  
9 and this is certainly not quantitative by any  
10 means, but you've got these open stairwells  
11 where preferentially the air turnover is going  
12 to come in through there.

13 It's as if all the windows in your  
14 home were open and you've got an exhaust fan  
15 on your -- on your roof, okay. Where is the -  
16 - and the air is going to enter your house.  
17 Is it going to come through the pore space in  
18 the soil around the basement of your  
19 foundation, or is it going to come through the  
20 open windows? It's going to come through the  
21 open windows.

22 Anyway, I'm sort of thinking out

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1 loud, trying to find the right place to be on  
2 this and right now I have to say that my  
3 sense, you know, to try to keep this, my sense  
4 is that, you know, you put all this together.

5 The measurements made in the conveyor tunnel  
6 probably aren't that bad a surrogate.

7 I've got -- I mean, you're  
8 watching sausage being made within SC&A. This  
9 is a conversation normally we would have  
10 amongst ourselves, but now we're having it in  
11 front of everybody, and I have no problem with  
12 that. Bob, I'd like to hear -- you know,  
13 certainly, how do you react?

14 DR. ANIGSTEIN: The thing is my --  
15 okay, two points. One is the individual --  
16 here is a borehole ten, which is in the area  
17 of the utility tunnel. Give me one second  
18 while I check exactly.

19 MEMBER LOCKEY: How far is it to  
20 the utility tunnel versus --

21 DR. ANIGSTEIN: Bore hole ten seems  
22 to be about 40 feet away from Building 30,

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1 maybe 40, 50 feet away from Building 30 to the  
2 east, so it's in the general range of the  
3 utility tunnel, and here you have one reading,  
4 albeit in the top six, no, in the top 12  
5 inches of soil, 813 picocuries per gram.

6 MR. ALLEN: How close is that to  
7 the utility tunnel?

8 DR. ANIGSTEIN: Well, it's very  
9 hard to tell, because these two maps are not  
10 easily superposed on each other. One second.  
11 Let's see.

12 According to my trusty ruler, it  
13 seems to be about 50 feet from the building,  
14 and the utility tunnel, a different scale, is  
15 -- Building 30. Oh, I can't answer it  
16 because, unfortunately, I don't see a scale on  
17 this map. Maybe there is one. Give me  
18 another map.

19 MEMBER LOCKEY: One other question.  
20 When was the sample taken?

21 DR. ANIGSTEIN: When were the  
22 samples taken? In --

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1                   MEMBER LOCKEY: The one you're  
2 talking about, when was it taken?

3                   DR. ANIGSTEIN: 1976.

4                   MEMBER LOCKEY: 1976.

5                   DR. ANIGSTEIN: Right. Just one  
6 second. Okay, here we go.

7                   MR. ALLEN: This is Dave Allen.

8                   DR. ANIGSTEIN: There is a -- okay,  
9 one -- I just want to answer that question,  
10 okay. There is a scale, so it's a quarter  
11 inch, okay, utility tunnel is approximately  
12 100 feet from Building 30 and the borehole is  
13 50 feet from Building 30, so it's on the order  
14 of 50 feet from the utility tunnel. It just  
15 happens to be the one.

16                   MEMBER LOCKEY: Jim Lockey. One  
17 other question. When were the EPA samples  
18 taken, Corps of Engineers?

19                   DR. ANIGSTEIN: I don't know.

20                   DR. NETON: I'm sorry, Jim, I  
21 didn't hear the question.

22                   MEMBER LOCKEY: The Army Corps of

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1 Engineers, when did they do their sampling  
2 around the tunnels?

3 MR. ALLEN: There's been a number  
4 of campaigns by DOE and then later turned over  
5 to Army Corps, and they've done sampling.  
6 This one that Bob analyzed was, I think, a  
7 1978 survey. There is another.

8 DR. ANIGSTEIN: It was published in  
9 `78. It was done in `76.

10 MR. ALLEN: Okay, published in `78.  
11 There was another one published in `84, I  
12 believe, another one in `93 and `98, and  
13 there's been a number of samples during the  
14 remediation in small spots.

15 DR. ANIGSTEIN: Yes, this was  
16 prior. This was the previous. It was the  
17 traditional Oak Ridge pre-remediation survey.

18 MEMBER LOCKEY: Okay so, John, Jim  
19 Lockey again. You know, my thinking is with  
20 the conveyor tunnel, it's a production tunnel,  
21 okay. It's used in the production process.  
22 If, in fact -- if, in fact, the utility

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1 tunnels were built in `57 and `61, and if, in  
2 fact, the backfill that they used is  
3 apparently has a low-level contamination, at  
4 least based on what the EPA report says, EPA  
5 sampling or Army Corps of Engineers sampling  
6 does, and if, in fact, the tunnels were not  
7 under negative pressure, what does that --  
8 what does that say? Are these just two  
9 completely different situations?

10 DR. MAURO: Where I'm leaning is  
11 the situation is worse in the conveyor tunnel.

12 CHAIR ROESSLER: Is that John  
13 Mauro?

14 MEMBER LOCKEY: No, that would be  
15 expected. It's a production tunnel.

16 DR. MAURO: Yes.

17 DR. ANIGSTEIN: Except that it was  
18 three months after.

19 MEMBER LOCKEY: It doesn't matter.

20 DR. ANIGSTEIN: The facility was  
21 still at stand-by.

22 MEMBER LOCKEY: It's a production

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1 tunnel. There is no -- there is no  
2 circumstances that you would have a production  
3 tunnel that wasn't a worst case situation.  
4 That just doesn't --

5 I mean, if you have ore running  
6 through a production tunnel on a conveyor  
7 belt, you're going to have residual  
8 contamination of the conveyor belt. You can't  
9 -- you can't unless you blow down the conveyor  
10 belt, and I can't imagine them blowing down  
11 the conveyor belt in the tunnel, but they  
12 might have done that, but that's obviously a  
13 worst-case situation.

14 In the utility tunnels, which is  
15 not a production tunnel, which is a utility  
16 tunnel where you don't have ore being  
17 utilized, where you have apparently backfill  
18 that is being utilized that has a low-level  
19 contamination, at least based on what the Army  
20 Corps of Engineers say, and also might have  
21 been built after the plant site, since it was  
22 no longer production in '57 and '61, I don't

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1 think they're compatible situations.

2 DR. MAURO: And the utility tunnels  
3 have all these openings, which defeats the  
4 negative -- in other words, it defeats the  
5 motive force to suck in. You see, the way the  
6 shifting that the conveyor tunnel is, in my  
7 mind right now as I'm looking at this and  
8 thinking about it, it's got to be a worse  
9 situation.

10 So the measurements made in the  
11 conveyor tunnel are probably -- I mean, my --  
12 I would -- I would lean toward that being  
13 bounding. In other words, with those openings  
14 in the utility tunnel that Jim just described,  
15 you've just created a circumstance where  
16 you're not going to really have that much  
17 motive force sucking in the radon that's in  
18 the pore space in the dirt.

19 In other words, so if you recall,  
20 the reason this all began was, well, you've  
21 got radium in soil in this fill material now  
22 that we know of that's outside --

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1 DR. ANIGSTEIN: What about thermal?  
2 Sorry for interrupting. What about thermal  
3 effect? If these are utility tunnels, they  
4 presumably would be containing, I don't know,  
5 steam pipes, electrical, certainly electrical  
6 cables, water. I would -- there would be some  
7 heating going in, whereas so, you know, warm  
8 air rises, so I would -- I could see where  
9 there could be a delta p created just by those  
10 convection effects.

11 DR. MAURO: Bob -- and I agree with  
12 that.

13 DR. ANIGSTEIN: And then -- and  
14 then some very slight -- you know, I'm not  
15 talking about a big negative pressure but some  
16 slight negative pressure, and since the fill  
17 space, the fill material is basically totally  
18 open to air conduction -- coarse material like  
19 gravel has to be open to air conduction, so  
20 the movement, even a very, very small fraction  
21 of air passing through that and through the  
22 concrete into the tunnel could give you very

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1 large effects, because, you know, we discussed  
2 at the meeting, if you had -- if you simply  
3 had the pore air moving directly through the  
4 tunnel, simply contained pore air, you would  
5 have something like, if I remember correctly,  
6 40,000 picocuries per liter. That's absurd,  
7 but even, you know, one percent of that would  
8 be very high.

9 MEMBER LOCKEY: It's the same  
10 effect -- Jim Lockey. If you have these large  
11 openings, that's -- you know, the same effect  
12 would take place as if you had ventilation for  
13 heating and cooling.

14 Again, you know, I'm going to go  
15 back to at least what the Army Corps of  
16 Engineers said, that the level of  
17 contamination outside the tunnels was low,  
18 unless you can show me data that says  
19 otherwise, and 50 feet is not outside the  
20 tunnels.

21 DR. ANIGSTEIN: Yes. There was a  
22 --

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1                   MEMBER LOCKEY: It's 50 feet away.

2                   DR. ANIGSTEIN: Yes, but that just  
3 happens to be the nearest borehole.

4                   MEMBER LOCKEY: Well, all right,  
5 but we have samples that are much closer to  
6 the tunnel.

7                   DR. ANIGSTEIN: Okay.

8                   DR. NETON: And I'd point out that  
9 that survey preferentially selected the  
10 highest gamma-emitting areas onsite. It was a  
11 biased sample to go and look for hot spots.

12                  MR. ALLEN: This Dave Allen. I'd  
13 like to point out, too, that with that kind of  
14 sampling, that explains why the dates on those  
15 tunnels, kind of explains why you wouldn't see  
16 many above those tunnels, which, you know, if  
17 it was backfilled and not associated with the  
18 MED material, then it would have essentially  
19 been cleaned up when they built the tunnels  
20 after the fact.

21                  DR. ANIGSTEIN: Well, you're saying  
22 that these were biased samples and they always

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1 are high. That's a little puzzling, because,  
2 on the other hand, you have a surface layer in  
3 one borehole that's as little as .7 and a mean  
4 of .8, so this is -- that's simply natural  
5 soil background.

6 MEMBER LOCKEY: Well, I'm just  
7 going with what the report says, Bob. I mean,  
8 it's in the writeup.

9 MR. ALLEN: Not all the  
10 contamination was radium. I mean, there was  
11 uranium, et cetera. It's just that radium is  
12 what we're talking about with the radon.

13 DR. NETON: Right. That's a good  
14 point, too.

15 DR. ANIGSTEIN: But radium is what  
16 gives you the external gamma. The radium  
17 gives you very little external gamma, unless  
18 there was potassium or thorium-232 there.

19 MEMBER LOCKEY: Yes, all I know is  
20 what we can read from the report and the way  
21 they went about their business.

22 DR. ANIGSTEIN: Okay.

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1                   CHAIR ROESSLER: This is Gen. It  
2                   seemed like we were coming to some conclusion  
3                   and evaluation here, and I would like to ask  
4                   John to expand on -- I think you were about --  
5                   you were saying that your conclusion is that  
6                   the conveyor tunnel, based on a lot of  
7                   evidence and common sense or scientific  
8                   evaluation -- a lot of other things that have  
9                   come up here are speculation, but I think  
10                  based on what we're hearing here, you were  
11                  about to say that the conveyor tunnel can be  
12                  considered the worst-case situation.

13                  DR. MAURO: You know, these are  
14                  judgments you make from, you know, listening  
15                  to and looking at a -- now, the points Bob is  
16                  making are certainly valid, all of which goes  
17                  to the weight one side or the other, and this  
18                  is, you know, a problem that, in my mind, my  
19                  sense is that the conveyor tunnel is probably  
20                  the bounding one.

21                  If someone were to ask me, John,  
22                  in your judgement, you know, which one would

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1 you expect to see the higher radon, and I'm  
2 going to -- and the reason I'm saying this is  
3 that inside that tunnel we found out -- there  
4 were two pieces of information that came out  
5 of here that sort of moved me, that almost  
6 made a reversal on me. I made a reversal,  
7 because I was coming into this meeting saying,  
8 you really can't say that conveyor tunnel is a  
9 good surrogate or bounding for the utility  
10 tunnel.

11 When we got on this phone, that's  
12 where I was, where I was leaning, but I just  
13 heard two pieces of information that changed  
14 my mind, and one was that the conveyor tunnel  
15 contains residue that was on the order of 100  
16 picocuries per gram inside the tunnel.

17 The other thing that I heard is  
18 that the utility tunnel has all these openings  
19 in it, stairwells that really, to a large  
20 extent, defeats the motive force to bring  
21 radon into the tunnel, notwithstanding Bob's  
22 very good point, you know, that it doesn't

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1 take very much, but in the end a judgement  
2 call has to be made, and, you know, imperfect  
3 and incomplete information, you've got to make  
4 a call.

5 Right now, my sense is that the  
6 conveyor tunnel is the one that's going to  
7 have the higher concentration and is the  
8 bounding circumstance, you know, in balance,  
9 which, by the way, I'll have to say is the  
10 reverse of how I came into this conversation,  
11 but this other information I was provided I  
12 think is very important and cannot be  
13 disregarded.

14 Right now I have to say that I'm  
15 leaning toward the conveyor tunnel being a  
16 good bounding surrogate as a way of providing  
17 a level of assurance that we're not  
18 underestimating the radon exposures to the  
19 workers who spent some time in the utility  
20 tunnels.

21 CHAIR ROESSLER: And are you  
22 speaking -- this is Gen -- on behalf of --

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1 would you say that that's SC&A's evaluation at  
2 this point?

3 DR. MAURO: I have to say no,  
4 because right now we're having a Work Group  
5 discussion, and I am sitting here with John  
6 Mauro's hat on and my perspective. You know,  
7 Bob and Steve, you know, this is the kind of  
8 thing that we would probably talk about  
9 offline amongst ourselves and come to a place  
10 that, you know, to sort of test each other's  
11 thinking.

12 So it would be -- it would be  
13 inappropriate for me to say this is SC&A's  
14 position. Right now, what we're doing is  
15 we're having a conversation, exploring the  
16 problem. So, no, this is not an official SC&A  
17 position. It is right now my thinking about  
18 the problem, as it is for everyone around the  
19 table right now.

20 CHAIR ROESSLER: Exactly, and I  
21 think what I'm looking for, our pattern in the  
22 past on any of these decisions is to use

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1 SC&A's evaluation of a NIOSH decision as a  
2 basis for making a Work Group decision and if  
3 you were willing to say this is what SC&A  
4 concludes at this point, I think we could do  
5 that, but I don't hear that, so I'm not quite  
6 sure where we go.

7 DR. MAURO: Yes, I can't do that.  
8 I can't do that, because it's on the -- we're  
9 really doing this in real-time, right now.

10 CHAIR ROESSLER: In real-time.

11 DR. MAURO: And I think it would be  
12 unfair to the process. I would very much like  
13 to, you know, make sure that Bob and Steve are  
14 in the same place. I would have loved to have  
15 had Bill involved in this conversation. I  
16 think, you know, he brings to the table a  
17 level of expertise that's beyond ours.

18 CHAIR ROESSLER: We should probably  
19 ask if Bill is on the phone, and I don't hear  
20 anything, so I assume he's not.

21 DR. MAURO: Would you mind if, when  
22 -- it sounds like, you know, SC&A has to

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1 regroup here. Would you mind if we engage  
2 Bill in this? Is this something that's  
3 appropriate? I guess it's a question for Ted.

4 MR. KATZ: This is Ted. I'm -- we  
5 have this on the agenda for discussion at the  
6 full Board meeting, and we're -- this is  
7 Friday, and there's the weekend in between, so  
8 I think at this point, you know, SC&A needs to  
9 figure out what it thinks in advance of the  
10 Board meeting, but I think, you know, you have  
11 all the information on the table. How long  
12 your discussion takes I don't know, but it's -  
13 -

14 DR. MAURO: It's going to be, yes,  
15 it's going to be hanging up on this call, and  
16 we're going to get on the phone, and two hours  
17 from now we're going to get back to you and  
18 have an SC&A, you know --

19 DR. ANIGSTEIN: Excuse me, John.  
20 That's assuming that we can get hold of Bill  
21 Field.

22 DR. MAURO: No.

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1 CHAIR ROESSLER: No, no.

2 MR. KATZ: Excuse me. This is Ted.

3 I'm not sure it's appropriate for you now to  
4 have a closeted discussion with Bill Field on  
5 this.

6 DR. MAURO: Yes.

7 MR. KATZ: Bill Field can hear all  
8 of this and weigh in at the Board meeting.

9 DR. MAURO: Okay. Okay.

10 MR. KATZ: But I'm not sure that  
11 that otherwise is really the way you need to  
12 go. I don't think you need to track down Bill  
13 Field to have your --

14 DR. MAURO: Okay.

15 MR. KATZ: This is, again, SC&A  
16 bringing its technical support to the Board.

17 DR. MAURO: You're right. You're  
18 right, Ted. I'm sorry. You know, I just  
19 value his contribution, but you're right. At  
20 the back end of the process after SC&A puts  
21 forth its official position, then it could be  
22 aired out before the Board and Bill will be

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1 there to listen to it and he will either  
2 accept it or not, you know.

3 MR. KATZ: Right.

4 DR. MAURO: Whichever way we come  
5 down.

6 MR. KATZ: Right.

7 CHAIR ROESSLER: This is Gen. It  
8 appears, and I think we already knew this  
9 before, that the Work Group is not going to be  
10 able to go to the Board and say, this is the  
11 Work Group's decision, so perhaps the best way  
12 to do this, and -- Ted, see if this works --  
13 is for John to regroup or get his group back  
14 together, discuss this, come to the Work Group  
15 with their conclusion, and then I'll put  
16 together what I see and which I've started on,  
17 this presentation.

18 Josie is here and listening, and I  
19 think Josie may want to put together a  
20 companion presentation. We'll try to get  
21 together on that sort of thing and present  
22 this to the Board and then ask the Board to

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1 make a decision.

2 MR. KATZ: I think that's fine, and  
3 I think that makes a lot of sense given where  
4 things stand, and, you know, the Board may  
5 take this up and give some deliberation, and  
6 they may not be ready to make a decision at  
7 this meeting, so, it's not --

8 You know, I don't want to predict  
9 that the Board will be ready to make a  
10 decision, but it'll get full information from  
11 all of you, so that'll be helpful in getting  
12 the ball rolling, and I think that's what the  
13 Board expects at this point, anyway.

14 I'm not sure that the Board was  
15 expecting to get a clear recommendation from  
16 this Work Group, because I think they've been  
17 following along and realize there's been a lot  
18 of back-and-forth and up-and-down in terms of  
19 people's thinking on different issues.

20 CHAIR ROESSLER: I would -- this is  
21 Gen again -- I would like to ask, John, as you  
22 discuss this with your people, I think the

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1 question we're asking is, is there a bounding  
2 number that can be agreed upon, and if you do  
3 decide that the number that NIOSH has come up  
4 with, I would like that stated. I'd also, if  
5 you say no, I would like to know how far off  
6 you think the NIOSH number is.

7 DR. OSTROW: Gen, this is Steve,  
8 Steve Ostrow. You can -- I'm not disputing or  
9 I don't doubt that we have a bounding number.

10 I think I agree with John that the conveyor  
11 tunnel numbers may be bounding. Where I have  
12 a problem is that you can always pick a  
13 bounding number.

14 My uncertainty is whether you can  
15 -- the situation is similar enough we can  
16 apply the conveyor tunnel results and utility  
17 tunnel results, even though you can say that  
18 the conveyor tunnel is a higher number, but is  
19 it scientifically applicable to the utility  
20 tunnels? That's what I'm wrestling with.

21 MEMBER LOCKEY: This is Jim Lockey.

22 Do you mean -- I'm not sure I understand what

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1 you mean. Do you mean that --

2 DR. OSTROW: Well, just because the  
3 conveyor tunnel number is higher doesn't mean  
4 you can actually apply it to the utility  
5 tunnel situation.

6 CHAIR ROESSLER: Not even as  
7 bounding?

8 MEMBER LOCKEY: You mean it may be  
9 too high. Therefore, it should be lower, but  
10 since we can't set a lower number, we can't  
11 use it?

12 DR. OSTROW: The point is it may  
13 not be applicable. You can always pick a  
14 bounding number that's high, that's higher  
15 than the situation that you're looking at.  
16 You can always pick a bounding number, but you  
17 have to have a scientific reason for picking  
18 it, also, and I'm not sure that you can --  
19 that it's valid to apply the conveyor number  
20 to the utility tunnel number.

21 CHAIR ROESSLER: Well, I think I'm  
22 asking the same question, then, that Jim is.

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1 Are you thinking that it could be -- that it's  
2 way too high, and that's not reasonable?

3 DR. ANIGSTEIN: This is Bob. I'd  
4 like to weigh in and actually confirm that I  
5 concur with Steve. It's just two different --  
6 you know, it's comparing apples and oranges.

7 Two reasons. One is the tunnels  
8 are -- the only thing they have in common is  
9 they're both tunnels, and they're both located  
10 on the Linde Ceramics plant in or on the  
11 grounds of the Linde Ceramics tunnel, the  
12 Linde Ceramics plant.

13 And the similarity ends there, and  
14 you could just as well have picked a tunnel at  
15 a completely different facility and say, well,  
16 the soil is similar, so let's use that one.  
17 The fact is this detailed model, this very  
18 carefully worked out mathematical model of the  
19 diffusion through the soil, is simply not  
20 applicable in this circumstance.

21 So the model, it's not a question  
22 of you have a model that, you know, uses the

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1 best science available and the best data  
2 available and then you have some confirmation  
3 or some sort of, you know, like a, pardon the  
4 expression, like a seat-of-the-pants saying,  
5 yes, you know, like, incidentally, we have a  
6 real measurement. Even though it's a somewhat  
7 different circumstance, it comes out in the  
8 same ballpark.

9 That just gives you a little  
10 additional confidence in the model, but we  
11 dispute the model as simply being a -- again,  
12 I don't mean to sound facetious, but, I mean,  
13 it's a good model, but it doesn't apply in  
14 this circumstance.

15 DR. NETON: This is Jim Neton. I'd  
16 just like to speak up on both those points.  
17 One is we are no longer relying on this model.  
18 I don't know that we've ever said in this  
19 second go-around that the model is even in  
20 play here.

21 We have decided to go with these  
22 radon measurements that are in the tunnels,

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1 and I would also very strongly disagree that  
2 the tunnels are not a good analogue. I mean,  
3 they are underground. They are tunnels.

4 They were -- could be occupied by  
5 workers. They're in a similar environment.  
6 They're on the site. I don't agree that you  
7 could pick a tunnel at another site and use  
8 it, but this is on the same site, so I think  
9 it's a fairly good analogue.

10 DR. MAURO: And, Jim, I think  
11 you've crafted the boundaries of the question  
12 very well, so at least now SC&A has something  
13 that we can say. What we're really asking is  
14 a surrogate data question.

15 DR. NETON: Yes, well, it's not  
16 really surrogate data. I mean, it's data  
17 onsite in a tunnel.

18 DR. MAURO: In fact, yes, it almost  
19 borders on a coworker model.

20 DR. NETON: I would -- I would  
21 argue that, for example, we could say, for  
22 example, you know, we have 150 picocurie per

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1 liter measurements in the plant itself and say  
2 that's bounding, but that's not what we're  
3 suggesting.

4 DR. MAURO: I agree.

5 DR. NETON: We've gone to great  
6 lengths to find as suitable an analogue as  
7 possible, and I think this, in our opinion, is  
8 very close.

9 DR. MAURO: Right, and I would say  
10 to define what SC&A needs to do is, we need to  
11 ask ourselves, there are measurements in this  
12 tunnel taken at a given time, a certain amount  
13 of data, a certain amount of information and  
14 there is a setting in which those measurements  
15 were made and we have to pose the surrogate-  
16 data criteria.

17 We have to test that against the  
18 criteria, you know, in terms of the degree to  
19 which it meets the criteria, and we've done  
20 this many, many times, even though I agree  
21 with you it's not classic surrogate, but I  
22 think that the intent of the surrogate data

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1 questions are similar here.

2                   That is, when all is said and  
3 done, what we're really asking is, is the  
4 setting sufficiently similar that the levels  
5 that are in the conveyor tunnel likely  
6 represent a reasonable bounding value for what  
7 might have been experienced in the utility  
8 tunnel and I think the right criteria to use  
9 are the same questions we ask ourselves when  
10 we pose surrogate data questions to ourselves.

11                   I mean, I don't know of any other  
12 way to do it because, you know, how else would  
13 we come out -- what kind of questions would we  
14 pose to ourselves?

15                   DR. ANIGSTEIN: Yes, I have a  
16 comment to add here. I would like to also  
17 explain. This is sort of a weak explanation,  
18 but I think it's obvious we had very little  
19 time to review this data, and one -- if you  
20 want --

21                   If people are wondering why I take  
22 that Oak Ridge data, the 1978 Oak Ridge --

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1 1976, really, published, is I saw the Bechtel  
2 report and the large -- page after page of  
3 numbers there, but what was lacking from that,  
4 and I admit I came at this last week, and it  
5 was already a little late in the Friday  
6 afternoon and there was no accompanying map.

7           There was a map. I mean, this  
8 particular PDF file was Chapter 4 of this  
9 report. There was a -- there was reference to  
10 see figure number such and such, and the  
11 figure was two dash something, so that would  
12 be in Chapter 2.

13           As far as I could tell, the  
14 Chapter 2 was not in the SRDB or, at least, I  
15 could not find it, and it was at a time where  
16 it was not possible to communicate with OCAS  
17 people, DCAS people to try to locate that. So  
18 we take this one, because here, at least,  
19 there were boreholes at precise locations.

20           Now, if the -- I guess it would be  
21 really, obviously, more appropriate for NIOSH  
22 to do this. If they could trace the tunnel on

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1 the map which I have and trace the borehole  
2 locations from the 711, I believe, data points  
3 and pick the ones that are most closely  
4 adjacent to the tunnels and do the same thing  
5 for the conveyor tunnel, I think that would be  
6 a very strong additional evidence.

7           It would still -- there are still  
8 structural differences and air-exchange  
9 differences, but at least if the radium levels  
10 in the soil could be more closely identified -  
11 - because right now my understanding of this  
12 latest David Allen report -- is that he simply  
13 took the Area 4 samples and compared them to  
14 the Area 5 samples.

15           I, for one, and I think my  
16 colleagues would agree, do not think that's  
17 representative for the soil environment of the  
18 tunnels or the two tunnels, the utility  
19 tunnels.

20           The utility tunnel goes to a  
21 little piece of Area 5. Area 5 is sort of a  
22 diffuse thing, and the conveyor is somewhere

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1 within the Area 4 but the Area 4 also is near  
2 to the utility tunnels, so there could be a --

3 This is what I attempted to do,  
4 and I'm being told, well, this was not -- this  
5 was not a good document to refer to, because,  
6 first of all, there is a relatively small  
7 number of boreholes. You said you were  
8 biased. Okay, fine.

9 So, if NIOSH would come up, would  
10 do the same job better by using the actual  
11 locations and the actual values and  
12 characterize as closely as possible, you know,  
13 the average, taking whatever is a good --  
14 depending on where the boreholes are, within  
15 ten feet of the tunnels, whatever is a good  
16 measure, and then going into the -- and then  
17 doing the same for the conveyor belt, I think  
18 that would be a very strong argument.

19 CHAIR ROESSLER: Does NIOSH have a  
20 response to that?

21 DR. NETON: Well, this is Jim. I  
22 guess I'm a little confused because just ten

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1 minutes ago I thought I heard a very strong  
2 argument on SC&A's point that this model is  
3 not a good analogue in the first place, so I  
4 guess we need to come to a conclusion there  
5 first, I think, and then maybe one can discuss  
6 diffusion.

7 DR. MAURO: The diffusion model --  
8 no, no. I don't think Bob is asking that  
9 question.

10 DR. NETON: I'm not talking about  
11 the diffusion model. I'm talking about the  
12 appropriateness of using the conveyor tunnel  
13 as an analogue for the utility tunnel.

14 DR. ANIGSTEIN: Well, and all I was  
15 saying was, you know, we're not saying -- I'm  
16 not taking -- I'm certainly not taking -- you  
17 know, I'm not stating an SC&A position,  
18 because we don't have one yet, but I'm saying  
19 that it would be useful information if there  
20 could be a comparison. It would bring it one  
21 step closer.

22 DR. NETON: But what I'm saying is

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1 it's a non-starter if SC&A's position is the  
2 conveyor tunnels, no matter how well you can  
3 characterize them, are a suitable model to be  
4 used for the utility tunnels.

5 DR. MAURO: We're not saying that.

6 DR. NETON: Well, that's what I  
7 heard a couple of guys say.

8 DR. MAURO: Right now, what you're  
9 hearing is individuals on the phone thinking  
10 through a very complex problem and coming to  
11 some judgment and everyone has this little  
12 visualization of this comparison of these two  
13 tunnels.

14 Now, what Bob is really saying is  
15 that, listen, you know, if it turns out that  
16 we have a better sense of how much radium is  
17 in the soil in the vicinity of these two  
18 tunnels in terms of the -- is there a  
19 substantial difference, or are they really --  
20 everything else is comparable, but you know  
21 what we're hearing right now. I mean, think  
22 about what we're hearing.

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1           We're saying everything about  
2 these two tunnels may very well be comparable.

3       That is, the amount of residual radium that's  
4 in the soil in the vicinity of the tunnels  
5 might be comparable, perhaps, but we're not  
6 quite sure.

7           You know, let's say within --  
8 we'll use ten feet just for the sake of this  
9 conversation, and now we have a sense that the  
10 fill material -- this was important. The fill  
11 material in all likelihood was probably a lot  
12 alike. It's not that we have a substantially  
13 different type of soil characterization.

14           DR. ANIGSTEIN: One is under a  
15 building. One is outdoors.

16           DR. MAURO: No, no, but the way you  
17 described the construction --

18           DR. ANIGSTEIN: I don't know.

19           DR. MAURO: You don't know.

20           DR. ANIGSTEIN: I have no idea  
21 whether this was -- was Building 30 put up  
22 first, and then the tunnel was dug, or did

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1 they create the tunnel in the process of  
2 building Building 30?

3 MR. ALLEN: The tunnel -- oh, the  
4 conveyor tunnel.

5 DR. ANIGSTEIN: The conveyor  
6 tunnel.

7 DR. NETON: That I don't know.

8 MR. ALLEN: It was used in the  
9 process of moving the ore, so we know it was  
10 there during the ore process.

11 DR. NETON: But rather than us  
12 embark on this detailed analysis that SC&A  
13 suggests, I think I'd like SC&A to get back  
14 and give us a more considered opinion. It  
15 seems like you're backing away from your last  
16 analysis of our, to some degree, your last  
17 analysis of our White Paper.

18 DR. MAURO: Well, the diffusion  
19 model, we all agree, that's got to go.

20 DR. NETON: Well, yes, and we --

21 DR. MAURO: And you agree.

22 DR. NETON: Maybe we were not

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1 specific enough, but, yes, we agree we're no  
2 longer using the diffusion model to bound  
3 anything.

4 DR. MAURO: Right, and now what  
5 we've got here is we've got measurement. It's  
6 almost as if we're saying, listen, we don't  
7 have measurements in the utility tunnel. If  
8 we did, we'd be in great shape. What we have  
9 is measurements in the conveyor tunnel nearby,  
10 which, for all intents and purposes, the  
11 argument is that's probably a pretty good set  
12 of measurements that could be said to  
13 represent -- be fairly representative.

14 For example -- I'll give you an  
15 example. Let's say -- let's say we agree that  
16 the two settings are comparable in many  
17 respects, but of course, there's a lot of  
18 uncertainties. When we're in a circumstance  
19 like this, to me this is a coworker situation,  
20 and you know what I do when I have a coworker  
21 situation? I say, let me see the data you  
22 have, and I take off the upper 95<sup>th</sup> percentile

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1 for the measurements I have where I want to  
2 assign that.

3 This gives me a -- it's not the  
4 perfect solution, but it starts to give me a  
5 sense that given the -- given the  
6 uncertainties we're dealing with -- now what  
7 it -- again, I'm just speaking for myself.

8 When you're dealing with that,  
9 picking off the high-end value that you're  
10 looking at, in this case the conveyor tunnel,  
11 is that a way that somehow gives people a  
12 sense of confidence that we're not going to be  
13 underestimating the typical exposures people  
14 might have experienced or the highest  
15 exposures people might have experienced?

16 DR. ANIGSTEIN: Can I comment? Can  
17 I --

18 DR. MAURO: Sure.

19 DR. ANIGSTEIN: There are only two  
20 actual measurements. The other four are less-  
21 than.

22 DR. MAURO: Well, they're less-

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1 than, you know.

2 DR. NETON: It doesn't make them  
3 invalid.

4 DR. ANIGSTEIN: You can't do a 95<sup>th</sup>  
5 percentile.

6 DR. MAURO: Well, what you do is if  
7 they're less-than, one thing you can do is  
8 say, if they're less-than, let's assume it's  
9 at the value that it's less than.

10 DR. ANIGSTEIN: Okay.

11 DR. MAURO: You know, we know it's  
12 not above that. I mean, I'm trying to give  
13 the benefit of the doubt to the numbers, so I  
14 say, okay, we know it's not higher than that,  
15 so let's assume it's that, and that would be a  
16 way of placing a plausible upper bound,  
17 because when you say it's less than, all  
18 you're really saying is that we're fairly  
19 confident it's not higher than that, so, I  
20 mean, there's ways of --

21 CHAIR ROESSLER: John, it seems  
22 like what we're doing right now is what your

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1 intent is to do once we finish this call.

2 DR. MAURO: Once we hang up, yes.

3 CHAIR ROESSLER: You get together  
4 with your people and carry on these  
5 discussions.

6 DR. MAURO: Yes. Yes.

7 CHAIR ROESSLER: And then come back  
8 to us with your decision.

9 DR. MAURO: Absolutely. Yes, I'm  
10 sorry. We're actually diving in and starting  
11 to tackle this problem on the phone with you  
12 guys and we shouldn't be doing that.

13 We'll get to work. We've got our  
14 work to do, and we'll get back to you. We're  
15 going to regroup right after this and lay out  
16 what is it we think we can do to try to come  
17 up with an SC&A position that we have a degree  
18 of comfort amongst our crew.

19 MR. KATZ: Okay, and this is Ted.  
20 John, when you do that, if you would send a  
21 memo to the Work Group and at the same time I  
22 think, given how little time we have between

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1 now and the Board meeting, if you would -- you  
2 might as well copy the full Board on that  
3 memo.

4 DR. MAURO: Okay.

5 MR. KATZ: And if you would also  
6 either write it in such -- well, you still  
7 need to get PA clearance, no matter how you  
8 write it. Please write that memo in a way  
9 that's easily and quickly PA-cleared so that  
10 we can get that to Antoinette for her  
11 purposes, as well. That would be great.

12 MS. BONSIGNORE: Ted, I just have  
13 one quick question before we adjourn. We've  
14 been talking about the difference between --  
15 somewhat the difference between surrogate  
16 models, surrogate models and standards and  
17 then coworker models and standards, and I know  
18 the Board has some policies and guidelines for  
19 evaluating surrogate data. Is there an  
20 analogous set of standards for evaluating  
21 coworker models and data it relies upon?

22 MR. KATZ: Right. Antoinette,

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1 there isn't -- there isn't a similar policy to  
2 the surrogate data policy about coworker  
3 models. There is a vast amount of experience  
4 that has gone already under the bridge in that  
5 respect, but this is -- this isn't really --  
6 you know, this isn't really a coworker model,  
7 nor is it exactly surrogate. It's sort of  
8 somewhere in between those two.

9           So I think SC&A said that they're  
10 going to sort of take in consideration, you  
11 know, what's, you know, what's obviously in  
12 their judgment, you know, what is -- what are  
13 the relevant considerations and that'll cover  
14 that. Of course, the Board Members have  
15 experience here, too, and would apply their  
16 judgment, as well, but there is no -- there is  
17 no Board policy that exactly fits this  
18 situation.

19           MS. BONSIGNORE: Right, and I just  
20 raise that issue because, I mean, whatever you  
21 would term what's going on here, you know,  
22 somewhere in between surrogate and coworker

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1 model standards or analysis, the other issues  
2 that have been raised in this petition have  
3 been discussed in regards to coworker models;  
4 have they not?

5 MR. KATZ: The other -- I'm sorry,  
6 Antoinette, the other issues?

7 MS. BONSIGNORE: The other, you  
8 know, the other issues that have been raised  
9 about bounding and some conclusions that have  
10 been reached between NIOSH and SC&A have been  
11 based upon some sort of agreement on coworker  
12 data; am I correct?

13 MR. KATZ: Well, I mean, that's  
14 better answered by either the folks at DCAS or  
15 SC&A. There are, you know, a whole number of  
16 issues that were resolved, and I couldn't tell  
17 you off the top of my head where they fall in  
18 terms of whether they're coworker. A lot of  
19 it is direct measurements, too, so I don't  
20 know, but ask that of them.

21 DR. MAURO: I mean, I can answer  
22 that, if you like. During the residual period

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1 for the occupational, for the exposures above-  
2 ground, the buildings above-ground, we spent a  
3 lot of time talking about those exposures and  
4 the methods used, and, in effect, NIOSH has  
5 adopted a method which one would not call a  
6 coworker model.

7           It would be for the residual  
8 period, they have adopted an approach that we  
9 have reviewed, OTIB-70-type approach, which is  
10 where you place what would be called a  
11 reasonable bounding exposure on what might  
12 have been experienced by the workers in the  
13 above-ground buildings. So it is really not a  
14 coworker model that we applied here for this  
15 particular -- for Linde for the 1954 time  
16 period for the buildings above-ground.

17           However, SC&A has thoroughly  
18 reviewed all of the various coworker models  
19 that NIOSH has been using either generically  
20 or at particular sites, and, you know, we do  
21 have a -- we do have our position regarding  
22 how a coworker model we have should be

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1 developed and should be applied. The degree -  
2 -

3 That experience is going to serve  
4 us well here, because what we'll do is we will  
5 take into consideration, you know, the way we  
6 see coworker models and how they're used. We  
7 will certainly --

8 I think we're going to give a lot  
9 of importance to the surrogate criteria the  
10 Board has adopted, which is -- and sort of put  
11 that together and do the best we can to come  
12 to a place where SC&A feels that we've got a  
13 circumstance where the numbers -- here's where  
14 the real question is. Are the measures that  
15 were taken in the conveyor tunnel, whether  
16 it's at the mean or the upper end or 95<sup>th</sup>  
17 percentile and given all the limitations of  
18 the data that exist, do we feel comfortable  
19 that that place is a plausible upper bound on  
20 what the exposures might have been to workers  
21 who were in the utility tunnel?

22 We'll give our rationale, and the

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1 test we'll put it to is the coworker  
2 consideration, the surrogate data  
3 considerations that we have -- that we do  
4 routinely. This is just unique because we  
5 have never dealt with tunnels before and so  
6 we're going to have to do a little work here.

7 MS. BONSIGNORE: Okay. Thank you,  
8 John, for that. Thank you for explaining  
9 that.

10 CHAIR ROESSLER: This is Gen. I  
11 have a question. As you instructed SC&A how  
12 to go about sending their memo to the Work  
13 Group and copy the full Board, what  
14 opportunity will the Work Group have to  
15 discuss how we're going to present this? Can  
16 we talk to each other on the phone, or what  
17 can we do?

18 MR. KATZ: Well, this is Ted. Can  
19 you hear me? You can -- we do not have time  
20 to have another Work Group meeting, I don't  
21 think --

22 CHAIR ROESSLER: No, I don't think

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1 so.

2 MR. KATZ: -- between now and the  
3 Board Meeting, and as individuals you can  
4 always talk to each other on the phone. You  
5 cannot all get together on the phone together,  
6 because that would be a Work Group meeting and  
7 we have -- although, obviously, that would be  
8 perfectly legal, the practice has been of this  
9 Board to hold all of its Work Group meetings  
10 transparently with transcription and all that.

11 So, you know, you can speak to  
12 your colleagues on this Work Group and off  
13 this Work Group individually to help  
14 yourselves with your thinking about the  
15 matters on the table.

16 CHAIR ROESSLER: Okay. I think we  
17 can --

18 MR. KATZ: But there's a limit of  
19 it.

20 CHAIR ROESSLER: I think we can  
21 handle that.

22 DR. MAURO: Could I ask a question,

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1 Ted? Would it be appropriate for Gen and the  
2 other members of the Work Group to caucus  
3 right now and get Bill thinking about this  
4 beforehand? I understand we're -- SC&A is not  
5 going to engage Bill in our own internal  
6 deliberations, but would it be appropriate for  
7 Bill to be sort of alerted to the dialogue --  
8 the conversation we just had?

9 MR. KATZ: In a normal -- the  
10 normal thing, John or Gen, in this situation  
11 is, you know, the Chair or any of the -- any  
12 of the members of the Work Group are welcome  
13 to talk to Bill and update him on this meeting  
14 and sort of get a sense from him. That's  
15 fine. You can't do it -- the Work Group as a  
16 whole can't caucus with Bill, but  
17 individually, you know, you guys can always  
18 speak to each other.

19 DR. MAURO: Okay.

20 MR. KATZ: That's wide open.

21 MS. HOWELL: If I could just chime  
22 in on what Ted's saying there, I mean, we have

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1 obviously a lot of interested parties in  
2 what's going on and we want to make sure that  
3 they have the ability to hear where that  
4 discussion is going.

5 So if there's some informal email  
6 exchanges, that's one thing, but one thing we  
7 want to kind of be sure of when we have the  
8 meeting next week and are discussing this  
9 again is that we take the opportunity to  
10 really restate for the record and for the  
11 stakeholders involved what some of those  
12 discussions were.

13 So, you know, I don't like the  
14 term caucusing, because it kind of implies an  
15 ex parte Work Group meeting, but, you know, we  
16 just want to be clear about what's going on,  
17 and I know that the Board Members are very  
18 interested in that, as well.

19 CHAIR ROESSLER: This is Gen. It's  
20 not appropriate for Bill to engage with SC&A.

21 I don't think it's necessary for us as  
22 members of the Work Group, actually, to talk

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1 to him. I think my main concern is to be able  
2 to get together with Jim Lockey and Josie and  
3 Mike and the four of us deciding how we're  
4 going to make this presentation, and I think  
5 we can do that. Once we get the report from  
6 SC&A, I think we can decide where to go.

7 MEMBER LOCKEY: Ted, Jim Lockey.  
8 Can we, and Gen, can we do that before the  
9 meeting when we're down there?

10 CHAIR ROESSLER: Well, we're going  
11 to have to.

12 MR. KATZ: Yes, I mean, you can  
13 certainly organize your presentations, you  
14 know, together at the meeting, what have you.

15 So organizing who's going to present what or  
16 how, I mean, that's fine, but in terms of  
17 having a substantive discussion about what you  
18 learned from SC&A as a result and then where  
19 do you go from that, I think you're beyond  
20 that point to do that. You cannot do that as  
21 a Work Group without having a meeting, so just  
22 --

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1           So organizing who's going to  
2 present when and so on, I think that's fine.  
3 Getting a sense whether you need one  
4 presentation or two, of course, you know, I  
5 mean, that makes perfect sense, but I wouldn't  
6 get into substance, because really, you know,  
7 we try to do all that in public.

8           CHAIR ROESSLER: Okay.

9           MEMBER LOCKEY: John?

10          DR. MAURO: Yes.

11          MEMBER LOCKEY: Jim Lockey. I  
12 guess, just to make sure I understand what  
13 you're going to be doing, what I'd like to  
14 know is, is the measurements that come from  
15 the conveyor belt tunnel, the upper limit of  
16 that, is that -- is that -- and the data that  
17 we have in relationship to the utility  
18 tunnels, I guess what I want to know is, is  
19 the 95 percent -- the upper limit of that, are  
20 you confident or not confident that that's a  
21 bounding limit for the utility tunnels?

22          DR. MAURO: That's exactly what

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1 we're going to be talking about. We're going  
2 to have -- we're going to have to -- I think  
3 that the onus is on us to say, can we use that  
4 data in a way, whether we take off the upper  
5 95<sup>th</sup> percentile or whatever it is that we do,  
6 and say with a degree of confidence that that  
7 places a plausible upper bound on what might  
8 have been experienced in the utility tunnel.  
9 That is exactly the question that we have.

10 MEMBER LOCKEY: That's the question  
11 I have, and if you're not confident that that  
12 -- if you come back and say, well, it could  
13 have been higher, and these are the reasons it  
14 could have been higher, then that has a lot of  
15 meaning to me, okay.

16 DR. MAURO: Yes.

17 MEMBER LOCKEY: And so that's  
18 really the answer. I'm not concerned about if  
19 the exposure in the tunnels were lower. I  
20 want to know if it's 95, the upper 95  
21 confidence interval, is it claimant-friendly,  
22 weight of evidence says it just isn't higher.

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1 DR. MAURO: Is it a reasonable  
2 upper -- I mean, the question we always ask  
3 ourselves is, does this represent a reasonable  
4 upper bound that you would say could be used  
5 to apply to the utility tunnel.

6 We're dealing with two  
7 circumstances that are similar enough that we  
8 -- and where the differences lie, there are  
9 certainly differences. This is always the  
10 case. This is true of any coworker model or  
11 the application of surrogate data. You have  
12 to get to a place where you feel confident  
13 that you've achieved that.

14 So, yes, we're going to -- we're  
15 going to come back, and either we're going to  
16 say, we feel comfortable that this particular  
17 number -- we'll tell you what the number is --  
18 is a plausible upper bound for what could be  
19 applied, what might have been experienced in  
20 the utility tunnel, or we're going to say, we  
21 really don't. We really can't do that. We  
22 don't feel like we have enough scientific

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1 grounding to be able to say that and say what  
2 we believe to be the upper bound.

3 MEMBER LOCKEY: John, to then  
4 explore that, take it a little further, by  
5 that -- by that you mean we're not sure that  
6 it's an upper bound, i.e. it could be higher.

7 DR. MAURO: Yes. That means it  
8 could have been higher, yes.

9 MEMBER LOCKEY: Okay.

10 DR. MAURO: And we may come down  
11 where we may come out, and then we're in the  
12 place where we say, well, how much higher.  
13 Right now I don't want to speak to that,  
14 because there may be other things we could  
15 consider amongst ourselves that, okay, if it  
16 could have been higher, how much higher to the  
17 point where it's still plausible?

18 In other words, we can't go to a  
19 place -- as both Bob and Steve pointed out  
20 earlier, we just can't throw a big number at  
21 it. I mean, right now, you know, we could  
22 probably pick a number that we know it's not

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1 higher than but that would no longer be  
2 plausible.

3 So, I mean, we're in a very  
4 difficult place where you have to find the  
5 number that you feel is bounding but still  
6 plausible, you know. When I say plausible,  
7 represents plausible circumstances. That's  
8 probably the better term, and that's what  
9 we're going to be working on.

10 Hopefully, we'll give you  
11 something that will be a firm position and not  
12 leave you where we are right now. Right now  
13 we're very wishy-washy. I'd like to be able  
14 to give you something.

15 We'll give our -- make our case,  
16 present it to Gen and the rest of the Work  
17 Group. Then, Gen, I guess you'll make your  
18 presentation to the full Board.

19 CHAIR ROESSLER: Right.

20 DR. MAURO: At that time, hopefully  
21 the Board can make some judgments. Now, the  
22 only thing I'm afraid of is that, once we dive

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1 into this -- right now, for example, there is  
2 information that's out there that was pointed  
3 out to us on the phone by Jim and by David  
4 that is important information that I don't  
5 know if we have in front of us or not, for  
6 example, the stairwells, the measurements that  
7 were made of the sand inside the conveyor  
8 tunnel, that sort of thing, the other borehole  
9 measurement data that might be out there that  
10 we could get a better feel for what the levels  
11 were adjacent to both tunnels.

12 I mean, all of that is information  
13 that, I guess, you know, we don't have in  
14 front of us right now, and we may want to  
15 reach out, by the way, to Jim and David not --  
16 and we do this -- I think we have the  
17 prerogative to do this or the discretion to do  
18 this, that is, just to make a call, could you  
19 please provide us with this? Could you please  
20 provide us with that, without -- you know,  
21 just requesting information that they're aware  
22 of that maybe we're not.

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1 DR. ANIGSTEIN: Yes, basically just  
2 to provide us with the documents.

3 DR. MAURO: Yes. Yes, that would  
4 be great, and, I mean, this way we have  
5 everything that we think might be helpful.  
6 As, Jim, you pointed out, maybe we should have  
7 seen it, but the stairwells, maybe it was  
8 information we have, but we didn't have the  
9 wherewithal to realize, wait a minute. Look  
10 at the stairwells, or maybe you have the  
11 information and we don't. I'm not sure of  
12 that.

13 DR. NETON: Yes, we can certainly  
14 provide you with whatever you need.

15 DR. MAURO: That would be great. I  
16 guess we're at the point where SC&A has got  
17 its work cut out for it.

18 CHAIR ROESSLER: John, if you come  
19 to the point that I think you were alluding to  
20 that you cannot come up with a decision and  
21 you need more information, you're going to  
22 have to tell us that, too.

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1 DR. MAURO: Oh, yes, we will, and  
2 I'm hoping that we can answer your question to  
3 your satisfaction and not have to just keep  
4 coming back, well, we need more information.  
5 There's a point you reach where you say,  
6 listen, we've got everything that's out there,  
7 and now come to some judgment based on that,  
8 and then, of course, it'll be up to the Work  
9 Group and the Board to decide whether you  
10 agree with where we come out on this.

11 CHAIR ROESSLER: Exactly, and can  
12 you give us a time line, your best estimate of  
13 when you think you'll be able to come back to  
14 us?

15 DR. MAURO: Well, we're going to  
16 regroup right now and talk about this and what  
17 is it we -- especially Bob. I'd like to hear  
18 very much from Bob, you know, what we -- what  
19 is it we can do, and the answer is, you know,  
20 I'd rather have -- I'd rather not have this  
21 conversation online.

22 I'd rather talk to them and let

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1 you know whether I -- you know, get back. Can  
2 we get back to you with an email of what we  
3 think we can be able to deliver to you by when  
4 after we have a chance to talk a little bit?  
5 I don't do much traveling on --

6 MR. KATZ: Hello? John, this is  
7 Ted. Really, this is going to be problematic  
8 if this runs into the weekend, because you  
9 have Board Members that won't even be able to  
10 get access to this information on the weekend  
11 and so on, so I would say, you know, have your  
12 conversations and look at the materials with  
13 DCAS, but you're going to need to be  
14 responsive today to close this so that --  
15 otherwise, we're going to have a problem with  
16 not everybody having access to the information  
17 and so on.

18 Now, if in doing that, you know,  
19 that short-circuits you and there's analyses  
20 you would like to have done that you can't,  
21 you can state that as part of your memo, and,  
22 you know, the full Board may decide it wants

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1 more information after everything is  
2 presented.

3 I mean, that's always open, but at  
4 this point we really need to get -- I don't  
5 see how Gen and others could prepare and how  
6 everyone else on the Board can get prepared if  
7 you're waiting until Sunday or Saturday or  
8 whatever, and some of them may not have access  
9 on the weekend and so on.

10 DR. MAURO: I'm going to tell you,  
11 the reality is I don't think we're going to  
12 have something for you by the end of today.  
13 We're going to -- we're going to regroup.

14 DR. ANIGSTEIN: You have another  
15 Work Group meeting.

16 DR. MAURO: At 1:00, we have  
17 another, yes, exactly, but I'm the only one  
18 who's traveling on Monday. Now, whether or  
19 not -- geez, I don't know. Could you give  
20 SC&A a chance just to regroup for a little  
21 bit? Any way that we could -- you know, so  
22 that we could get our bearings on this one.

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1 It sounds like the --

2 CHAIR ROESSLER: Why don't you  
3 regroup and let us know what you think the  
4 time line might be.

5 DR. MAURO: Yes, we'll email back  
6 everyone this afternoon with, you know, where  
7 -- after we have a chance to sort of, you  
8 know, get our thoughts together on this thing.

9 CHAIR ROESSLER: Okay. Okay, so I  
10 think we've come to the end of our meeting  
11 unless someone has comments. I would like to  
12 just comment to the other Work Group members,  
13 particularly to Josie and Mike, because we  
14 talked about this before, that we would expect  
15 to perhaps have two presentations. Does that  
16 sound still like a good approach?

17 MEMBER BEACH: Gen, this is Josie.  
18 Excuse me. Yes, I think that's probably  
19 going to have to be the approach.

20 CHAIR ROESSLER: And we might have  
21 to do it independently in view of the time and  
22 maybe just put our heads together a little bit

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1 before the meeting.

2 MEMBER GIBSON: This is Mike.

3 Sounds good to me, too.

4 CHAIR ROESSLER: Okay, Ted, is  
5 there anything else we need to do at this  
6 point?

7 MR. KATZ: No, I think -- I think  
8 this has been intense and I think a lot of  
9 good work has gone into this already and we  
10 look forward to the final pieces from SC&A.  
11 If you want to adjourn, I think it's the time  
12 to do it, then.

13 MS. BONSIGNORE: Ted, if I could  
14 just ask, if there are any major developments  
15 from SC&A today that -- I understand things  
16 have to be PA-cleared, but if you could at  
17 least alert me if there has been some sort of  
18 decision made from SC&A's perspective, not the  
19 context of it but the fact that a decision has  
20 been made.

21 MR. KATZ: I will do that,  
22 Antoinette. I will get in touch with you this

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1 weekend.

2 MS. BONSIGNORE: Okay. Thank you.

3 I appreciate it.

4 CHAIR ROESSLER: All right, then.

5 I think -- thank you, everyone. I think we're

6 finished for this meeting.

7 (Whereupon, the above-entitled  
8 matter went off the record at 12:03 p.m.)

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