

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

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WORK GROUP ON LINDE

+ + + + +

FRIDAY
NOVEMBER 12, 2010

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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 96th 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 95th 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 95th 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 95th 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 95th
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 95th
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 95th 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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