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 CERAMICS

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FRIDAY
APRIL 16, 2010

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The Work Group convened telephonically at 11:00 a.m. Eastern Standard Time, Genevieve Roessler, Chair, presiding.

PRESENT:

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

ALSO PRESENT:

TED KATZ, Designated Federal Official
NANCY ADAMS, NIOSH Contractor
ANTOINETTE BONSIGNORE, Petitioner
CHRIS CRAWFORD, DCAS
JASON DAVIS, DCAS
STU HINNEFELD, DCAS
EMILY HOWELL, HHS
JENNY LIN, HHS
LINDA LUX, Petitioner
MONICA HARRISON-MAPLES, ORAU Team
JOHN MAURO, SC&A
JIM NETON, DCAS
STEVE OSTROW, SC&A
LAVON RUTHERFORD, DCAS
MUTTY SHARFI, ORAU Team

C-O-N-T-E-N-T-S

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

(11:02 a.m.)

MR. KATZ: So let's begin with roll call, then, starting with the Board members, starting with the Chair.

CHAIR ROESSLER: Gen Roessler, Chair. No conflicts.

MR. KATZ: Thank you.

MEMBER LOCKEY: Jim Lockey. No conflict.

MEMBER BEACH: Josie Beach. No conflicts.

MEMBER GIBSON: Mike Gibson. No conflicts.

MR. KATZ: And then the NIOSH ORAU team.

MR. CRAWFORD: Chris Crawford. No conflicts.

MR. RUTHERFORD: LaVon Rutherford. No conflict.

MR. HINNEFELD: Stu Hinnefeld. I am on. I don't have a conflict with Linde.

MR. SHARFI: Mutty Sharfi. No conflicts.

MS. MAPLES: Monica Harrison-Maples. No conflicts.

MR. DAVIS: Jason Davis. No conflicts.

MR. KATZ: Very good. Then SC&A.

DR. MAURO: John Mauro. I have no conflicts. John Mauro, SC&A. No conflicts.

MR. KATZ: Great. And then other federal agencies including HHS, DOE, DOL officials or contractors.

MS. HOWELL: Emily Howell, HHS.

MS. LIN: Jenny Lin, HHS.

MS. ADAMS: Nancy Adams, NIOSH contractor.

MR. KATZ: Okay. No one from DOE or DOL.

And then, members of the public.

MS. BONSIGNORE: Antoinette Bonsignore, Linde petitioner.

MR. KATZ: Welcome, Antoinette.

MS. LUX: Linda Lux, Linde petitioner.

MR. KATZ: Welcome, Linda.

MS. LUX: Thank you.

MR. KATZ: I'll have a question for you, Linda, after we get started here.

MS. LUX: Okay.

MR. KATZ: Okay. But before we get any further onto this matter, there's one, let me just check with the Board members about, we don't have a set end time for this meeting. But let me hear from you as to when you need to be off this call.

CHAIR ROESSLER: I'm okay for all day. This is Gen.

MR. KATZ: How about you, Jim?

MEMBER LOCKEY: Three hours.

MR. KATZ: Okay.

MEMBER BEACH: This is Josie. That's about my max, too.

MR. KATZ: Okay. Three hours.

And the same for you Mike?

MEMBER GIBSON: I'm good.

MR. KATZ: Okay. And then how about the DCAS ORAU group? Does that, does that work for you? Three hours?

MR. CRAWFORD: Yes here.

MR. KATZ: Yes. I'm not saying, I'm not saying that this will take three hours, but -- and the same for you, Steve and John?

DR. MAURO: That's fine for me, or longer, if necessary.

MR. OSTROW: Yes. I'm fine also.

MR. KATZ: Okay. Good. Okay. I just wasn't -- so then before I turn it over -- someone has a -- if folks would mute their phones, there's feedback coming back. I'm hearing myself, which is awful. If you would mute your phones, *6, if you don't have a mute button, and then just press *6 again when you want to come back on to talk.

I also just want to remind everyone to disconnect completely; don't put

the call on hold. Okay.

I wonder if it's the court reporter's recording or something that's giving me the feedback. I don't know if other people are hearing it or it's just me.

CHAIR ROESSLER: I'm not hearing anything. This is Gen. I'm not hearing anything.

MR. KATZ: Okay. Because everything I say is echoed right back in my ear.

Before we get in to it, Gen had -- I sent out an agenda for Gen and let me just go over the broad outlines, because Gen and I spoke this morning. We had a couple of emails from Antoinette and I just want to lay out the outlines of this. And then Gen will go in to the details of the agenda.

But we have, Gen will be presenting some background information. She'll talk more about that. I have a petitioner letter from Linda Lux. And Linda

is on the line.

And, Linda, I just want to know if you want me to read that in to the record or, since you are on the line, whether you want to do that yourself.

MS. LUX: You can go ahead and read it. My voice isn't so great today.

MR. KATZ: Okay. That's fine. That's fine.

So after Gen does her background bit, I'll read Linda's letter into the record as she has requested.

And then we have presentations of the OCAS documents, the work that's happened since the last Work Group meeting by Chris Crawford. And a review and response from SC&A. And after that, Antoinette has sent a couple of emails with some concerns she posed about worker interview material. And so we'll have -- she'll have an opportunity to present those concerns and ask some questions relating to those. And then finally, the Work Group

will discuss how to go forward with respect to the May Board meeting in terms of reports to the full Board. Okay.

So if that's good, then -- and before, just let me note, before Antoinette speaks on the issue of these interviews, I'll have a couple of remarks to say with respect to the Privacy Act. But, so let's then get started and, Gen, it's in your hands.

CHAIR ROESSLER: Hi. Thanks, Ted.

For those of you on the Work Group or others who did not get the agenda, if you're like me and you don't check your CDC email every day, you might not have received it. But I noticed this morning that it's posted on the OCAS website. So if you want to look at the agenda, once you go there, it will be under the Linde section.

I would also remind speakers that since we have a new court recorder, it would be good for us to -- and we get in the habit of not doing this -- but to give our names as

we talk because he probably won't recognize all our voices.

So we have picked a tentative end point for the call. We're hoping to get done by, let's see, two Central, that would be three Eastern, if I got the times right.

MR. KATZ: Two o'clock Eastern.

CHAIR ROESSLER: One Eastern. Ted, you better say the time because I got it wrong on the first agenda.

MR. KATZ: It's 11 to two Eastern time, is what we're shooting for here.

CHAIR ROESSLER: Eleven to two Eastern, and I think we can do that.

And we'll follow, as Ted mentioned, we'll get the technical work done first. And then we'll take care of some other things and, Antoinette, you'll follow after our technical discussion.

I'd like to remind the Work Group and others that we're, that we did have a December 14th face-to-face Work Group meeting

in Cincinnati that's posted on the website, that we followed that with a January 25th teleconference that's also posted.

And then we have the, not Work Group meeting, although the Work Group, I think, listened in; the OCAS and SC&A had a February 23rd technical call.

What I thought would be helpful is, and I listed this in the agenda, is to summarize the documents that we'll be looking at today.

One that's not listed in the agenda, and I think Ted sent it to you and I also sent it to Work Group members this morning, is Steve Ostrow put together a document. It's a one-page document. The title of it is, Linde Work Group-SC&A Commitments. And he has on there three items. If you have that in front of you, that might also help to get through the process today.

The other documents then that you should have in front of you, I've got listed

on the agenda. There's the summary of the February 23rd technical call. Steve put that together. And then just the other day, Chris Crawford -- I think that was sent on April 7th -- was it, Chris? The three documents. They're called, The Cover Letter for Linde Work Group Transmittal of Tunnel and Time Line Papers, the second one is Approach to Dose Reconstruction During the Linde Residual Period and the third one is a document on Linde tunnels.

So if we have all of that in front of us then I think the next item on the agenda would be for Chris and the OCAS people to go into their presentation of documents.

Or, Ted, did you want to read the petitioner letter first?

MR. KATZ: Yes. Let me just read that first and then we'll be on to Chris.

So this is from Linda Lux, dated April 14th, 2010 and it's addressed to the Linde Site Working Group.

After reviewing the notes regarding the Linde Site in Tonawanda, New York from the past Work Group meetings and also the Worker Outreach meeting I would like to say I feel the same frustration that participating petitioner Antoinette Bonsignore stated over the lack of importance the affidavits that had been submitted by claimants have been given. After all, they're the only ones who were at the Linde site at the time in question.

I think, quote, the best available science, end quote, and a common-sense approach can only be applied after you read their statements. Anything else would not be a true effort in establishing if a dose can be reconstructed. I read in the 2005 Worker Outreach meeting, page 120 of 126, under the heading Miscellaneous, it states that, in Building number 100, eight individuals that were office and clerical workers all developed cancer within a short

period of time from each other. Would a dose reconstruction ever account for an unexpected situation like that?

In regard to the renovations issue, along with the 1960s renovation of building number 30 there were other renovations, as well. Building number 14 was one of the most contaminated buildings inside and also in the soil outside. It stood right next to Building number 11. Both buildings, number 14 and number 11, were connected to the also-contaminated tunnel. Building number 11 had two renovations. One in the 60s and again in the 70s.

It is stated in my father's medical records that he worked in extremely dusty conditions for about a two-year period. My father worked in building number 11 in the 60s and 70s.

When my father passed away in 1994 at the age of 59 of multiple myeloma, he had no idea he had worked in a contaminated work

site.

I have read that Mr. Elliott has made the statement that a low percentage of cancers are related to radiation exposure. I am sure that many, many workers just like my father never realized they had been exposed and therefore, it was never mentioned to the doctors.

I also find it very frustrating that risk factors are not being looked at for all cancers. For example, my father died of multiple myeloma at 59 years old. The risk factors are; over the age of 70, parenthetically, my father was 59; being obese, parenthetically, my father was slim; African American, parenthetically, my father was white; exposure to radiation, parenthetically, yes; male, parenthetically, yes.

I feel in individual dose reconstruction that too much emphasis is being put on the job category and not that Linde as

a whole was a contaminated site.

In your last work session, Dr. Mauro stated that all home's natural radiation should be below 4 picocuries per liter. I believe natural radiation is called ionizing radiation. The workers, if I'm correct, were exposed to alpha, proton and/or neutron, which can cause five to twenty times more harm.

These workers were exposed to these amounts day after day, all day, inside and outside.

I feel individual differences in metabolic behavior of uranium and radiation in the body needs to be taken very seriously.

It is also concerning that some but not all of the testing data is missing. I have to wonder; was it lost or destroyed? I've read a lot of workers stating that they were never told some of the testing results that were done on their bodies, soil, or water.

According to the statement of this

bill it states, quote, uncertainties are to be handled to the advantage rather than the detriment of the claim, unquote. I sincerely hope every affidavit from the Linde workers is read and carefully considered in your decision-making process.

Thank you for letting me comment on my concerns.

Sincerely, Linda Lux.

The end of the letter.

And just to note, I had previously distributed the letter to the Work Group. Thank you.

And now it's you, Chris.

MR. CRAWFORD: Thank you, Ted.

Just in terms of the agenda, Jim has, who is unfortunately not here, Jim Neton, has said that he would like us to concentrate on the period of the 107 Petition, if at all possible because that's probably the most pressing issue at the moment.

And, in essence, I would like to

proceed right to bullet point number 2 which is the document entitled Approach to Dose Reconstruction at Linde. For that reason.

This document addresses specifically the 107 period. That is, from January 1st, 1954 through to 2006, I believe -- July 31st, 2006.

So if that's okay with the Chair, I'll get right to that document.

CHAIR ROESSLER: It sounds like a good approach, Chris.

MR. CRAWFORD: This document is in partial response to previous Work Group meetings and conversations with and papers exchanged between SC&A and NIOSH and our ORAU contractor.

One of the big issues is how to account for internal dose, in particular during the period after the decontamination at Linde, through at least the 1976 survey, which is the next time we have a data point. In other words, we have data recorded from the

decontamination period and then there's a long blank period until 1976 and then, thereafter, there are quite a few more data points after that.

Because the Linde Site was originally turned over by the AEC to Linde more or less as an unrestricted workplace -- in other words, by the standards of the time, it had been decontaminated sufficiently that it was considered not a hazardous situation.

Based on our negotiations, you might say, between SC&A and NIOSH, we looked carefully at the decontamination era readings of some of the decontamination procedures. We had talked at one point of using the vacuuming process as a source for the airborne contamination, but, and then discounting that by a factor which is based on the presumed amount of material removed from the site: the contaminated material. Which means that further disturbances after 1954 would have churned up less material for several reasons.

Recently however, we settled on another measurement which is the air measurements recorded after pneumatic hammering of surfaces that had been previously cleaned by sandblasting.

The reason we are looking at that as a good representative sample of contamination is, first, the site after 1954 represents a site that has in fact been cleaned by sandblasting and other methods. Second, that pneumatic hammering does loft a lot of material when it's done, of course. We all know that.

And we decided not to reduce the maximum contamination levels by that factor of two that I mentioned earlier because we are working on a previously cleaned surface. So we're assuming that the 2.3 MAC air, which is a measure of contamination which is 2.3 times beyond the accepted limits, shall we say, the maximum air concentration allowed for the entire period from 1954 through 1969, when we

think, from worker testimony and other evidence, that the bulk of the renovations were done in the building.

After 1969 we are using the TIB 70 approach recommended by SC&A to do an exponential decline in the airborne contamination from the 2.3 MAC level down to the level actually measured in 1976.

After 1976, we're assuming those levels were constant. All of these, in this document, all of this material is contained and you can see the actual readings in Tables 3 and 4 on the approach document.

We had previously resolved the radon issues to the satisfaction of SC&A. That is also available in Table 5. We had accepted a level of 10 picocuries per liter which was actually measured in the plant, I believe, in a quiet period between the early production period and the later production period as being bounding, considering that the ore had been removed and then the building

decontaminated, of course, after 54.

So we're going to continue that 10 picocurie per liter assumption, which works out to .48 working level months per year through to 1970.

And then we also do a decline on that down to the levels actually measured in 1981 during that survey. The reason we picked the 81 survey is they were slightly higher than the 1976 radon measurements. So that's claimant favorable to do it that way.

I should note, by the way, that the 1981 measurements were not much above background level for the Buffalo area and that type of building.

But the amounts allocated prior to that time and the continuing level from the tunnels, which we'll discuss in the next section, are accepted at the much higher levels from the 40s.

There's also a section on external dose which is based on actual measurements

made in the building in the 50-54 time frame, Building 30, I'm referring to, which is the most contaminated of the buildings and then further measured in 1976 and 1981. Those measurements are quite comparable. In other words, there wasn't much change in the external radiation environment during that entire period. So that's more or less a constant.

Since we all have the paper, I'd like to move on and introduce the tunnel paper.

And then, Gen, I don't know what you're intention is. Perhaps SC&A would like to reply at that point.

CHAIR ROESSLER: Chris, this is Gen.

I just turned my mute off, but maybe missed a little bit of what you said. I think you're asking, at what point do we want SC&A to respond?

MR. CRAWFORD: That's right.

Should I finish the tunnel, as well? Or should we take up the --

CHAIR ROESSLER: Well, let's ask Steve and John what their -- what they recommend.

MR. OSTROW: This is Steve. I think it would probably be beneficial to discuss the airborne that Chris just went over now before we move on to the tunnel issue.

DR. MAURO: Yes, I agree Steve. This way, basically, you have to carry too much information, you know, information at one time. CHAIR ROESSLER: That sounds like a good approach.

So I think, Chris, you have presented your approach.

And let's then hear from Steve and John.

And we'll wait with the tunnels. We'll take the tunnel issue up next.

MR. OSTROW: Okay.

DR. MAURO: Very good.

MR. OSTROW: Chris, this is Steve.

Just to clarify, I just want to make sure I got it right. I read the document. I listened to you. From, in the first period, from 1954 through the end of 1969, you held the uranium air concentration constant at, I think it's 2.3 MAC. Is that correct?

MR. CRAWFORD: That's correct.

MR. OSTROW: Okay. In 1970 to 76, that's the next period, you assumed that that 2.3 MAC which is, I think, 1,059 dpm per cubic meter, decreases down to .277 dpm per day until 1976. After the 1976 measurements, you have it decaying away from the 69 period to the 76 period.

And then from 1977 onward to the present I guess, you're assuming the concentration is constant at the 2.77 dpm per day.

Did I get the three periods correct?

MR. CRAWFORD: Yes. That's correct.

MR. OSTROW: Okay. And I see that as you noted, we checked into this, that this is consistent with the OTIB 70 guidance that we had suggested that you use in our previous meetings, teleconferences and technical calls. So, you did it consistent with what we suggested.

And as we looked at it and we think this is a bounding approach right now and consistent with the OTIB.

John, do you have any comment on that?

DR. MAURO: Yes. I have to say I'm very pleased that you adopted the OTIB 70 strategy.

In fact, you know, in effect, and this might be helpful for the group is, in effect, the levels that were observed are D&D, which are relatively high. I mean, when you think about the, when they clear a site with,

you know, 70 dpm per cubic meter or 1 MAC being the clean-up objective they've achieved, theoretically, based on the literature, it sounds like that would probably achieve that in 1954. That's why they were relative clear in release of the property.

But nevertheless, you're going to go with measurements made during D&D at 2.3 MAC and assuming they stayed at that level. And I can understand doing that because there was remediation going on where you were jack hammering. I know it wasn't going on continually but it was going on intermittently. Perhaps not until the 60s.

But, the, what we see here is, you were in a difficult situation. I think everyone on the Work Group should understand that, really, very limited air sampling data. And that was a challenge. Here you have starting in 1954, all the way up until when the FUSRAP program began, we don't really have any particulate air sampling data, and this is

not uncommon in the residual period for many facilities, AWE facilities. And it's always a challenge to, well, what do you do? You don't, you know, no measurements were made because the general sense was well, it's cleaned up.

But we all know that the clean-up criteria at the time, you know, may not have been what we would like or what it is today and, so you sort of, in all AWEs, including here, you have this situation.

And OTIB 70 is the strategy that was adopted to come to grips with this problem in a uniform way that's claimant favorable and I think you have fully achieved that here. So yes, we are very supportive of the strategy that you just described.

MR. OSTROW: Thank you, John.

MR. CRAWFORD: Are there any other issues about the approach document at this point? Or should I proceed to the tunnel document?

MR. OSTROW: This is Steve, again. I just want to --

MR. CRAWFORD: Steve.

MR. OSTROW: I just want to mention again, you mentioned it also, that we accepted your radon model. So, yes, ten picocuries per liter throughout this time period until you actually have the radon measurements later, much later is, it falls in to that same category of a strategy that is very consistent with OTIB 70 and I consider it to be a bounding strategy and an appropriate strategy to take in this situation.

MR. CRAWFORD: Thanks, Steve.

CHAIR ROESSLER: Well, it seems then we've resolved another issue.

And then, unless there are any other questions I think, Chris, it would be appropriate to go on to the tunnel discussion.

MR. CRAWFORD: Thank you, Gen.

The tunnel network which ran between and below most of the buildings, I

would say, at the Linde Site presented quite a different problem.

The things we know about the tunnels have to do with, we know about the size of the tunnel which has a minimum diameter of about 6 feet. A maximum diameter, I believe, was 10 to 12, that it wasn't used for common foot traffic. Many people didn't even know about the tunnels except for, of course, the trades workers who had to service them all the time. We also know that it wasn't used to transport processed material, that is, uranium ore or oxide; that contamination of the tunnel happened, we believe, probably a small amount, from foot traffic, but primarily, from runoff from rain and some flooding in the tunnel areas. They were described as often damp. So over the years, material from the soils would come into the tunnels and contaminate the tunnels with uranium and its progeny.

We have no measurements in the

tunnel of radon. We do have measurements but from very late, I think it was 2001/2002, of surface contamination and that's fairly highly localized near some of the buildings. Building 14 and Building 31 in particular are the most contaminated areas of the tunnels. In between those buildings, there's relatively little contamination.

Our task, then, was to make a bounding estimate of radon: always a concern. And of course, of airborne radionuclides, uranium and its progeny.

We basically approached this by looking at the tunnel ventilation system first. Was there a ventilation system?

And we had several worker interviews point out that there were at least two six-foot diameter fans that were used to ventilate the tunnel.

We also had the secondary evidence from workers saying that while the tunnels were often damp, mold wasn't a problem, which

there's some evidence of air circulation also.

The 2002 document estimated the air flow as a complete air change in the tunnel every 10 hours. So we had something to go on there.

We decided, because of the lack of knowledge, that we should take a conservative approach. And again, we chose the 10 picocurie per liter level of contamination, the .48 working level months per year as representative of the worse case in the tunnel scenario.

Then we also had to deal with airborne contaminants. And there again, we have a paucity of measurements. We do have surface contamination measurements done in 2002 and very little beyond that. So there we had to use a calculation to come up with reasonable and claimant favorable estimates of the likely airborne material.

Now the reason we believe that these are claimant favorable estimates is,

number one, we took the levels in the highest contamination spots found in the tunnels and assumed that they were the basis for all of the airborne contamination. We also assumed that 100 percent of the material was removable, which is very favorable because, typically, you're going to get about 90 percent of the material fixed. That's found in TIB 70 also for those who want to see where some of the assumptions come from.

So by assuming it's all removable, we think we have our worst-case scenario outlined and therefore, a bounding scenario outlined in the tunnels.

The tunnel document which you'll all refer to, I hope, gives a -- our estimate of the dose rates both for external exposure and, more significantly I think, for the internal exposure.

We used uranium progeny ratios based on the most claimant favorable ratios found and those happen to be outdoor

measurements. There were many -- several, let's say, piles of uranium-contaminated soil, windrows, that allowed us to make measurements in the outdoors.

And then we took a look at what, how much of the material could have been airborne at one time, and we took a 95th percentile beta surface contamination level and calculated the likely air concentration of the various uranium progeny. That's contained in an unnumbered table under Internal Dose Potential in the tunnel document, page 4.

I think I'd rather just entertain questions from Steve and/or John at that point.

By the way, these are considered to be, just to make it clear, these tunnel exposures are for all time. That is, from the 1940s: 42, 43, right up through the end of the period in 2006, so anybody who worked in the tunnels during that time would get these exposure levels.

The one thing I did not mention is, based on worker testimony, we have some idea of how frequently workers worked in the tunnels and we interviewed several workers. I say we, ORAU conducted the interviews. I did not and was not present during the interviews. We found that, typically, maintenance and repair took about two months a year. In fact, the longest repair job that any -- one worker who spent his whole career in the tunnels, he said, could remember was a two-month repair job. Other than that, there were various inspections monthly. A couple of trades craftsman went through the tunnels looking for problems, leaks and that sort of thing.

So we have discounted the total exposure by the time spent out of tunnels, you might say. So only 20 percent of the time the worker worked at the site is credited to tunnel work.

And it's our intention to give the tunnel exposures to all trades people and

laborers and inspectors.

For the most part, workers who worked in the surface buildings during the 40s, 50s and 60s, would have had higher doses in those buildings than they would have in the tunnels. So we will always give people the highest possible dose assumption.

After the exponential decay into the 1976 airborne-measurement time frame, the tunnel exposures will be higher than the surface building exposures and we will give the tunnel workers -- credit for working the tunnels for that time period.

I hope that's reasonably clear.

DR. MAURO: Steve, do you want to jump in or do you want me to?

MR. OSTROW: I just have a little clarification.

Chris, I think you mentioned somewhere, I can't find it right this second, that you weren't -- you would take care not to double-count on time. So that if a person who

was working two months per year in the tunnel you'd only give him, like, say, 10 months above ground. Is that correct?

MR. CRAWFORD: Yes. Unless the above-ground exposure or intake would have been higher, in which case we would give them 12 months above-ground because that would be more claimant favorable.

MR. OSTROW: I understand. Basically you're only going to give people 12 months a year, not 14 or anything. You're just going to, you know, you're not going to double-count those, basically.

MR. CRAWFORD: Correct. We'll just take the highest and give them that for the periods involved.

As I said, after 76, the tunnel time will involve more exposure than the surface then.

MEMBER LOCKEY: Jim Lockey. Will the tunnel time involve more exposure prior to 1976 for anybody?

MR. CRAWFORD: Probably not, because of the 2 MAC, 2.3 MAC air contamination assumption.

MEMBER LOCKEY: So really, what this does, this kicks in the 76 time frame, from that period on.

MR. CRAWFORD: Right. Sometime between 70 and 76, Jim, the tunnel becomes a source of more intake than the surface buildings do.

MEMBER LOCKEY: Okay.

DR. MAURO: What is the MAC for the tunnels? What I heard you say is, you got this residual activity measurements, you would make a certain assumptions regarding the mix, and you went with some upper 95th percentile, I guess, of becquerels per 100 centimeters squared or for meters squared, then applied a resuspension factor to get your airborne radioactive particulates.

MR. CRAWFORD: That's correct.

DR. MAURO: And what resuspension

factor did you use and what MAC did you get?

MR. CRAWFORD: We applied 10 to the minus 6. I don't have a calculation here on the MAC reading, only the ones in the table that you see which are in dpm per year or dpm per meters cubed.

DR. MAURO: What's your dpm per cubic meter?

MR. CRAWFORD: That's, for uranium-238, which is the biggest, or 234. Two thirty-eight is 1.29 dpm per cubic meter.

DR. MAURO: Okay. So it's --

MR. CRAWFORD: The MAC --

DR. MAURO: -- way below 1 MAC.

MR. CRAWFORD: Yes.

DR. MAURO: Okay. Got you. MAC is 70 dpm per cubic meter.

MR. CRAWFORD: Right.

DR. MAURO: Okay. I just wanted to get a feel for it.

But at that, but that's even higher than what it is going to be assigned

for the Building 30 people. In other words, because you have real measurements above-ground in the 70s and 80s, those numbers are lower than this 1 dpm, this 1 dpm per cubic meter number. Is that correct?

MR. CRAWFORD: Right. Yes. That's my understanding, too.

DR. MAURO: Okay. Okay.

MEMBER LOCKEY: I got a question. Jim Lockey. They had 6 foot fans, multiple fans in the tunnels. Right?

MR. CRAWFORD: Yes. At least two, Jim. That's, we're sure of. But --

MEMBER LOCKEY: And when workers went down there did they increase the ventilation rate seeing that this was somewhat of an enclosed space and below ground? Do you know or not?

MR. CRAWFORD: The workers didn't state that in the testimony that I read.

MEMBER LOCKEY: The reason I would ask that question is that it's belowground

accumulation of gases, things along those lines. I just was, but I guess the ventilation was, as far as what the workers were saying, was a constant ventilation rate. I guess then, right?

MR. CRAWFORD: That was the impression we got from the statements that we took.

MEMBER LOCKEY: Okay.

DR. MAURO: Did you have any radon measurements down there at all?

MR. CRAWFORD: None at all to my knowledge.

Mutty Sharfi, if you know of anything that's been done, let me know. But I don't think so.

DR. MAURO: So you're going to use the 10 picocurie per liter number across the board for the tunnels?

MR. CRAWFORD: Yes.

MR. KATZ: Let me just ask the court reporter. Are you having an okay time

identifying who's speaking?

COURT REPORTER: I'm doing all right. But I would appreciate if you fellows would identify yourselves before speaking.

MR. KATZ: Okay. Thanks.

MEMBER GIBSON: This is Mike Gibson. I have a question. Was entry into these tunnels considered a confined-space entry or was a permit required?

MR. CRAWFORD: This is Chris.

I can't answer that. Nothing was mentioned in the interviews, to my knowledge, about a permit being required.

And we know that these entries were routine. That is, at least a couple of workers went through the tunnels, I think, on a weekly basis.

So I can't answer the question fully.

MS. BONSIGNORE: Mike, this is Antoinette. I can answer that question.

There was no permit required.

And I apologize for interrupting here. I know I was told I could speak after this but there are so many errors here in terms what is being characterized from the worker that worked at Linde in the tunnels for -- from 1953 to 1991, that I feel like I need to say something because all of this material is being based on incorrect information.

The tunnels: Chris said that the tunnels, people did not use the tunnels commonly to get between buildings. In fact, they did. During the winter months, all of the workers used the tunnels to get from building to building because of the inclement weather. That was a very common practice. It was not condoned by Linde management but everybody used them.

And the worker that was interviewed stated that during the interview. He also stated -- he mentioned one job that he had done for two months. But he never stated that that was the longest job that he's

ever -- that he had ever participated in. In fact, he said, a lot of the jobs that he worked on could have took between six and ten months. And he also mentioned that during the interview.

So the, combined with the fact that all of the workers used these tunnels to go from building to building all over the facility during the winter months, and combined with the fact that you really have no idea how long jobs took, or the time worked that was done in the tunnels, and I'm getting some further information from two other workers that did work in the tunnels during the 70s and 80s, and also because you have absolutely no data from inside the tunnels.

And the tunnels were never remediated.

And the tunnels also, they were flooded on a regular basis. But also during the 1940s during the operational period the effluents from the operations flooded into

those tunnels. And contaminated those tunnels. So you need to take that in to account as well.

So there are a lot of discrepancies here in some of the documents as to what has been attributed to this worker. And I don't know where the error occurred.

But this worker was never provided with an opportunity from the ORAU interviewers to take a look at the notes that were taken during that interview. Which has been common practice in the past. So he was never allowed to check the accuracy of what he what has been attributed to him. And I think that would have been helpful.

And we could have avoided all of these issues if he had simply been provided with the notes and he could have corrected what had been attributed to him.

MR. DAVIS: Chris, could I chime in here for a minute? This is Jason Davis.

MR. CRAWFORD: Very good Jason,

yes.

MR. DAVIS: I'm Jason Davis. I actually conducted these interviews.

I conducted interviews with three separate workers that were in the tunnels from time periods spent in 1952 all the way up through 1954.

We had three different workers that had three different job functions in the tunnels. Each of them provided different parts of the information that we're using for this tunnel document.

We had one worker, that was an electrician, say that he spent, at max, 2 percent of a 40 hour work week in the tunnel on a routine basis. Longer only if projects called for it. But the projects were typically short in length.

We had another tunnel worker that said that he may have went into the tunnel maybe once a month, or for two to three jobs, if he needed to. And would come up for

supplies and lunch.

We had a third worker that said he went through weekly walk-throughs with another employee. And would spend approximately one hour doing a complete walk through of the tunnels.

Each of the interviewees also had different perspectives on how much time other workers would have spent in the tunnel. The maintenance worker that did the weekly walk through said that he had one other person go through with him. But didn't remember anybody else going through. The worker that said he spent the longest time down there said that, using the tunnel for transportation between buildings was not at all condoned by the company. And could only remember once instance, in particularly bad weather, where employees had used it to get from tunnel to tunnel.

As far as the workers not having a chance to review their interview statements

these interview statements have just gone to ADC review about three weeks ago. They were carried out as part of an effort for SEC 154. So it's a little bit delayed in the process. Since they have just been through ADC review, document control has not had a chance to send them to the workers in order for the workers to verify the information. Because we're not permitted to mail things that have not been ADC reviewed. There is always the potential that a worker could say something that might have security implications. So it has to be derivative classified before we can send it through mail or email. So we haven't had a chance to send these to the workers yet.

But it is something that we intend to do.

MS. BONSIGNORE: Okay. But I have to emphasize that the worker that I spoke to that has been identified in this report as having worker there from 1953 to 1991, I know

him personally, he went over the document, he said, he never said these things.

MEMBER BEACH: Can I ask a question? This is Josie Beach. Of Jason.

Jason, were you the only one that conducted these interviews? I read some that I thought that a Ms. Maples had conducted?

MR. DAVIS: Those were earlier interviews that were conducted a couple of years ago.

The interviews that I'm referring to right now, there was myself and a [identifying information redacted] who unfortunately isn't on this call right now.

MEMBER BEACH: Okay. So you and [identifying information redacted] then?

MR. DAVIS: Yes.

MEMBER BEACH: Thank you.

MS. BONSIGNORE: And one, this is Antoinette, one more thing. I specifically asked this worker if it was common practice for people to use the tunnels to get, to get

from one building to the next during the winter months. He said it was common practice.

I then verified the information with two other workers, who have not been interviewed yet, who are preparing statements for the Linde Working Group, who also confirm that.

MR. DAVIS: And we actually point blank specifically asked him the same question. And he said no, it was not common practice. But --

MS. BONSIGNORE: Well that's incorrect.

MR. DAVIS: -- practice.

MS. BONSIGNORE: That's just incorrect.

MR. DAVIS: We can only go by what he gives us.

MS. BONSIGNORE: Well, I, then you heard him incorrectly or someone could, you know, I don't know if you tape recorded the

interviews.

But I asked him specifically that question. And he said, he doesn't know where you got that information. He never said that.

And he also doesn't know where you got the information that he said that the maximum time he took -- it took for him to jobs was two months. He, I mean, he essentially said I don't know where they got that. Somebody is dreaming about that. Because that's not true.

MR. DAVIS: Do you specific --

CHAIR ROESSLER: This is Gen.

I have a question. Assuming that the tunnels were used in winter weather, this is a question of the OCAS people, I would assume that you could calculate the amount of time a person would spend in the tunnel going from place to place. Do your estimates -- would they cover that sort of scenario?

MR. DAVIS: Even if a worker were to walk from building to building, yes, we

could estimate the time it would take them to walk from building to building.

But as Chris Crawford has already said, the exposures we're giving people from working aboveground are going to be higher than any exposure they would have received in the tunnel during that time.

So it would actually be less claimant favorable for us to subtract time and give them a tunnel exposure for the 20 to 30 minutes it took them to walk to another building.

CHAIR ROESSLER: And who is speaking?

MR. DAVIS: This is Jason Davis again.

CHAIR ROESSLER: Okay.

MEMBER LOCKEY: That was my impression, Jason, is if you are using -- if the non-tunnel exposure was higher, you're going to go that direction to be claimant favorable.

MR. DAVIS: Exactly.

COURT REPORTER: Sorry. This is Ben. Who's speaking?

MEMBER LOCKEY: Jim Lockey.

Sorry Ben.

DR. MAURO: Yes. Jim, this is John Mauro.

I've been listening to the occupancy time issue. And I think that that isn't the driver here. What I mean by that is, for the reason you just gave, I -- my main interest is for, up until 1976, in effect, you develop a surrogate data model. I mean, let me explain what I mean. You don't have any data for airborne radon or airborne particulates for the tunnels from 54 all the way to -- no data at all. But then in, I guess around 1970, you have this surface contamination information.

So what, effectively, you're saying is, we're going to assign all workers the Building 30 dose up through 1976, I

believe. Which we all agree, for Building 30, is claimant favorable for the workers there.

And so from that perspective one could argue, yes.

So, you know, the tunnel issue effectively means that as long as we're sure that the levels in the tunnels during this time period were less than the levels in Building 30 we are claimant favorable for that time period since we're going to assign all workers the more limiting exposure, which is the Building 30 exposure. Now, in my mind, the most important question that we have to ask ourselves is, is it -- a case needs to be made, and I think this is the case that I really haven't heard. That assuming, though effectively you are saying that, you consider it virtually extremely unlikely that the average airborne dust loading inside the tunnels from 54 to 76 was above 2.3 MAC, as long as a case can be made why it's highly unlikely that the levels that were in the

tunnels during that time period were less, and you feel comfortable that they're less than this 2.3 MAC number that you are assigning to all workers, and so in effect you are saying that we're going to use that as our bounding.

Same thing goes for the radon. You're saying, in effect, we feel confident that the levels of radon in the tunnels are less than that.

So it doesn't really matter how much time a person spends in the tunnel. Because you're going to be assigning everyone, at least up to 1976, this extremely conservative number.

Now the only thing I haven't heard is the arguments of why you believe that it really isn't plausible for the concentrations in the tunnels to be above 2.3 MAC particulate and above 10 picocuries per liter radon.

If that case can be made, and in extremely -- you know, a compelling way, I'm fully supportive of the approach you are

taking.

But right now, I guess in reading the material, I haven't heard too much why you feel -- why you could say with a degree of confidence that there wasn't anything unusual about the tunnels. You know, that it's almost self-evident. Of course, it's going to be higher in Building 30 than in tunnels. I really haven't heard anything like that.

MR. CRAWFORD: This is Chris.

I think our -- obviously, we've had to make a calculation of the airborne level based on the contamination found.

We know there was very little remediation in the tunnel. The only remediation I'm aware of is, in fact, in the stairwell going down to the tunnel in Building 14. Which I believe happened in the 70s. But the tunnels themselves I haven't seen any document suggesting there was remediation.

Which means that we can pretty much assume that, I think, that we have a

steady state situation. That the extensive measurements that were made in the 2001/2002 survey where they took measurements every meter along the length of the tunnel in multiple places around the diameter of the tunnel, give us a very good picture of what contamination, most of it probably fixed by that time, was present.

And so we calculate what could be the airborne level based on pretty much a steady state.

Again, if we had had any indication that processed material was carried through the tunnel it would be, you know, a new ball game. But these tunnels were used to carry steam, and electricity, and you know, water, piping. And were pretty much limited to that use from what we can tell.

By the way I would like to make one slight correction to Jason's statement for the employee in question. He didn't say, there were no or only one instance. He said,

he did recall more than one instance in which employees used the tunnel to get from the buildings to the cafeteria. But it wasn't general practice. Just to get that as accurate as possible.

But getting back to your point, I think we have -- we've made enough claimant favorable assumptions with the contamination that we do have measurements on to calculate a claimant favorable level of airborne contaminants in the tunnel.

DR. MAURO: In effect, you are assuming 2.3 MAC in the tunnels. I mean for all intents and purposes, you are assigning all workers 2.3 MAC.

MR. CRAWFORD: Through the 70s.

DR. MAURO: Right up through the 70s.

And you're making the assumption that -- and by the way, we completely accept that as being the bounding assumption for the building, the workers in the buildings

aboveground.

And now you are saying, you believe that's also the bounding, that is, you don't expect it to be more than 2.3 MAC in the tunnels.

And the reasons you would argue that is that for the measurements you do have for residual radioactivity in the tunnels, which of course are in the 70s, you think that, whatever those observed levels were that you saw in the 70s, likely were the same. All the way back to 1954. And there really is no reason to believe that they would be substantially higher at an earlier time.

You know, we're not very happy with the 10 to the minus 6 resuspension factor. We'll get to that in a minute.

But in essence you are arguing that, you know, if you assume that the upper 95 percentile residual activity observed in the 70s was probably -- that level wasn't that much different during the 60s and the 50s at

the surface contamination level that was observed. Especially if you picked the 95th percentile. You could make a very compelling argument, not withstanding what resuspension factor you used. Let's say you decide to go to 10 to the minus 4. By the way, which is a number I like a lot better, but it was wet.

So, but what I'm getting at is, I just, I just feel like I need a little bit more level of comfort that there were no surprises. That there was no reason, that there really would be, by assigning 2.3 MAC from 54 -- in effect, what you are doing is saying, listen, for all intents and purposes, we believe strongly that the levels of radon and air particulates in the tunnels were below the levels that we're assigning to the above grade buildings. And the argument you are making is basically, there's no reason to believe that they could have even approached that level based on the residual radioactivity

that you observed in the 1970s. Would that be a true statement?

MR. CRAWFORD: Yes, and when we do get to the, this is Chris by the way, for the court reporter, when we do get to the 10 to the minus 6 value I have some part of TIB-70 that I think is relevant here.

DR. MAURO: Okay. You hear, I mean, I guess, in effect, for the Work Group members, you can see -- in effect what we have here is, the exposure time does not -- I understand that there's a concern about what is the exposure duration. But that really is not a SEC issue here. The real issue is, because they're using, across the board -- since you don't know who went in to the tunnels or not, you just automatically go to assign everyone that worked there, this 2.3 MAC and 10 picocuries per liter. Which clearly is a conservative number. As long as you believe that those concentrations probably were never even approached inside the tunnels.

CHAIR ROESSLER: This is Gen, before we address that further, I think I would like to make an interpretation here because of what Antoinette brought up.

I think what you're really saying John, and what Chris is verifying, is that the discussion about any errors in how long people were in the tunnels is really not pertinent to this.

DR. MAURO: This is John. That's what I'm saying.

CHAIR ROESSLER: Yes. I just wanted to reemphasize that.

MS. BONSIGNORE: Can I ask a question? This is Antoinette.

Does -- the assumptions that you're making about applying the Building 30 exposures to people who worked in the tunnel after 1954, does that take in to account the fact that the effluents, and I don't know if I'm saying that, pronouncing that correctly, from the operations period from the 1940s

leaked into the tunnels on a regular basis? Does that take into account that fact along with the fact that the tunnels were never remediated from that, from those effluents?

MR. CRAWFORD: Antoinette, was that addressed to me, Chris?

MS. BONSIGNORE: Yes, it was.

MR. CRAWFORD: Okay. First of all, let me just say that when you speak of those effluents, I think you may be speaking of the injection wells on site. And typically those wells are drilled down fairly deep. And then liquid material is pumped in to them and sent in to the ground table.

Something that would never be permitted today, by the way, but was done in the 40s when they were in a hurry and didn't have the standards that we have today.

There is no direct testimony or evidence, that I'm aware of, that there was ever a direct leak from the pumping operation in to the tunnels.

Our baseline assumption, and the most likely source of contamination for the tunnel, we think, is surface runoff water. It rains or snows. There's a quick melt. The tunnels flood with surface waters.

Jim Neton has just joined us by the way.

And that water brings in with it radioactive materials that have contaminated the soils around the Linde buildings.

It's a minor point, but I just wanted you to know that we don't think any direct effluents were ever pumped through the tunnel or, you know, spilled in to the tunnel.

MS. BONSIGNORE: And you're basing that on what? Your belief that none of the effluents were actually in the tunnels?

MR. CRAWFORD: Well, it's based -- first of all, we have no evidence to the contrary which is something.

The second, the purpose of an injection well is to take contaminated liquid

material, highly acidic probably due to the processes used here, and pump them into the ground. There is no connection between that operation and the tunnel. I mean, you --

MS. BONSIGNORE: So when the injection wells would overflow where would that water go? MR. CRAWFORD: In the soils around the well, I assume.

And by the way, I'm unaware of the injection wells overflowing. So it's --

MS. BONSIGNORE: I've read that in many documents. The injection wells overflowed all the time. That was part of the problem.

MR. CRAWFORD: At any rate, they would contaminate the soils around the injection well itself. And we do know those locations.

DR. MAURO: How deep -- I'm sorry to interrupt. This is John Mauro. How deep were the injection wells and how far below were they below the tunnel level? And I

guess, along those same lines, the ground water, the water table. I assume the injection wells went down in to the ground water or below?

You know -- let me explain where I'm going. I see this is a relatively simple question. Are there any -- is there a possibility that there are any surprises in terms of there being substantially elevated levels of residual radioactivity, in sediment type material, sitting in these tunnels in the 50s and 60s that were substantially higher then what was observed in the 70s? And I guess that's really where I'm coming from in all of this discussion regarding runoff, injection wells, et cetera, all go toward the question of being assured that there were no surprises where the residue that might have been present in the sedimentary material inside the tunnels was not orders of magnitude, on that order, higher than what was observed in the 1970s from FUSRAP measurements

made in the tunnels.

I guess for me to be comfortable with the strategy you're adopting would be a level of assurance that there's nothing -- there's no real possibility that that situation could have existed. And this goes toward the injection wells, the runoff, et cetera, and whatever. To be sure there was no mechanism where you could have had a circumstance where there were relatively high levels in the 50s and 60s in the tunnels and then, for some reason low levels, in the 70s.

MEMBER LOCKEY: Jim Lockey. I have one question about the tunnels.

Was there, there had to be drainage back in the days with the tunnels. Is that right? Or do we know that, one way or another? I mean, if these, if these tunnels would flood at times from runoff where would the drainage go once it was in the tunnel?

MR. CRAWFORD: Jim, this is Chris Crawford. That's a good question.

At some point -- we can look at the 2002 survey and see if they mentioned that. It seems very likely there would be drainage. I don't see how else you could work in the tunnels if they didn't have some way to get the water out.

MS. BONSIGNORE: I have an answer to that question.

They had sump pumps in there. And the sump pumps were regularly clogged up and they had to be replaced on a regular basis. That was some of the work that the maintenance people did to handle the flooding which was in the area of about four or five inches of water that flooded the tunnels regularly. And they often malfunctioned and they needed to be replaced.

MEMBER BEACH: This is Josie. I have a question about the sump pumps.

Where did they pump it to when they were operating and pumping correctly? Do you know, Antoinette?

MS. BONSIGNORE: I don't know, but I can ask.

MEMBER GIBSON: Jim, this is Mike. I've got a question or maybe just a comment. I've got to jump in here.

You know, we're sitting here discussing all these details making worst case assumptions and this and that. But we still have worker comments that are basically unresolved. And you know, I don't think that shows much deference to the philosophy of this program to give them credible weight to these workers. You know, they're interviewed. They're listened to. And then we sit here on these calls and try to make worst case assumptions. And I just don't think that's fair to the workers.

MEMBER LOCKEY: John, this is Jim Lockey. One of the questions I have, let me ask you.

In the surface water runoff in the -- what is the level of contamination in that

soil, in that surface soil? Do we know historically what it was back then?

DR. MAURO: This is -- are you posing that question to me? This is John Mauro.

MEMBER LOCKEY: Yes John.

DR. MAURO: I don't have an answer to that. And it's a good question.

The only information I have, and Steve you may have more, is the rock you're stand -- that NIOSH is standing on, regarding the tunnels, regarding its potential for exposure from the 50s right through to the 70s, is the residual radioactivity measurements made in the 70s. And on that basis, one, and in fact that's the level, that level that they observed is in fact representative more or less even within the order of magnitude of the level that actually existed in the 50s and 60s in the tunnels. They are fine.

But the concern I think everyone

has here is the assurance that there were no surprises. That is, just like everyone is asking, what happened to the runoff? Is there reason to believe that there might have been substantial levels that accumulated in the tunnels. But then over time, because of the flooding or whatever, could have washed it away and it could have ended up someplace else. And by looking at that someplace else we may have some idea of what the levels were.

In other words, there may be a line of, there's just a line of questions that are emerging from this discussion. And I think it would help give us the assurance that there were no surprises in the 50s and 60s in the tunnels.

Right now, all we know is that measurements were made in the 70s that were very low. And that if that was in fact more or less the case for the entire time period, there really is no issue here.

Notwithstanding occupancy time,

occupancy time becomes a nonissue from that perspective.

But I do think that there, we could sure use a little more information about the assurance that there were no surprises in the earlier years in those tunnels regarding residual activity and the potential for radon buildup associated with the residual radioactivity.

MR. CRAWFORD: Jim Lockey, this is Chris Crawford.

I just wanted to mention that the FUSRAP surveys, and there were multiple FUSRAP surveys, were very concerned with soil contamination. In fact, more so than with the building contamination, I would say. Because they were thinking of remediating the soils in particular. So we have quite a bit of data on the external contamination of the soils if that helps.

MEMBER LOCKEY: Well, I think it's a piece of the puzzle.

I think the questions being raised are important in regard to the injection wells. Where were they located? How deep were they? How often did they overflow? What was the surface soil contamination in the areas of the surface wells? And was the runoff -- is the runoff situated in such a way that it can make its way in to the service tunnels?

I think that that's sort of the track that we already have here. And I think the questions are being raised are good questions.

But the tunnel -- that the tunnel wasn't remediated I think it provides at least some information that perhaps -- and historically it wasn't significantly contaminated.

But I don't think we have information about -- well perhaps it was significantly contaminated in the past. And it might have been cleaned up by the work

force and we just don't have that information.

I think it's a valid, it's valid to go back and look at where the surface wells were, how deep they were, what the soil contamination was around them, where the flow occurred from a hydrology perspective, and where the tunnels were relocated. You know, just a, I think that's a worthwhile endeavor.

DR. NETON: This is Jim Neton. I just joined in a little late. I apologize for my delinquency but I had a conflict with an appointment.

I think I've heard some very good points raised here in the last 10 minutes, you know, the discussion. I've got a couple questions, I guess, and a comment, maybe.

One is, the injection wells were used during the production period only. Is that right? I mean, was it the idea that they would produce this raffinate type material and dispose of it through these injection wells. So during the time period that we're taking

about reconstructing exposure now, there were no injection well activities ongoing, is that correct? So any injection well activity would have preceded any of the time periods that we're looking at. So it couldn't have increased it during this time period.

And then we have, it seems to me, that we have a lot of information about plant survey conditions during the operations and at the end of the operations. And I'm just wondering out loud here if the plant -- if it's conceivable that the tunnels themselves could be more contaminated than the plant surfaces themselves?

I'm trying to get a feel for a potential bounding mechanism here.

DR. MAURO: Jim, I agree with you completely. That's what I was fishing for.

DR. NETON: Right. And I'm not, you know, not withstanding this other information we might be able to find. We may or may not be. And I do think we need to

exercise some more due diligence here and figure out what happened in these tunnels.

But I think there are some scenarios here where one could still conceivably bound them given plant conditions. Because those were fairly contaminated surfaces with none ratios of long-lived progeny and such.

So I just offer that up as a food for thought.

But I think, I heard pretty clearly here that, you know, more work needed to be done on these tunnels in order to provide a convincing argument that we have bounded the dose.

MEMBER LOCKEY: Jim Lockey.

What's a little disturbing to me is that this is the first time I heard the word sump pump used.

And living in Ohio we have some old foundations here that water just flows through. You don't -- when it rains, you

don't go down in your basement because you have six inches of water on the ground.

So I think we do have more work to do about the tunnels, and the injection wells, and where this runoff could potentially be going.

MEMBER BEACH: I'd also, this is Josie, I would also like to request SC&A to interview some of these workers if they haven't already that Antoinette keeps referring to.

MS. BONSIGNORE: They would be willing to speak with SC&A. Absolutely.

And just to point out, they did speak with SC&A back in 2006 when SC&A produced that report.

MEMBER BEACH: Right.

MS. BONSIGNORE: And they talked about the tunnel contamination.

And actually, SC&A made a finding back in 2006 saying that NIOSH needed to evaluate worker exposure in the contaminated

underground tunnel system. But NIOSH never addressed that issue in the revised Site Profile of 2008. And actually in the report that SC&A put out in, I believe it was August 2009, which was the assessment of the disposition of SC&A's Linde Site Profile Review in response to SEC Petitioner concerns, the underground tunnel exposure issue was not even mentioned.

CHAIR ROESSLER: This is Gen.

It seems we've come down to one big question. And I would say that what we are trying to determine is, if the exposures in the tunnels can be bounded by the plant conditions? And if that's true, then I think what we need to do is come up with an itemized list of what more work needs to be done by OCAS, and perhaps SC&A can help us put this list together. And have that as one assignment.

Then it seems like, as that's going on then, to answer some of the questions

that Antoinette has brought up, if it's a proper procedure, then we could ask SC&A to interview these workers since they are available.

DR. MAURO: Gen, this is John Mauro.

And I would be more interested, not so much in occupancy time, I know a lot of attention was paid to that, I'd be more interested in hearing what they may have to say that would help us get a richer understanding of the, of the processes and scenarios by which residual radioactivity might have entered the tunnels during operations. Because, and somehow you know, the residual radioactivity could have been somehow deposited there by some mechanism.

I fully understand that the measurements made in the 1970s show that there was a negligible amount of activity. And the strategy adopted by NIOSH is certainly valid if there's confidence that that level of

relatively negligible activity was observed in the 70s was in fact the case for the entire life of the tunnels.

But I don't know if we can get that kind of information or where we, how we approach that problem. You know, what kind data would we look at? What kind of questions would we pose that would help us to get a richer understanding to be sure that there were no surprises in the 50s and the 60s by way of a buildup of activity in the tunnels.

Because I can envision that, if there was a buildup, it could have been washed away over time, also. And therefore, things looking really good in the 70s may not have looked so good in the 50s.

MS. BONSIGNORE: This is Antoinette.

I think in terms of being able to interview workers who would have direct knowledge of the possible contamination of

injection wells, that may be a little difficult because most of those folks have passed.

The workers that I've been speaking to are people who worked there in the late 50s and forward.

People who would have direct knowledge, I only know of one gentleman who worked at Linde during the early 40s, during the operational time period, who I've spoken to a few times. Who I think lives in Ohio. But he's -- his recall is incredible actually. But I don't know what his health is. I haven't spoken to him in a few months. But I could get that name to SC&A.

CHAIR ROESSLER: Antoinette, this is Gen.

I think the injection well question could probably be answered by OCAS by looking back through the record.

MS. BONSIGNORE: Well it could. But I think it would be helpful to, if we

could provide some worker statement from somebody who was there as to what was going on. I think, I think that worker testimony as to the actual working conditions is very relevant.

MEMBER BEACH: Well Gen, this is Josie.

If they did pump -- if they did use the sump pump to pump the water, it's likely -- there's a likelihood that they sampled that water before they discharged it.

DR. NETON: Yes. This is Jim.

I don't know. It's possible. We would have to go see if we can find a record. We've certainly not seen anything like that in the information we've retrieved so far.

MEMBER LOCKEY: Jim Lockey.

Well where does, where do the sump pumps drain in to, is the other question. Where was it going?

MS. BONSIGNORE: I'll ask the gentleman who told me about that. I'll ask

him that question. I didn't think to ask it because quite frankly I'm a little, it wouldn't have occurred to me ask that. So I will ask him that.

CHAIR ROESSLER: So in order to move forward on this, it seems like there are two things we need to do.

We need to come up with a list of things that OCAS -- I think SC&A needs to help us come up with a list of things that OCAS needs to do to assure SC&A in looking at this that the exposures in the tunnels can be bounded by the plant conditions.

And then it seems, intertwined with that, we need to pursue the idea of SC&A interviewing the workers. And to do that, I think we also need a list of topics and items that should be asked of these people, that will help them answer this main question.

And it also seems that, if we're going to do this, and I think we do, we have brought up so many questions here, that we're

not going to be able to come up with any resolution with regard to SEC, I think this is 107, that we can present at the Board meeting in May. Am I correct in the way I'm evaluating this?

MEMBER LOCKEY: Gen, I agree with that.

Jim Lockey.

CHAIR ROESSLER: Any feedback from anybody else?

MEMBER BEACH: Gen, this is Josie.

I agree with that.

And I wonder if Antoinette is comfortable with that assumption also.

MS. BONSIGNORE: I am.

And also, this is just another separate note. There is SEC 154 that qualifies in January which covers the time period from 1947 to 1953. And I don't know what the overlap is in terms of the analysis of that data with respect to its impact on 107. So, and I'm -- since that Petition only

qualified at the end of January I expect that the ER for that won't be available probably until July.

MR. RUTHERFORD: This is LaVon Rutherford.

Actually Antoinette, we anticipate that will be done sooner then that.

MS. BONSIGNORE: Okay.

MR. RUTHERFORD: We are actually hoping to have it out either in May, late May, or at the latest, early July, early June.

MS. BONSIGNORE: Okay, great. All right. Thank you, LaVon.

DR. NETON: This is Jim Neton.

I don't think there is any overlap between the dates, obviously. They are two separate dates.

But the 107 Petition specifically deals with the post-decontamination era.

MS. BONSIGNORE: Yes, I know that there's no overlap in the dates but there must be some overlap in the data that's being used

because some of the data that you're using for bounding estimates is based on data from that time period, from the early, from the 47 to 53 time period.

DR. NETON: Right. And I guess there's the tunnel issues in that time period.

MS. BONSIGNORE: And there's also the tunnel issue --

DR. NETON: Yes.

MS. BONSIGNORE: -- which I don't know if even, if that was even addressed in that in that evaluation --

MR. RUTHERFORD: This is LaVon Rutherford.

MS. BONSIGNORE: -- this discussion.

MR. RUTHERFORD: This is LaVon Rutherford again.

Yes. With the tunnels being brought up during the 107 Evaluation Review and we are addressing the tunnels in 154 as well.

DR. NETON: You are correct, Antoinette, there is overlap there with the tunnels. But it would be the same, a lot of the same logic would go in to those analysis.

DR. MAURO: LaVon, this is John Mauro.

It may turn out that some very valuable information might be available to you for the, I guess that's 47 to 53 time period. Where they may have, I don't know whether they made measurements or didn't make measurements in the tunnels. But if there is any data for that to -- in effect, where I'm headed with this is, if there's some data characterizing what might be in the tunnels in that time period, or even earlier, you know, any time period, you know, during operations, during D&D, and then you have the back end of the process, mainly the measurements made during FUSRAP measurements in the 70s, well now we're sitting pretty good.

So I mean, in effect, if that data

is out there and you find something when you're looking in to this other SEC time period, that's going to be golden for this time period.

MR. RUTHERFORD: Well it's -- John this is LaVon again.

It's become quite clear that we need to make sure that 154 has fully addressed that. And I know we have that in there and we are working on that. So we will make sure before that's released that that's -- in those two, 154 and 107 SEC Petitions, work together on that.

DR. MAURO: This is John again.

One more line of inquiry. And I know that Gen you had mentioned that maybe SC&A could help put together some things that might be worth looking in to.

But one thing that comes to mind right away, and we'll certainly put this together as part of the memo, is understanding the injection wells and what they look like

and what the hydrogeology looks like. And where the injection wells went. And these are matters where, what you're really saying is, okay, let's assume that a considerable amount of water was put down the injection wells along with some residual activity that was generated during D&D, and maybe even during operations. And it went down in to these injection wells. And then understanding the hydrology of the region and the ground water. Understanding whether or not there's any possibility that there was a hydrogeological connection between where the injection well deposited its water and any hydrogeological connectivity to the strata at which the power is located.

If there isn't any, that will go a long, and this is a classic ground water or hydrogeological question, if there isn't any reasonable connection where you just could not get there, you know, that's a very important piece of information. It's part of the weight

of evidence.

But if it could get there, you know, then it changes the complexion of the problem a little bit.

MEMBER LOCKEY: John, Jim Lockey.

I agree with you. I would actually like to see an illustration of the, of where the tunnels were in relationship to the injection wells.

DR. MAURO: Yes, me too.

MEMBER LOCKEY: The topographical configuration of the area.

I don't have a clear understanding of these tunnels, and how long they were, and were they covered by ground or were they covered by -- you know, I just don't have a good understanding of that.

And the second thing I'd like to know and -- perhaps when they interview the workers again, is that when they did have a flooding problem in the tunnel, was there any residual contamination, just soil

contamination of the tunnels? And if there was, how did they handle that? Or was it just ground water uncontaminated, just pure groundwater, rain runoff that perhaps ran down the side of the tunnel and crept in to the cracks. I just don't have an understanding of that. And I think that's something the workers can help answer.

MR. CRAWFORD: One thing I, this is Chris Crawford, one thing I would like to point out is, during the later production period and the decontamination period, the airborne levels in the Technical Basis Document or the Site Profile are so high that we've already accepted that at 33 MAC it is probably irrelevant, the airborne levels in the tunnel at that point, during that period.

To get -- it's one thing that I've noticed that, well one can't expect the workers to understand easily, but the concept of dose gets lost sometimes in these

conversations. The difference between the accepted airborne levels of uranium and progeny in the 47 to 53 period and that measured in 1976 is a factor of 15,000. Okay. Less in 1976. It's not like it's close.

So I just want people to keep that in mind. The levels we're talking about during the production period are extremely high.

DR. MAURO: But our real interest is this 2.3 MAC. In fact, what is being said is, your plan is to assign this between 54, right now just to stay within the time period that we're concerned with for this SEC, 54 in to 70s or later, up -- from 54 to 76, you're effectively going to assign 2.3 MAC to all workers. It doesn't really matter whether there are tunnels or not. It's irrelevant. All workers are going to get that assignment.

The only little question is, are we sure that number is bounding to people who may have spent some time in tunnels. And if

we could say that with a degree of confidence, we're done.

MEMBER LOCKEY: Up to 76, John. Right?

DR. MAURO: Yes. I think it's, yes -- up to 76, different questions come in because then they are doing something else. But, and we haven't really talked about that.

But between 54 and 76, I guess, the case has to be made that 10 picocuries per liter radon and 2.3 MAC sure as heck bounds any possibility as to what exposures people may have gotten in the tunnels. And if we can, that can be said with a degree of confidence by all the different lines of inquiry, interviews, looking at the ground water, looking at the injection wells, or whatever, and looking at the runoff, et cetera.

And if the weight of evidence builds along the lines that shows that yes, we can feel confident that 2.3 MAC and 10 are

more than bounding for the tunnels from 54 to 76, we're done.

Then of course, we really haven't talked about this. What about 76 and on? We, you know that, we haven't had that discussion yet.

MEMBER LOCKEY: Chris, Jim Lockey here.

Are the tunnels still there? Do you know?

MR. CRAWFORD: As far as I know, they are. And I'd also like to mention that we have some tunnel measurements in the 76 to 81 period. I forget which FUSRAP visit they did tunnel measurements. They're not large numbers: maybe 15. And then a very thorough survey in 2002. So we do have some beginning and endpoint measurement for that period.

DR. MAURO: I would -- this is John Mauro. I would argue that since you do have lots of measurement for surface contamination starting in the 70s, the only,

and so therefore you have a handle on external, of course, exposure and airborne particulates. The only place where we may have some dispute with you on what you're going to assign for post-70 exposures would be that you've used this 10 to the minus 6 resuspension factor. But that's a site profile issue.

I mean, the way I see it is, that's a tractable problem. We can debate it, you know, and eventually settle on a strategy that is claimant favorable.

The issue that remains as an SEC issue is putting to bed the pre-70s levels that we are going to assume the workers are experiencing. And you know, and I agree with you. Certainly, you know, intuitively, we won't argue that 2.3 MAC certainly should not -- but you know, you'd be a lot more comfortable if you could, you know, show that it is highly unlikely that the levels in the tunnels were substantially higher in the 50s

and 60s than they were in the 70s when they were measured for various, you know, lines of argument that could be made. But you'll hear more about that.

I know we're putting a lot of attention on this. At one time, it was a nonissue or a secondary issue and now this is becoming the primary issue. Because I do believe we've resolved the above-grade problem. I think you've come up with a solution that is certainly claimant favorable and now we're chipping away at the tunnel issue.

But I think that, you know, the big issue is not so much from an SEC point of view, in my mind, 76 and forward, is more of a site profile issue and how you're going to come at that problem because you've got data. So I don't know if that helps any.

MEMBER LOCKEY: Yes. That does help, John.

CHAIR ROESSLER: John, this is

Gen.

It seems like the approach on this then is to be able to convince SC&A that the number that's being used, the bounding number that's being used for the plant conditions then is actually appropriate for the tunnels. And I think what we need to have SC&A do, and hopefully you and Steve can put this list together based on the things that have come up today, a list of things that OCAS needs to answer to reassure you that numbers, those numbers are appropriate.

DR. MAURO: I would call in more lines of inquiry. In other words, the thing that we need to be assured of is that there's no reason to believe that the concentrations residual in the tunnels in the 50s and 60s was, it would have to be orders of magnitude higher than what was observed in the 70s in order for it to be a problem.

I can't say off the top of my head how many orders of magnitude, but it has got

to be -- it would be a big difference. But it's, you know, it could have been.

And there are lines of inquiry that can help us.

We're never going to narrow it: the number. We're never going to know it exactly. But we can start to make a weight-of-evidence argument based on all the kinds of things we've talked about earlier that can lean you either one direction or the other. Say, hmm, it appears that, you know, there really was no vehicle by which these tunnels could have been contaminated and create the situation where there were very high levels in the tunnels in the 50s and 60s. Or maybe we will find there are depending on what we learn about the injection wells, for example.

DR. NETON: Yes. John, I'm just sitting here thinking where you're through on the 2 MAC error. It seems like we can almost reverse-engineer the -- that's a bad term. We can almost back-calculate using 2 MAC error

what the surface contamination levels would have been in the tunnels --

DR. MAURO: Yes.

DR. NETON: -- using some very conservative or claimant favorable resuspension factor to compare the level that would have been there. And I suspect just off the top of my head that those values are going to be orders of magnitude higher than what was measured.

DR. MAURO: I like it. In fact, that's a very good line. That you just said, okay. Under what circumstances could you have a, create a situation in the tunnels where people could have gotten more than 2.3 MAC?

DR. NETON: Right.

DR. MAURO: And what levels of residual activity and sedimentary material on the bottom of the tunnels could create that? And --

DR. NETON: Yes.

DR. MAURO: -- and then you have

to ask yourself, well, all right, what -- is there any way you can imagine that that could have happened? And if you find a way for that to happen, it's over.

DR. NETON: And there's a limit -- you need to look at, look at the tunnel pumps and all this kind of stuff. But it gives you -- sort of grounds you in a value.

DR. MAURO: Right.

DR. NETON: It says, look, it could it have been it could've been this high, given now what we've researched about the tunnels under those conditions? So --

DR. MAURO: Yes. And if that doesn't approach this back-engineered number --

DR. NETON: Right.

DR. MAURO: -- I think that that's one way to come at the problem.

DR. NETON: Yes.

DR. MAURO: I realize that we're never going to know exactly what the right

answer is. But if we can say, listen, we're comfortable that, you know, it probably was never higher than this for a variety of reasons. And the 2.3 MAC will cover that.

DR. NETON: Right.

CHAIR ROESSLER: For the court reporter's information, the recent conversation was, I think, between Jim Neton and John Mauro.

DR. NETON: Yes. Thanks, Gen. I'm sorry. I keep forgetting that.

MS. BONSIGNORE: This is Antoinette.

I'd just like to make a comment that the workers wanted me to express at this meeting, the one's that I've been speaking with.

They lost a lot of confidence in this evaluation process for this reason. Their feeling -- and quite frankly my feeling -- is that a lot of this evaluation, discussion, and going back and forth starts

from the perspective of, how do we figure out how to deny this SEC petition? How do we, of course, we can bound this. We just have to figure it out. We just have to manipulate the numbers. We have to make assumptions after assumptions after assumptions. That's their feeling from all of this. That's my feeling from all of this.

And I realize I'm not, you know, I mean, clearly I'm not a scientist. I'm not a health physicist. Neither are these workers. But their feeling is that this is the way the approach is taken on these SEC evaluations.

And it's disturbing to them because they don't understand why they're being, that their concerns that they've raised in worker interviews are not being taken seriously and why their statements are being used as a way to deny this. How can we figure out how to deny this petition? That's how, that's how they feel. Quite frankly, that's how I feel. And I just want to

make that statement because all of this back and forth about MACs and picocuries and all this other technical jargon that's going back and forth is somewhat difficult for me to follow and it's difficult for them to follow, and I think that should be a concern of this Working Group.

CHAIR ROESSLER: Thank you, Antoinette. I understand what you're saying and, of course, this is a difficult situation to deal with.

This is why the program has SC&A as the critiquer of the work that OCAS is doing. Critiquer, interpreter.

And I think we can achieve part of getting partway on this with what we've planned to do upcoming and that's to have further worker interviews by SC&A.

MS. BONSIGNORE: Well, I just, I just hope that the people doing the interviewing will comment this objectively and not, and not in the mind set of, how can we

use the information from the workers to deny this petition. Because that's their feeling when they're, when they are interviewed. That's the feeling they have.

And that, you know, that should be a concern to them. This is, this is a remedial compensation program. This is a reparations program. Something -- there was a great injustice done to these people. They were systematically lied to. And their feeling is that, they are being victimized all over again.

DR. MAURO: Antoinette, this is John Mauro.

I envision questions that go toward, did they experience any operations or make any observations where they could have seen ways in which residual radioactivity could have found its way in to the tunnels?

In other words, I'm sort of arguing from your perspective. I'm looking at it from the point of view that is, can there

have been any circumstances where there could have been some surprises in those tunnels?

So in effect, I'm looking to see, I want to be convinced there were no circumstances. And until I'm convinced of that, you know -- and that's why we're holding a hard line on this. I don't know if you've noticed. I mean, there are some measurements that were made in the 70s. In effect, SC&A says, that's not good enough. We want to hear a little more.

And everything that we've been talking about is finding ways that maybe there was some surprises. Maybe there's some radioactivity that found its way into those tunnels in the early years that was substantially higher. And in effect, we're looking for that.

And we're going to pose our, we will offer up our -- when we build our interview questions. Certainly, I mean, I don't know if this appropriate but I have no

problem, you know, getting the help of Antoinette and crafting the questions in a way that will probe this very important question that we're trying to get to.

MS. BONSIGNORE: I would be more than happy to help you devise questions.

Just to, further on your point there, John, it's not only this discussion, but it's been the discussion of all aspects of this petition evaluation process that they're very concerned with.

And that's, you know, they ask me time and again, why are they, why are they working -- why is their job to deny this petition? I thought their job was to evaluate this fairly. Not figure out; how do we deny this petition? They're feeling is that where you start from, that you get a petition, and the beginning, at the very outset of the evaluation, the job is how do we deny this petition? That's their feeling. That's my feeling.

MS. LUX: This is Linda Lux.

I don't know. Can you hear me?

DR. MAURO: Yes, I can.

CHAIR ROESSLER: I can hear.

MS. LUX: I just wanted to say that I completely agree with what Antoinette just said. I, and my mother, both feel the exact same way. And that is why in the letter that I did read that when there was those eight individuals in Building number 100 that had all, were diagnosed with cancer right around the same time period, would a dose reconstruction account for an unexpected situation like that?

I mean, where you're so focused on one building but there are so many other things that are not accounted for that nobody would have ever known until it shows up that someone has cancer.

How do you account for that?

CHAIR ROESSLER: Okay. Well, I think again to move forward on this, Ted, do

you have any recommendations as to how we should proceed? Can we make these assignments to SC&A?

MR. KATZ: I'm sorry. I'm sorry. I'm just coming off of mute.

Of course, we can make assignments to SC&A. And it sounds like there's some follow-up that DCAS also needs to do. And then, and we just need to make certain that all those are prescribed clearly.

And then John and DCAS will, following this meeting, distribute memos saying, these are the action items we understand. This is why we are going forward, so that the Work Group will have a very clear understanding of exactly what work is getting done by either party, both parties. And so we can figure out when to meet again as well. Probably should need a rough time frame to go with action items.

So if there needs to be more discussion now to clarify what each party is

going to do, that would be good. And then, and then we'd have these action items.

As far as the Board meeting is concerned, what I heard is that we are going to take Linde off of the agenda entirely based on this more work to do. So then it would not -- there would be no discussion of Linde, you know, other than the Work Group reports where you can update folks on where things stand. But it wouldn't be a separate agenda item as it is presently in draft for the Board meeting.

CHAIR ROESSLER: That's my understanding as explained. We would just, as a Work Group, do an update.

MR. KATZ: Right. And --

MS. BONSIGNORE: Ted, just a thought in terms of the May Board meeting. That would probably be a good opportunity for SC&A to do interviews if that's possible to arrange.

MR. KATZ: All right.

MS. BONSIGNORE: Because all the folks are going to be there. They'll be at this Board meeting. I'll be there.

MR. KATZ: That's a great idea, Antoinette, actually. That saves SC&A money and trouble. And the Board saves the Board's money because that's how SC&A gets paid. And so, that's a great idea.

MS. BONSIGNORE: And one last thing I wanted to raise is, LaVon had mentioned, I believe during the March 31st Board meeting, I think it was on worker outreach, but I'm not sure, about increasing transparency about data-capture efforts in these kinds of evaluations, listing of the data-capture efforts when they occurred. What, you know, what the effort was. The date of the effort. What was produced.

Is that something that that we can expect for this evaluation? Because it would be helpful to me to know what the data-capture efforts have been to date, when they occurred,

and in particular what data-capture efforts have been done in response to worker's statements and worker's affidavits.

MR. RUTHERFORD: This is LaVon Rutherford.

Antoinette, are you concerning 107 or are you talking about 154 SEC?

MS. BONSIGNORE: Both.

MR. RUTHERFORD: Both. Okay.

One oh seven, we could go back and do some, you know, and pull some stuff together to give you a feel for the level of effort that went in to recovering documents in support of 107. And 154 as well.

MS. BONSIGNORE: Okay. Thank you.

DR. MAURO: Ted, this is John Mauro. Just a quick question for you.

We will certainly prepare what I consider to be a series of action items, as we understand them, based on this conversation. Taking notes as we went along. And as usual, I will send out an email saying, this is our

understanding of the actions.

Now, I know one of the actions are going to be lines of inquiry. And you know, we're going to provide to the Work Group things that I think are worth pursuing. And of course, one of them will be setting up questions and SC&A performing interviews perhaps at the time of the meeting.

But a question I have is, one of the lines of inquiry, clearly, a hydrogeological injector well question. We can lay out kinds of things, kinds of investigations and drawings and information that is going to be important for that part of the problem. Now, question to you is, we will do all that, but is it the Board's desire that SC&A then do it? That is, do the -- we have the hydrologist. We have the people that are very familiar with injection wells and hydrogeology, or is that something that once we've identified the problem and what needs to be done, we stopped and leave it in the hand

of NIOSH?

MR. KATZ: Well, let me ask, John, for DCAS.

Is this, is this something that you are confident and prepared to go forward on? Or is something that we need to ask, task SC&A with following up on?

MS. HARRISON-MAPLES: This is Monica. Can I jump in on this a little bit?

MR. KATZ: Yes, of course.

MS. HARRISON-MAPLES: I just wanted to -- I didn't know if Chris was aware that there are quite a few records having to do with the injection well. I didn't speak up earlier because I don't have those at hand. And I didn't want to mis-speak anything that was in those reports.

But I think before we answer that question, we ought to at least review those to see what information is already out there because there were quite a few studies done before they placed the injection wells. There

were hydrology studies and studies having to do with the water table and that kind of stuff and we need to look at those.

MR. KATZ: Well I guess then, and it makes sense. I mean, you understand the basic framing of the problem with respect to hydrology and the tunnels. And if DCAS then will go ahead and see what information they have, lay that out. Then if there needs to be more work to come, you know, you can raise that to Gen and to myself. And if we need to bring in SC&A to do work where there's hidden data or there is an analysis, and you can do that, we'll take care of that at that point.

DR. NETON: Yes. Ted, this is Jim.

I totally agree with that approach. I think, you know, we brought forth that we need to evaluate the exposures in the tunnel to see if they can be bounded by the 2.1 MAC conditions that we're proposing for the plant.

But in conjunction with that, I do think we need to explore the configuration of the tunnels, or the relation to the injection wells, and the surveys and such that Monica made, you know, had just brought up.

I think, I think the burden falls on us at this point to take that forward. I don't know that jumping into the hydrogeology issues and stuff at this point might be a little premature.

DR. MAURO: This is John.

And that was, and you answered my question. So we will just lay out things that, lines of inquiry that we think will be helpful. And other than interviews, take no other action.

CHAIR ROESSLER: Okay. So then it seems like the next thing -- this is Gen -- we need to talk about is the time line. Since the interviews cannot be conducted, or it's appropriate that they be conducted at the Board meeting in late May, I'm wondering if

Jim, you and Chris, would have your information pulled together by then or shortly thereafter so we can schedule another Work Group meeting?

DR. NETON: You mean at the Board meeting itself, Gen? Or --

CHAIR ROESSLER: No, I wasn't thinking about the Board meeting.

But it will take some time, I think, after SC&A does the interviews to compile them and put a report together. So I'm thinking sometime after the Board meeting.

DR. NETON: Yes. I think after the Board meeting, June time frame maybe. End of June maybe. How does that bounce up against the next Board meeting, though? We have one in August. Is that correct?

MR. KATZ: That's right. We have one in August. This is Ted. One in August.

I guess what I would suggest is, if the folks of NIOSH are going to go look at what information they have in hand, which may

then let them know how much work they have left to do, depending on what they do have in hand with respect to the injection wells, et cetera. So why don't, when we get the action items from them, they can give us a clue then as to whether June makes sense, or July, depending on how much work they have left to do.

And again, you know, we'll plan -- as I suggested that if SC&A can pull it off, if not necessarily, you know, tractable -- but if it they can pull it off and do the interviews during the May Board meeting, then that would be great.

MS. BONSIGNORE: And I can, this is, I'm sorry, this is Antoinette. I can put together a list of names for SC&A.

DR. MAURO: Great. That was -- this is John Mauro. I was going to say that would be very helpful.

Because while we are working on the questions and the lines of inquiry that we

would like to pose, if we have the right people to talk to, and of course, the hardest part is scheduling, you know, when those folks might be available. We will be available when they are available. If they are available at the time of the meeting, great.

MS. BONSIGNORE: Yes. We have been planning on presenting to the Board in May. So they've all cleared their schedules for this Board meeting. So they'll be there.

And also there was that one other gentleman who worked at the site in, during the early 40s from, I believe, from 42 to maybe 49 -- some of his documents are actually cited in some of the site profile. He lives in Ohio. I can give you his name. I could call him first and let him know, and make sure it's okay. But I think it would be useful to speak with him as well because he may be able to shed some light on the issue of flooding and overflow from the injection wells.

MR. KATZ: Right. Thank you, Antoinette. And this is Ted again.

And if NIOSH has some names to give you, John, that would make sense as well for the interviews. We can set a time for the next meeting when we hear back from NIOSH and SC&A with their action items.

CHAIR ROESSLER: Sounds like a good approach.

So do we all, have we pretty much reached the end of our discussion today? In fact, I'm wondering whether we have completed the technical discussion and whether we've also incorporated everything that Antoinette had wanted to say? We said we're going to let you talk at the end, Antoinette. But I think you've probably covered everything.

MS. BONSIGNORE: Yes. I think I've talked enough.

I just have one question for Ted. You mentioned there's a Board meeting in August. Where is that?

MR. KATZ: It's in Idaho. Yes. It's in Idaho.

MS. BONSIGNORE: Idaho. Okay. Where in Idaho?

MR. KATZ: In Idaho Falls.

MS. BONSIGNORE: Okay.

CHAIR ROESSLER: That meeting I think is the 10th through the 12th.

MR. KATZ: That sounds right, Gen.

CHAIR ROESSLER: Of August, in Idaho Falls.

MS. BONSIGNORE: Okay. Thank you.

MR. KATZ: That sounds right.

So, but John, just to be, have we covered all the technical matters?

MR. OSTROW: This is Steve.

There's one other matter we should mention that hasn't been resolved today. We had brought up the -- this is based on, we had went through the worker statements very carefully. And we identified one of the issues as the thoriated tungsten welding

electrodes.

Apparently, the workers at Linde occasionally used welding electrodes that contained a couple of percent thorium in them. Which is apparently common welding practice. We did some research in this and there's a potential to get an exposure from the electrodes, internal inhalation.

Since, in order to use them they have to be ground to a point. And when you are doing a welding every now and then you have to re-grind the electrode.

And we have spoken to NIOSH. And we understand that NIOSH is addressing this issue but on a complex-wide basis not just a Linde basis.

And I just wanted to ask the question to you, Jim, to what the status is of that White Paper or methodology you're devising?

DR. NETON: Yes. Steve, this is Jim.

We are currently incorporating that into a TIB. And it's draft form. I was hoping, I'm hoping that we can have that TIB completed by the Board meeting next. So the Board meeting in Niagara Falls.

But, you know, in sitting here sticking through the issue with thorium welding rods, we certainly acknowledge that there are covered exposures during AEC-covered time periods while AEC operations are ongoing. But if these, I have to follow up on this. But I suspect if these were used during the residual period, they would not be considered covered exposure. Because only, you know, only during AEC operations would you cover that. I need to follow up on that.

But I don't know if it would be covered exposure during the residual contamination period. Because there's no AEC contract in place. The welding rods were, you know, not being used for any purposes related to AEC operations, at least to my knowledge at

this point.

So we need to follow up on that.

MEMBER BEACH: And, Jim, this is Josie.

I was reviewing SC&A's commitments and there was one issue under number 1 that said, SC&A still had some disagreements about NIOSH's approach to dust loading during 1954 to 1962 and post-1970. Did we address that fully?

CHAIR ROESSLER: I'm not sure that we did.

Steve, if you're there, can you answer that?

MR. OSTROW: I got a little bit interrupted here. What was the issue again?

CHAIR ROESSLER: This is in the material you sent out that I sent to the Work Group members this morning. It was your listing of SC&A commitments. And under number 1, this is in the red type, the last line, you said, but still have some disagreement about

NIOSH's approach to dust loading during the 1954 to 62 and post-1970 period.

MR. OSTROW: Okay. This is Steve. I see it now. Yes.

We discussed that all. We discussed the dust loading. That was the first thing we discussed today. And it covered the entire period up to the present.

MEMBER BEACH: So I guess my question was, if you were comfortable with that and we're finished with that?

MR. OSTROW: Yes, we are.

MEMBER BEACH: Okay. Thank you.

DR. NETON: Thanks for bringing that up, Josie.

I, of course, missed the first part of the meeting and I'm glad to hear that those issues are resolved.

CHAIR ROESSLER: So I would ask any other Work Group members; Jim, or Mike, or Josie, do you have any further items or questions that we should address?

MEMBER LOCKEY: Jim Lockey. No, I'm good.

MEMBER GIBSON: This is Mike. Not at this point.

MEMBER BEACH: Gen, this is Josie. I'm good. I just would like to review the questions that are going to be asked.

CHAIR ROESSLER: I think that's part of the plan.

MEMBER BEACH: Right.

CHAIR ROESSLER: I mean, that is the plan that we'll get a chance to look at those.

So I think, Ted, I think we're finished.

MR. KATZ: I think you're right. I think you are right.

So thank you, everybody, for all the hard work today and that went into today.

And thank you very much to Antoinette and to Linda for participating.

MS. LUX: Thank you.

MR. KATZ: We're -- I believe, we're adjourned then.

(Whereupon, the above-entitled matter went off the record at 1:00 p.m.)