The Work Group convened in the Frankfurt Room of the Cincinnati Airport Marriott, 2395 Progress Drive, Hebron, Kentucky, at 9:30 a.m., Mark Griffon, Chairman, presiding.

PRESENT:

MARK GRIFFON, Chairman
BRADLEY P. CLAWSON, Member
MICHAEL H. GIBSON, Member*
JAMES E. LOCKEY, Member*
PHILLIP SCHOFIELD, Member
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ALSO PRESENT:
TED KATZ, Designated Federal Official
NANCY ADAMS, NIOSH contractor*
MEL CHEW, ORAU Team
HARRY CHMELYNSKI, SC&A*
EMILY HOWELL, HHS
JENNY LIN, HHS
MIKE MAHATHY, ORAU Team
ARJUN MAKHIJANI, SC&A
STEVE MARSHKE, SC&A
JOHN MAURO, SC&A*
ROBERT MORRIS, ORAU Team*
JIM NETON, DCAS
BILLY SMITH, ORAU Team*
TIM TAULBEE, DCAS
ROBERT WARREN, Petitioner*

*Participating via telephone
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Adjourn
MR. KATZ: So good morning, and welcome everyone in the room and on the line. This is the Advisory Board on Radiation Worker Health, Savannah River Site Work Group. My name is Ted Katz. I'm the Designated Federal Officer for the Advisory Board, and we're just getting started here.

We'll begin as usual with roll call for everyone on roll call with the agencies and contractors. Please specify whether you have a conflict of interest issue here with the Savannah River Site, and we'll begin with Board Members in the room with the Chair.

Introduction of Board Members and Participants

CHAIRMAN GRIFFON: Mark Griffon, no conflict on Savannah River.

MEMBER SCHOFIELD: Phil Schofield,
Work Group Member. No conflict on Savannah River.

MEMBER CLAWSON: Brad Clawson, Work Group Member, no conflict.

MR. KATZ: And then Board Members on the line?

MS. LIN: Jim Lockey, Board Member, no conflict.

MR. KATZ: Welcome Jim.

MEMBER GIBSON: Mike Gibson, Board Member, no conflict.

MR. KATZ: Welcome Mike. Any other Board Members on the line?

(No response.)

MR. KATZ: Okay. NIOSH ORAU Team in the room.

DR. NETON: Jim Neton, NIOSH, no conflict.

DR. TAULBEE: Tim Taulbee, NIOSH, no conflict.

DR. CHEW: Mel Chew, ORAU Team, no conflict.
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conflict.

MR. MAHATHY: Mike Mahathy, ORAU Team, no conflict.

MR. KATZ: And on the line, NIOSH ORAU Team?

MR. SMITH: Billy Smith, ORAU Team, no conflict.

MR. MORRIS: Robert Morris, ORAU Team, no conflict.

MR. KATZ: Thank you and welcome.

SC&A team in the room?

DR. MAKHIJANI: Arjun Makhijani, no conflict.


MR. KATZ: SC&A team on the line?

DR. MAURO: John Mauro, SC&A. I am conflicted.

MR. KATZ: Okay, and now HHS and other government officials or contractors in the room.
MS. HOWELL:  Emily Howell, HHS.

MS. LIN:  Jenny Lin, HHS.

MR. KATZ:  And then the same on the line, HHS, other government officials or contractors to the government?

MS. ADAMS:  Nancy Adams, NIOSH contractor.

MR. KATZ:  Welcome, Nancy. And then now there are no members of the public in the room. But on the line, any members of the public or petitioners who want to self-identify?

MR. WARREN:  This Bob Warren, representing Johnny Williams, one of the petitioners.

MR. KATZ:  Welcome, Bob. All right then. Let remind everyone on the line, please mute your phones. Use the *6 button if you don't have a mute button, and when you want to speak to the group, *6 again will take you off of the mute.
Please do not put the phone on hold at any time. Just start back in, because the hold will disrupt the call. We have an agenda we put out. It should be on the NIOSH website and was also, I hope, distributed to participants. Mark?

Agenda

CHAIRMAN GRIFFON: Yes. I'm not sure if everyone got the agenda, but I'll briefly go over it now. We are going to start the meeting with a presentation by NIOSH. There's an addendum to the SEC Evaluation Report, and Tim will start us off with that.

Then we're going to go back to the matrix that we've been working from. The emphasis will be on -- there were a number of actions that we came out of our last meeting. I think the last meeting was in January, and there were a number of action items.

We're going to focus certainly on where progress has been made on those actions,
and those include primarily -- we'll go through them, all of the matrix items. But the focus, apparently where the most progress has been made, is on issue number 4, 6, 7, 10, 12, 13, 15, 16 and 23. So we may touch on the other ones, but more focus will be on those.

And certainly the addendum, I think, covers issue 1 as well. I should say that. So with that in mind, and then certainly I know the petitioner is on the line, you know. We certainly will have time for comments from you all, and look forward to your participating in the meeting.

I guess with that, I'm going to let Tim start it off with the presentation of this addendum to the Evaluation Report. Tim, just to clarify, this was recently posted but it's not available publicly, right?

DR. TAULBEE: That is correct.

This was just posted to the Advisory Board Members and SC&A last night once it was
approved. This has been submitted to DOE for the final ABC review before public release.

We expect to get that back within the next week or two, at which time we'll post it on our website and send a copy to petitioners, all of them, of this final report.

CHAIRMAN GRIFFON: Okay. So members of the public and the petitioners should be able to see this soon on the website, or get a copy sent to them, right?

DR. TAULBEE: Right. Well the petitioners will get a copy sent to them.

CHAIRMAN GRIFFON: Yes.

DR. TAULBEE: Other members of the public can get --

CHAIRMAN GRIFFON: Can get it online, right. Okay.

DR. MAKHJANI: I guess I'm not on the email list. Where are -- is it posted on the 0: drive?
CHAIRMAN GRIFFON: On the O: drive.

DR. TAULBEE: Yes, it's under Advisory Board on Radiation and Worker Health, under Document Review, and then there's SEC --

DR. NETON: On the AB Document Review.

CHAIRMAN GRIFFON: And those on the line on the -- other Board Members, we're all just finding this right now, so it's not something that I didn't circulate in time. It was just posted, I believe, last night or yesterday some time. So if you have your access to your O: drive, you might want to pull it out now.

I might ask that Tim, if you could also email the presentation that you're going to do today to the Members. It might be a helpful summary of it.

DR. TAULBEE: Sure.

CHAIRMAN GRIFFON: Okay. I'll let...
Tim start. Tim Taulbee.

NIOSH Presentation

DR. TAULBEE: Thank you, and as Mark mentioned, this is the addendum to the SEC 103. If you recall back in December 2008, we had reserved the thorium section of the Special Exposure Cohort Evaluation Report for thorium for those early time periods, because we were concerned about our level of information and our level of knowledge as to what was happening at that time.

So we reserved it at that time, continued to do more research. So this is the summary of our additional work and research. Just take it back to slide 20.

So instead of going through the entire ER again, what I'm going to focus on a little bit is give a brief overview of the process descriptions, particularly tailoring it to thorium, talk a little bit about the Savannah River Site data with respect to
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thorium, the pedigree of it, and then the feasibility of dose reconstruction. Then we'll wrap up with some conclusions here.

Next slide. Okay. So to remind you all of the Savannah River operations, the primary mission was to produce plutonium and tritium at the site. That was their main function during the Cold War, and these were materials used for nuclear weapons. Another function was to manufacture tritium reservoirs.

A third function was isotope production, and this is where the thorium comes into play. They produced isotopes for heat sources, polonium and plutonium 238, radiation sources, cobalt 60, for example, and then transplutonium isotopes such as curium 244 and californium 252.

Under these additional isotope production, one of their functions was to produce uranium 233. So to produce uranium
233, you irradiate thorium 232. So that's part of the process of making it. So that's what I'm going to be focusing on in this particular presentation, is that thorium work.

Next slide. So the five main areas of the site are the 100 area, those are the reactors, the 200 areas, those were the separations canyons, F and H canyons. The 300 area was a fuel and target fabrication, and then 400 was heavy water production, 703 was research and development.

The reason the 300's highlighted here is the targets is what we're really talking about here. What they were manufacturing and fabricating with regards to thorium were thorium targets to be irradiated in the reactors, and then the uranium 233 will be separated from the thorium 232.

The separations for this early time period that I'm talking about did not take place at Savannah River. In later years
it did, in the mid-1960's and later. But in the 1950's, all of the irradiated thorium was sent to Oak Ridge National Laboratory. So there wasn't any separation in that other time period.

Once the targets were fabricated, they were in sealed cans. So there wasn't any exposure then at the reactors. So in this early time period, what we're looking at is the exposure in the 300 area.

Next slide. So the time period what we've identified during this, I think in the original petition, we indicated pre-1960. During our further research, we found that from 1953 through 1965, they were doing basically the same work with the thorium metal.

1960, the reason we had cut it off initially, was the whole body counter came online, and we were expecting that there was going to be whole body count information. So
that was why we reserved it at that time.  

However, what we found though is from '53 to '65, it was all thorium metal work. All of the work was very similar. So we decided to combine it and expand that evaluation time period, if you will, for this thorium work.

In the 300 area, it was thorium metal canning. Most of this was done at Sylvania, and I'll get more into details about in a minute. In the 700 area, there was some metallography work that was going on, where they would take small samples of them and slice them and do inspection between the cladding and the metal work.

As I indicated before, all of the irradiated thorium was sent off site during this particular time period. The later time period, '65 to '71, where there was more uranium 233 production, this was with thorium powder. This was a totally different
operation that was being done, and we're handling it separately from an exposure standpoint, and an evaluation standpoint.

This was also a glove box operation that was done, and we've written -- we have a draft of Report 46, which will address this dose reconstruction method. We expected both these reports to come out at the same time.

It looks like the Report 46 is going to lag by about a week. So within the next few weeks, you should be seeing Report 46 as well, which will handle the second area of operation.

For the separations, which is this later time period, during the separation, the purpose wasn't to recover the thorium, it was to recover the uranium 233. Uranium 233 went through B lines, which are glove box lines.

The thorium nitrate, the first batch was actually pumped directly into the
tank farms, and all of the other batches were then loaded directly into railroad cars, railroad car tankers and sent to Fernald.

So this process, I guess it will be under the Report 46, what I'm going to focus on today is the factory.

Next slide. So let's look at these pre-1965 operations. Well, in canning, what you have is you're taking a bare slug of metal, and you're sticking it in an aluminum can and then welding the end caps, and then pressure-testing it and doing other tests to make sure it's held its containerization.

So the thorium canning and uranium canning in the 300 area were very similar operations. Basically, they were identical. They also had similar work controls as well, although from documentation that we have, it looks like that they were a little more concerned about the thorium than they were the uranium.
So in 1955, they dropped the maximum permissible concentration in the air down from \(1 \times 10^{-11}\) to \(2 \times 10^{-12}\) microcuries per centimeter cubed. So they were taking a little more precautions with the thorium.

In addition, the Health Physics log books, if you go through and read them, they were concerned about the external dose rates coming from these thorium slugs. If they get too many of them on a cart for their inspection, they were concerned about the dose rates.

So they limited the number that an individual inspector would be working with. Then the test authorization for some of these, the canning processes, indicated that surfaces should be covered with paper and the paper discarded and the can shipped. So it does appear that the thorium was controlled a little better than what the uranium was during
this time period. Next slide. So let me talk
--

DR. MAKHIJANI: Can I ask a question about the concentration limit. Go back. If you can go back. Is that 1 times ten to the minus eleven about the same as what was being used at other sites for uranium?

DR. Taulbee: I don't know about other sites, but this was the limit for uranium.

DR. Neton: I'm pretty sure that's what it was.

DR. Taulbee: So let me talk a little about the 300 area, the time line of operations starting in that area. June of 1951 is when construction began in the 300 area, and August of 1952 is when the 313 building, this was the main canning building at Savannah River, was declared an exclusion area.

So this was the introduction of
radioactive material into the area in August 1952. They began operations a month later, effectively official operations, although there was quite a bit of shakedown going on and additional working of the equipment.

The first thorium introduction or campaign, if you will, was in January of 1953, January to March of 1953. This is really experimental type of levels, and I wouldn't -- I'm not even sure I would call it R&D at this point, because there was 320 slugs that they manufactured, and they sent that to Hanford.

The Savannah River reactors were not operational at this time yet. So a dispersed grouping of 320 slugs went to Hanford. At the end of this time period, March '53 is when NBS Handbook 52, which was the first national internal exposure guidance came out, the same month as when the first radiological control procedures came out for Savannah River there in the 300 area.
In November 1953 was the start of uranium, routine uranium bioassay program in the 300 area. So now in June 1954 is really when the first research and development work for thorium canning began at Savannah River, and at that time, what they were doing was they were experimenting between two different processes.

One of them was called the dipping method, the aluminum silicate dipping method, and the other was the hot press bonding method. Aluminum silicate dipping method was done at Savannah River, and the hot press bonding was done at Sylvania.

So during this time period, Savannah River did 1,700 thorium slugs and Sylvania did another portion, although I don't have it here on the slide, what number they did, and they were comparing the two, which one was better from a ceiling next to the edge of the can.
And so this was really the R&D phase if you will, and the reason I say that is 1,700 slugs. January 1955 to August 1955 they decided on the Sylvania process, hot press bonding. At that time, they started making 26,000 slugs. So you see a huge ramp-up now. They tested two methods; they found the one that they liked and worked the best, and they went with it. So here's where production really began in June of 1955 -- January 1955, sorry.

There was another campaign out here in 1957. Next slide. So let me talk a little bit about this dipping method. This is actually a photograph of the interior of the canning room, 1956. This was demonstrating the dipping method, and like I said, what you do is you take a slug, put it in an aluminum can.

You would dip it in an aluminum silicate bath and what you wanted is for the
aluminum silicate to go down in between the sleeve of where the thorium was and the outside of the can, just make a better heat seal, so that when you put it in a reactor, with the metal expansion you get better heat transfer across the boundary.

And so the other components of this was if you go to put the thorium slug inside the can and it doesn't fit initially, you might have to do some additional lathing. So we have some air sample data, 1954, when they were doing that, during that testing phase, some of the lathing, and we have air sample data from that.

And you would do the dipping and then you'd weld the end caps on, and then acceptance testing, pressure testing and various other tests would be conducted. So as I mentioned, in 1955, the hot press bonding method developed by Sylvania was found to be far superior. They were getting much better
acceptance testing.

The dipping method was resulting in I believe over 50 percent failures or 50 percent unacceptable slugs. So they went with the Sylvania process. At that time, SRS switched more to a finishing mode, welding the end caps on and inspecting of the slugs that Sylvania actually encapsulated or canned.

Next slide please. So if you look at the whole production process, the number of thorium slugs, and I mentioned the 320 way back here in 1953 that were done, the 1,700 that were done.

This was using the dipping method, and then here's where you started full-scale production of 26,000 done, being canned at Savannah River or not canned at Savannah River, but canned at Sylvania Electric Products and then finished at Savannah River.

What's important to look at here, if you look at the number of uranium slugs
versus the thorium slugs, as to how much thorium work were they doing compared to uranium, and clearly they were doing a whole lot more uranium work, to the point of even here in 1955, only two percent of the work was actually thorium. Two percent of all of the slugs canned were thorium.

If look at later years, the highest in 1963, where about four percent. So in all of the years in doing this thorium metal work, 95 percent or greater of the work was uranium canning in that time period, using similar controls, although the thorium seems to be controlled a little better.

And so this is what got into our mode of how we were going to estimate the actual doses.

Next slide. So let me talk briefly here about the data pedigree. All of this data is --

CHAIRMAN GRIFFON: Just one
question on the previous table. You show the ramp-up, which I understand. But then all of the sudden you have several zeroes. I mean this is obviously a batch type -- I mean --

DR. TAULBEE: Oh absolutely.

Batch type operation.

CHAIRMAN GRIFFON: So it wasn't like a scale-up and then drop off. It was --

DR. TAULBEE: No. These were campaigns. These were short campaigns of we need 5,200 slugs over these three months. We're going to can some thorium.

CHAIRMAN GRIFFON: And you're confident in the data? It's not that there's missing reports or data? It's that actually nothing happened in those years.

DR. TAULBEE: That is correct. Nothing happened. In fact, we've even checked the reactor production logs, and you can see them being canned, being shipped to various reactors, the number of slugs irradiated in L
versus K, and then shipped off site.

CHAIRMAN GRIFFON: Thanks.

DR. TAULBEE: So all of the data that we've got here all came from original source, original sources. We have the thorium bioassay log book, which I mentioned during the original presentation at SRS, at the December of 2008 Board meeting.

We have uranium bioassay logs. We have more of them from '53 beyond '65, but the ones we used for this analysis were '53 through '65, uranium and thorium air sample log sheets. We also have radiation survey sheets, Health Physics log books, and then all of our process information came from those monthly reports.

You can track where the material is going and how much of it, based upon these actually weekly, monthly and quarterly reports.

DR. MAKHIJANI: Is this data
compiled somewhere that we can see?

DR. TAUlBEE: All of it is in the SRDB, and all of the data as well, if you look at the references on the ER addendum, everything is referenced. So yes, all of this documentation is available.

DR. NETON: One, just another comment. Yesterday, I don't know if you're aware, there's a new version of the SRDB out there.

DR. MAKHIJANI: Since yesterday?

DR. NETON: No.

DR. MAKHIJANI: It's pretty each to search now. It's much better than --

DR. NETON: Okay. The one that gives the title of the documents and everything.

DR. MAKHIJANI: The complaints are gone.

(Simultaneous speaking.)

DR. MAKHIJANI: Yes, it's much
better. Before it was unuseable. Now it's better. Before it was unuseable. Now it's

DR. Taulbee: You can see the
titles of the documents.

DR. Makhijani: Yes, right. It's much better than before.

DR. Taulbee: Yes. So as I mentioned, all of these are original source
term documents, handwritten. They've been in the Federal Records Center probably for 50 to 60 years now, I guess 50 years.

So these -- from these sheets, data was coded for analysis, and we'll certainly provide you any of those spreadsheets that you want to look at. It's not a problem. Next slide. So --

DR. Makhijani: And you have those in hard copy. They're not liked scanned or anything?

DR. Taulbee: Oh, no, no, no.

They are all -- everything is scanned.

DR. Makhijani: Oh, okay.
DR. TAULBEE: Everything has been scanned. In fact, everything coming from Savannah River has to be scanned.

DR. MAKHIJANI: I was just wondering if you could provide a copy, if you have hard copies?

DR. TAULBEE: Oh no. Savannah River has an interesting, or different from other sites, to where they will scan everything and provide it to us. Part of the reasoning is is they have the EDWS system, which I think you're familiar with.

So they are purposely trying to make all of their documents electronic. So this gives them an excuse to scan an entire box of records.

So since the uranium and thorium canning inspections were similar, the uranium bioassay is what we're going to use to estimate and reconstruct thorium intakes. So the basing methodology is we have uranium...
bioassay. It was recorded in units of mass per unit volume in urine, and based upon this concentration, using the ICRP models and IMBA, we can back out what the uranium mass intake was.

Here's where we assume a 1 to 1 ratio of uranium mass intake to thorium mass intake. So they're doing the same work with uranium as they are with the thorium. We have the uranium bioassay. We're backing out how much uranium they breathed in.

So assuming a 1 to 1 ratio, trying to estimate the thorium based upon that mass, not activity, and go through and calculate the thorium dose. If I were doing an epidemiologic study, this particular point right here, I'd go back to that table, be multiplying by those fractions.

Four percent for that one year, .1 percent for another year, to get what I would consider a best unbiased estimate.
program, we can't rule out that if an individual worker, his only work was during one of those thorium campaigns, so therefore we're assigning this massing 1 to 1 ratio.

This is a very claimant-favorable assumption in doing so, considering the volume --

DR. NETON: Okay. Let me see if I understand this. It wasn't clear to me when I read this the first time, and now it's becoming clear, is it's not only a 1 to 1 -- we're saying the dust loading for uranium and the dust loading for thorium are going to be effectively equivalent because they're similar processes.

We're going beyond that and saying that the air concentration of thorium would have been that way the entire year --

DR. Taulbee: That's correct.

DR. NETON: Even though 95 percent of the time or greater during that year, it
would have been a uranium --

DR. TAULBEE: That's correct.

DR. MAKHJANI: And you're going
to assign a uranium dose based on the same

data as well?

DR. TAULBEE: Yes.

MR. MARSCHKE: For the years where
there was no thorium production, are you going
to assume zero for the thorium for those
years, I assume, or are you going to give them
a dose for those years as well?

DR. TAULBEE: We're lumping it all
together into bands, and you'll see that from
the uranium data here in just a minute. So we
will be assigning during that. I mean that's
something that we could, you know, discuss and
potentially not assign it.

If this group feels that that's,
you know, important, we can certainly do that.

DR. NETON: If you can back up.

We're talking about double-assigning the
uranium and thorium? I'm not sure -- I think we would take the highest of the two intake scenarios, wouldn't we?

DR. TAULBEE: Well for one thing, we have uranium bioassay for these people. So if somebody has uranium bioassay in that time period, we're going to assign their dose to uranium based their bioassay.

DR. NETON: Right.

DR. TAULBEE: And this is estimating what's their thorium dose. So there, we're taking the coworker effectively for the uranium, to estimate what the thorium is, we'd be assigning the thorium dose.

DR. NETON: If you're using a coworker model, and this is -- I like to call this a substitute model, not a surrogate model so there's no confusion here, but if you're using the model, it seems that you would pick the -- you don't know what the person was exposed to because you have no bioassay on
MR. MARSCHKE: For thorium.

DR. NETON: For thorium.

DR. TAULBEE: We do for uranium.

DR. NETON: Oh, I see. Yes, we'd have to work through the --

MR. MARSCHKE: Yes. What if we have the -- we have a guy who has no bioassays for either?

DR. TAULBEE: Well, for either. Then we would, in my opinion and Jim please step in, we would assign both, in my opinion.

DR. NETON: I'm not sure.

CHAIRMAN GRIFFON: -- both 100 percent of the time, I see here.

DR. TAULBEE: Yes. I mean it seems there's sort of a logical system, but --

DR. MAURO: Whoever's speaking, get a little closer to the microphone. The main speaker, I'm not even sure who that is, I can barely hear you. You know, it's very hard
to hear.

DR. NETON: I think this is a situation where we can sort of become a victim of our attempts to be claimant-favorable. Realistically, what Tim was talking about earlier, what you do every study, probably makes the most sense.

I mean you fractionate it based on the percentage of time. I mean you couldn't assume that the processing --

CHAIRMAN GRIFFON: But then I see that going there too, you don't know who might have worked more in the thorium processes or whatever.

DR. NETON: Well, but realistically, though, it's related the number of slugs canned per year, and so unless there was a very large discrepancy in the processing time for a thorium slug versus a uranium slug, if you have five percent that are thorium slugs being processed, then really you can
only get five percent of the dose.

DR. MAKHIJANI: That's a population dose. So if you take the population of workers, I would agree, that you can't -- you can't say well, you know, as Tim said, whether an individual worker worked longer with thorium than with uranium, or was more devoted to thorium production, or most of the workers were doing uranium all the time, which would have been the case anyway.

But I think this raises a different question of consistency in my mind. I mean why didn't we do this in Y-12 or Mallinckrodt?

DR. NETON: What?

DR. MAKHIJANI: This model.

DR. NETON: Mallinckrodt, we didn't know the -- Mallinckrodt was because of thorium 230.

DR. MAKHIJANI: Oh, 230. But I thought we had thorium 232, and plenty of --
and there was uranium in the same rooms.  

DR. NETON: The processes were not similar. We don't really know what the process was for thorium.

DR. TAULBEE: Exactly.

DR. NETON: That was sort of an experimental process of Y-12, remember, where 300 pounds dropped on the floor. We had no monitoring. This is so very unique in the sense that these were both canning operations to can slugs for reactors. So I mean this is, I think, somewhat unique.

CHAIRMAN GRIFFON: It's definitely different.

DR. TAULBEE: Yes, and Jim's got it nailed dead-on. The process is what matters, is the most important thing here. We know uranium canning and the thorium canning were the same, whereas at Y-12, what were they doing with the canning versus what were they doing with uranium.
We know now with the thorium, that they were doing the same processes for the same purpose in the same buildings. Okay.

MEMBER CLAWSON: So Tim, can I just add one. When these thorium campaigns came up, they were still doing the uranium too though?

DR. TAULBEE: Absolutely.

CHAIRMAN GRIFFON: And I'm assuming that the methodology we're laying out here would only be used in the years that you have known processing, like if you weren't doing -- right.

DR. TAULBEE: Absolutely. Well that's why we made the break in 1965, was the thoria process, the powder, the whole process completely changed.

Instead of working with uranium metal now, they're working with the thorium powder, and they actually built a glove box line in order to work with that. So we're
only applying this when they were doing the
exact same process.

DR. MAKHIJANI: Initially, you
were, if I'm recalling correctly, you were
going to use air concentration and bioassay
data for thorium. That was a suggestion
anyway. Am I remembering that right?

DR. TAULBEE: You're correct, and
I'll get to that here in a minute.

DR. MAKHIJANI: Oh, okay.

DR. TAULBEE: I'll get to that.

DR. NETON: We reviewed the data.

DR. TAULBEE: Oh, sorry. I was
trying to move this closer, because John Mauro
was saying he was having trouble hearing me.
Is it better now?

CHAIRMAN GRIFFON: John, can you
hear Tim Taulbee?

DR. MAURO: It's -- well yes.
Tim, if you can get a little -- I can hear Jim
Grace and everyone else and you, Mark. But
I'm having trouble hearing Tim.

CHAIRMAN GRIFFON: Yes. We don't have a lapel, like, you know, microphone. When he's standing up with his presentation. That's probably why.

DR. MAURO: Oh, I see.

CHAIRMAN GRIFFON: We'll work on it a little bit.

DR. NETON: Maybe you can just sit down and speak from the slides.

CHAIRMAN GRIFFON: Yes.

DR. Taulbee: Oh, I can do that. Sure.

DR. NETON: It's good for effect, but --

DR. Taulbee: Okay. I can do that. John, is this better?

DR. MAURO: Oh, that's better. Thank you.

DR. Taulbee: Okay, thanks. All right. So the first step of that was modeling
uranium intakes. So we went through and modeled all of the years from 1953 to 1965, and you'll see that in ER addendum, and what I'm showing up here on the slide now is the uranium mass for 1955 and 1960, just to give two of the examples here.

And our modeling was we took the maximum sample per person per year. So if somebody had four bioassay samples, four uranium bioassay samples in a year, we took the largest and threw them into the coworker model.

So if they had two non-detects and then two positive detects, of the two positives we took the highest. So from 1955, what you'll see is the following distribution.

There are 486 people monitored in the 300 area for that particular year. It fits a log normal distribution quite nicely, with the geometric mean of 1.97 and a geometric standard deviation of 1.7.
Now as we got into later years, the radiological controls got better, because people -- all of the doses or all of the intakes started decreasing. It's very clear to see, and I'll show that in the next slide.

So what we had in the second slide in 1960, we only had 58 of the 456 people that had positive bioassay in that latter time period.

So in order to fit this, we used a two distribution assumption, where there's an underlying population that will be the same as the missed dose or non-detectable population, overlaid with a detectable population. So we fit this particular alignment along this line.

Which TIB is this?

DR. NETON: I was going to say. There's a TIB. I can't remember the name of it. This is one that Tom LaBone is working on for us. I don't remember. Is that what you used? I was going to ask pathologically?

DR. Taulbee: Yes, yes. It was
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pathologic.

DR. NETON: This is the assumption. You have two, an underlying distribution of zero exposures that would have its own normal distribution, with a log normal distribution superimposed on that normal distribution you'd expect from people that had no exposure.

DR. NETON: It's a TIB.

DR. TAULBEE: OTIB-0076. Okay. So when you fit all of the years of the data that we have --

DR. NETON: Let me go back. I think one thing to point out, that this is a very low intake potential situation. These are very low doses. They weren't really working directly much with the thorium metal at this point or the uranium, right? These were just cans that were used were sealed up.

DR. TAULBEE: That's correct, and most of the canning was being done at
DR. NETON: That's important, I keep forgetting. This is not like a lathe operation or --

DR. TAULBEE: Now in the earlier years it was, and in fact you'll see that on this particular draft right here. If you look in the 1953 down to 1956 time period, you'll see a steady decrease. There was a lot of lathing going on in those earlier years, particularly '54, '55, and you'll see that the uranium intakes were rather significant during that time period.

And but then by the time we get to about 1957, it kind of levels off. More of the actual canning is being done at Sylvania, and they were doing more of an inspection role.

Then we get to 1963, and it increases again, and I believe that this is due to the re-introduction effectively of
Savannah River beginning to do a share, a larger fraction of the canning.

DR. MAKHIJANI: Now this is thorium data or uranium data?

DR. TAULBEE: This is all uranium.

Yes, this is all uranium.

DR. MAKHIJANI: Why would uranium data follow the thorium canning production in here?

DR. TAULBEE: Because they were doing the -- Sylvania also canned a lot of uranium for them as well, not just the thorium.

DR. MAKHIJANI: They were doing no uranium canning production at the Savannah River Site?

DR. TAULBEE: No, they were doing some, but it was a decreased role. They were contracting out more of that particular work. So you see that with the bioassay, in that the exposures dropped during this time period.
And this is why we feel that this is the best method for estimating the thorium, is because it would be tracking along what the uranium production is doing as far as contracting, inspection and number of slugs and that type of thing. Okay.

So, based upon those uranium mass intakes, assuming the one-to-one ratio, we calculated out the intakes of thorium. So if you look at the Type S, this is what we're proposing to assign, 1953 would be 347 picocuries per day, because the exposures were quite high due to uranium there.

So we are assuming that the thorium exposures would be quite high, doing the same process. 1954 drops to 175. '55, '56, it's an average of about 80, and then '57 to '62, it's dropped way down to about 4.7, 4.8. And then '63 to '65, it comes back up.

So this is what we're proposing to assign for the thorium intakes during this
time period. Again, due to the similar operations between thorium and uranium, we feel this is a reasonable method of estimating the doses.

Similar radiological work controls. We have indications that the thorium is actually controlled a little tighter than what the uranium was.

So in order to verify this, we did look at some air sample data. How do these compare during this time period? We interviewed, actually, the person who took the air samples. He's still around, and one of the things that he indicated was that routine air samples were representative of the breathing zone of the worker.

They were located where the operators were standing, and they were not mounted on walls. So we felt that we could look at the air sample data then and compare between the thorium air samples and the
uranium air samples.

And so we took, it was 30 thorium air samples, 33 uranium air samples. There are literally thousands of uranium air samples that we have captured, and you'll see in the SRDB.

Mike went through and extracted the ones where there's uranium and thorium in the same buildings at the same general time periods, so that we can compare the two results.

Basic hypothesis testing, that whether the thorium mass was less than the uranium mass, and there's no statistical difference between these two distributions that we can find here, doing a standard T test and the T value is .238.

So we don't have any evidence to refute that these two operations were similar. The air samples are showing similar mass loadings. So from that, we are using the
assumption that we can use the uranium bioassay, the mass bioassay, to estimate the thorium intakes.

So now here comes to Arjun's question there of what happened to the thorium bioassay and the thorium air sample results. Well, if you look at the thorium bioassay, none of the thorium bioassay results from 1956 to 1957 were positive, none of them.

And so, using a minimum detectable activity of .5 DPM per day, we can extrapolate to an air concentration of 34 picocuries per meter cubed, which is much greater than the maximum per square concentration by their test procedures, by the test authorization procedure and by their radiological controls in the area.

This would result in a 650 picocurie per day intake, if we were to try and use the thorium bioassay. Basically, it's showing that the air concentration would have
had to have been, what is that, almost 20 times the maximum permissible concentration before you would see anything.

So it really wasn't a feasible method for monitoring the thorium at that time period. They tried, but it just wasn't sensitive enough.

MEMBER CLAWSON: So you're saying the process was that they couldn't just, they couldn't see the thorium samples?

DR. NETON: It's a typical thorium bioassay. It's a very insensitive indicator of intake, worse than plutonium. Not much comes out in the urine when you inhale thorium. Not much comes out -- plutonium is even worse than thorium.

DR. MAKHIJANI: So basically you have all -- the thorium bioassay is all less than minimum detectable, detectable at .5 DPM.

DR. TAULBEE: Right.

DR. MAKHIJANI: A detection limit
of .5 DPM?

DR. TAULBEE: Right.

CHAIRMAN GRIFFON: What was the detection limit? I'm sorry.

DR. TAULBEE: .5 DPM for thorium.

CHAIRMAN GRIFFON: There it is, okay.

DR. NETON: Which is not a bad detection rate.

CHAIRMAN GRIFFON: Right, right.

DR. TAULBEE: But 650 picocuries per day, and that was what their missed dose was. That was effectively due to that process. So if you look at the air sample data that we just did, and you look at the mean mass concentration, you get 6.4 micrograms per meter cubed.

There was .7 picocuries per meter cubed, which is still -- the mean is less than the maximum permissible air concentration value that they were using to control the
workplace at the time, why they were taking those samples, and that was at two picocuries per meter cubed.

And if you go through all of the air sample data, I think there was only -- air samples. There's only one, maybe two samples out of that 30 that were slightly above MPC, and one of them was like 2.2. I think that's the highest.

So, you know, from the air control standpoint, they were controlling it down to here below the MPC. Using the MPC then as your intake value, as to what your daily intake would be, and you get 19.2 picocuries per day. However, if you look back at the uranium mass methodology that we're proposing, '55 to '56, we're proposing 80 picocuries per day, which is much above this, significantly above this maximum permissible concentration.

You've got to remember that we're basing this on the uranium, for one, and the
uranium was controlled at a much higher level. In fact, it would be about a factor of five higher, yes, from the activity standpoint.

So, you know, we feel that this 80.4 was probably high, but reasonable from that standpoint, certainly a lot more reasonable than 650 picocuries a day for an intake.

In the central time period of '57 to '62, we know the uranium exposures were rather low. So that we're assuming the thorium exposures were rather low during that time period, and so it's significantly below what you would assign based upon the MPC.

Then in that latter time period, '63 to '65, it jumps back up a little, to where we're on about the same order of magnitude, the same scale.

And so we feel the uranium mass methodology is the best method for doing this, because it's going to track more of what we
see with uranium data, since the processes were the same. We did look at thoron concentrations as well, and this is where I learned a lot during this process, I'll tell you.

Normally, when you think air sample data, you kind of assume that what's on your -- what's being collected on your filter is a much longer activity than with -- you know, you can ignore the decay while it's on -- well, during sampling.

Jim pointed out you can't, correctly so. So we took the air sample data where we had two counts at known times. We decay corrected during sample. This is the lead 212, and then decay-corrected from the stop of sampling to the start, or the first count.

This results in a multi-equation solution. This is Appendix C that we have there in the ER addendum. It goes through all
of the mass, all the three equations, the three unknowns.

We come up with the geometric mean of 13.1 picocuries per meter cubed, and GST of 1.78 and resulting intake of 126 picocuries per eight-hour shift for thoron.

So overall, our conclusion is is that we've determined we have sufficient personal monitoring data, source term information and workplace monitoring data for thorium to allow adequate bounding of the total potential internal exposures at the site during this time period.

Consequently, NIOSH finds that it's feasible to estimate with sufficient accuracy the radiation doses resulting from internal thorium exposures received by members of the Class.

And I should have acknowledged earlier, but Mike Mahathy did the lion's share of all of this here. So thank you very much.
Mike, and Mel's team and Mel himself helped out a lot. So we'll be happy to answer any questions that you all have. Oh, and Billy Smith, yes.

DR. NETON: A quick note of clarification. Liz Brackett just emailed me and indicated that this Report 44 that actually describes the method for analyzing bioassay data, which is simply a fraction less than that.

DR. TAULBEE: Okay. You did 44?

DR. NETON: Oh yes, Report 44.

CHAIRMAN GRIFFON: Report 44.

DR. TAULBEE: Sorry about that.

DR. NETON: Yes. The OTIB-0075 is the use of NOCTS data --

CHAIRMAN GRIFFON: I don't even know if we looked at the report.

DR. NETON: It's a good report.

DR. TAULBEE: Any questions?

MEMBER CLAWSON: Where is
Sylvania?

DR. TAULBEE: Where is Sylvania?

Where are they? Sylvania Electric Products.

It's one of the SEC, not SEC --

(Simultaneous speaking.)

DR. MAKHJANI: Isn't Sylvania in Long Island?

DR. NETON: No. They were near New York City.

DR. CHEW: Bob would know the answer. Bob? Remember, I think you looked at the Sylvania. Do you remember where that was?

Are you on the line?

MR. MORRIS: Yes. This is Robert Morris. Sylvania's in New York.

DR. CHEW: Okay.

MEMBER CLAWSON: Okay. I had some --

DR. CHEW: Thanks Bob.

DR. TAULBEE: They're one of the As.
CHAIRMAN GRIFFON: Or AWEs. 60

DR. TAULBEE: AWEs, thank you.

MEMBER CLAWSON: Okay. I just was wondering, because I hadn't heard about that.

CHAIRMAN GRIFFON: An initial question from me is why, and I think you might have -- the way you've grouped them might answer this, but why were there no zero intake years, because that's the question I asked earlier, was, were you're going to apply this methodology consistent with the production numbers that you have, where you show that it's very much batch-wise, and even though the uranium urinalysis levels dropped off, they didn't go to zero.

But the production of thorium did go to zero. So is this to account for like residual or -- ?

DR. TAULBEE: Effectively, yes, although you know, from reading the test authorizations at the end of each shift, they
I would just gather up the paper and so forth. But I think the exposure potential is very low during that time period. If there is any residual thorium around, sure, maybe. But the doses they were assigning in that time period are pretty small, .4.

CHAIRMAN GRIFFON: Are low, yes, right.

DR. TAULBEE: So out of convenience in a sense, it might be easier to just go ahead and assign it. We could go through here with this table in the years that there wasn't any campaign and not assign a dose. We could certainly do that.

CHAIRMAN GRIFFON: Right. But then you'd have the opposite question, which is, wasn't there any residual material? Yes.

DR. TAULBEE: Yes, exactly.

MR. MAHATHY: You've got on the thorium production, the campaign beginning in '64. When we added '65 to the count for,
including renewables, then you can see your thorium added.

CHAIRMAN GRIFFON: All right.

DR. TAULBEE: When you go through the log books, even after a campaign, you might find several months later where they do some surveys on the outsides of them, where they had some that were just sitting off to the side or something, and then they would move them off. So there is--

The campaigns are actually the production, the heart of the production. It doesn't mean that they weren't sitting somewhere off to the side and they go through for housekeeping and, you know, let's send these all off or strip the sides off or something.

CHAIRMAN GRIFFON: I mean, that's the other question I have, was, I did find while you were presenting, I looked for the uranium urinalysis logs, and you do have the
reference IDs in the reference list, which is very helpful.

So they're easy to find on the SRDB. But I noticed they're all uranium logs, but you did mention that you at least looked at the thorium data. Are those logs on the SRDB as well and do we have references? Are they easy to search? I mean, if I looked for thorium urine logs or thorium bioassay?

MR. MAHATHY: You have the -- is given in the original.

CHAIRMAN GRIFFON: In the original ER document, okay. All right, all right, because those might be worth -- I'm thinking a SC&A review. I think obviously this one is going to have to go for a normal review. We just received this, so -- but if you have any preliminary questions, Arjun or Steve or John.

DR. NETON: I don't see Report 44. I don't see a Report 44 in the report to this.
DR. MAKHIJANI: So Mark, when you review this, we knew we would be going along with reviewing the 1076 and the Report 44 along with it?

CHAIRMAN GRIFFON: Well, I don't know if TIB-0076 applies anymore. I think it's this Report 44.

DR. TAULBEE: It's just Report 44.

CHAIRMAN GRIFFON: Yes, that we have to find. But yes, I would say yes. Not in a procedures review format, but you're going to have to be familiar with it to do the review, I imagine. Yes, yes.

DR. MAKHIJANI: No. There won't be a separate document.

CHAIRMAN GRIFFON: Right, right, right.

MR. MARSCHKE: We were just given, under the Procedures Subcommittee, we were just given a report to review. I'm just trying to look up now and see which report. I
think it might have been 44. We're just trying to look and see.

DR. NETON: It probably was, because --

DR. TAULBEE: Here it is.

MR. MARSCHKE: I'm trying to -- I don't remember --

DR. NETON: If you're talking -- it's in our -- it's on our K: drive. I don't know that --

(Simultaneous speaking.)

CHAIRMAN GRIFFON: One person at a time, please. I'm going to help out the --

DR. NETON: You got that right off the O: drive.

CHAIRMAN GRIFFON: Actually, I got it off my hard drive.

DR. MAH שכ: Yes, I mean there's no hurry. If you could put it in that -- I don't see it in the --

MR. MARSCHKE: It's available
someplace, Arjun.

DR. MAKHIJANI: Yes.

MR. MARSCHKE: Actually, I've gone back to the Subcommittee, the Procedures Subcommittee meeting minutes that were held back in March. We were assigned the review of Report 44, and I believe John Mauro has assigned that to Joyce, to take a look at.

DR. NETON: It's definitely in our list of documents on our drive.

DR. MAKHIJANI: Okay, yes. No problem. I just wanted --

CHAIRMAN GRIFFON: Okay. It's there somewhere.

DR. NETON: So that's nice timing actually. That works out well.

CHAIRMAN GRIFFON: So do you have any -- John, this is open to you too, any preliminary thoughts, comments or --

DR. MAURO: No, nothing to offer.

CHAIRMAN GRIFFON: Okay.
DR. MAKHIJANI: I think my biggest dilemma here is I think there's a -- I still think that it's worthwhile to look at the consistency question, because we've gone through a lot of situations where we had uranium and thorium.

And I understand the logic that Jim and Tim were talking about, that we know the process here. But I think it is worthwhile thinking about the consistency, not having usable thorium data and, also, I guess we've talked a lot in other contexts about the reasonableness of a bounding dose, and that kind of --

If you have orders of magnitudes lower production, a population dose at least might be orders of magnitude lower. And then, how is it reasonable to assign a dose that's basically a population dose that's two orders of magnitude greater than what your best estimate is?
DR. NETON: You see, that's why I don't quite understand why you couldn't apportion it based on production.

DR. MAKHIJANI: I don't think you can apportion it based on production.

DR. NETON: Because it's a percentage of -- if it takes x amount of seconds to process one slug, and you have that many slugs to produce, then it seems logical that you could only spend four percent of your time processing thorium slugs, right? I mean that's --

CHAIRMAN GRIFFON: Right, and you're assuming the work force stays consistent for that whole -- that's the assumption. I mean, what if some, what if 20 people were brought in specifically for thorium processing for a couple of years or whatever?

DR. NETON: Right. But my point is though, if it's x amount of time per unit
slug production, then it's proportionate. If you have a million widgets made and 50,000 of those widgets are of one flavor and 950,000 the other, your dose can't -- your dose should be proportionate to the number of widgets made in that category.

DR. MAKHIJANI: The dose -- the population dose to the workers will be proportionate. So I agree with Tim on that, that if you're trying to do an approximate approach to an epidemiological study for that group of workers, you'd assign it proportional to the production.

But the individual dose certainly, and we have argued this in other contexts, that you could have a very small production. You can take here, right here in Ohio, if you look at the records of that no records field, where you look at the production conditions in the uranium subcontract that was given by Fernald to a small shop near Oxford, I doubt,
I doubt that you could say that -- you know, they only produced about 200 tons in that shop, if I'm remembering correctly. But I doubt that you could say that you could make it proportional.

DR. NETON: But this is one process facility using the same equipment, the same process, see, that's what I'm saying. So that if, you know, if you process -- let's say you process 100 of something in a year and that took you all year to do that, and I only did ten of these in that particular year, it would seem to me that they'd only occupy ten percent of your time collectively.

MR. MARSCHKE: I agree basically with -- I go kind of in the middle ground, I think, because you've either got to spend all your time processing -- there could be one guy processing all 50,000 thorium slugs.

DR. NETON: Right, but it wouldn't have taken him --
CHAIRMAN GRIFFON: It wouldn't have taken him a full year.

DR. NETON: That's my point.

MR. MARSCHKE: But he would have -- however long it took him to do it, I mean he would have -- he could have spent the whole year processing thorium slugs. But then he's not going to have any uranium exposure. So he's --

DR. NETON: No, no, no. But see my point is, why would it take him an entire year to process 1,726 thorium slugs, when they could do 500,000 uranium slugs in one year?

MR. MARSCHKE: Well, there's a lot more guys doing the 5,000.

DR. NETON: -- workforce assigned to it.

MEMBER CLAWSON: That's how they get --

(Simultaneous speaking.)

DR. MAKHIJANI: So it seems to me
that that's a pretty important question.  

DR. NETON: I agree.

DR. MAKHIJANI: And that's the biggest question. Those are the two big questions that are in my mind.

DR. NETON: I think what -- is the thorium exposure can be controlled and very low. Somehow, I think, within this analysis, there is a bounding mechanism. I do agree with you, Arjun.

It's sort of -- I'm not comfortable with double assignment of dose because it's just illogical. It's hard to say if you give people a 100 percent of each.

DR. TAULBEE: But, as Mark pointed out, then if you don't, then what about the residual source?

DR. NETON: Well, I think we need to talk about this. But I think what Tim's done here is a very nice analysis that clearly demonstrates what happened and what the
exposure conditions were.

CHAIRMAN GRIFFON: I mean, I think the other thing that I'm curious about is the -- and I'm sure you have, from health and safety reports and interviews, I think, is your basis for this claim, that the air sampling data, where it's actually BZA, even though it says --

DR. TAULBEE: Pseudo-BZA.

CHAIRMAN GRIFFON: Pseudo-BZA, right, right, right. I think that might be worth looking at. It might even be important in the thoron aspect of it, all right. I assume they're also assumed to be BZA? It's the same sample.

DR. TAULBEE: Right, yes. It's the same sample almost. If you look at the air sample logsheets you'll see they'll have the time on, the sample on, sample off and then the time of the first counts and the time of the second count. All of that's there on a
single air sample logsheet.

CHAIRMAN GRIFFON: Yes. But anyway, I think -- yes. So this will go through SC&A review and possibly more discussion.

DR. TAULBEE: Or a discussion paper on this or something like that.

Findings 1 and 2

CHAIRMAN GRIFFON: Yes, yes. Right, right, right. And I'll add this. I think this really belongs on that issue 1.

DR. TAULBEE: Oh, it is issue 1.

CHAIRMAN GRIFFON: This is totally issue 1, and there's no other changes in the addendum that we -- it's all on the thorium, right?

DR. TAULBEE: That is correct.

CHAIRMAN GRIFFON: Okay. All right. So with that, why don't we move on to the matrix, and at least go back to our initial matrix.
DR. TAULBEE: Yes.

MEMBER CLAWSON: What?

DR. TAULBEE: Thorium nitrate.

MEMBER CLAWSON: Thorium nitrate.

DR. TAULBEE: Yes, and in fact, this kind of gets to the issue that we have unearthed.

CHAIRMAN GRIFFON: Yes. Well, let me just read -- and this, I think, is going to change, now, a finding. We had finding 1 and 2 kind of together, or issue 1 or 2, whatever we're calling them.

DR. MAKHIJANI: Well, Mark, I think issue 1 will now change from 3/19/60 to up to 1965.

CHAIRMAN GRIFFON: Five, right.

DR. MAKHIJANI: Right, Tim?

DR. TAULBEE: That's correct.

CHAIRMAN GRIFFON: And then issue 2 will cover '65 and beyond, is that correct?

DR. TAULBEE: Through '71.
CHAIRMAN GRIFFON: Okay. But this also says that NIOSH is completing its White Paper on thorium. It will use air concentration data only. I think that's all --

DR. TAULBEE: That's issue 2.

CHAIRMAN GRIFFON: Okay. So this might be relevant for issue 2, okay, all right.

DR. TAULBEE: Yes.

CHAIRMAN GRIFFON: Okay. So why don't we just give an update -- maybe just give an update on issue 2.

DR. TAULBEE: Okay. We can certainly do so. This is looking at the -- it's currently labeled as post-1960 thorium, but it's really post-1965 thorium. This is where the thoria work was being conducted, and it really started in 1964 with their initial developments.

And here's where we have a report
coming out. It's going to be Report 46. It's currently being reviewed and we do expect it to be at least sent to DOE within the next week or so, and then obviously afterwards, we'll send it out here to the Board, and you'll probably want SC&A to look at that as well. But that's your choice, from that standpoint.

What we've done in report -- or what I mentioned earlier was that starting in 1965, with the thoria powder, the process changed. So we can't use this uranium bioassay report. Instead of working with uranium metal, you're working with thorium powder.

So, powders are much more difficult to control in the workplace. So Savannah River built a glove box line to handle the thoria powder, and we have pictures of that in the report.

I believe it was attached to a
HEPA filtration system before it went out the building exhaust ventilation. There are pictures of it coming directly off the glove box line into the HEPA filter.

And so, all of this work of canning the thorium, they would take the thoria powder, they would compact it within the glove box. It would then look like a slug. There's some pictures of that.

They would then put it inside the can and then they would weld the can there all within inside the glove box line, take it out, and then they would do their other acceptance testing after it was already canned and welded.

And so, during this time period, we have thorium air sample data in that room with the glove box line. This individual who took those samples is the one that indicated that the position, the air sampler there, next to the glove box line where the people were,
where the workers were working during this process.

And so, due to that, the secondary process, that's where we're proposing to use the air sample data in order to estimate doses during this time period. We do have indication that they used whole body counts as a confirmatory check.

If you would go through the monthly reports, they'll indicate that they sent, you know, ten people this month to the whole body counter for counting, to check for thorium assimilation.

In interviews -- and, Mel, please jump in, you're the one who talked to the individual -- this process was a very small operation. So in total, there was only 15 to 20 people total that were working along this thorium powder line, where they were making these slugs.

So sending ten people or so per
month into the whole body counter seems pretty reasonable. They never saw any thorium assimilations. That's mentioned in the monthly reports. But, based upon the detection levels and the MPCs that they were using, what we see in the air samples, you wouldn't expect to see any assimilations, because the air samples are actually below the MPC.

I think the geometric mean is .8 or .08. So, it's only eight percent of the MPC is what we see from all the air sample data. So in other words the glove box line was doing what it was supposed to be doing, and controlling it fairly well.

Which takes us up to the end of the production time period, the 1969 time frame, and then the facility was D&D'd. And we have smear data during that D&D process. So by 1971, all of the thorium operations were pretty much gone from the facility.
CHAIRMAN GRIFFON: So this covers '65 to '71, right?

DR. TAULBEE: That's correct.

CHAIRMAN GRIFFON: Okay, and this is going to be -- you're still going to provide a White Paper on this?

DR. TAULBEE: Yes.

CHAIRMAN GRIFFON: Not an addendum. It will be just a White Paper.

DR. TAULBEE: Yes, a report actually, and the reason why it's not part of the addendum was back during the time when we proposed or gave the original SEC Evaluation Report, we thought we'd be able to use whole body count data during that time period.

So we felt we could reconstruct the doses. We knew they had conducted whole body counts. We didn't have the data at the time, but we felt that we could use that to do it. As it turns out, finding that whole body count data has proved very, very difficult.
At Savannah River, all of the whole body count data are in the individual files. So the only way to find those ten or so people would be to go through all 50-60 thousand records, individual records at Savannah River, searching all of the whole body counts, to try and find those.

So we didn't consider that to be feasible and we had this, all of this air sample data. So that's what we propose to use. So that's where we're at with this. I do expect to send out that report next week to DOE for the final ABC review, and then once that comes back, we'll post it there to the --

CHAIRMAN GRIFFON: Did you find any accidents, incidents on the glove box line, any reports of things like that, abnormal --

DR. TAULBEE: There were a few --

CHAIRMAN GRIFFON: Because you're saying the glove box line was doing what it
supposed to do. But I would expect over that time period --

DR. TAULBEE: There were a few occasions where they would find some contamination, and they would go back in. You can see that in the survey log sheets. But they're very sporadic and really, having looked at most of the --

CHAIRMAN GRIFFON: And nothing enough to be picked up on the whole body counter, obviously?

DR. TAULBEE: No.

CHAIRMAN GRIFFON: Yes, right.

DR. TAULBEE: I can only think of one, maybe two that were noteworthy. Noteworthy in that, you know, it was the Health Physics technician saying you know, we need to wipe down this area. So that's -- and that was over that entire six-year time period. I believe one of them was during D&D, but I'm not sure it was.
CHAIRMAN GRIFFON: Okay. I don't think we have to go into this. I just put on "remains an NIOSH action item," and did you have an update on the possible time frame of when we get this report? It's in review now with DOE -- or no?

DR. Taulbee: No. It's in review with us. I expect it to be approved later this week, early next week, and then, at that point, we'll send it to DOE and they have two weeks to review it.

CHAIRMAN GRIFFON: So it should be available by June time frame or something --

DR. Taulbee: Yes. Easily before June. Probably at the end of your next Board meeting or shortly afterwards.

DR. Makhijani: Mark, did you want us to combine these two thorium reviews into one White Paper?

CHAIRMAN GRIFFON: I guess it doesn't -- I would say keep them separate, but
yes.

DR. MAKHIJANI: Keep them separate?

CHAIRMAN GRIFFON: Yes.

DR. TAULBEE: And because the processes are totally different.

CHAIRMAN GRIFFON: They're very different, yes, yes.

MEMBER CLAWSON: Okay. Where was this glove box line at?

DR. TAULBEE: 313 M.

MEMBER CLAWSON: So it kind of replaced the other process? I'm not that familiar with the building there. What I'm getting at is with the small personnel like that, they could be pulling people off other lines to submit this line. So when you start getting into vacation and whatever else like that, we see it quite often when they have small, when they say we've got a small group. They're usually pulled from another uranium
line or whatever else like that. I'm just --

DR. TAULBEE: It was all confined to one room. So yes, could they have pulled from others? I suppose probably they did, although I think it's also important to, and let me pull this back up here, the previous presentation again.

No, that was thorium metal. Never mind, I'm sorry. Yes. I'm not sure what -- in the report, we have the production, don't we? So there's the production of a table, or not table but a graph.

MR. MAHATHY: You mean 46?

DR. TAULBEE: Yes, in 46. There's a graph that shows it.

MEMBER CLAWSON: Well, just keep in mind a lot of times like that --

CHAIRMAN GRIFFON: Can everybody just make sure we're speaking up? I know those on the phone are probably having trouble hearing.
MEMBER CLAWSON: Okay. I just want to make sure that we look at, you know, I'm sure we've only got supposedly ten people there. We don't have all the data in there, but usually, on a process like this, I'll end up pulling people in from other places and they go back and forth.

We need to kind of be thinking about how we would handle that, especially if they said, oh yes, I was a part of this or something like that.

MR. MAHATHY: We actually do build that in the ER addendum. The ER addendum was the outcome proposals of all the people who worked --

CHAIRMAN GRIFFON: Okay. So this is a remaining action item. I don't know that we have to do it now.

DR. TAULBEE: Okay.

CHAIRMAN GRIFFON: I'd rather save the in-depth discussion for when we have the
Chairman Griffon: Moving on to Finding 3, I also think you don't have much of an update here, but just give us kind of a status and --

DR. Taubbee: Sure.

Chairman Griffon: This is the recycled uranium?

DR. Taubbee: Recycled uranium, yes. We are revising the TBD, and let me just say that some of these issues, you know, as Jim said, we have a draft report here that we have not released to you all, that I'm working off of. We need to review it a little bit more before we release it to you.

But this provides some of the data as to what we're proposing to -- how we're proposing to revise the TBD in order to address this issue. And so we've got some
revised numbers here that we'll be putting in there, and I plan on putting out this report also, some time in the near future once we can get that reviewed, to you all, which would document our responses here.

I know you're updating your matrix as we speak here, but this would provide some written responses to some of the things that I'm saying here today.

CHAIRMAN GRIFFON: Okay.

DR. MAKHIJANI: So what's the form of those responses, Tim? Would that be a paper that you're still not getting the TBD, did you say?

DR. TAULBEE: Yes. But we will be providing that data that we'll be updating the TBD with, in what I would call a kind of response and status report to you all, so that you'll have something to review basically, instead of just saying we're going to do this in the TBD.
You'll see what it is we're going to put into the TBD. Does that make sense? We've been focusing on thorium a lot for the past several months.

CHAIRMAN GRIFFON: Okay. Let's --

MR. KATZ: What was the time frame of that? Sorry. Roughly.

DR. TAULBEE: Roughly a month. I mean some of it depends upon, you know, Jim's availability and we've got a Board meeting coming up, so he's swamped.

MR. KATZ: Sure. Okay.

CHAIRMAN GRIFFON: All right. Let's move on to finding 4.

Finding 4

DR. TAULBEE: Okay. This is covering the spontaneous fission, and this was a question that you had asked, Arjun, at the last meeting, was does the ICRP models consider neutrons, and, in fact, it does. We've gone through and found that ICRP
Publication 68 does consider neutrons and fission fragments and prompt gammas, et cetera, from the spontaneous fission of californium-252.

So again, we'll put that into this interim issues report to you all documenting it. But we have, we've gone through and researched and found that it does in fact include that.

CHAIRMAN GRIFFON: Arjun, do you have a question?

DR. MAKHIJANI: Yes, as I had mentioned before, I discussed this with Joyce, I was unable to find an answer to this question, so I'm glad to you asked and tried to look at it.

CHAIRMAN GRIFFON: All right. I mean you might want to look at it, I think, and examine it too.

DR. MAKHIJANI: Because when I corresponded with Joyce about it, there was
some question about how could it be done, whatever's being done. So I'd like to correspond with Joyce about this --

CHAIRMAN GRIFFON: Is there anything in writing beyond yes, it's in ICRP 68?

DR. TAULBEE: Oh, yes. We have a paragraph discussing it.

CHAIRMAN GRIFFON: So these are the things that okay. You can provide those afterwards, and I'll integrate --

DR. TAULBEE: Well, that's going to be -- I was planning to put all this as part of our issues response within the next month.

CHAIRMAN GRIFFON: Okay. So that one's not complete?

DR. TAULBEE: No, it's complete.

CHAIRMAN GRIFFON: It's ready to go; you've just got to pull it all together.

Okay, all right.
DR. TAUMLBEE: Internally, before we turn it over.

DR. MAKHIJANI: So there will be -- there is one issues response document?

DR. TAUMLBEE: Yes.

DR. MAKHIJANI: Okay.

DR. TAUMLBEE: One issues response document. I think that's more efficient than having 25 issues response document. And then the next, maybe the next Board meeting or the next Work Group meeting we can go through it and cross some of the issues off, and this one's been addressed.

CHAIRMAN GRIFFON: I mean, I would -- I think it might be worthwhile just letting Joyce know the nature of the response, and maybe she can at least begin to look into this.

DR. MAKHIJANI: Basically, on this point, the response is that it's in the ICRP 68?
CHAIRMAN GRIFFON: Right.

DR. TAULBEE: That's correct.

DR. MAKHIJANI: Okay. So I will talk to Joyce about that.

CHAIRMAN GRIFFON: Yes, okay. All right. I'm going to ask if we're going to take just a quick like ten minute, come back at 11:00 a.m., break, and continue on the matrix?

MR. KATZ: For everyone on the phone, we'll start back up at 11.

CHAIRMAN GRIFFON: Thanks.

(Whereupon, the above-entitled matter went off the record at 10:49 a.m., and resumed at 11:05 a.m.)

MR. KATZ: So we're reconvening after a short break. This is Savannah River Site Work Group, Advisory Board On Radiation Worker Health, and off we go.

Finding 5

CHAIRMAN GRIFFON: All right.
We're continuing to go through the matrix. So we're on finding number 5, and I'm going to go through these, like I said, sequentially, even though they may not be very significant updates.

But we'll go through them sequentially, just for the sake of completion.

Finding 5, Tim, the status?

DR. TAULBEE: Sure. This is the neptunium coworker model, and this is all the coworker models. Well, not all of them, but just to give a brief update on all the coworker models, we're still working on them, and the actual due date, I think I had told you back in January, was going to be some time in June.

That has now been pushed out to August, as to when we would be receiving them, and I'll explain a little bit as to why that has happened.

One of the major things has to do
with meeting the June 1st goal of processing dose reconstructions. So less people have been available to work on that in the past several months. The other issue actually comes up with neptunium-237 and with the mixed fission products.

The initial drafts of those coworker models, they found that there was not sufficient data in order to actually develop a coworker model. So what we've done or had to do is go back to the NOCTS data set and, instead of just looking at urinalysis data, we're now looking at the whole body count data as well.

So that is what is currently being included from neptunium-237, and from mixed fission products, and I'll get into that more on the next issue. So currently, there's more data being coded to supplement those uranium, or not uranium, the urinalysis, the neptunium urinalysis data, using the whole body count
data.

And so the actual expected date for the coding to be finished is not until the end of June time frame, probably the middle of July is when that will actually be completed. That's when the analysis will begin on that particular issue.

DR. MAKHIJANI: Full analysis?

DR. TAULBEE: Yes. The data coding is estimated to take about three months, and this was started the first of April. So all of April, May, June. I'm anticipating a couple of weeks of delay, just because it happens. So the analysis will start probably mid-June or mid-July, I'm sorry. Mid-July.

CHAIRMAN GRIFFON: I'm sorry. This response applies to neptunium, but you said also --

DR. TAULBEE: Mixed fission products fall into the same --
CHAIRMAN GRIFFON: Which is issue 6.

DR. TAULBEE: Issue 6 and 7.

Findings 6 and 7

CHAIRMAN GRIFFON: And seven is the activation? Yes, 6 and 7?

DR. TAULBEE: That's correct, and but there is a little bit more of an update. We have a longer discussion on 6 and 7 last time, and you asked some additional questions. Those we are prepared to answer.

CHAIRMAN GRIFFON: Okay. I want to ask, not to bring the temperature up in this meeting, but when you did the initial ER report, refresh my memory. What did NIOSH, what is NIOSH's -- I haven't found it right now -- what was NIOSH's position on the neptunium coworker model?

DR. TAULBEE: We had -- we had indicated that we had sufficient urinalysis data. But what we were doing is looking at
the total number of data points. We were not looking at breaking it down by --

CHAIRMAN GRIFFON: But this is part and parcel to the entire regulatory process. I mean, we've always gone back to the reg and said well, NIOSH has to -- the timeliness issue. NIOSH has to, in the time frame set out in the regulations, determine that they have sufficient data available to do dose reconstruction.

We've pushed back with the Advisory Board process and said that we want to, you know, basically show me the money, you know, see the data, see how you're going to do it. And the delay has always been sort of put on the Advisory Board, because NIOSH met their time frame.

In this case, I would argue that NIOSH didn't meet their time frame. They said they could do a urinalysis coworker model because you had the data. Now you're coming
back and saying oh, we looked a little harder, 100
and we realized we don't really have the data.

So is there a timeliness issue here? I mean I --

DR. TAULBEE: I would challenge your, that we don't have the data, because we do. It's all in-house and it's all been in-

CHAIRMAN GRIFFON: But you just said the data was -- we found part of the delay was based on the fact that there was not sufficient urinalysis data. You said it was -- the thorium model was going to be based on urinalysis data.

DR. TAULBEE: Yes, that had already been coded, okay. Now all we are doing is going through the individual claim files that we have, and we're coding the whole body count data. So we've had this data --

CHAIRMAN GRIFFON: But that's not urinalysis data.
DR. TAULBEE: No, it's not. That's all. I'm not trying to make this overly contentious, but I know from our side, where we sit, the public is constantly on us about the timeliness question, and rightly so.

I mean, you know, and a lot of the delays are our process. I understand that. But I, you know, I'm just pointing that out to -- I mean, I think you might have to answer at a full Board meeting, if this kind of thing comes up. I think we, you know, we should, you know, okay.

DR. MAKHJANI: I'm a little confused about this, because you know, this may come up when we discuss our review of TIB-0075 and construction worker or non-construction worker. But, if memory serves me right, in the Evaluation Report you said you had coded all claimant data, and then -- I think it does say that in the Evaluation Report.
And then so we proceeded on that basis to do our review, and then actually we didn't check whether it was all claimant data or not. We just assumed it was.

CHAIRMEN GRIFFON: I didn't remember the coded part, but I thought I remembered that it was a urinalysis-based coworker model assignment. All right. I don't want to harp on that. I just thought that it was worth pointing out, and it is an issue often brought before us at the full Board meetings.

DR. TAULBEE: And I understand that point. So it's just -- you know, let me just clarify. The only thing that I was concerned with what you had said was that it made it sound like we had gone and gotten more data, and we hadn't. We were just mining our files a little better and --

CHAIRMEN GRIFFON: Okay. Anyway, so we have the estimated time frames anyway on...
the completion of this, June and then August
for the -- probably back to us, August is a
likely time frame?

DR. Taulbee: Most likely, yes.

Chairman Griffon: All right, and
so, Arjun, unless you, and I don't think
there's much to comment on at this point.
Let's move on to 6 and 7. Similar responses,
but there's a little more story to tell. Is
that what you're saying?

DR. Taulbee: That's correct.
It's the same issue. Well, with mixed fission
products, it's really the inverse of what we
see traditionally, and that is all urinalysis
data prior to 1965 can be used for a coworker
model. The data after 1965 can't be.

What happened was they changed
their reporting detection limit, because they
started relying on the whole body counter more
for confirmation that assimilations were not
happening, because it was more sensitive than
the urinalysis. So -- actually, it wasn't more sensitive than the urinalysis; I shouldn't say that. It was more convenient, easier to do.

So starting in 1965, they raised what their threshold was for actually reporting the mixed fission products. So we went through and started developing the coworker model. We can go all the way up to 1965, at which point now the doses jump up tremendously high, due to this artificial reporting limit that they had for urinalysis.

So this is where we actually started to go back to the whole body count data, because we could drop the sensitivity back down to around the order of where the previous, pre-1965 data was. While we were there, we said, let's get the neptunium data at the same time.

So they're actually interrelated, 5 and 6, from a coding standpoint, even though
the coworker model is totally different. This is a case where we started to develop the coworker models. We set off the urinalysis. We ran into this higher detection limit, and so now we're looking at the whole body count data to bring it down to something that's more reasonable.

So that's the status of where we're at with that one, although during the discussion that we had, I believe it was Arjun or maybe it was you, Mark, indicated how will we know the mixed fission product, the mix, that we use in the TBD is claimant-favorable.

And we didn't know that. So part of what we've done over the past four months is we went back and compared the ratios of mixed fission products that are in the Savannah River Site TBD, to what is in OTIB-0054, which is a very rigorous analysis of fuel decay times and different steps of the process.
And we found that the ratios that are in the Technical Basis Document, Site Profile currently, are more claimant-favorable than what's in OTIB-0054.

However, we kind of ran into a dilemma here of OTIB-0054 we considered to be more rigorous, more scientifically based and bounded. Savannah River Site TBD was the first TBD ever written that we tried, so we built in a lot of conservative assumptions.

So we feel OTIB-0054 is a better representation of what that mix should be. So we plan on updating Savannah River Site TBD to be consistent with OTIB-0054. Does that make sense to everybody?

CHAIRMAN GRIFFON: Yes. I'm just trying to keep my notes up to date.

DR. TAULBEE: Sure, sure, sure.

CHAIRMAN GRIFFON: Arjun, do you have any follow-up on that?

DR. MAKHIJANI: I don't think I
followed your, 1965 transition thing, but we can just wait until we see the piece of paper first. We're not going to do anything.

CHAIRMAN GRIFFON: So you're going to -- out of this we're expecting really two things, the coworker models, but also in your report with all your responses, you'll have a section on this, discussing the choice of -- or that it's a claimant-favorable approach, right?

DR. TAULBEE: That's correct. That discussion of the mix will be in this issues report that we have. And then in the coworker model, we'll go through the discussion that I think Arjun was asking for, of why the transition from urinalysis data to the whole body count data, due to the higher detection limit.

DR. MAKHIJANI: No, I understood why they made the transition, but I don't think I got how you're making the adjustments,
because the MDA is so high. But we'll just look at the paperwork and then try to figure it out, rather than hash it out verbally. Sometimes we just need to look at the paper.

Dr. Taulbee: Okay.

Dr. Makhijani: I'm okay with it, yes.

Dr. Taulbee: So that's really where we're at then with the issue 6 and 7. I just wanted to give you that update, that there is more data coding going on and we did look at your question as far as the fission product mix.

And there is a White Paper coming out about that comparison of the fission product mix.

Dr. Makhijani: Oh, okay.

Chairman Griffon: So that's in addition to the issues report?

Dr. Makhijani: Is that separately from this?
DR. TAULBEE: If you want it separate, we can do that or we could run it with other issues. It's up to you all.

CHAIRMAN GRIFFON: However you want to provide it, you know. If it makes sense to roll it in, that's fine. If you think it's something that's going to overlap on other sites or whatever, it may be good to separate it --

DR. TAULBEE: No. Savannah River-specific.

CHAIRMAN GRIFFON: Savannah River-specific?

DR. TAULBEE: We'll include this as an appendix to this issues report then. That would be done --

Finding 8

CHAIRMAN GRIFFON: Okay. If there's no further comments, issue 8. We can move on to finding or issue 8, whatever works for you.
DR. TAULBEE: This is one where we're still working, as far as the --

CHAIRMAN GRIFFON: Which one is this? It's the coworker model --


DR. TAULBEE: Yes, and this is a very small operation. It was done in the 700 area, and so the bioassay is going to be very limited. However, also, so is the exposure time period and the number of people.

Most of the polonium 210 that was made at the site was shipped directly to Mound.

CHAIRMAN GRIFFON: Mound.

DR. TAULBEE: And so this was some, one or two small projects that we do have documentation that they did some -- they have a single glove box set up in one room in the 700 building, where they worked the polonium.
CHAIRMAN GRIFFON: How are you going to determine who worked on this process? That's always been a question on these kind of things, you know.

DR. TAULBEE: Well, from it being a coworker standpoint, that's the whole reason we're developing this. I guess I'm not convinced that everybody who worked on it was actually -- actually has bioassays. So we're not sure.

CHAIRMAN GRIFFON: But then if everybody doesn't have bioassay and you started playing the polonium doses across the site, I think you get into some rough places.

DR. TAULBEE: Yes. We certainly should not be applying these across the whole site.

CHAIRMAN GRIFFON: Right. So how do you know --

DR. TAULBEE: The way I -- unless the largest bound I would see would be the 700
area, because we can identify them, those
people based upon TLD badge, of being in the
area. This operation was early 1967. So it's
one year.

CHAIRMAN GRIFFON: Sixty -- fifty

DR. TAULBEE: '67.

CHAIRMAN GRIFFON: '67.

DR. TAULBEE: Yes. So it's
really, really small.

Finding 9

CHAIRMAN GRIFFON: Okay, and then
Finding 9, just to go through these
sequentially.

DR. TAULBEE: Finding 9 is where
we'd like to discuss a little more of the
OTIB-0075 type of issues, because that's where
this has kind of come up for us.

CHAIRMAN GRIFFON: Okay.

DR. TAULBEE: Okay. And so what
we've done is the tritium coworker model we
went through and developed, and once it was developed, we went through and separated out construction trades workers versus non-construction trades workers and compared them, especially against the OTIB-0070 or SC&A's review of OTIB-0075.

And so what we did was, we took the tritium urinalysis, the bioassay data from '54 to 1990 and converted it to annual doses for each of the claimants. We stratified it, based upon construction trades and non-construction trades. We did not include zeroes in our data set.

And from that point, and again we were using the one sample or the highest -- well, actually these weren't the highest sample. They were total dose for the year for each person.

What we found is that of the 37 years we compared, 20 of them we don't see any difference between construction trades workers
and non-construction trades workers, 20 of the 37.

For the 17 where there is a statistical difference between the two, the construction trades workers were always lower. So this is kind of the opposite of what SC&A has found in their OTIB-0075, yes, for tritium. And that's why I wanted to bring this up here and try and open some dialogue here.

We've had a couple of statisticians look at this already, and we've got a third one, Daniel, who's currently working on this for us.

But it's causing us some concern in that SC&A has an analysis that's showing construction trades workers are more heavily exposed for tritium, and we're showing the opposite.

DR. MAKHIJANI: Did you parse it by area or job type?
DR. TAULBEE: No.

DR. MAKHIJANI: That's what -- I mean our whole analysis in the OTIB-0075 review was that you have to parse it by job type and area, otherwise you won't catch the differences. So I think --

DR. TAULBEE: But if you're looking --

DR. MAKHIJANI: -- to compare -- at this stage, just going on what you have said, to respond to what -- you're doing apples and oranges because our whole approach to review of OTIB-0075 was to see why it would apply in here, which is what you've done, and then to see whether there were certain job types and in certain areas construction workers were more exposed. Where's our tritium? I think it's the last section.

DR. TAULBEE: Well, I guess here's one of the concerns our statisticians have all voiced of that stratification of, you know,
what is the basis of the stratification in kind of the first place?

You know, and I noticed in your stratification you've got all the reactors individually separated. All the reactors were heavy water reactors; they were all operated similarly. Why should those be broken out separately versus all combined?

So there's concern about too much stratification is where they're -- at least our statistician's concern is, that could be causing some of this difference. You know, in my mind, from thinking of the Savannah River Site, stratifying, really the only stratification that makes sense to me, based upon location, is the canyon area, the 200 areas, versus the reactors.

Those processes are different, and so that would be really the only location stratification I would even look at, at least in my mind, and then if you look at
construction trades workers altogether versus non-construction trades workers.

So I guess I wanted to know, why did you stratify across all the actors?

DR. MAKHIJANI: Well, I think it would be better to see something in writing, because -- I don't know. Harry, are you on the phone, on the line?

MR. CHMELYNSKI: Yes, I am.

DR. MAKHIJANI: You know, I think you can argue that you can put all the reactors together or not, but I think a stratification, we found, was necessary, and Steve and Harry -- Steve compiled the data and did the initial compilation, and Harry did the statistical analysis. So I'll let them give you a preliminary response.

But, overall, I really prefer to see your statistical analysis in writing, because these are pretty complex topics. My gut response is, if you haven't batched it
even, you could lump all the reactors together
and the reprocessing areas together. But if
there's no parsing by area, you can't really
compare the two analyses. I mean that's my
initial response. Harry?

MR. CHMELYNSKI: Yes. I think our
conclusion agreed with their conclusion, in
terms of the all-worker, all-area analysis
that yes, we agree that it's been demonstrated
they are comparable, and the question then
becomes, is that the appropriate level of
detail to work at.

In terms of the specific breakdown
we used, I have to refer that to Steve, as to
why he picked the areas he did in our tables.

MR. MARschKE: That's pretty
simple. I mean we just picked those areas,
because those areas were ones where we had
data for in the data files that we used, and
that's another question I guess we wanted to
talk somewhat with NIOSH about.
When we started this analysis probably over a year ago, the first thing we did was we went to the O: drive and when the O: drive was still on the -- was still the ORAU O: drive, and we found a couple of data files that were available that looked to be the appropriate data files.

And we downloaded those data files and that forms the basis of all the subsequent analysis. Recently, discussions that we've had, including the Work Group meeting back in January, has led me to believe that NIOSH has a much more extensive NOCTS database than what it is we used in our analysis.

CHAIRMAN GRIFFON: So I guess that's a preliminary thing. We want to make sure we're working with the same data, yes.

MR. MARSCHKE: Yes. That definitely could cause a difference in the results. Now when we were getting ready to release this, one of the things I did was I
went back to the O: drive, to the folder where I got the files, and checked to make sure, to see whether or not they had been updated, and they had not been updated, so we did not make any changes.

But again, discussions that have been going on recently, leads me to believe that there is more NOCTS data out there than what we have included in our analysis.

DR. TAULBEE: I'm not sure that there is, but we will certainly check that. I have one question I wanted to ask you all is I know, Arjun, you posted a couple of -- or several spreadsheets just last week. Are those the analysis files that you're talking about Steve?

MR. MARSCHKE: Yes.

DR. TAULBEE: Okay. The statisticians will work from those.

CHAIRMAN GRIFFON: And I was just going to ask. Maybe we can ask NIOSH to do
the same, if you can provide your analysis files on the O: drive.

DR. Taulbee: Certainly.

Chairman Griffon: And then --

DR. Taulbee: Hopefully we're working from the same sets.

Chairman Griffon: Right.

Hopefully we're working from the same set --

DR. Makhijani: I don't know if we are. We, and that, I think, is a problem, because we assumed, based on the Evaluation Report, that all NOCTS data had been coded, because that's what the Evaluation Report said. I just checked.

And so we proceeded from the spreadsheets that were there on that assumption. But it turns out not all NOCTS data has been coded, or maybe there are new claimants since it was coded. I mean, I don't know what has happened. But now we're not -- it seems clear that we're not working from the
DR. TAULBEE: Okay. Well I think the start point then will be, we'll work from the same data, at least from that standpoint, and see if we can then compare apples and apples.

CHAIRMAN GRIFFON: Well, I guess what I would propose is put up the data set that you're working from, along with your analysis files, to post the data set that you're working from along with your analysis files on the O: drive.

And then also in your issues response report, I guess we'll get a description of what you did in your conclusions, right, on this --

DR. TAULBEE: Actually, not in the issues -- well, we can put it in there, sure. We were actually planning a separate response to SC&A's OTIB-0075 review.

CHAIRMAN GRIFFON: That's fine.
This can be a stand-alone, because TIB-0075 is a big — covers several things. So yes, all right. So in your TIB-0075 response, you can outline it.

Then once SC&A has their response and the data from the O: drive, it may be, at some point we may want to break off and have a technical call, where we can get the statisticians to work, you know, talk through this a little more.

Because maybe it is a matter of just the data, but maybe it's a matter also of the selection of how you slice the data. So, and there may be some dialogue that has to happen there.

DR. MAKHIJANI: Yes. I think my gut feeling is that it would really be good to have an apples-to-apples comparison, and we won't have it unless you make some parsing of the data that you consider reasonable. If you're going to --
I mean, I definitely see an argument for putting all reactor data together and all canning data together, and that's a sort of an argument within, you know, you can have some technical differences about that.

But I think we won't have comparable analyses unless we're operating from the same data, and unless you have some analysis by area of construction workers and non-construction workers.

DR. Taulbee: Can I propose, you know, that this time, that first we start from the same data set. So we'll try and get that hashed out in the next few weeks here. Then if you all would do an analysis of basically the reactors together and the canyons together, we'll do the same.

Then just the first cut of all construction trades workers versus non-construction trades workers, and then we can talk about the additional, you know,
stratification of additional trades if you want.

But at least so we can try and walk through this together on the same page is what I'm trying to get to. Would that be acceptable as a starting point to resolve this issue?

DR. MAKHIJANI: I think so. Tentatively, let me just say yes. I mean, the only reason I'm hesitating is as we go along, we'll be kind of doing reviews in parallel, and we'll be redoing our TIB-0070 type review as you are doing a response to our OTIB-0075.

I think it seems a little kind of labor-intensive to be doing reviews of reviews in parallel with Ted, Mark. I mean, I'm happy to follow your direction.

DR. TAULBEE: I agree, that it does seem like it would be, but I'm not sure we're going to come to an agreement, unless we start trying to walk through it together.
CHAIRMAN GRIFFON: And I hate to rush the judgment on the stratification, because that seems to be one of the more important, you know, criteria in this analysis. I mean, I think if you look at the overall data set the same way, you're going to get the same result probably, hopefully.

But the stratification becomes important, and maybe they're -- I don't know enough about the Savannah River, especially the construction worker sector, whether there's subsectors, pipefitters or others that fall into that category, that are different enough than the overall, that there are reasons for separating them --

DR. MAKHIJANI: I think there are.

Steve, did we do a tritium analysis by job type?

MR. MARSCHKE: We did a -- yes.

There is a limit as to how much you can parse the data, because you can either go by area or
you can go by job type. But we wouldn't recommend you go by area and job type, because you just -- then you end up with very little data.

CHAIRMAN GRIFFON: Lose your numbers.

MR. MARSCHKE: But we did do, we did do, found we did have enough tritium data so that we could look at the -- all the job types, construction job types, and I think that is reflected in our report.

There are some graphs and figures in there which do demonstrate kind of consistently what we found, I think, in the OTIB-0052 report. We found some construction occupations received higher doses than other occupations.

DR. MAKHIJANI: And that three -- actually, we compared non-construction workers and non-construction workers, construction workers to construction, you know, and then
construction workers to non-construction workers. There are a number of different types of comparisons in that report.

DR. TAULBEE: That's where I'd like to try and jump back to kind of some of the basics, and see if we can get on the same page, before we start breaking it out into all of the different construction trades and so forth, to see if, you know, the analysis will agree.

CHAIRMAN GRIFFON: Well, I would ask that SC&A consider, you know, the stratification that you just talked about. But I don't want to do, you know, I don't think that SC&A is ready to say yes, we think that's the right strata, you know.

But at least consider those strata that Tim just mentioned, and then you know, like you said, make sure the data is the same that we're working from. So in the next couple of weeks, hopefully that's the stuff
that's going to be resolved.

MR. KATZ: So maybe they should just have a technical call, because it's hard for them to do it on the fly here. But maybe they should have a technical call, so that at least Tim and his folks can hear their input on --

CHAIRMAN GRIFFON: And their reasoning for --

MR. KATZ: -- observations and reasoning --

CHAIRMAN GRIFFON: Yes, I agree.

MR. KATZ: -- and then they can take that into account. They can do their work. SC&A doesn't have to do more work on this at this point.

CHAIRMAN GRIFFON: But I'm not sure any of that can happen until at least we get the same, make sure the data's the same.

MR. KATZ: Yes. I mean that's separate, getting the data -- being on the
same page with respect to data is another. 130

CHAIRMAN GRIFFON: Right.

MR. KATZ: But I think the technical call would at least then Tim Taulbee and his crew aren't going forward with an approach that is sort of a non-starter.

CHAIRMAN GRIFFON: Yes, yes. I agree, and we'll schedule that once we -- once the data is posted and stuff like that. Just let me know, and it will be an SC&A and NIOSH technical call, but all members of the Work Group will be notified if they want to listen in.

So hopefully within the next, maybe, month that can happen, after the data's posted and maybe a week or two after that, you know, something like that.

MR. MARSCHKE: I was just going to say if you look at the email that Arjun sent, directing you to where the data files are, again those data files have been extensively
changed. They include my analysis in there.  

If you want to track back and look at the data files, the original data files that I started with, those are in the coworker directory, under the working files, under the SRS, under the coworker study, and then there's finally a folder called "Original Data Files."

DR. TAULBEE: Can you send me an email with that directory?

(Simultaneous speaking.)

CHAIRMAN GRIFFON: Didn't y'all get that?

DR. TAULBEE: Can you just post that --

MR. MARSCHKE: I'll send an email or something to --

DR. TAULBEE: Can you just put the whole data -- can you just pull it over into the AB directory?

MR. MARSCHKE: I can pull a copy
of the original data file folder over and put it into the directory where Arjun has put the --

CHAIRMAN GRIFFON: I think that would be easier, yes.

MR. MARSCHKE: Yes, okay. We can do that.

DR. MAKHIJANI: And you simply called them original NIOSH files.

MR. MARSCHKE: I'll just put the whole folder, yes.

DR. MAKHIJANI: Yes, put the whole folder in.

MR. MARSCHKE: Just take the whole folder, it's got the name on it, "Original Data Files" and you just plop it in there.

CHAIRMAN GRIFFON: That will be fine. Okay.

DR. MAKHIJANI: All right. The other thing I'd just like to say is that, you know, in figure 5-3 in the table above that,
we've got the comparison of tritium samples for construction workers by craft, with samples for all non-construction workers.

That's sort of a relevant parsing. I don't know, you know, whether we want to combine these crafts.

But we thought these were the things that I think we had analyzed when we looked at TIB-0052, and I believe the NIOSH data from TIB-0052 external dose had those various categories. Am I remembering right Steve? You did that.

MR. MARSHCHE: We looked at TIB-0052. We looked at some of these crafts. Again, you know, we didn't start with a list of crafts and then go into the database. What we did is we looked at the database and saw what crafts were available to us.

DR. MAKHIJANI: Okay. But these are broadly, I think, the same. There's a big overlap with what we did in TIB-0052 for
external dose, and the results were not that different, or somewhat different actually.

MR. MARSCHKE: And if I recall what we did in 52, the final conclusion or the way we resolved a lot of this was to put a little note in OTIB-0020, saying that if your claimant is in one of these crafts, you may have to take special considerations.

DR. MAKHIJANI: Pipefitters come to mind.

MR. MARSCHKE: Pipefitters comes to mind, exactly. So maybe, you know, and I think that's the way we addressed this.

DR. MAKHIJANI: And that was for external dose.

MR. MARSCHKE: And that was for external, right.

DR. MAKHIJANI: Okay.

MR. MARSCHKE: The other thing about 52 -- again this is very related to 52, construction workers -- but the other thing
about 52 was the internal on 52 was based on uranium and plutonium data.

    DR. CHEW: Just plutonium.

    MR. MARSCHKE: Just plutonium.

    DR. CHEW: Yes, sir.

    MR. MARSCHKE: And since this is tritium, a lot of the SRS concern is with tritium, we may want to take some, you know -- how applicable are the conclusions that were reached in 52 for plutonium, for, you know, the tritium isotope.

    DR. MAKHIJANI: Of course, we've sent you a separate report, because last time Jim had raised this question about the TIB-0052 plutonium database, and we did look at that. And we've sent you the -- I think, have you seen it? I don't know if you're on that. But Tim --

    DR. NETON: I have not read it.

    MR. MARSCHKE: Well, it came out a week ago.
DR. NETON: Yes. Now I definitely haven't read it.

MR. MARSCHKE: I think the main conclusion was -- the main sentence is we agree with the NIOSH regarding the ER statement concerning OTIB-0052 plutonium bioassays. But we're just unclear as to, you know, what it has to do with the validity of the coworker study, or the coworker model.

DR. MAKHIJANI: And also the plutonium bioassay doesn't allow us to get into this area question. There just wasn't enough data there to do anything.

DR. TAULBEE: I think a technical call is really in order here.

DR. MAKHIJANI: Yes.

DR. TAULBEE: Because we have other questions. So let's try and get the data set issue resolved, and then we'll schedule a technical call and then we'll go our different ways for the analysis.
DR. MAKHIJANI: But it would be helpful to see something in writing from you on the statistical analysis, so Harry can look at it and we can all look at it and then we can talk about --

DR. TAULBEE: Do you want to do that before the technical call?

CHAIRMAN GRIFFON: Well, I think the data and the preliminary analysis. SC&A has their analysis up there, post what you have.

DR. NETON: But it sounds to me like we have issues of the database and that we didn't stratify. So really, I think SC&A's comment's going to be well, you're comparing apples and oranges.

CHAIRMAN GRIFFON: Yes. You probably don't need to see their analysis.

DR. NETON: I don't know that it really accomplishes much.

DR. MAKHIJANI: Well, if we put up
the data, you know, I'm not -- you know, it's a different data set. It's a much bigger data set.

I don't know how -- some of these ratios are based on, you know, fairly small numbers. Some are more robust and have bigger numbers. I mean, we omitted when we had less than ten data points for construction workers, right, Steve?

MR. MARSCHKE: That's right.

DR. MAKHIJANI: But so they're not -- we didn't calculate where we felt the foundation was, and we didn't do the calculation for that. But that said, some of these numbers are more robust than others. You add a lot of data points, some of these conclusions may change.

MR. MARSCHKE: Yes. For the construction workers, we use like ten data points as the cutoff point. For the non-construction workers, I think we used 100 data points.
points as the cutoff point. I mean, that would be the first thing.

If you look at the data files that we used, and we find out that, you know, we used a couple of thousand data points and now you have a folder that has 20,000 data points, then obviously then there was a disconnect.

DR. TAULBEE: I don't think with tritium that's the case. I think with uranium it is, but I don't think that's the case with the tritium. I think that we've all got very similar --

CHAIRMAN GRIFFON: Well, why don't we start with just posting the data. I mean, I don't think we need the analysis up there. If it's going to hold things up, I certainly wouldn't want that to be a hold-up, because more of the discussion, like Jim said, is on approach and methodology.

DR. TAULBEE: That's right. I hope we try and get somewhere an agreement on
CHAIRMAN GRIFFON: So why don't we just get the data posted and then NIOSH and SC&A will work together to get a conference call scheduled. Just notify the Board, because some of us might want to dial into that as well.

DR. MAKHIJANI: So you want to post tritium data to start with?

DR. TAULBEE: Yes.

Finding 10

CHAIRMAN GRIFFON: All right, and on finding 10, do you have similar or different update? This is the tritides. This is --

DR. TAULBEE: The tritides issue. I have additional.

CHAIRMAN GRIFFON: Okay. That's what I thought. Okay. I think we're ready to move into finding 10, yes.

DR. TAULBEE: Okay. I actually
I have a slide up here that I wanted to pop up. Give me just a second here. While this is coming up, let me talk to you a little bit about what we've been doing from the tritide standpoint.

I think from our last meeting, you had asked that we go through and look at the different tritides that have been used at Savannah River, and I think I had indicated that we felt all of them were Type M and Type F tritides, but we didn't have any Type S issues at Savannah River.

That was incorrect on my part. We do have some Type S. It is -- or at least we suspect that there are some Type S. And this comes down to some of the tritium beds that were worked with in the processing areas, and we're actually not sure whether they are Type S or not at this time.

And let me talk a little bit about what Mel's group has done here, and Mel,
they went through and identified all of the different tritides that were out there, and then they looked for the solubility information on all of them.

And I believe it was 19 different ones that you've investigated, and of the 19, I believe it's eight, is that correct, that we have determined the solubility to be F for those.

DR. MAKHIJANI: How many?

DR. TAULBEE: Eight of them, ten of which we don't know yet what the solubility type is, and one of them we have confirmed to be Type S. Let me bring this up here. Okay. Here we go. And so eight of them are Type F and M. One is Type S.

The ten that are unknown. Of these, two of them, the LANA, which is lanthanum nickel tritide or hydride, whichever way you want to call it, has been assumed by the Savannah River Site -- whoops, let me
bring this up because you guys aren't seeing it -- sorry. One more.

There we go. Okay. Lanthanum nickel beds were used rather extensively there at the site. When you look at some of the Savannah River Site's dose calculations or estimates before work would start, like doing an estimate for this particular job would involve this particular, this type of a dose, they assumed the lanthanum nickel was Type S in their calculations.

We don't know whether it is or not, but that was what the site assumed. So right now, we're going by the assumption that it's Type S at this particular time. So we know one of these two here. The palladium rhodium is another one that was worked with there at Savannah River, that might also be Type S, and I also point out here that this month's issue of Health Physics Journal has a new paper out on zirconium tritide, where they
are indicating that it's Type S. However, other documentation indicates that zirconium tritide is actually Type M. So there's some difference between those two that we're also still working on.

So what we need to do to address this hydride issue a little better, especially since we know lanthanum nickel was used extensively at the site, and it may be Type S, is, we're going through and looking at when were the lanthanum nickel beds introduced, the same with the palladium rhodium. In order to do so, we've gone back to the site and asked them for some documentation.

One of the things that we found in the past several months was in September of 2008 -- let me back out of here real quick and see if I can't show this to you.

CHAIRMAN GRIFFON: Is that LANA, L-A-N-A, is that -- ?

DR. Taulbee: That's its acronym,
Chairman Griffon: Acronym? It's not L-A-N-I --

Dr. Taulbee: No, no.

Dr. Chew: It's lanthanum nickel aluminum.

Chairman Griffon: Oh, lanthanum nickel aluminum, okay.

Dr. Taulbee: Yes, and back in September of 2008, the Savannah River Site gave a presentation to the Savannah River Site Citizens Advisory Board, and this was kind of giving some updates of some of their work.

One of the things that they had done was -- is they had done some funding for New South Associates, to do these thematic studies of different areas.

And so you'll see here the M-area Thematic Study, the T-area Thematic Study, and we have all of these, and all of these are in the SRDB. So we have captured these documents
and you can all look at them. 146

They're really good summaries of what took place, the history of that particular area over time. Well, if you look on the next slide here, you'll see there's a 777 M study, and then there's the Tritium Thematic Study, not for public dissemination at this time. So we've gone back to the site and asked for this particular study.

What we're hoping is is that it contains the same type of process information that we found necessary to investigate the thorium issues, where it helped us identify some of this process information, of when things were changed. When they might have introduced these palladium rhodium alloys, as well as the lanthanum nickel.

So that's where we're currently at with this particular component. If we can find within the study when those were introduced, then we can go and look
specifically at air sample data and smear data during that time period, to determine what kind of levels were they seeing during these change-outs of the beds.

They never really broke into the beds from the standpoint of getting down to the actual hydride material. The change-out would consist of cutting a bed, you know, cutting it at its ends, sealing it, shipping that to the burial ground and putting a new one in.

So the potential for exposure is rather low at that time, but I'm certainly not going to say that it's zero at that time period.

We also believe that this work would have been done in bubble suits, but we don't have any confirmation of that. It just makes sense, due to the very high levels of tritium you're going to be dealing with in these process lines when you cut them open.
So right now what we're proposing to do, is, well, we're going to be getting a copy of this particular report, or if it's a report. If not, it might be a compilation of tritium documents from the area, and Karen Brown is currently working on that for us there at the Savannah River Site.

And following that information, once we digest it, and certainly you guys will want to read it as soon as we get it as well, I'm sure, we might want to be conducting some interviews to confirm, you know, what happened in those areas during these particular bed change-outs, and try and narrow down some of these time windows.

How often was this done? Was it done once every ten years? Do we know when it was done? Was it done once a year? These are questions we currently don't have with regards to this Type S material.

And so we might also be, like I
said, conducting some interviews down there, and one of the things I wanted to ask you, Mark, was, would you all want to be involved when we conduct these interviews, or do you want to wait until after we investigate this on our own or --

CHAIRMAN GRIFFON: I would think it would make sense for SC&A to be involved in these.

DR. TAULBEE: Okay. These would likely be in classified space.

CHAIRMAN GRIFFON: Classified, yes.

DR. TAULBEE: Just due to quantities and that kind of thing. So, okay.

CHAIRMAN GRIFFON: And I would think that would make sense. They've been involved in those meetings before on tritide issues, so I would request that, yes.

DR. MAKHIJANI: Yes. Just give us enough notice, because, you know, we have to
allocate the time of our people.

CHAIRMAN GRIFFON: Yes, and Tim's been pretty good with that, and just from a scheduling standpoint, I think it doesn't make sense for SC&A to wait for your report, because then they might want to interview the same people and they'd have to go through another meeting and you know, yes.

DR. Taulbee: Right, okay.

CHAIRMAN GRIFFON: So I think that -- yes, that makes sense.

DR. Taulbee: So I see this one actually taking quite a while to put to bed, and this comes down to, you know, our, I guess misunderstanding initially of the Type S materials that might have been used on the site.

And again, we're not solely convinced that lanthanum nickel is a Type S. It's just we've got -- we have calculations out there where they're assuming that it is at
this time. So we want to interview the Health Physics folks that did those calculations, of why did you assume this?

If the reason was, is, we felt the doses were going to be low, and so we just assumed the worse case, that doesn't necessarily make it Type S. It's, you know, just what they assumed. So those are some interviews that we feel we need to conduct.

CHAIRMAN GRIFFON: Although we've certainly used worst cases in many other coworker models. So I'm not sure that's a good stance to have. But, Arjun?

DR. MAKHIJANI: If you think it useful, I'd like to ask Joyce's opinion on this, you know, as we go along. Would that be all right if I did that?

CHAIRMAN GRIFFON: Of course.

MR. KATZ: Tim, will you just copy me when you make arrangements?

DR. Taulbee: Absolutely.
Mr. Katz: Thank you.

Chairman Griffon: One other thing. It seems like, I mean I guess the solubility class is one question. But the real focus on this is the exposure potential. Is that -- that's really what you want to get at, right?

Dr. Taulbee: That's right.

Chairman Griffon: You know the source terms there. But what's the likelihood of an exposure potential?

Dr. Taulbee: So I'm thinking that well, even with the interviews or following the interviews, we might want to have more of a -- I know we had a tour down there of the tritium facilities, but we might want to do that in a little more depth than what we got in the half hour that we were there, to better understand what that --

Chairman Griffon: Yes. They didn't really want to talk about much of that.
when we were there either, even though we had the clearances, yes.

DR. TAULBEE: And one of the things we've learned recently is that we should probably be considering that tritium facility a separate site, that's under separate DOE management compared to the rest of the site.

So we actually have to coordinate through -- still through Karen Brown, but the actual official requests go to a different person than the site general manager. So it's a little more complicated, because it's in an NNSA site.

DR. MAHKIJANI: So you're -- did I get the import of what you said? Right now you're proposing to split up SRS and --

CHAIRMAN GRIFFON: No, no, no.

DR. MAHKIJANI: So I misunderstood you.

DR. TAULBEE: No, no, no. It
makes it a little more complicated for us to work with the site, only from the standpoint of there's different DOE management.

DR. MAKHIJANI: From our point of view --

(Simultaneous speaking.)

DR. TAULBEE: Just the logistics of how we go about doing this.

DR. MAKHIJANI: Okay, thank you.

DR. TAULBEE: So from that, we'll see how that goes. But I do see -- well, not necessarily, but depending on how it goes, I can see some possible data capture of their sample data and smear data some time in the future, dealing with this issue.

CHAIRMAN GRIFFON: Okay. Here's what. I'd like to get through, I think, finding 11 before we break for lunch, and 12 is going to be a bigger discussion, I believe. But 11, I'm not sure. There might just be a brief update on 11. Am I accurate on that?
Finding 11

DR. TAULBEE: I don't have anything for 11.

CHAIRMAN GRIFFON: Right. Very brief.

(Laughter.)

DR. TAULBEE: I'm just waiting to pull that one up.

DR. MAKHIJANI: Exotics.

CHAIRMAN GRIFFON: Eleven disappeared.

DR. TAULBEE: Eleven disappeared from my list.

CHAIRMAN GRIFFON: Actually, I think SC&A is supposed to -- yes. There's an SC&A action on the action list, yes. So Arjun or Steve, I think it's fair to say you guys are still working on it?

DR. MAKHIJANI: Well, you know, we decided to wait on these things, you know, on the overall report, until the data issues were...
resolved, because you asked us to -- last
time, you asked us to do an overall report,
and at a certain point when this data
confusion arose and the coworker models were
somewhat delayed, we didn't know whether we
should proceed, since we felt we weren't
working from the right data sets.

So part of the reason I just
focused on the things that were really
discrete, that were independent of that
confusion, which is the TIB-0052 plutonium
database and I've got something on Item 23
that's not 100 percent finished.

CHAIRMAN GRIFFON: Can you refresh
my memory? What is the essence of finding 11
here? It's the exotics.

DR. MAKHIJANI: Well basically
it's to see what documentation there is about
exposure potential, and about exposure
conditions and measurements. So it's not --

(Simultaneous speaking.)
CHAIRMAN GRIFFON: So it's not much -- does it overlap with --

DR. MAKHIJANI: But the ER doesn't --

(Simultaneous speaking.)

CHAIRMAN GRIFFON: Does it overlap with all the coworker models that we've been toggling through, or are there additional exotics that we --

DR. MAKHIJANI: I don't remember.

Let me go to my task list.

DR. TAULBEE: I wonder, since polonium is kind of one of the exotics.

CHAIRMAN GRIFFON: Yes, yes, right, and neptunium.

DR. MAKHIJANI: No, I guess not. It's sort of like I guess I suspended work at this time period. These are suspended too. So we'll just pick this up --

CHAIRMAN GRIFFON: Okay.

MR. KATZ: What is the topic,
CHAIRMAN GRIFFON: Well, that's what I was trying to find out. It's exotics, beyond the ones that we've discussed already, beyond neptunium and polonium?

DR. MAKHIJANI: Yes.

CHAIRMAN GRIFFON: Others.

DR. MAKHIJANI: There's a whole list of radionuclides.

CHAIRMAN GRIFFON: Yes. You talk about 150 radionuclides.

DR. MAKHIJANI: And that number came from somewhere. It must have come from some Savannah River --

CHAIRMAN GRIFFON: It looks like it's the TBD, yes.

DR. MAKHIJANI: And that it says in our, in the task list that I circulated to our team, was that we will look at the work spec technical reports. I do remember starting to look at these work technical
reports, but after discussion with John about you know, keeping the budget in order, I have just focused on those discrete things.

But this is a discrete thing, and we should be -- we should go ahead with the item.

CHAIRMAN GRIFFON: Didn't we have Bob Barton identifying --

DR. MAKHIJANI: We did do some work on this, and at a certain point, when I suspended work and decided to focus on just a couple of discrete items, I should have revisited the list and find out how many discrete items there are that we can go on independently.

CHAIRMAN GRIFFON: So these are the radionuclides, the ones discussed already, and the fission product? It's not in any of those categories.

DR. MAKHIJANI: No. There were separate campaigns dealing with individual
radionuclides that are mentioned in these work technical reports.

The TBD writes 150. I don't know that we've identified. We certainly haven't identified 150 or time lines for that. Have you all identified time lines for these exotics? Are they there?

DR. TAULBEE: For some of them. I mean there was campaigns to produce cobalt 60, you know, and strontium 90 and some of the others, sure. They're there. But have we gone through systematically and done this? No, from that standpoint. Because you know, in general, the mixed fission products bioassay or whole body counting methodology picks, you know, virtually -- well, whole body counting picks up all of the data, and the methodology for the mixed fission product is prior to 1965. We pick up all of the data on this.

So we felt the bioassay monitoring...
methodology that we had pretty much covers all of this.

CHAIRMAN GRIFFON: Okay. So it's back in. SC&A needs to follow up on that.

DR. TAULBEE: Yes. If there's some that would not be covered under the whole body counting or the beta counting of the urinalysis, then --

DR. MAKHIJANI: We have done some work on this, I see, and this must be what Bob Barton was working on.

CHAIRMAN GRIFFON: Bob Barton.

DR. MAKHIJANI: So this must be what Bob Barton was working on for us, and then he stopped.

(Simultaneous speaking.)

CHAIRMAN GRIFFON: So it's for SC&A. It is out of your hands, okay.

DR. MAURO: Mark, this is John Mauro. This is something I did want to explore a little further for my own benefit,
because talking to Arjun, quite frankly we've invested quite amount of level of effort in site visits, gathering data.

But it's my understanding that there was still quite a bit of effort going on by NIOSH in data capture and refining its coworker models. I was concerned that we really should not be moving aggressively in terms of reviewing material and capturing data until NIOSH has an opportunity to complete its work.

CHAIRMAN GRIFFON: Well, I don't think on this topic though, John --

DR. MAURO: Yes. That's where I'm a little bit disoriented, and I'm having a little trouble with the boundaries. In other words, what is the work and bear with me. Others may benefit from this too.

What is the work that clearly we could move forward on, productively and come to closure, and other areas where we should
probably just sit tight for a while? It's not really clear to me where those boundaries are.

CHAIRMAN GRIFFON: Yes, and it's not clear to me what these 150 nuclides are either. So I guess it starts there, and maybe if you can identify these other exotics. If to the extent they're identified in NIOSH's TBD, I don't think they are, though.

MR. MAHATHY: They're not in there.

CHAIRMAN GRIFFON: Not in there, right, right.

DR. MAURO: Now that being the case, okay. Let's say right now we have a concern with exotics, based on previous findings, and let's say that NIOSH is pursing data capture and gathering information regarding the nature and extent of those exotics and how to come to grips with them.

I guess it would be my perspective that until that is, I guess, let's say a White
Paper is issued on that subject by NIOSH, it's something -- does it really make sense for SC&A to pursue too aggressively? Or would you like to hear more from us of why we're concerned about that?

I guess you're trying to parse this out. I'm trying to avoid not having too much effort being put into an area that's still very much under development at NIOSH.

CHAIRMAN GRIFFON: Tim, do you have -- what you just stated, is that written anywhere, the approach, that you believe these other campaigns did exist. However, the current bioassay, you believe, would be sufficient to estimate those doses?

DR. TAULBEE: I believe that's in the original ER.

DR. MAKHIJANI: I don't -- Tim, I don't think it is. Let's see what it says.

DR. TAULBEE: It might be. I don't remember. ER position: No explicit
discussion of these radionuclides. It's not
in the ER.

CHAIRMAN GRIFFON: I know, John, I
agree. I know what you're saying. You want
to define this work, and really it's not
SC&A's role to do the research to find out,
you know. If somewhere it says there were all
these campaigns of the nuclides, I think it is
-- it's sort of NIOSH's work to find out, what
were these nuclides, and assure us that the
current approach is bounding of those nuclides
or whatever.

So yes. I think that does fall
back into -- yes.

DR. TAULBEE: Well actually we do
address it under the fission and activation
products, and most of these are activation
products, these special radionuclides, these
campaigns. Those are activation. That's
where you're absorbing the neutron and
generating cobalt 60. So we're covering it
all under that as part of the ER.

CHAIRMAN GRIFFON: That's what I thought.

DR. MAHIJANI: What I meant by no explicit discussion is there were production campaigns for these things, and so the workers who were participating in these production, my assumption is that if you have production campaigns for radionuclides, you need to know who was exposed to it, you know, or whether they were -- that class of workers was monitored at all.

CHAIRMAN GRIFFON: It is sort of a dose assignment question, I guess, is what you're getting at. Who gets these --

DR. MAHIJANI: Because these are not canyon type of exposures where you have mixed fission products or reactor exposures, where you might have activation products or dealing with, you know, absorbents.

CHAIRMAN GRIFFON: It's a discrete
window of time when they did these things.  

DR. MAKHIJANI: Right, and we opened -- I'll give you an example. Fission products won't cover all of it, or even activation products won't cover all of it, because we got a number of these radionuclides and we've got europium-152, you've got iodine-131, you've got iridium 192, you've got technetium-99.

(Simultaneous speaking.)

DR. TAULBEE: When you're looking at the fission product or activation product bioassay that is in the 700 area, that's those campaigns that were done. So that's where I'm a little confused, as to where your concern is. So --

DR. MAKHIJANI: The concern is that if you have production campaigns for iodine-131 or technetium-99, which are in very limited windows of time, that exposure potential is going to be different than
exposure potential when those campaigns weren't happening to that particular radionuclide, and you want to know whether those workers were monitored or not.

DR. Taulbee: I mean that latter phrase I absolutely agree with. I'm just -- I'm having trouble understanding why in the 700 area, where these campaigns would have been taking place, and we have this data during those time periods, that I mean are you asking me to go through and identify all of the workers that worked with each of these production campaigns?

DR. Makhijani: Well, I don't know --

(Simultaneous speaking.)

DR. Taulbee: If that's the case, then --

CHAIRMAN GRIFFON: No, no, no. I think we're asking what the approach is going to be in general, you know.
DR. MAKHIJANI: Yes, that's it.  

CHAIRMAN GRIFFON: If you're saying you're going to apply a coworker model using this approach, you know, something like TIB-0054 or whatever to all workers that were in the 700 area for these years, then I think that's what you're looking for, or SC&A is looking for.

Well, and partially it's a limit. Are there others that don't fall into the activation or fission.

DR. TAULBEE: I mean first and foremost, we use the individuals, their dosimetry data --

CHAIRMAN GRIFFON: Right, right.

DR. TAULBEE: So from the 700 area, you could take all of those people --

CHAIRMAN GRIFFON: So if they had that data, then yes.

DR. TAULBEE: Right, and those people that, you know, were not monitored in
that area, we would apply the coworker model. 170

CHAIRMAN GRIFFON: Which is under
development still?

DR. TAULBEE: Which is under
development for the mixed fission products in
particular, and activation, because they're
lumped together. It's a beta analysis --

DR. MAKHJANI: And when you do
your coworker model, are you going to parse it
by area, like 700 area, 300 area? Or do you
have a Savannah River Site-wide coworker
model?

DR. TAULBEE: The general approach
has been Savannah River Site-wide. However,
that doesn't mean that we can't parse it by
the 700 area.

Currently, that data is still
being proofed. So we don't know. This is the
whole body count data that's being proofed.
We have the data through 1965 now, urinalysis-
wise, that we could go through and look at
CHAIRMAN GRIFFON: So now I am maybe rethinking this, because I think John might be right, that you know, we should wait and see. One thing I would ask is if SC&A has some information on these exotic radionuclides that they feel don't fall into the activation product or fission product arena, you know, then at least look into those or identify those so that NIOSH, you know, is aware of those.

But beyond that, I think we need to wait and see what the approach is on the coworker model for these things, and then SC&A can look at it and say well, we don't think this approach is adequate or whatever, you know.

DR. MAURO: Mark.

CHAIRMAN GRIFFON: Go ahead, John.

DR. MAURO: Yes. I think we, SC&A, have an obligation to clearly articulate
our concerns and with the substantiation of why we have those concerns. At that point, give NIOSH an opportunity to, you know, respond to those concerns.

It sounds like that -- I just want to make sure that Arjun, do you feel comfortable that our concerns regarding this matter have been clearly communicated, so that it's at least -- I don't want to leave NIOSH in the uncomfortable position of they're not quite sure what we're concerned about.

That's the only -- so the extent to which we can communicate that perhaps better if we haven't, to NIOSH, and if NIOSH is then in the process of either gathering data, parsing it, building a coworker model, perhaps by area or campaign, then we really are lined up the way we should be.

I was a little concerned that -- I don't know. Is there anything more than we could do? I guess this is a question to Arjun
or Mark. Do you feel that we have, there's more we could do to better explain our concerns, so that this could move forward productively?

DR. MAHKIJANI: Yes. Well you know, what I should do is to reduce the central concern we've been talking about to writing, so that it's not left to a transcript and a gut. Then share with the Working Group and NIOSH the table that we have prepared.

It's not a complete table of initial work. Now some of these radionuclides are covered in what we've talked about, the curium and californium and so on. But others are not, and so we'll just share that table with you.

We can either work further on it and try to make it as complete as we can, and then share it, or we can share it now, along with -- you know, in short order, along with a memorandum saying here's our concern: Do we
have some way to relate the exposure of the people who worked with these things during production campaigns to the data set that we have, and the coworker model that you're going to be preparing?

CHAIRMAN GRIFFON: I mean my initial feeling would be to share what you have, because if there are other nuclides that sort of NIOSH looks through the list and says yeah, we're working on this coworker model, we're working on this, this falls under fission and it covers all of them, then you know, I don't know that we have to go much further, unless --

I'm also thinking back to the -- but also I'd like to where this statement came from regarding the 150 other nuclides or whatever. It is in the TBD version, right?

Yes, I see you're looking at --

DR. MAKHIJANI: The evaluation, SEC Evaluations.
CHAIRMAN GRIFFON: Right.

DR. MAHIJANI: I think the 150 came from the TBD.

MR. MAHATHY: But it -- that version hasn't been published.

CHAIRMAN GRIFFON: Yes. It's an earlier version.

(Simultaneous speaking.)

DR. MAHIJANI: We have that version because version 4E was the point of reference for this, yes, and it's explicitly mentioned in there.

DR. TAULBEE: What page were you looking at in the ER? I'm sorry.

CHAIRMAN GRIFFON: In the ER report, what page is that?

MR. MARSCHKE: Page 49.

DR. TAULBEE: Thank you.

MR. MARSCHKE: The top of page 49.

CHAIRMAN GRIFFON: And your point on page 49 is -- you've got it, Steve. Tell
MR. MARSCHKE: Well, they're talking about americium, the whole discussion really is on americium. But it's almost -- in the Evaluation Report, it's almost an aside. You're talking about symbols containing americium, curium 244 and 150 nuclides of 66 elements.

So it looks like, you know, and so that just a red flag out there, you know. What are these 150 radionuclides for these 66 elements?

DR. MAKHIJANI: And that's the reason for that point basically.

MR. MARSCHKE: And there is a SR, Savannah River company memorandum or paper or something or a report or something that is given as the source, I guess, of that information, which I don't know if we looked at it.

DR. MAKHIJANI: Bob might have
looked at it. I don't know. I'll have to go back and ask.

MR. MARSCHKE: We have to look at it, yes.

CHAIRMAN GRIFFON: So I would say SC&A should share what they have now, and then let NIOSH crosswalk that with their current work that's going on, their coworker models, whatever they have, and look back to this reference as well and give us some feedback on that.

DR. TAULBEE: So NIOSH will do that?

CHAIRMAN GRIFFON: Yes, I think so.

DR. TAULBEE: So we'll share what we have now and NIOSH --

(Simultaneous speaking.)

CHAIRMAN GRIFFON: That's a NIOSH research function, not a --

MR. KATZ: Yes. I'm just unclear.
What was the January task to SC&A that we’ve been talking about though? What was SC&A asked to do in January that --

DR. MAKHIJANI: We were asked to look at these technical work reports.

CHAIRMAN GRIFFON: Which I think really is --

DR. MAKHIJANI: SC&A will look at work technical reports to see if incidents were catalogued there. So the initial concern around these 150 radionuclides wasn't just, is there routine bioassay data.

It was probably motivated by our experience in Y-12, where there were also, you know, a good bit of the periodic table, and where --

CHAIRMAN GRIFFON: What we're calling the Y-12, now I see the Y-12 reference in the matrix.

DR. MAKHIJANI: Yes. It is there in the matrix.
CHAIRMAN GRIFFON: The whole argument on Y-12, in part, I think was that they were totally sealed and there was no exposure potential. Then we found some incidents and that sort of became an issue. Is that right Jim? I'm sort of trying to recollect --

DR. CHEW: I remember cyclotron and the --

CHAIRMAN GRIFFON: -- yes, right.

DR. CHEW: -- Jim, we worked on that.

CHAIRMAN GRIFFON: Yes, I think Mel worked on that.

DR. NETON: I remember the cyclotron.

CHAIRMAN GRIFFON: But I think the initial -- anyway, I don't know. I think part of the initial argument was they're sealed. There's no potential, you know, very limited potential for exposure. Then we found some
incident reports. NIOSH found some incident reports.

DR. TAULBEE: I mean we'll look at that report a little more closely. It does look like that these were likely sealed, but we want to look closer into this.

CHAIRMAN GRIFFON: So yes. There's a laundry list of nuclides, but also I think we need to consider the exposure potential.

DR. NETON: In Y-12, I think we also had some laboratory sources, right? But they were the small quantities.

DR. CHEW: Well, there were a couple of incidences where the targets were burnt through, ruptured.

CHAIRMAN GRIFFON: Right, right. That's right.

DR. CHEW: But the breakouts were done under conditions.

MR. KATZ: So Arjun, SC&A will
have a little memo or something to the Work Group about this?

DR. MAKHIJANI: Yes, just explaining --

CHAIRMAN GRIFFON: I didn't think that one would take as long as it did, but we needed an update as to where we were. So that was good, yes. All right. I think we're ready for a lunch break. On the phone, we'll be back at 1:15.

DR. MAURO: Okay.

CHAIRMAN GRIFFON: All right, thank you.

MR. KATZ: Thank you everybody.

(Whereupon, the above-entitled matter went off the record at 12:17 p.m. and resumed at 1:22 p.m.)
This transcript of the Advisory Board on Radiation and Worker Health, Savannah River Site Work Group, has been reviewed for concerns under the Privacy Act (5 U.S.C. § 552a) and personally identifiable information has been redacted as necessary. The transcript, however, has not been reviewed and certified by the Chair of the Savannah River Site Work Group for accuracy at this time. The reader should be cautioned that this transcript is for information only and is subject to change.
MR. KATZ: Good afternoon and welcome back. This is the Advisory Board on Radiation Worker Health, Savannah River Site Work Group, and we're just reconvening after lunch. Let me check on the phone and see whether we have with us our Board Members.

MEMBER GIBSON: Ted, this is Mike. I'm here.

MR. KATZ: Hi Mike. And Jim? Dr. Lockey? Okay. He might be here late, but --

CHAIRMAN GRIFFON: Okay. This is Mark Griffon. We're going to pick up where we left off on the Savannah River Work Group, the matrix, and we're going to start on item number 12.

Issue 2, for me it seems to encompass several different things. I'm not sure they're all related either, but maybe I can ask for either SC&A or NIOSH to summarize...
the issue, and then sort of give an update on where we're at.

According to my action task list, I have a couple of actions for both SC&A and NIOSH. One is related to TIB-0052, which is a plutonium coworker model, I believe.

DR. MAKHIJANI: Is that under 12?

CHAIRMAN GRIFFON: Yes. This is under issue 12. The other is related to I think -- well, it says log books.

DR. MAKHIJANI: Mark, I think the TIB-0052 is different.

DR. NETON: I think it's in 13.

CHAIRMAN GRIFFON: Okay. It's listed under 12 on this action list. All right. Well let's just go ahead. Start with 12, and if someone can summarize what the issue is --

DR. TAULBEE: I can tell you what we have, what we thought the issue was.
CHAIRMAN GRIFFON: Okay, all right.

DR. TAULBEE: And this was dealing with incidents and investigations, and I believe you asked for us to find a criteria for what constituted a special hazard investigation report. We have gone through DPSOP-40, historical versions of that, and have identified those.

Basically, it's the acts or conditions which caused or could have caused radiation contamination hazards, incidents of contamination which required costly cleanup or that concerned Health Physics. I'm reading kind of directly here from the DPSOP-40.

CHAIRMAN GRIFFON: Can you say that acronym again?

DR. TAULBEE: D-P-S-O-P dash 40. This was their radiological control procedures.

DR. CHEW: DuPont's.
DR. TAULBEE: DuPont's, yes. What was it, DuPont's?

DR. CHEW: DuPont's Standard Operating Procedures.

DR. TAULBEE: Yes. DuPont's Standard Operating Procedure. Then one of the other was incidents that caused internal body contamination or concern to Health Physics and medical. So from this, what we recognize is that not all incidents, especially what workers might consider incidents, would be included in these special hazards investigations reports. But these are the major incidents that would have occurred.

We have found in our studies of Savannah River Site records that there are incidents noted in individual personnel files, where skin contamination, that type of thing, does not necessarily prompt a special hazards investigation.

In addition, when there is an
unusual occurrence, I guess I would say, something along those lines, we'll find an annotation in the Health Physics log books, and they will mention, you know, we took nasal smears on these people. Those aren't in the special hazards investigations.

So really the SHIs are kind of the top level major accidents and incidents that happened at the Savannah River Site over the years. There's 499 of these, so these are the ones that, you know, were significant that occurred. I'm sure --

CHAIRMAN GRIFFON: And that's a database, right, the SHI isn't it?

DR. TAULBEE: It's actually not a database. These are individual reports that we've obtained from the site, detailing each of the individual incidents.

DR. MAKHIJANI: And there is an index, though.

DR. TAULBEE: There is an index,
yes, to that. But this is one of the components that I think went into that incident database that you all have talked about some. So this was kind of the first cut at that, and then they started going through the Health Physics log books.

There's also incidents mentioned throughout the monthly technical reports, the works technical reports. You will see on every month a different incident or so that had occurred, that didn't rise to the level of the special hazards investigations. But they are documented there in those reports.

So my understanding, and Arjun please correct me if I'm wrong here, but the incident database that had been talked about a lot during the TBD review, really is comprised of first, the special hazards investigations, going through all the monthly technical reports. Then the Health Physics log books.

That's kind of the tier of how
that database was developed, having all of these incidents into one place.

DR. MAKHIJANI: Which database, the tank farm database?

DR. Taulbee: Yes.

DR. MAKHIJANI: Well, you know, I personally don't know how the tank farm database was developed. I looked at in a previous incarnation before, long before this project in the 1980's from Bob Alvarez, who got it through a Freedom of Information Act request.

There were 14,000 incidents in the tank farm that were listed in there. He dropped it in my lap and said do something with this. So that's how I actually -- and then there was a safety analysis report that went along with it more or less, and some models for failure rates and so on that were derived from it.

So unfortunately that data, that
printout was later lost at the Environmental Policy Institute, and but I had actually catalogued them for the report I did for the Institute. That's what this is from. I personally do not know, other than what was in the data bank itself, what went into it.

But it was very clear that the frequency of incidents increased greatly over time. So the data recording, it wasn't the actual number of incidents that increased. I didn't, I don't think that that was the case.

It was the recording practices that changed, and actually I noted in there that before 1965, we didn't. So there were actually -- and even in this data bank, there were incidents that were not in the special hazards investigation that appeared to be, you know, of some magnitude, which is why we raised it in the TBD review, that how do you take those incidents into account? Are they -- you know, now we have looked at individual
worker dose records, and we don't have the identity of the workers who are involved in the incidents that are listed in the data bank.

So you have -- you have a spill of high level waste or some incident that is serious, and you got radiation rates that are, you know, in the several rem or 10 to the roentgen per hour, and but we don't know who those workers are.

So we can't go to their files and see whether there's any incident logged. Since we did not find incidents of some magnitude in the SHI index, even -- yes. So we kind of raised a question as to how, whether the incident record's complete. Then when the SEC, that was during the TBD.

When the SEC petition was filed, the petitioners raised the same concern, that they were in incidents that didn't seem to be recorded anywhere.
DR. TAULBEE: And in general, they are recorded in their individual files, is where really the baseline level is. So just to kind of re-summarize here, the special hazards investigations are the top level.

DR. MAKHIJANI: Right.

DR. TAULBEE: Then you've got mention in the monthly reports and weekly reports, and then you've got the Health Physics log books, and then you also have kind of parallel going on here is the Health Physics monitoring. Within their individual files, you'll see the skin contamination incidents or potential for inhalation, and they sent the individual for a special whole body count or for a follow-up bioassay.

You'll see those annotations in the individual files. I'm not sure how you want, how you would go about correlating this?

(Simultaneous speaking.)

MR. MAHATHY: We do have a
document that we reviews the tank farm. Have you seen that one? It's SRDB No. 76064.

DR. MAKHIJANI: Probably not. 76

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MR. MAHATHY: 76064.

DR. MAKHIJANI: 76064.

MR. MAHATHY: And I think I ought to mention there's three of them.

DR. MAKHIJANI: Three what?

MR. MAHATHY: It was a technical report they put on that database, I used 30 incidents as an example.

DR. MAKHIJANI: What is the date of that report?

MR. MAHATHY: Eighty-five.

DR. MAKHIJANI: Oh, '85.

CHAIRMAN GRIFFON: It's a review of the tank farm database?

MR. MAHATHY: Yes.

CHAIRMAN GRIFFON: Do you guys have the tank farm database?
DR. MAKHIJANI: No. We were not \textsuperscript{9}\textsuperscript{4} -

CHAIRMAN GRIFFON: You never received it.

DR. MAKHIJANI: There was a fair amount of effort devoted both by NIOSH and us, and at some point jointly, I think. This may have been while you were leave.

DR. TAULBEE: Long term training was not leave.

(Laughter.)

DR. MAKHIJANI: Not participating in the project, where Kathy, I think, maybe --

CHAIRMAN GRIFFON: Yes, I was there. I was there.

DR. MAKHIJANI: Tried to recover this particular database.

CHAIRMAN GRIFFON: Actually, that's when Sam -- that's why somebody may have thought Sam was there.

DR. MAKHIJANI: It seems to have
been merged with other stuff.

(Simultaneous speaking.)

MR. MAHATHY: I was there. It's no longer retrievable. It became an overwhelming one. They had had -- it became more of an operational database than anything else. Like when we wanted to add 165,000 or something like that.

CHAIRMAN GRIFFON: But Mike, can you just describe what this document is? It's a technical review of that database, what it contains or --

MR. MAHATHY: We also have Arjun's document from '88 with --

DR. MAKHIJANI: I had provided a scanned copy of my notes. Now some of them were verbatim quotes from the data banks, and some of them were my summary, where they were -- this was the longhand phase, where there were no personal computers. I didn't have one.
DR. TAULBEE: The title of it is Incidents at the Savannah River Site Waste Tank Farms.

DR. MAHKIJANI: That's right.

CHAIRMAN GRIFFON: What's the number on that document, just so we --

MR. MAHATHY: Oh, you mean that one. Okay. SRDB 76064.

DR. MAHKIJANI: And I'm reasonably confident that --

CHAIRMAN GRIFFON: I'm sorry seven --

MR. MAHATHY: 76064.

CHAIRMAN GRIFFON: Okay, thank you.

DR. MAHKIJANI: I'm reasonably just so, I sent this in a cover memo, but just since it has come up, I'm reasonably confident that overall it is accurate. But because the data bank was lost, it was never proofread.

So I'm not 100 percent sure that
every single number in it is right, that my handwriting was transcribed properly when it was typed. So it's just kind of unfortunate what happened.

MR. MAHATHY: It gives a summary — go ahead.

DR. TAULBEE: Okay. I was just going to say that, you know, so from the incident standpoint, we recognize that the special hazards investigations don't cover all incidents that workers might define as an incident, and clearly it doesn't. It's just the highlight that's there.

But we do feel that the others are covered in their individual files when they were significant and they did follow-up bioassay or sent through the whole body counts and so forth. So I'm not sure what determines --

DR. MAKHIJANI: Well, yes. I don't know how you want to proceed on that.
You know, and I don't know that that's right, because we only looked at the SHI index. The point of this, in this context, because the petitioners have also raised it. So I don't know how you want to resolve.

DR. NETON: Well, we've had discussions about incidents before. It seems like this comes up almost every time.

DR. MAKHIJANI: Right, right.

DR. NETON: For internal exposures anyway, the episodic models that we developed of coworkers usually encompass those episodic type incidents that have been occurring. We got that very early on in the program.

DR. TAULBEE: Savannah River has got coworker models using the highest sample per person per year. Some of these upper tail exposures are clearly from incidents. Those are not routine.

DR. MAKHIJANI: We need some
guidance from you as to --

CHAIRMAN GRIFFON: Well, I'm not sure, and the only thing is, you were mentioning some with possibly high external --

DR. NETON: External is a different scenario, and --

DR. MAKHIJANI: That's a separate geometry type of question, because I think the tank farm had some very particular geometries, and would especially affect that structure.

DR. TAULBEE: But that's issue 20, isn't it?

DR. MAKHIJANI: Yes, and then there was the question of not, you know, badges not being worn on weekends and so on, and we've done -- that's Item 23, and we kind of -- Steve, you know, we compiled all of the affidavits and made a spreadsheet of that. Of course, we've interviewed a number of these people.

There are some things appear to be
not -- well, we'll come to that when we discuss 22.

CHAIRMAN GRIFFON: I mean the other -- I know what Jim's saying. The other question that might get to some of the petitioners' concerns is some mention that the files contain a lot of these individual, you know, when people were -- when it tripped a special, you know, sort of maybe a special bioassay is needed or whatever.

That would be in the individual's file, and I don't know that there's any way to crosswalk like the tank farm database, you know, to see --

DR. MAKHIJANI: No. It doesn't seem possible because their names are not -- we don't have names. We don't have any IDs in the tank farm database.

CHAIRMAN GRIFFON: Okay, right, right.

DR. MAKHIJANI: And you know, all
we have is my notes on it. But I looked at that thing for quite a while and made longhand notes from it. I do not recall any personal identifiers.

CHAIRMAN GRIFFON: I mean the only thing that kind of piqued my interest on this was that you mentioned that the tank farm, at least on your preliminary review of the tank farm database, seemed to have some accidents that, you know, sort of in your professional judgment, there's a level of being in SHI, you know.

DR. MAKHJANI: Because you have external radiation dose rates from incidents that are in the tens of roentgen, 10 R per hour, 20 R per hour, 50 R per hour. So I would you expect that those things would be in the SHI index, and we had some other examples of that in the TBD review also.

I mean we kept a lot, I think several. So that -- but where we go with that
in terms of is it someplace else, I don't know.

CHAIRMAN GRIFFON: Right.

DR. TAULBEE: Well I guess, you know, when you mentioned some of these incidents, you know, that you feel should have -- in your opinion should have probably been in an SHI database.

DR. MAKHIJANI: Based on the definition that you've read.

DR. TAULBEE: Without going to the individual's files, there very well could be a discussion, you know, about that potential exposure or that exposure scenario in their file, their individual files, especially if it's skin contamination involved. I've seen so many hundreds of skin contamination incidents in personal files that my impression is is that they would be in there.

To me, possibly they should have been in SHI at the time; who knows. But there...
was follow-up that was done in the individual
files and so when we do dose reconstruction we
see that, and we incorporate that, especially
if they have skin cancer.

DR. MAKHIJANI: This is a pretty
big point for the petitioners, and one of the
things, I mean, and it seemed to be a hard
one, to kind of -- because sometimes you're
trying to prove a negative. It's been
discussed before, you know.

But it may be that we could pull
from the -- and I think the concern would be
bigger over the years probably. We could pull
some tank farm worker, especially a
construction worker claim file, and take a
look at that, and try to match them --

(Simultaneous speaking.)

DR. MAKHIJANI: No, from the claim
file, and try to match them with --

CHAIRMAN GRIFFON: Yes. People
that worked in the tank farm area you mean,
okay.

DR. MAKHIJANI: --in those dates and match them with the dates. You know, it's a long shot, but I don't know --

CHAIRMAN GRIFFON: Yes, I know.

DR. Taulbee: I don't know if we could readily do that.

MR. MARSCHKE: We do have, I mean the claimants, the petitioners in their affidavits have identified -- you know, where they've identified, where they think an incident was missing. I mean we could probably -- you could look at that person's file and see whether or not it was addressed or not addressed.

DR. MAKHIJANI: But half of the petitioner affidavit writers are not claimants, about. Would you say that?

MR. MARSCHKE: No, they're not construction workers.

DR. MAKHIJANI: Oh, they're not
construction workers?

MR. MARSCHKE: Half of the petitioners are not -- because that's what I said. Half of them are not construction workers. I don't know how many of them are claimants or not. But even if they're not claimant, you could, you know, ask for their records to be retrieved, and look and see what is in the dose records for these 13 or so petitioners.

DR. MAKHIJANI: We could do that.

MR. MARSCHKE: And actually I do remember one of the petitioners talked about an incident which I believe is in the SHI. There is an SHI. There are certain differences. The year is different, whether or not the CAMs were alarmed or not is some differences.

But general description of the event is very similar. Same number of people, same area, same task that they were working
on. So you know, so the fact is some of these may be --

Some of the events which the petitioners have raised may be in the SHIs, but other ones, I mean we do have -- I mean at least we have a name, an individual's name, and we could probably, you know, go and find their file, and see whether or not the file reflects what they're just talking about. Does that make, you know, sense?

DR. MAKHIJANI: Yes. We could do that.

CHAIRMAN GRIFFON: That's, of course, if they've made their specific allegations.

MR. MARSCHKE: Yes, and there's only 13, and I don't know that all 13 of those petitioners raised this concern. I think probably only a handful of them. So you would just have like a handful of them to maybe track down.
CHAIRMAN GRIFFON: Does NIOSH have access to the records if they're not a claimant?

DR. TAULBEE: If they're not a claimant, we have to request them.

CHAIRMAN GRIFFON: Yes.

DR. TAULBEE: The site's been very cooperative along those lines, so it's certainly possible to obtain them.

DR. NETON: I thought we had a master inventory of SRS exposure records.

DR. TAULBEE: Oh we do, we do. But in order to get to the incident information --

(Simultaneous speaking.)

DR. NETON: Yes. The other stuff is just database.

CHAIRMAN GRIFFON: Yes. Right, right.

DR. TAULBEE: I mean we've got all the bioassay logs and the external logs.
(Simultaneous speaking.)

DR. TAULBEE: A discussion of an incident.

CHAIRMAN GRIFFON: Right. I think that may be one useful aspect. I'm not -- and I think Tim, you said that the tank farm, the possibility was doable from NIOSH's standpoint, that you could identify -- I mean this is another track. The one that Arjun was mentioning, look at tank farm workers and pull people that worked in the tank farm area. You said that was possible.

DR. TAULBEE: We can pull them, yes.

CHAIRMAN GRIFFON: I think this might be a better first step, just to follow up on these 13, you know.

DR. TAULBEE: So if I'm understanding what you're asking us, is to go through those affidavits, the 13, and those
that are specifically talking about incidents, pull those out and look at those individual files.

DR. NETON: Doesn't NIOSH do that?

CHAIRMAN GRIFFON: Yes.

DR. TAULBEE: Or do you want SC&A to do that?

DR. NETON: Don't they have to request the records?

CHAIRMAN GRIFFON: Yes. They've got to get the records, but I'm not sure it's not on SC&A, because it's their concern about the, you know. So I would say NIOSH obtain the data, but then verify that the 13 names either are all claimants, or if they're not, get those records and then SC&A should review those, to see what's going on, regarding the incidents that the people reported, yes.

DR. TAULBEE: Okay.

CHAIRMAN GRIFFON: So really, I guess what you're trying to investigate is
whether these people that raised concerns about certain incidents, whether they're included in their individual -- the incidents they raised concerns about, were they always involved in them personally or do you know that?

DR. TAULBEE: I think so. I've got a spreadsheet somewhere.

CHAIRMAN GRIFFON: Okay, because it's not going to work if they're talking about some other incident.

DR. TAULBEE: They'll see that when they go look at the affidavit.

CHAIRMAN GRIFFON: Yes, yes.

MR. MARSCHKE: That's one of the problems with the SHI, is the SHIs back in the early 50's or back in the 50's when they first started them, they identified the individuals. Then somewhere later on, I'm not sure exactly when, but they started editing out that information. So the SHIs don't really tell
you, you know, [identifying information redacted] was exposed.

DR. TAULBEE: What you will find, to follow up to that Steve, you're absolutely right, is that when you're going through an individual's file, you'll sometimes see that SHI report in their individual file. So then you know this is one of the people who was involved with it.

MR. MARSCHKE: Right, right.

DR. MAKHIJANI: What we can do to try to make the communication easier is we already have a spreadsheet with all petitioners, with a worksheet for each petitioner. I will just put it in the same file, where I put those other file spreadsheets. We'll put it there, so you can look at who we're talking about.

DR. TAULBEE: Okay.

CHAIRMAN GRIFFON: That will be helpful, yes. All right. I mean the only
other concern I have on this one is going back to that tank farm database and these ones that you believe likely were SHI type of incidents.

DR. MAKHIJANI: Yes.

CHAIRMAN GRIFFON: And I'm wondering if there's anything we can do with maybe not all of those, but if you have a specific one, you know, four or five of those.

DR. MAKHIJANI: We listed several in the TBD review. What I might suggest for your consideration is if I can just maybe send that list again to Tim, and you can try to make a judgment as to, you know, some of these things are pretty serious.

So and that's what I'm thinking about. I can refer them to you and send them to the Work Group of course, or make a little spreadsheet and put it in the same place and send you a note.

(Simultaneous speaking.)

DR. MAKHIJANI: And give us a
judgment as to whether these things should have been in the SHI or whether this -- because my feeling is that SHI initially was not being maintained in the early years.

CHAIRMAN GRIFFON: And I guess also the bottom line, is what I'm interested in, is even if these weren't in the SHI and they possibly should have been, given the conditions described, we believe that our methodology, you know, is still adequate for the following reasons, you know.

Particularly I'm worried about the -- because there's also allegations about the badging practices and stuff. So it may not be only an internal or a coworker internal model; it might be other issues. So all right.

So there's two actions on this then? We're going to get the 13 people, follow up on those 13 people and then follow up on these I don't know how many --

DR. MAHKIJANI: Yes, and I have
two minor sort of data information type of items to put, and I'll send you all an email when it's done.

CHAIRMAN GRIFFON: Okay.

DR. MAKHIJANI: It should be done fairly soon.

CHAIRMAN GRIFFON: All right. Okay. Now 13 may actually get into what I was starting to talk about before perhaps. This task list is a little bit overlapping, I think. So I apologize, but --

DR. MAKHIJANI: Yes. That's the TIB-0052. Now we sent you a report about that, about a week or ten days ago.

DR. TAULBEE: I'm relying on you, because I have not -- as Jim, I have not read Arjun's report yet on that particular issue. So this is dealing with the TIB-0052.

DR. MAKHIJANI: Yes. I mean I can summarize it for you if you want.

DR. TAULBEE: Please do.
DR. MAKHIJANI: Yes. I mean it didn't go out that long ago. It's not long. It's only about 12 pages.

Basically, we compiled the data, and the data are only for plutonium, and we kind of looked to verify NIOSH's statement that the number of below MDAs were greater for construction workers than for non-construction workers, and that the average for the positive results was greater for non-construction workers than for construction workers. I can quote it, but that's the spirit of the statement that's in the ER.

And we also tried to see whether the database allowed us to confirm or verify or revise the conclusions that we made from the plutonium analysis in the TIB-0075 review. This database was a lot smaller than the early databases, and I don't know if everybody has it open, but there's --

In figure 1 on page six, it shows...
a little bar chart. So basically our idea was can we derive some conclusion from this about construction workers versus non-construction workers. And Harry did a statistical analysis of this data bank, and in the 1950's, there no construction worker data at all.

In the, as you can see in figure 1, in that data bank. They can't say anything about the 1950's, about the relative exposure. 1960's, there's just a few data points. 1970's also not many. The only decade for which there was a significant amount of data we could actually do a comparison was the 1980's.

So Harry ran an analysis and found that probably the conclusions for the 1980's in the ER were correct. Now it wasn't possible for us to compare this particular database for the 1980's with our earlier analysis, because we don't have any job type or area data.
So we weren't able to do any area and job types, because an earlier analysis was all keyed to are specific types of construction workers, is there some indication that some types of construction workers or construction workers in some areas had higher exposure potential some of the time than non-construction workers, on average?

And we weren't able to analyze, given we had no information on job type, and area of work in this particular data. Then we looked at the number of positive results, and again, it's not possible to say anything except for the 1980's, and even then for the number of positive samples for construction workers are very, very few.

There were 131 bioassays above the reporting level for non-construction workers, but out of that, 104 positive bioassays were for only three workers. So you know, what you can say from this database, in comparison to
the other --

So we verified that factually, so far as the statement goes in the ER is correct. We don't have an issue with that. But what you can say from this database, in terms of ability to do a coworker model using non-construction worker data -- we at least could not go beyond what we did before in our analysis from the larger database that we looked at before.

The second thing is that the earlier analysis showed that on radionuclides, there are particular exposure patterns, and you cannot extrapolate from plutonium generally, which the ER did. It said, you know, these are the characteristics of plutonium.

So we're comfortable that we can use non-construction worker data for making -- for construction workers, for other radionuclides as well. I mean that's sort of
the underlying premise. We didn't find that underlying premise was justified.

DR. Taulbee: Could you repeat that last point there?

DR. Makhijani: Let me just -- it might be helpful if I just read what's in the ER. Okay. OTIB-0052 indicated that construction trade workers had more plutonium bioassay measurements below the reporting limit compared to non-construction workers, and OTIB-0052 also found that for positive bioassay, the non-construction worker results were generally higher than construction trade workers.

Now this, that statement, together with the analysis in TIB-0075, are the justifications for using non-construction worker data to make the coworker model for construction workers, as being claimant-favorable.

So as I read the Evaluation
Report, or as we, our team, read the Evaluation Report, that's the basis for using non-construction worker data. Now the TIB-0075 thing, we already analyzed and we'll discuss it further. But in that, we found -- we looked at various radionuclides in TIB-0075 and TIB-0075 does that.

But we didn't agree with that general proposition, that in non-construction worker data, exposure potential appears uniformly or generally bigger for all radionuclides, because it varies by radionuclides.

DR. NETON: Well, I got a little concerned here, Arjun. We went through embedded TIB-0052 through the entire Procedures Working Group. As far as I remember, almost all issues are closed. So we have come to agreement on that document. It sounds to me like you're saying that that's no longer the case.
DR. MAKHIJANI: Well, we didn't review it in the context of an SEC and we're not disagreeing with the statement that it's in TIB-0052.

DR. NETON: SEC or not, it was for dose reconstruction purposes. I don't understand why that makes a difference. So if SC&A is going to change their opinion on TIB-0052, I hope you go back and rescind it and re-review the document, because we've got a closed document that says we can do dose reconstructions for these nuclides using these approaches and it's closed.

So I have a great inconsistency concern going here right now, and if you're changing your opinion --

CHAIRMAN GRIFFON: We closed that out? Are you sure?

DR. NETON: Well, it's virtually closed.

(Simultaneous speaking.)
MR. MARSCHKE: There's a few that I think are still open.

DR. NETON: But nothing like what we're talking about here.

DR. MAKHIJANI: I do not believe we addressed -- I'm not disagreeing with the statement factually about what's in the plutonium database.

MR. MARSCHKE: I also think that OTIB-0052, basically the analysis that was done, avoided using the SRS internal information in your analysis, because of the --

DR. MAKHIJANI: We'll have to bring it up.

MR. MARSCHKE: Huh?

DR. MAKHIJANI: We'll have to bring it up. You know it as well.

MR. MARSCHKE: Because there wasn't a lot of -- it wasn't available, I guess, electronically I guess. For some
reason, the internal analysis of OTIB-0052 was based upon, I think it was Rocky and Hanford.

But I don't think it was -- and maybe Idaho.

But I don't think it was Savannah River Site just had this one figure, which basically the recurring two in the Evaluation Report, which showed these data that was selected on hold, just to support the OTIB-0052 analysis.

DR. NETON: Well, but again, the contention is thoroughly indicated in that report that these were felt to be representative of the sites that were evaluated, and we've received no comments from SC&A saying that this was not an appropriate approach.

I'm not saying right or wrong. I'm just saying right now, we've got a big internal inconsistency issue with the SC&A review process. That's my opinion.

DR. MAKHIJANI: Okay.
DR. NETON: And if you're going to rescind your review and go back and bring TIB-0052 back on the table, then that's where we should take it up, because we've been behaving as if that approach has been vetted and is appropriate for use in dose reconstruction. If it's not, then --

DR. MAKHIJANI: I agree we should go back and look at it. But I think in this particular context, there's a specific issue relating to the SRS/SEC evaluation, that statements in the Evaluation Report that I think shouldn't be held up.

I mean it's entirely up to the Working Group. I think that we can proceed, based on the data that are before us for SRS, and without prejudicing whether we go back and take a look, because as you say, I don't remember what all we said in the OTIB-0052 review.

CHAIRMAN GRIFFON: Neither do I.
That's why I'm not --  

(Simultaneous speaking.)

DR. NETON: Well, I guarantee lots of these issues that we're discussing now were brought up.

DR. TAULBEE: I think Jim's got a valid point. If you're critiquing what we wrote in the SEC, you know, where we're relying on the two as being a valid method in using the coworker to transfer to the construction trades worker. Because under our understanding, that one is effectively closed out. There isn't an issue with this. So this is an appropriate method.

DR. NETON: And I'm not suggesting the comments you raise here aren't legitimate. I'm just saying that we've been through this before, and now these are new surface issues and we've got to go back for consistency purposes.

CHAIRMAN GRIFFON: I know. Yes, I
agree.

(Simultaneous speaking.)

DR. MAHKIYJANI: If it is closed, we definitely and we're raising it again, there will be a consistency issue.

DR. NETON: I mean the only issues left to deal with there are things like multipliers for pipefitters and I think --

DR. MAHKIYJANI: That was external.

DR. NETON: Yes. But I'm just saying, I don't recall that there were any big internal dose issues remaining on TIB-0052. In fact, we vetted that thing twice. We thought we had it closed, then reopened it, and then it became closed again. This will be the third time we're opening it.

DR. TAUCLBEE: And also just to mention, there is Savannah River Site in OTIB-0052, and specifically polonium.

MR. MARSCHKE: But it was physically -- it was handled as a -- I don't
think it factored into the final conclusion, 122, that the multiplier for internal dose was one. 123
It was just this one figure that showed -- 124, well, it showed exactly what it says in the 125 ER, that the plutonium bioassay measurements 126 were reported, were below the reporting limit, 127 compared to non-construction workers.

DR. CHEW: Steve. I'm leafing 128 through this and I respect what you're saying. 129 OTIB-0052 clearly demonstrated that 130 construction workers throughout the years had 131 lower bioassay results from non-construction 132 workers.

So therefore, remember what TIB-133 0052 is trying to say, can you go ahead and do 134 -- is there a correction factor? Do we need 135 it for a construction worker? The conclusion 136 based on the data was shown that the answer is 137 no, zero. So no, and that was discussed. So 138 I agree with Jim. I think that's not an issue 139 on the table anymore, right Jim?
DR. NETON: Well, I'm just saying for consistency purposes, if we're going to treat Savannah River differently now than what -- as it raised in TIB-0052, then we ought to go back and revisit TIB-0052.

DR. MAKHIJANI: Well, I think we clearly need to look at what we said about -- in our TIB-0052 review. I don't have any question about that. I have our review in front of me. But --

DR. CHEW: Can I comment? TIB-0075 is still on the table. We have seen your assessment of the issues on OTIB-0075, but we have not responded back to that. Yes, and that -- so we cannot say that what your assertions in OTIB-0075 is still correct until we get a chance to review it.

DR. MAKHIJANI: Oh no absolutely, and we decided we're going to discuss that.

DR. CHEW: Right.

DR. MAKHIJANI: And it's not a
right or wrong, you know. It's a question of resolving the issues and coming to some mutual understanding about it.

The point I want to make is whatever -- I know that we did not look, we did not parse the plutonium data by job type, in looking at OTIB-0052, and we did that when we looked at the claimant database, the NOCTS database that NIOSH created for the purpose of making coworker models when that data was available to us.

Now for the first time, we had data that had job types and that had areas of work and periods, and when we had that data, we actually analyzed it, and right or wrong, whatever the resolution is, we made an analysis of that issue.

From the earlier database, that analysis wasn't possible. It's still not possible because that earlier database doesn't contain that information.
MR. MARSCHKE: Can I read from the Procedures database? We got finding number 5 for OTIB-0052. Plutonium and/or uranium were used to compare internal construction trade workers and all monitored worker doses. What about other radionuclides? Then that's the SC&A finding.

Then NIOSH's initial response, the underlying assumptions for internal dose comparisons is that the internal dose hazards for a study is closely tied to the radionuclides being handled in greatest quantity at the site. The vast majority of bioassay data at the DOE complex is for plutonium and uranium. Data on other radionuclides is limited in the time frame and number of results.

Consequently, meaningful comparisons between groups for less prominent radionuclides were not judged to be feasible. The status of this finding at this particular
point in time is in progress.

DR. NETON: At what point in time?

MR. MARSCHKE: Today.

CHAIRMAN GRIFFON: Today.

DR. NETON: That's for other nuclides. What about plutonium at Savannah River?

MR. MARSCHKE: Again, if you look at the Savannah --

(Simultaneous speaking.)

DR. NETON: The gold standard is based on job category, which is what we didn't do. If that's the gold standard, then we've got to go back and revisit 52 against all those parsings by job categories. I'm serious.

Right now, we find your approach to be inconsistent with the analysis that was done on TIB-0052. If SC&A's opinion now is that the only valid comparison of coworker data is by job category, then we've got to
judge TIB-0052 against that.

MR. MARSCHKE: We do that in OTIB-0052. We looked at job categories. It's for both internal and -- for both -- and the finding was we had to change OTIB-0020 to give basically a warning that, you know, there are some construction workers who, you know, the OTIB-0020 standard methodology may not be favorable.

DR. NETON: And the finding for internal was?

MR. MARSCHKE: And the finding for internalized, you've got me on that. I can't remember that one.

DR. CHEW: That's what we're talking about.

DR. NETON: That's what I'm talking about. And so again, we have -- you're changing, you're obviously mode of operation here, so I just want to be consistent and go back and --
CHAIRMAN GRIFFON: I mean that's a little heavy. Think of the overall process from the Board's standpoint too. We've always said that the procedures review is at one level, and an SEC review is at -- there's this need to drill down.

We've always been stopped on procedures reviews when we -- because you're not talking about getting into the individual site data and pulling the records. A lot of times they're not, you know. We've always stopped it there.

The procedures review is at a different level, to see if these things are going to work and they're science, yes. I know. I know SC&A's outlined procedure for how they conduct their procedures review.

DR. NETON: Again, but I still say that this does have ramifications for --

CHAIRMAN GRIFFON: No, I agree.
We would have to go back, and I don't want $^{234}\text{Pu}$.

(Simultaneous speaking.)

DR. NETON: There are inconsistencies here now.

DR. MAKHIJANI: Well, there are two issues, just to kind of summarize my understanding, I'm going to have to take it back to our team, is so far as other radionuclides are concerned, extrapolation of plutonium and other radionuclides remains an open issue in TIB-0052. It remains an open issue here.

I think that's simply a conclusion from our review of this plutonium database and our earlier analysis. I agree with Jim that we need to go, however you want to characterize it, we need to go back and review what we said about plutonium and SRS, and its implications for SRS on other sites.

At that time we did not have data by area, or even plutonium data. Internal
data we did not even have by craft. We only had external data by craft. So we're able to do that now.

We might have to revisit the earlier conclusions, since we have more information. I mean that's how I would characterize it.

DR. NETON: There's more subtleties involved in this, though, because I recall in those data sets we were unable to tease out certain classes of workers. I think one data set had the crafts construction built in, and then we went through these lengthy explanations of why that was claimant favorable.

I'd like to go back and revisit this approach, because we worked hard. I felt that we had a fairly good, solid understanding that at least for the sites that we looked at, that we were in agreement that construction workers for internal were not different,
except for Hanford, and I don't know.

CHAIRMAN GRIFFON: Let me just get, capture the action, Arjun, that you're -- what are the actions on this?

DR. MAKHIJANI: Well, the other radionuclide issue in TIB-0075 is so on is reports, whether you can extrapolate, you know, use the plutonium data as representing the general pattern for other radionuclides is an open -- I mean we said that you can't do that a priori.

You have to demonstrate that, and that our analysis of the data indicates that you can't do it. So that issue, I would say, is before NIOSH, since we've said in our analysis we can't make that extrapolation to other radionuclides.

For this other thing, for the plutonium data, I think, you know, Steve and I just need to revisit what we said before, and send the Working Group a memorandum on that to
wrap this up, as to -- because you know, it was so long ago.

DR. NETON: And I'm not saying that you shouldn't go back and drill down and look at these new sets of data. What I'm saying is that was what was done in 52.

DR. MAKHIJANI: Right, and probably you are right.

DR. NETON: It needs to be visited at 52 level again, and maybe that's a separate issue. It needs to go back to the Procedures Group. But you know, I'm uncomfortable --

CHAIRMAN GRIFFON: This is the difficulty we had on TIB-0052, especially in the Procedure Review Committee, that it does cover several sites. Because if you recall in the procedures, a lot of times what we're doing with the site-specific procedures is we're referring them back to Work Groups that are covering that site.

So in this instance, it's like
where do you, you know, where you do put it? I guess you have to leave it in Procedures, and then I don't think we have, at least my experience with it is that we haven't dealt with the drilling down to the data aspects this far.

Now but we have to be consistent at the end of the day, yes.

DR. TAULBEE: Can I ask a question, and this I guess, is more for my education. But I'd like to know a little more from SC&A or you, Mark, of why you don't feel that we can extrapolate from the plutonium to some of these other radionuclides, such as curium and californium and americium?

They're all controlled, especially as op emitters, inside glove boxes or hot cells. And so I'm a little confused as to why this extrapolation is -- I guess I'd like to know what your basis for why we can't extrapolate?
DR. MAKHIJANI: Well in our review of TIB-0075 -- I don't know Mark.

CHAIRMAN GRIFFON: Go ahead, go ahead.

DR. MAKHIJANI: In our review of TIB-0075, we had not covered americium, californium and curium, and we were actually doing that when we realized that you've got a bigger database than what we're working with and we stopped that. So we have not finished those --

But to the extent that we did radionuclides, uranium, plutonium, tritium, mixed fission products, I think that was the list, right, that we analyzed, we found that the patterns of ratios of construction worker doses in specific areas or specific job types to non-construction worker averages or GSDs, were different for different radionuclides.

That the patterns of exposure were not the same, and that's the basis for the
statement.

DR. TAULBEE: Oh, okay. I can perfectly understand that when you're comparing tritium and uranium and plutonium, and the mixed fission products. But when you're -- I mean the exotics that you're effectively talking about here, where we have very limited bioassay on, are things like the curium, the americium and so forth. Those are --

DR. MAKHIJANI: Well, we're talking generally about all extrapolating from a plutonium statement to other radionuclides, including americium.

DR. TAULBEE: But we have sufficient data so that we're not extrapolating the tritium. We're not extrapolating the uranium. We're not extrapolating with --

DR. MAKHIJANI: You are. What you're extrapolating is not numbers, but
you're extrapolating a hypothesis. You're saying here -- you're making a hypothesis.

You're saying here is a characteristic of plutonium data, and we can accept that, you know, whatever the words are.

We can accept that that statement is correct for the plutonium data.

You're assuming that the same statement is also correct for other radionuclides. And you'll find that the number of below MDAs generally would greater for construction workers than non-construction workers, that the average of positive results would be greater for non-construction workers than for construction workers.

And what we're saying is that general construct cannot be extrapolated from plutonium to other radionuclides, because it doesn't appear to hold up.

DR. Taulbee: I guess at this time I'll just agree to disagree with you on that,
until we get this TIB-0075 thing worked out.

DR. MAKHIJANI: Yes, right.

DR. TAULBEE: Because from what we've seen from the tritium is it does hold.

DR. MAKHIJANI: Okay.

CHAIRMAN GRIFFON: Right. So you disagree there, but that's a good clarification on the hypothesis, though. It's not extrapolating.

DR. TAULBEE: Okay. I do understand now --

(Simultaneous speaking.)

CHAIRMAN GRIFFON: -- modeling. It's extrapolating the concept or the conclusion, yes.

DR. MAKHIJANI: I think this confusion would be sorted out when we look at the review. You know, we should be able to agree on the -- so long as we're not saying the data are all bad or somebody screwed up with the measurements or something. That's
not on the table.

We have a discrete set of numbers.

We all know numbers. We should be able to arrive at some conclusion looking at the set of numbers.

DR. NETON: Let me ask a more broad-based question. Are you leading eventually to the suggestion that construction workers can't be reconstructed, or that there's a different possible multiplier that would be applied and will be proposed for TIB-0052?

DR. MAKHJANI: We haven't --

DR. NETON: Well, I'm trying to get down to it. Is it a dose reconstruction issue or --

DR. MAKHJANI: Don't know.

DR. NETON: See, I mean if you're just -- if you're saying that you have enough data to do the comparison to show that they're different, it sort of implies to me that one
can reconstruct doses for construction workers.

DR. MAKHIJANI: Well, is it --

yes.

DR. NETON: Is that true? If you have enough data to make that comparison then --

DR. MAKHIJANI: Well, that's where we might wind up. I think --

DR. NETON: Well, that's what I put on the table though, because how far we take this, to put the SEC issues to bed, is dependent upon where that ratio is.

DR. MAKHIJANI: Well, it will depend on how reliable these issues are, and some of these ratios --

DR. NETON: Be careful.

DR. MAKHIJANI: No, no. I am being careful. I don't have an opinion about this honestly. That's why I believe we wrote that TIB-0075 review without even implying,
and Steve and I worked on this together, and I think we did not imply an opinion on this question, as to whether ultimately you'll be able to attach a ratio.

It's obviously a question that's occurred to me in the course of preparing this review. And I've tried to avoid giving any implication one way or another, because I honestly don't know.

The reason I don't know is, A, for a lot of cases, we just couldn't even do the calculation. There just aren't enough data there. You see no calculation, no calculation, no calculation, no calculation.

In some of the cases where we did the calculation, the data were minimal, 10, 12 construction workers. The non-construction worker data are much more plentiful. So I think the reliability -- so what we've --

CHAIRMAN GRIFFON: I think Jim posed a good question.
DR. MAKHIJANI: It is a very good question.

CHAIRMAN GRIFFON: Do you have enough data to do the comparison? Do you have enough data to make a separate construction worker model?

DR. MAKHIJANI: That's right, and the reason -- I'm just saying the reason that I don't have an opinion about this is if we're going to look at more data, Jim may very well be right, that if there's sufficient data that we can actually do these ratios, come up with the ratios for areas and periods and so on, then it won't be an SEC issue. But if we can't, or if there isn't enough data, then it's an SEC issue.

CHAIRMAN GRIFFON: And I guess --

DR. Taulbee: There isn't enough data.

DR. CHEW: Not enough data to become an SEC issue? What are saying?
CHAIRMAN GRIFFON: Yes.

DR. NETON: I'd have to think about this. If there's not enough data to prove --

(Simultaneous speaking.)

DR. NETON: You know, -- are different. If you don't have enough data to prove that they're not different, I mean that doesn't imply automatically that they are, and you can't do it. I mean there's a certain logical connection there --

CHAIRMAN GRIFFON: Yes. From NIOSH's standpoint, I think you created this model, not necessarily because you didn't think there was enough construction worker data, but rather because you thought that using it altogether would be more bounding, you know, right. Is that fair?

DR. NETON: That would be fine.

That's a fair comparison.

DR. MAHIJANI: And so the point
of putting that analysis on the table is not to say there's an SEC here or not an SEC here.

It is simply to say that the construct that NIOSH -- that we don't agree with the construct that NIOSH said, that you can use all the data to make coworker models. We don't think so.

CHAIRMAN GRIFFON: But I think that question is important to Jim, right? I think SC&A should answer that question, you know. Is there enough data to create a separate construction worker model? And would it be appropriate, in your opinion.

DR. MAKHIJANI: We can answer that question, and we haven't yet.

DR. NETON: But in the SEC context, that's what needs to be --

CHAIRMAN GRIFFON: Yes, because otherwise, then that's a -- and we can kind of get it off the SEC schedule.

DR. NETON: Right, because we've
got a lot of things on the table.

CHAIRMAN GRIFFON: Yes, I agree

with that. I agree with that.

DR. MAKHIJANI: Maybe the main
task to be done is once this database is
completed and NIOSH says this is the database
that we're going to use and the radionuclides
are there, then we can.

CHAIRMAN GRIFFON: That's true.

We don't have a fully populated database.

DR. NETON: We don't.

(Simultaneous speaking.)

DR. MAKHIJANI: -- we were going
to be here further along, but about a month
ago, we just suspended work, because we
realized we're not working from a complete
database.

CHAIRMAN GRIFFON: Yes. Tim, do
you have a comment? It seems like you wanted
to say something. No?

MEMBER CLAWSON: I wanted to say
something though, because I mentioned this before, and especially during a construction.

I have not been able to see the OTIB and see how it placed in. But one thing I do want you to realize is Savannah River is completely different than any of the other sites when it comes to construction workers.

Because in the interviews and everything else like that, what they were telling me the processes they were involved in and stuff like that is totally different than the normal site that we usually see.

I cannot answer to this, because I haven't read how the OTIB comes in or anything else, but this is always been something that's bothered me, is how different this site and how we can't -- to me, we can't generalize it as some of the other sites.

I've said this for quite a while, and we were waiting for this OTIB to come out and we'll go from there.
CHAIRMAN GRIFFON: Let me ask for a 15 minute break.

MR. KATZ: Can we just clarify?

CHAIRMAN GRIFFON: Go ahead.

MR. KATZ: It's still slightly unclear to me --

CHAIRMAN GRIFFON: It's very unclear.

(Simultaneous speaking.)

CHAIRMAN GRIFFON: -- because I want to caucus with Arjun and Jim a little bit. So let's take 15 minutes, because I want to sort this out a little bit and come back and clarify the actions and stuff, yes, right. So 15 minutes, about -- what's that, 2:35 about?

MR. KATZ: Yes.

(Whereupon, the above-entitled matter went off the record at 2:20 p.m. and resumed at 2:34 p.m.)

MR. KATZ: This is the Savannah
River Site Work Group. We're reconvening. Let me just add too, after the lunch break, I didn't hear from Dr. Lockey. Are you with us?

(No response.)

MR. KATZ: Okay, Mike, do we still have you?

MEMBER GIBSON: Yes, I'm still here Ted.

MR. KATZ: Great, Mike.

CHAIRMAN GRIFFON: Okay. We're continuing on issue number 13, and I think there's one other item and then we'll go through sort of the actions. But one other item that I was looking at over break, from the last meeting we said that the log books, the comparison of the log books and the database, and I think this might come up in a later issue too.

There's some overlap in these issues. But it was definitely listed in this, and NIOSH posted, I think, a spreadsheet and
log books. Then SC&A was tasked to review those, comparing to the database, or at least to review NIOSH's analysis. I think Arjun indicated he's started that process and they have some questions. So maybe we can just discuss that for a little bit.

DR. MAKHIJANI: Yes. You know Bob Barton is unfortunately at Simonds, and he's our guy on this. And so I'll just kind of mention the difficulty we ran into, and if I might request that we have a technical call about this, because I want Bob Barton to be here.

CHAIRMAN GRIFFON: I don't know think it's a technical, I think --

DR. MAKHIJANI: I think we just need some clarifications for what NIOSH did, because the verifications were from the log books and it said yeses and nos, and we couldn't figure out what the yeses and nos meant. What was being verified?
DR. TAULBEE: Okay. This is the comparison between the NOCTS and the SRD, or the NOCTS and what's in the log books. From what my understanding, and Mike, please jump in here if I'm speaking incorrectly, is that we went through and just picked 200 log book entries, okay, from the log books. That's where we started.

From those, we identified that, of these entries, 62 of them were claimants in the -- for which we should have bioassay data for them from the site. So from these we went through and compared those particular results.

DR. MAHJANI: Which results?

DR. TAULBEE: The log book results to what we have on the bioassay card that we received from the site for that individual.

DR. MAHJANI: So the actual result for the bioassay in the individual's file with --

DR. TAULBEE: Yes, that's correct.
So from that table that we sent you in that spreadsheet, wherever yes is there was a direct match between what was the entry in the log book and what was entered onto the bioassay card, okay.

So from that grouping of 62 claims, three claims contained no data corresponding to the log book entries. So that's less than five percent, 57 claims --

DR. MAKHIJANI: Three claims contained. That didn't register under percentage. Three claims contained --

DR. TAULBEE: Three claims contained no data corresponding to the log book.

MR. MAHATHY: In other words --

DR. MAKHIJANI: Yes, I got that. No correspondence. Sorry.

DR. TAULBEE: And I -- now we've got a numbers problem here Mike, because then we say 57 claims had corresponding data. So
57 of the 62 claims had corresponding data. Now some people had multiple entries in this whole thing.

So it wasn't -- when you look at the actual spreadsheet that we gave you, what you'll see is the NOCTS claim ID and just going down through here, you'll see midway through on that table, Claim 1756 has two entries.

MR. MAHATHY: The 57 should be 59.

DR. Taulbee: I'm sorry? 57 should be 59 in my write-up. This is why this is a draft write-up and we haven't released it yet. Okay. That's it. So 59, I'm sorry, of the 62 claims, we have corresponding data.

DR. MAKHIJANI: Okay.

DR. TAULBEE: The third column is construction trades workers, okay. This is from -- we further subdivided the group, and this gets into a little bit of what Brad was talking about, where we're using the self-
identified construction trades workers, based upon -- from NOCTS basically, where somebody says they were a pipefitter or a carpenter.

Whether they were Roll 4 or not, Roll 4 is the traditional construction trades workers at Savannah River Site, and these are additional people that Brad was indicating construction, you know, some people that other sites would consider construction trades, Savannah River considered them as operations, maintenance type of people.

CHAIRMAN GRIFFON: And they were with DuPont?

DR. TAULBEE: That's correct. So the CTW column there is including those people as well. And so from this, what you'll see is that over 92 percent, we were getting direct match from what we see in the files, and what we see in the log books.

DR. MAKHIJANI: Now I think one of the questions we had was the 62 claimants.
Did you look at all their bioassay data or just the entries that corresponded to --

MR. MAHATHY: Just the entries from the log book.

DR. MAKHIJANI: Okay. So there were 62 entries -- so far 62 claimants, there were 62 entries in the log books, and there were 59 matches and three non-matches.

MR. MAHATHY: Well, we used 200 log books. Some of people in the logs were used multiple times. In other words, the person selected 200 entries from these three log books or two log books.

DR. TAULBEE: There's not 200 entries here. It's just some people had multiple entries. So I think in total you come up with 70-something or something like that entries.

DR. MAKHIJANI: Okay, so you compare.

DR. TAULBEE: We did not go
through it, to answer your question Arjun, we did not go through at least 62 people and look at all of the bioassay and pull all the other log books.

No. We just took these three different log books, I think it's three, three different log books, and we looked at those entries and from the point of data, are we seeing a match?

(Simultaneous speaking.)

DR. MAKHIJANI: Four log books, right?

MR. MAHATHY: Four log books. We listed, you know, to explain this, we looked at 200 entries, and only 62 of the corresponding people were in NOCTS. Of those 62, three of the entries did not match what was in the log book.

DR. MAKHIJANI: I'm getting confused between entries and people. That's what I'm getting confused with. So there were
200 bioassay data points for 200 separate people or less than 200 people. Less than 200 people.

DR. TAULBEE: Less than 200 people, because some of them were the same person.

DR. MAKHIJANI: The same person. The 62 or 62 people or 62 bioassay data points?

DR. TAULBEE: People.

DR. MAKHIJANI: People.

CHAIRMAN GRIFFON: Those are people.

DR. MAKHIJANI: And you had more than 62 bioassay data points?

CHAIRMAN GRIFFON: I think that where he got the 70-something, and there were some with more than one entry.

DR. TAULBEE: Some of them had more one entry, yes.

CHAIRMAN GRIFFON: So it was in
the 70s or something, right?

DR. MAKHIJANI: And when you say three claims contained no data, so none of the data points corresponded, and 57 claims had all of their data points verified.

DR. TAULBEE: Fifty-nine.

DR. MAKHIJANI: Fifty-nine, sorry.

MR. MAHATHY: Okay, and this is -- like I said, this is -- while we haven't totally released this, although you have it, it's actually not totaled either, because the interpretation is three log book bioassays results were not contained in NOCTS. But the same people did have other bioassay results that were in the log books. Three of the log book reviews will not be in NOCTS.

DR. MAKHIJANI: So we're talking 62 bioassay entries, and 59 bioassay entries were matches and three were not matches?

MR. MAHATHY: 62 people, with about 70 some-odd -- some people had more than
one.

CHAIRMAN GRIFFON: So it was three out of 70 some-odd, is that right?

MR. MAHATHY: It's probably the correct translation, yes.

DR. MAKHIJANI: Now you can see why we were confused.

(Simultaneous speaking.)

CHAIRMAN GRIFFON: All right.

DR. MAKHIJANI: Okay. At least I know what we're doing. I might have Bob Barton call you when he's writing up this memo. Sorry Steve.

MR. MARSHKE: One of the concerns was that again, we don't think we have the complete NOCTS database, and --

CHAIRMAN GRIFFON: What do you mean the NOCTS database?

(Simultaneous speaking.)

CHAIRMAN GRIFFON: The claims filed is what you're going to be looking at.
MR. MARSCHKE: Because what we were looking at, what Bob was looking at, and I could be wrong, but what Bob was looking at is he has this -- he was comparing it to the same files that I was using to do the OTIB-0075 review, and like we spoke this morning, we don't --

CHAIRMAN GRIFFON: You're looking at the claimant's files.

MR. MAHATHY: Yes. We're looking directly in the files.

MR. MARSCHKE: You're looking at the claimant's files. So when we go and we try to check, when we try to check your work, to make sure that these entries were made, I guess the question is how do we check that?

DR. MAKHIJANI: Does your report have claim numbers?

DR. TAULBEE: In this table, you have the NOCTS claim number, so you can go and open up that particular claim and look at the
hard copy.

MR. MARSCHKE: I don't think we were doing that.

DR. MAKHIJANI: I think that's we should do.

MR. MARSCHKE: That's what we need to do, what we need to do.

DR. MAKHIJANI: Yes. I think we just got stuck in some misunderstanding.

MR. MAHATHY: Well, the wording wasn't exactly --

DR. MAKHIJANI: About what was being done. I think Bob's confusion was the same as mine, although I don't --

CHAIRMAN GRIFFON: But now I think we've got it straight pretty much now.

DR. MAKHIJANI: Yes, I think we can do it now. So we can finish this on short order.

CHAIRMAN GRIFFON: All right. Can I ask a question on the -- how did you select
the entries that you looked up? Just random selection or -- because I mean 383 isn't a very significant. You don't see any trends obviously, but I'm always --

When I look at these log books, I always kind of pick out the highest values and go from there, because if they're missing, that's more important than anything else missing, because a lot of this is for coworker modeling.

DR. TAULBEE: This is done under the original or the first part of the SEC, so we were really cramped for time, to try and get this analysis in. So we can certainly look at more, you know.

CHAIRMAN GRIFFON: Oh no. I'm just curious, how you --

DR. TAULBEE: I don't think it was random. I think it was just -- well, selecting a few log books was probably random.

We just opened up these and let's take 25
from each one or 50 from each one and then 266
let's see do we see any claimants in here and
go check their data.

So you know at that time, we were
only going to make sure hey, are we seeing
something reasonable here or, you know, are we
only picking up ten percent of the data, you
now, in the files. Since we're in the 90s,
we're like okay.

CHAIRMAN GRIFFON: Because you see
where I'm going. Yes, the importance here is
if it's -- if you're only missing five percent
or less, but they're all the high values, then
we have a problem potentially you know. But
if you're missing five and they're all, you
know, it's all over the place, then it's --

DR. TAULBEE: I mean there's other
analyses that can be done. Now that we've
coded all the uranium data through 1965 on the
thorium side, you know, that can be directly
compared as to those values and they're both
electronic data sets now, so it's -- but that would be possibly a reasonable comparison to do from that standpoint.

Of course, it's only checking one isotope, but the bioassay results are available.

DR. MAKHIJANI: So did you want NIOSH to work further, or did you want us to pick --

(Simultaneous speaking.)

DR. TAULBEE: Yes.

DR. MAKHIJANI: --to be clear on who you're assigning.

CHAIRMAN GRIFFON: I think at this point it has to stay with you until you, you know --

DR. TAULBEE: So we might come back.

DR. MAKHIJANI: So we finish these four log books, and you want us to stop there, or do what you just --
CHAIRMAN GRIFFON: I mean the one question I would ask, just as an action, is just a description of the methodology that you did use for your -- if that's already out there, that's fine. But if it's not, maybe just so that will help us in looking at this.

DR. MAKHIJANI: So should we credit these out some high values and crosswalk them?

CHAIRMAN GRIFFON: I think you should review the four log books and what NIOSH did. So if you --

DR. MAKHIJANI: So go further than those four log books?

CHAIRMAN GRIFFON: Yes, that would be worthwhile, yes. Because you may be of the opinion that yes, it's not worth going any further after that.

DR. MAKHIJANI: Yes.

DR. TAULBEE: So we will get you the better description of that --
CHAIRMAN GRIFFON: Is that okay with other Work Group Members though?

MEMBER CLAWSON: I'm still trying to figure out what they would have.

CHAIRMAN GRIFFON: I'm just making sure everybody's --

MEMBER GIBSON: That's fine with me, Mike.

CHAIRMAN GRIFFON: Oh, okay. Then I'm going to also ask Arjun -- I'll give you a second to catch up.

DR. MAKHJANI: Yes, to catch up.

CHAIRMAN GRIFFON: Okay. Now for the other items, the TIB-0052/TIB-0075 discussion, I had on here that SC&A will provide an updated response to this, but do you think that response already is out there or --

DR. MAKHJANI: Let's see. Which number are we on?

CHAIRMAN GRIFFON: Well, this is
still under 13, that before the break we were talking about.

DR. MAKHIJANI: Yes. We did. That's what we did. I mean that was the TIB-0052 review.

CHAIRMAN GRIFFON: Okay. So I thought you were going to -- at some point in the conversation, I thought you said you were going to look further at this thing.

DR. MAKHIJANI: That was in response to what Jim was saying.

CHAIRMAN GRIFFON: Regarding the consistency of the procedure, okay.

DR. MAKHIJANI: Yes. I don't think there was --

CHAIRMAN GRIFFON: Is there any other action? No. I mean it's just hanging there kind of. We didn't come to any conclusion on it.

DR. MAKHIJANI: No, basically, we punked until NIOSH is done with the database.
Well, there are basically two things, three things. There's the other radionuclides question, the classification component, then going back to TIB-0052 and you know, see what we said there.

And then the third thing is that we agreed that NIOSH is going to put the more complete database that you're now constructing for tritium.

Dr. Taulbee: For tritium, yes. But that's under TIB-0075.

Dr. Makhijani: And then we're going to look at our analysis for tritium and TIB-0075 and your analysis, and try to come to some resolution, or at least carry the dialogue further.

Dr. Taulbee: Yes. I think once we post that data set, I think we're going to try and do a technical call? Guys?

Dr. Makhijani: Yes, right.

Dr. Taulbee: Okay, and that's
going to happen before we post our analysis, right?

DR. MAKHIJANI: Yes, yes.

DR. Taulbee: Okay.

DR. MAKHIJANI: I mean we have some idea of what you've done.

CHAIRMAN GRIFFON: All right, and let me -- this may just be me, but you said TIB-0052 regarding use of other radionuclides?

DR. MAKHIJANI: Well, I think this is extrapolation to other radionuclides.

(Simultaneous speaking.)

DR. NETON: I thought we were going to -- SC&A was going to start investigating, you know, the SEC implications of that, I guess. You know, are these SEC --

(Simultaneous speaking.)

CHAIRMAN GRIFFON: Yes, I do. That was the other thing I figured out --

DR. NETON: I think that's very important in my opinion. That's sort of the
ultimate litmus test of what we're doing. 273

CHAIRMAN GRIFFON: Yes.

DR. MAKHIJANI: Now we cannot do this for all radionuclides unless we have the data for all radionuclides. So far we've only talked about tritium, and when I looked at our -- the database that we were working from, there are almost no data for like neptunium. Almost nothing there.

As you know, I mean that's what you found too, because I believe that's why you're coding more data. So we really couldn't say anything.

CHAIRMAN GRIFFON: Start there at least.

DR. MAKHIJANI: Yes. We can start with tritium, but ultimately it would have to go radionuclide by radionuclide, until -- unless there's a general pattern, and then we can say okay, there's a pattern and you can settle it with ratios and then you're done.
DR. Taulbee: Right. Well, what I think we should be doing is I think we should start with this tritium to start with, and come to some agreement on the analysis methodology for comparison before we move on to others.

Then once we've moved onto others, plutonium, uranium or whatever was next, then we can start looking for the whole pattern. Instead of trying to solve this other radionuclides all at once here, let's look and see what these ones where we do have sufficient data, where we have a tremendous amount of plutonium data and tritium data and uranium data, to make these comparisons.

DR. Makhijani: Yes, and that's one issue. But I don't think it's going -- I think it will be helpful if the data sets that you're going to use for other radionuclides are all posted, and we can talk about tritium in terms of construction workers versus non-
construction workers. But there's clearly going to be --

CHAIRMAN GRIFFON: Are the other data sets not ready or --

DR. TAU_LBEE: The uranium is parsed in two phases, which is why I didn't want to bring it up at this point, only because we've got all of the data prior to 1965 coded. But then we don't after 1965. We only went up to '65 for the thorium, okay, at that point.

So you know, that hasn't been coded. So all the tritium data has been coded and there's lots of it. So that's why I want to try and start with the tritium. Then for the plutonium, if we're seeing a difference then in the uranium, then we can look at the data that Mel had collected previously for OTIB-0052, possibly ways of cutting that.

And there's also the possibility of adding to that database. Again, we have
all of the hard copy records of bioassay from the site. It's just not all coded, and so if you're wanting to look at more construction trades workers from that hard copy, it can be coded.

CHAIRMAN GRIFFON: I guess what I -- I'm trying to get to Jim's question, which is, and I think if the data that was used to make TIB-0075, I mean if -- it's not going to be anything other than additional data, right? Oh, I got to be careful with that maybe.

I was thinking the data set's just going to grow from there, right? But it would definitely --

DR. TAULBEE: I can certainly give you more of these exotic radionuclides. But there's going to be so few samples, I don't know what kind of meaningful comparisons can be made.

CHAIRMAN GRIFFON: Right.

DR. TAULBEE: That's why I think,
you know, sticking to the big three of tritium, uranium and plutonium, and if they're all showing the same --

DR. NETON: Well, I understand an argument can be made though, that these are different processes.

DR. MAKHIJANI: In the past what has happened with SECs, as you know Jim, is you have data for the main radionuclide, and then you don't have data for the radionuclides that were ancillary or not part of the main processing.

The SECs have been driven not because the sites weren't paying attention to the main thing; that would be process. They were. They were driven by other things. So in this particular -- since you're asking, since the Work Group is asking us to kind of give our opinion about whether you can cover this by ratios and Site Profile issue, I can --
Just from past experience in looking at the data that we have looked at, I can tell you that there is not much data for construction workers for californium or americium, and these are production items. So you can't just say a priori that we have plutonium data and it's --

DR. NETON: No, I understand. I mean there may be good reason why there aren't a lot of data points, and that would be incumbent upon us to go and discuss it.

DR. MAKHIJANI: That's right, exactly. But I can't give you an opinion -- I can't go to my team and go to Joyce and say give us an opinion about this until we actually look at the data.

DR. TAULBEE: And I'd also like to emphasize, what you're looking at when you say there's limited data on the californium, curium and so forth, you're absolutely right. In NOCTS right now, and I'm not even sure
we've gotten to that coworker model yet, but if we need to, we will go back and we will supplement from those log books like we did the uranium.

DR. MAKHIJANI: This is the issue, is that you know, at a certain point you find insufficient data, and then you say you've got more and you code more, then it's --

(Simultaneous speaking.)

DR. NETON: We need to go back and look at the uses of those nuclides, and how often they were used, what the exposure potentials really were. This is not unlike what we're trying to do right now, come to some agreement at Los Alamos.

I mean Los Alamos had a number of minor radionuclides that we called exotics, and our position is that there just wasn't much potential for exposure. That's why you don't have many nuclides and they were controlled basically at the same levels. We
need to -- I'm really concerned about drilling down and having to demonstrate that we have unique distributions for every single isotope, because you know, earlier we talked about 150 radionuclides. That's not going to happen.

CHAIRMAN GRIFFON: I guess I just wonder if it's useful to, you know, the big three as Tim talked about, would it be useful for SC&A to look into the big three and determine whether there's sufficient data there for those three to make construction worker models separate from the overall model, you know, if there's --

DR. NETON: I agree. I mean if it doesn't work for them, there's no reason to go after the data.

CHAIRMAN GRIFFON: Right, right. And you know, we're not extrapolating from there that therefore you can do all the others. We're just saying look at these three as a starting point. Do they have the data,
though? That's what I want to understand.

because --

DR. TAULBEE: In the tritium --

(Simultaneous speaking.)

CHAIRMAN GRIFFON: The tritium you will post, right. What about plutonium, uranium --

DR. TAULBEE: The uranium we can post. You've got to keep in mind it's only up to 1965.

CHAIRMAN GRIFFON: All we really need is what's posted, what was used for the TIB-0075, right?

DR. TAULBEE: Right.

DR. MAKHIJANI: And TIB-0075 Savannah River was only for tritium from 1991 to 2001. That's extremely limited. So when we looked at TIB-0075 for Savannah River Site, you could hardly say anything.

(Simultaneous speaking.)

DR. MAKHIJANI: Something about
that tritium, and we did. We thought it was okay, if I'm remembering right.

DR. TAULBEE: But you know, in the review of the coworker models, obviously we don't just look at whatever TIB-0075 is. That was a methodology demonstrating that a random sample can be pulled from NOCTS. That was the purpose.

CHAIRMAN GRIFFON: So uranium, you have up to '65 you're saying?

DR. TAULBEE: To '65, yes.

CHAIRMAN GRIFFON: And then plutonium?

DR. TAULBEE: Plutonium, we have the basic NOCTS file, and then for OTIB-0052, we went down and captured construction trade workers specifically, doing a sort based upon external dose, that people who have higher external doses will have higher potential for internal plutonium. So based upon that, they were selected for additional --
(Simultaneous speaking.)

DR. TAULBEE: How many people did you get additional for --

MEMBER CLAWSON: For construction workers? About 400-something.

DR. TAULBEE: About 400 additional. So we have NOCTS, and then we have about 400 additional workers. So it's not a complete data set. It's been modified. I'm not sure that it's really random now, but it's what we have electronically.

DR. MAKHIJANI: The issue, I think you know, I mean I am very hesitant to say that we can say anything. If the database is not a constant, then it becomes very hard. I can just tell you, if the database is not a constant, then it's going to be very hard to say.

Because then every time you have more data, then you've got to go back, and that's what's been happening, is we're going
back a second round because the database is expanding.

DR. Taulbee: Can I propose this then?

Chairman Griffon: Yes.

DR. Taulbee: Let's start with the tritium, and then let's do the analysis of the uranium through 1965, and then reassess, see where we're at -- if we get that done before the next worker meeting --

Chairman Griffon: Is the tritium complete now or --

DR. Taulbee: Yes.

Chairman Griffon: Okay. So that's not going to change?

DR. Taulbee: No, and neither is the uranium prior to '65.

Chairman Griffon: All right. I agree with that, because we don't want to hit, we don't want to go at these moving target possibilities.
So all right. So we're going to task SC&A with looking at that, with an eye on the question of is it an SEC issue or a Site Profile issue. In other words --

DR. MAKHJANI: And then we'll conclude just for that much.

CHAIRMAN GRIFFON: Right. Just for those pieces, yes. You can qualify your responses appropriately, yes.

DR. TAULBEE: So we'll post both the tritium data and the uranium data through 1965.

CHAIRMAN GRIFFON: Yes.

MR. KATZ: So it's basically an adequacy of the data in terms of --

CHAIRMAN GRIFFON: It's really a question is the data sufficient to reconstruct doses, and that can be through a coworker model or whatever.

MR. KATZ: Right.

CHAIRMAN GRIFFON: Because if it's
a question of like Jim said what is correct in NOCTS then we can move that to Site Profile, yes.

MR. KATZ: Fair enough.

CHAIRMAN GRIFFON: Okay.

MR. MARSCHKE: Yes. I think that once we get the same data set, we'll see. But right now, the analysis that we did in this report here for uranium, we only had a little -- we had 240 samples. So obviously --

CHAIRMAN GRIFFON: Yes, it could change.

MR. MARSCHKE: It could change if we get a significant more number of samples. We do have a lot of tritium. We did do a lot of tritium samples, over 17,000. So this is for the construction workers. So I would think that they wouldn't change too much.

But whatever you give us now, we will basically go back and redo the analysis with the new database, and see what the
results are. Then we'll, I guess --

Finding 14

CHAIRMAN GRIFFON: All right.

Let's move on to finding 14. We've got to get through this matrix, yes.


CHAIRMAN GRIFFON: I have SC&A will clarify this matrix item and supply examples of off normal and unauthorized work practices.

DR. MAKHIJANI: This is John Mauro's baby. John, are you on the line?

(No response.)

DR. MAKHIJANI: Apparently John had had a discussion about this at some point, and --

(Laughter.)

MR. KATZ: You lost the word. Are you going to call him?

CHAIRMAN GRIFFON: Okay. We'll pass on that one. If John comes back, we'll
get it later. But right now, it's still on an SC&A action. That's fine. Number 15.

Findings 15 and 16

CHAIRMAN GRIFFON: I've got to go back and find what this is.

MR. KATZ: Did you get John?

DR. MAKHIJANI: He's not in. I left a message.

MR. MARSCHKE: Oh, that was something with Ed Brown and John Mauro having a discussion.

CHAIRMAN GRIFFON: That was 14, yes. So if he comes back, we'll get that.

MR. KATZ: I'll send him an email.

CHAIRMAN GRIFFON: And number 15, does anybody have --

DR. Taulbee: My notes indicate this is a TIB-0052.

DR. MAKHIJANI: Yes. This is going back, I think we've got multiple ways of saying the same thing here.
CHAIRMAN GRIFFON: Fifteen 289 is covered in number 13 or number 12 it says.

DR. NETON: We were going to do 13, 15 and 16 altogether.

CHAIRMAN GRIFFON: Altogether, yes, yes.

(Simultaneous speaking.)

DR. TAULBEE: Can you combine all that into one?

CHAIRMAN GRIFFON: Yes. I'll try to do that. When I put out a new matrix, I'll try to do that.

DR. MAKHIJANI: Yes. I understand we need a new matrix.

DR. TAULBEE: Just combine those into one.

CHAIRMAN GRIFFON: Yes, okay.

DR. MAKHIJANI: This is a little bit ancient, you know, from last August, and it was done with a paper review and the TBD review, and that was just, you know, a
DR. TAULBEE: Right.

CHAIRMAN GRIFFON: Okay, and I think we covered 16 also, right?

DR. MAKHIJANI: Yes.

Findings 17 and 18

CHAIRMAN GRIFFON: So we're on to 17 and 18.

DR. TAULBEE: I can give you a real quick update on this. Unfortunately, we're not as far along as what I had hoped by this time. Actually, I hoped issue 17 would be done, and I'd have a White Paper out to you all. The delay is me and my time, in order to do this analysis.

But I do hope to have that out by -- I expect to have the analysis done by the end of June, and then getting it out for review probably by mid-July, out to you all I hope, for at least issue number 17. This is neutrons -- or I'm sorry. I'm talking about
issue 18. Issue 17 is going to be done after issue 18.

Issue 18 is the 1962 to 1971 neutrons, and that's the one that I'm currently working on. I do expect mid-July.

CHAIRMAN GRIFFON: And then go on to the --

DR. TAULBEE: The other one will be following after that.

CHAIRMAN GRIFFON: Okay.

DR. TAULBEE: For the second one?

The first one.

DR. MAKHIJANI: Did you want us to hold off until we have another Work Group meeting to review the issue 18 White Paper, or just go ahead and do it, or what's your pleasure?

CHAIRMAN GRIFFON: Is that a White Paper on the TIB?

DR. MAKHIJANI: No. When the White Paper comes out --
CHAIRMAN GRIFFON: Oh right. If it comes out, no, I think it will be an -- yes. SC&A will review it once it's delivered.

DR. MAKHIJANI: Okay.

Finding 19

CHAIRMAN GRIFFON: All right.

Number 19.

DR. TAULBEE: I have that SC&A will investigate and revise the comment.

That's my notes.

DR. MAKHIJANI: I did not do this.

(Laughter.)

DR. MAKHIJANI: True confessions.

CHAIRMAN GRIFFON: Stay after class.

DR. MAKHIJANI: I apologize. I apologize for that.

CHAIRMAN GRIFFON: All right.

It's carried forward with SC&A action.

Finding 20

CHAIRMAN GRIFFON: Number 20?
DR. TAULBEE: Okay, number 293. This was a work in process that we currently have, when you say you want to know about what we're doing. Actually, Bob Morris is the one who's going to be -- who is doing this, and he is developing an MCNP model, basically from a worker position standing in the tank farm area.

I think the issue is that a badge worn on the lapel, and he's working all of the exposures coming from below them, all of the scatter radiation from the tops of the tanks, and would it be under responding for organs that are a waist type of geometry.

So he's working up an MCNP model on that, and a second model from that standpoint will be the work of crouching down, to see what those differences are. He's in the process of it. We don't have the results out yet, but once we do, we will provide those to the Board.
DR. MAKHIJANI: Could I make a request while he's doing that?

DR. TAUlBEE: Sure.

DR. MAKHIJANI: As you'll see, as you read those tank farm data bank entries that you have, you'll see a lot of the high radiation rates, if I'm remembering right, were like when pipefitters were in diversion boxes and junction boxes and all of you who have experience in the site, we know what that geometry is so we can cover that geometry --

DR. TAUlBEE: For the diversion boxes?

DR. MAKHIJANI: Yes. I mean take a look at that data bank, and you'll see the --

DR. TAUlBEE: We're isotropic at that point, because diversion boxes --

(Simultaneous speaking.)

DR. MAKHIJANI: But they're down there. So it might not be.
CHAIRMAN GRIFFON: We might add that on as one of your scenarios, yes. Just the rest of the workers --

(Simultaneous speaking.)

DR. MAKHIJANI: So it's not hanging there after you come out with your analysis. Then we go back and decide something else.

DR. Taulbee: Okay.

CHAIRMAN GRIFFON: No, I agree with that, because then otherwise people are going to come back and say we never worked up there. We were --

DR. MAKHIJANI: So I just want to give you some of the external dose entries from that tank farm data bank. So if Bob could look at that, and devise sort of the, you know, claimant-favorable scenarios from that.

DR. Taulbee: And so you're going to send those to us?
DR. MAKHIJANI: You have that. You have the tank farm data bank entries. You know, the document we were referring to earlier that I prepared in the 80s.

DR. TAULBEE: Oh, okay. That document.

DR. MAKHIJANI: That document will, has entries for situations in which workers experienced high dose rates. So it might be useful as a point of reference in devising the scenarios. That's all I'm saying, for telling which scenarios to devise, because I think you all have more experience in that.

DR. TAULBEE: Okay. All right. So we will look then at your document and make sure that there's some scenarios which you've discussed in there that we include in our --

DR. MAKHIJANI: Yes. That should be, you know, said to be that these are the claimant-favorable ones or these are the...
situations that would cover all of these other geometries and the ratios will be less than $x$.

DR. TAULBEE: Okay. We can do that.

Finding 21

CHAIRMAN GRIFFON: Okay, and number 21. This is TIB-0052 again? Is this an overlapping issue here?

DR. MAKHIJANI: Twenty-one is settled.

DR. TAULBEE: Yes, this is separate.

DR. MAKHIJANI: I think 21 was the pipefitter thing that is done, because this is an old -- yes.

CHAIRMAN GRIFFON: So this is TIB-0052, coworker bounding for external.

DR. MAKHIJANI: External.

CHAIRMAN GRIFFON: All workers, not just the pipefitter. The pipefitter was the one example, right?
DR. MAKHIJANI: Yes. We looked at the various job types in the TIB-0052 review, and pipefitters were sort of the construction worker type. Steve, I mean this is your baby. So why don't you --

MR. MARSCHKE: Well, yes. The OTIB-0052 review, we looked at different types of construction workers and we found that pipefitters tended to get higher exposures than the other construction workers. I guess this issue has to do with external exposures, and I think --

As we talked earlier this morning, I think the solution that we came to was to put some words into OTIB-0020 and just give people a warning that, you know, if a claimant was, you know, identifies himself as a pipefitter, you may want to take the guidance from OTIB-0052 with a little grain of salt or something, and look a little harder at his dose calculation or put a little adjustment in
I forget what the wording was in, but we did have some suggested wording. Wait a minute. Maybe I have it actually.

DR. NETON: The document has been modified.

DR. MAKHIJANI: So I think that this is an issue that has been resolved.

CHAIRMAN GRIFFON: And the nature of the corrections is sort of the Site Profile issue.

DR. MAKHIJANI: The correction was to leave it at the discretion of the dose reconstructer to use a higher correction factor.

CHAIRMAN GRIFFON: Okay, because this is not the way I have it outlined in this task list. I sort of -- it says NIOSH will review the coworker model and see what is bounding for all workers, e.g. pipefitters. I mean I think we based that on the fact that
you thought that was probably a worst case. 300

DR. MAKHIJANI: The pipefitters were the worst case for external.

(Simultaneous speaking.)

CHAIRMAN GRIFFON: But we had a NIOSH action here last time --

DR. MAKHIJANI: Yes, okay. Sorry. So maybe I’m speaking out of turn.

CHAIRMAN GRIFFON: I mean if you're in agreement, no. Maybe it's a done deal, you know.

DR. CHEW: There was a conference call by phone, and I think all of us participated in it, where that suggestion was put together, and that was exactly how it was resolved.

DR. MAKHIJANI: I think it was resolved that way, and maybe it was resolved around the time that this was written or just --

CHAIRMAN GRIFFON: Was there a
conference call for the Procedures? I don't remember.

DR. MAKHIJANI: I think it's a Procedures.

MR. MARSCHKE: It was a Procedures, and it was some time -- it was quite some time ago when this conference call was, yes.

CHAIRMAN GRIFFON: I might have missed that one.

DR. MAKHIJANI: So the question in this context is does NIOSH want to adopt a specific adjustment factor for pipefitters, given the analysis in our review or not for SRS?

CHAIRMAN GRIFFON: Well, and that's not even an SEC issue.

DR. MAKHIJANI: It's not an SEC issue. I think --

CHAIRMAN GRIFFON: Let me ask the other part of this task list. I'm not going
to disagree with the conclusion on the Procedures call, which I don't think I was on. But it says NIOSH, or in my notes for the task, it says NIOSH -- this is referring back to Table 6.1.

NIOSH will provide an explanation of why the number of monitored workers is greater than the number of records.

DR. TAULBEE: Yes. That's actually a different issue.

DR. MAKHIJANI: And a separate issue.

CHAIRMAN GRIFFON: It's a separate issue I know. But I just wanted to make sure we didn't lose that. That's under 23.

DR. TAULBEE: We set it under 23.

CHAIRMAN GRIFFON: All right. I've got it lumped under finding 21 for some reason. All right.

DR. TAULBEE: So is issue 21 closed effectively then, with regard to the
pipefitters, because the guidance to the dose
reconstructers is if you maybe were working
with the pipefitter --

(Simultaneous speaking.)

CHAIRMAN GRIFFON: As long as SC&A
is satisfied with it, then yes.

DR. MAKHIJANI: I think we're okay
with that.

DR. CHEW: I think it's probably
listed as in abeyance.

CHAIRMAN GRIFFON: Well, but
closed from an SEC standpoint I think. Yes.
Closed from an SEC standpoint I think.

DR. CHEW: Yes.

CHAIRMAN GRIFFON: All right.

Everybody on the phone all right with that?

(No response.)

CHAIRMAN GRIFFON: Okay, all
right. I knew we'd close one of these.

(Laughter.)

DR. TAULBEE: At some point, could
we take a comfort break?

CHAIRMAN GRIFFON: Right now would be a good spot actually, yes. Let's take ten minutes.

DR. TAULBEE: Ten minutes.

CHAIRMAN GRIFFON: Keep it a little shorter this time, because we've got planes to catch.

DR. MAKHIJANI: I'll try to call John again.

CHAIRMAN GRIFFON: All right. Ten minute break on the phone. Be back at 3:25.

(Whereupon, the above-entitled matter went off the record at 3:16 p.m. and resumed at 3:25 p.m.)

MR. KATZ: Okay. So Savannah River Working Group, and we are just reconvening after a short break. And Jim, do we have you back again and Mike?

MEMBER GIBSON: Yes. Still here, Ted.
MR. KATZ: Dr. Lockey?

(No response.)

MR. KATZ: Okay.

Finding 14 Recalled

CHAIRMAN GRIFFON: Okay. Just to -- we're just about at the end of this matrix, believe it or not. We will finish, I'm pretty sure. I just wanted to give one update. During the break, we did hear from John Mauro on finding 14, and he has no further update at this point on finding 14.

So that's going to, on the matrix, remain an SC&A action item to follow up on that. Then --

DR. TAULBEE: Mark?

CHAIRMAN GRIFFON: Yes.

DR. TAULBEE: May I propose that we combine 14 and 25 together, because that's where my notes had indicated --

CHAIRMAN GRIFFON: Fourteen and 25 go together?
DR. TAULBEE: Right.

CHAIRMAN GRIFFON: Okay. So that will be 14 and 25. That's fine.

DR. TAULBEE: Because I think this is talking primarily about the burning grounds, is what the particular issue of concern was, and I have an update for 25.

CHAIRMAN GRIFFON: Oh, okay. All right. You're going to give me that when we get to 25?

DR. TAULBEE: Yes.

CHAIRMAN GRIFFON: Okay, that's fine. All right. Then right now we're on item 22, finding 22, I believe.

Finding 22

DR. TAULBEE: This is on the badges, and you were to provide the interviews that you had conducted?

DR. MAKHIJANI: Yes. We have finalized the interviews, and we also did that spreadsheet that I said I was going to post,
that Bob Barton did for all the petitioners. We have a completed report nearly that has to go for DOE review still. So that's what it's not in your inbox.

I'm putting items 22 and 23 together. But we -- well, I'll be done with it this week and then we'll go to DOE review next week.

CHAIRMAN GRIFFON: Can you just restate the things you've done and --

DR. MAKHIJANI: Well, what we did was we -- we put together all the petitioner issues in a spreadsheet, by petitioner, by affidavit record, and then -- so that spreadsheet is done and I will post it.

The other thing we did was we said in issue 22 and 23 was, you know, there were basically the workers said they didn't have badges on the weekends and that there were external doses that were not captured, and that they were in situations without badges...
that were supposed to be non-radiological that were radiological.

So what we've done is we've gone and looked at all the external dose issues in the affidavits, and done a report on that. Does that accurately characterize what we've done Steve?

MR. MARSCHKE: I believe so, yes.

DR. MAKHIJANI: Okay, and so that report essentially has gone through our internal review and is just awaiting final edits from me and we'll go to DOE for review next week. So you should have that soon.

CHAIRMAN GRIFFON: Okay.

MR. MARSCHKE: What we looked at was HPAREH. We've done a lot of studies on HPAREH before. We did it for OTIB-0052. We did it for the paper study and so on and so forth. So we have no surprises in giving you a preview of what you're going to see in this report.
DR. MAKHIJANI: Do you want to do that? Mark?

CHAIRMAN GRIFFON: Sure.

MR. MARSHKE: And so really there's no surprises in that area. As Arjun said, we did go back and look at the 13 affidavits, and we grouped them into like four different issues, one of them being pencil dosimeters going off scale.

Another one being unmonitored on the weekends and other off hours. Another one, working in supposedly clean areas, unmonitored in supposedly clean areas which were later discovered to be contaminated areas, and the fourth issue was incidents.

I think we've already discussed incidents at this meeting enough. We don't have to talk about that. In the report, you'll see that we describe the pencil dosimeters going off scale, and we kind of concluded, I guess, that that's not really
going to be a big problem in reconstructing
the doses, because the pencil dosimeters are
not utilized in dose reconstruction anyways.

We did make use, actually we did
make use of -- to tie this back to again the
discussion we had earlier of the special
hazards investigations, there were quite a few
SHIs related to pencil dosimeters going off,
and in almost every case the badges were
pulled and so on and so forth.

So we found that there was -- that
one was pretty much taken care of. Working in
clean areas without -- unbadged in a clean
area, which was later found to be
contaminated.

We kind of point to one of the
OTIBs, which I think addresses -- OTIB-0020, I
think, basically addresses that, and we agree
that that's probably a good way to address
that if you look at the report. We don't have
any major concerns from that.
The one that we haven't talked about so far is the -- working on the -- badges unavailability on working on the weekends, and this was -- one of the petitioners' affidavits described that. In the interviews that we had with some of the SRS workers, there was some confirmation of that happening.

Perhaps because they changed the badges out on a monthly basis and if the end of the month happened to fall on a weekend, the badges might not be available. This was an independent interviewee that provided this information.

So we're still kind of investigating that issue at this point, to see whether or not, where we're going to go with that issue.

DR. MAKHIJANI: The one particular worker who said that badges were not on the weekends and so on in that affidavit, we
looked at that claim also, and it turned out he only had external dose records for two of the four years that he worked there. And we just point that out.

MR. MARSCHKE: Yes. He was a worker there, yes.

CHAIRMAN GRIFFON: So I guess that's just really a little introduction or overview, and I'll see the report soon.

DR. MAKHIJANI: Yes, and then there's the incident issue, which I think remains outstanding.

CHAIRMAN GRIFFON: Yes, okay. I don't think you have any response at this point, right?

DR. Taulbee: No.

DR. MAKHIJANI: Now the interviews, we have run it through DOE and the classification review. All that process is complete.

DR. Taulbee: Have you posted it
on the SRDB?

DR. MAKHIJANI: No. So that's my question, is normally we attach interviews to our final report. We could attach it to this; we could post the interviews separately. How do you want it done?

CHAIRMAN GRIFFON: I'd say just post them.

(Simultaneous speaking.)

DR. MAKHIJANI: So I'll post them in that SC&A Docs section of the O: drive.

DR. TAULBEE: Can I ask that you post them as SRDB documents?

DR. MAKHIJANI: Can we do that?

DR. TAULBEE: Because that's what we do.

DR. MAKHIJANI: Can we post things to the SRDB? I do not believe we can.

DR. TAULBEE: No. So send them to Cheryl. They would get entered then as an SRDB number.
DR. NETON: Yes --

DR. MAKHIJANI: But we cannot.

DR. NETON: I don't have write access to the SRDB.

CHAIRMAN GRIFFON: Why don't they post them on the O: drive, and then if you guys want to move them over, you can do that.

MEMBER CLAWSON: And just make notification to you that they've been put there and then --

(Simultaneous speaking.)

DR. MAKHIJANI: Now these are individual interviews with names.

DR. TAULBEE: Yes. In the SRDB, that's where all of our interviews are, and they have individual names on them and that's why it's restricted from public access.

DR. MAKHIJANI: So I'll put it in the same place where we put Steve's spreadsheets. Just all the SRS documents that are SC&A documents that are final, I'll just
put in that place, and then --

   DR. TAULBEE: Okay, and you're
going to send me an email when they're put
there?

   DR. MAKHIJANI: Yes, I can actually
probably do it right now.

   CHAIRMAN GRIFFON: Okay. Is there
anything else on 22? I mean you're
overlapping with 23, but I think there's other
things on 23, right?

   DR. TAULBEE: Yes.

   Finding 23

   CHAIRMAN GRIFFON: All right.

   NIOSH has something on 23, I believe.

   DR. TAULBEE: Yes.

   CHAIRMAN GRIFFON: The one action
I had was with regard to the NIOSH, an
explanation of why the number of monitored
workers. So that's what you're reporting on?

   DR. TAULBEE: Yes.

   CHAIRMAN GRIFFON: Okay, great.
DR. TAULBEE: We broke 23 into three different parts. One was the discrepancy and HPAREH discrepancy with the HPAREH data, and this was your Table 6.1 question. And basically the --

CHAIRMAN GRIFFON: So this is 23(c) you're addressing now or 23(a)?

DR. TAULBEE: No. I'm addressing 23(a).

CHAIRMAN GRIFFON: Okay. I see up there (c).

DR. TAULBEE: Sorry.

CHAIRMAN GRIFFON: That's all right.

DR. TAULBEE: This is the question that you had on Table 6-1 from the SEC, the original Evaluation Report, and let me pull this out here.

What you were questioning was how can we have in HPAREH, taking let's say 1952, for an example, where we had 270 monitored
workers, but we only have 177 shallow dose records or deep dose records.

The response to that, how can we have less of these records than we have people monitored, and it has to do with the assumption of how we define the number of workers monitored in HPAREH, in that there's a difference between a blank and then --

A blank field that can have a zero or just a space in it, and then when the data was transferred into the database, having no information whatsoever.

So in some cases, when HPAREH was built and they went back and collected other people's data files, they might not have any data, or it was non-detectable, and so they didn't enter into that particular field. But they were actually working during that time period.

So because that field was not, what had been populated with a space or with a
zero or something like that, it was counted 316  
than as them being monitored, okay. However,  
when they -- when we figured out the shallow  
dose records and the deep dose records, if the  
record had a zero in it, then we were  
including it. If it was just a space, then we  
weren't.

So this is why there appears to be  
less records, okay. These were compared to  
the Savannah River Site document, WSRC-RP-95,  
S234, and what you'll see is they estimated  
more workers being monitored, because they  
looked at the original cycle by cycle -- I  
shouldn't say cycle by cycle data. They  
looked at a larger population.

Remember HPAREH, which started to  
be populated from 1979 backwards, when people  
were still working there. So HPAREH would  
have less than what the site had indicated had  
been monitored, based upon the monthly  
reports.
So that's why the first column there shows more workers. HPAREH is showing less, but then the next column over for the number of shallow dose records is less than what you have for HPAREH, the number monitored. Does that make sense?

We will provide this discussion and write-up with our issues report that we come out with.

CHAIRMAN GRIFFON: All right.

DR. TAULBEE: So that's the first part of 23 that we address. The second part we actually did a little while ago, and that was the internal comparison, the 200 log book entries that we discussed back up a ways. I had that as 23(b), but --

So then this gets us to the final one of 23(c) for us, and this is where you asked us had we ever looked at the external monitoring records, the hard copy versus what was in HPAREH, as to whether there was any
agreement between those data.

CHAIRMAN GRIFFON: Hard copy versus HPAREH, okay.

DR. TAULBEE: So this is the new piece that we did, and I've got it up here as 23(c), and this is where we went through and we looked at 100 workers from -- in 1960. Or in 1960, we looked at 100 workers from Roll 1, which would be the salary people, 100 from Roll 2 and then 100 from Roll 4.

These were pulled at random, and if an entry was illegible, then we went into the hard copy records, because some of them are not scanned real well. Then we would substitute and take the next random number to go and find them.

So you'll see that illegible down here in this bottom row from the deep dose, we did deep and shallow dose, by the way, you can see we only did replacement on four people out of this whole set, and all of those were in
1960, when the records were much harder to read.

What you'll see is we found a match of not only the people but also the dose. For Roll 1, 98 out of the 100, Roll 2, 97, and then Roll 4, we found 93. Roll 4, by the way, is the construction trades workers at Savannah River.

CHAIRMAN GRIFFON: Right.

DR. TAULBEE: So what you'll see across that top row is that, in general, we're seeing in the 90 percent range of the doses from the hard copy records matching what is in HPAREH.

So from a standpoint of using HPAREH to develop a coworker model, we feel pretty comfortable that way, whether it's Roll 1, Roll 2, Roll 3 and Roll 4, that the data set is complete. It's matching the hard copy records that we have in a reasonable manner.

Any questions?
CHAIRMAN GRIFFON: You're providing this in your write-up too? I mean we're kind of looking at the table --

DR. TAULBEE: Yes.

CHAIRMAN GRIFFON: Okay.

DR. TAULBEE: I mean really the important one is that the match is very high, and in some cases the dose that was in HPAREH is greater than what's in the hard copy. Then in very few cases, it looks like out of the, let's see 1,200 entries, it was less than four cases out of 1,200 entries.

From a coworker development standpoint, we feel pretty comfortable with this.

CHAIRMAN GRIFFON: And you just -- '60, '65, '70, '75, you kind of just spaced it out?

DR. TAULBEE: We spaced it out by five years.

CHAIRMAN GRIFFON: Right, okay.
Any questions Arjun or Steve?

MR. MARSCHKE: No.

CHAIRMAN GRIFFON: You're going to put it in your report?

DR. TAULBEE: Yes.

CHAIRMAN GRIFFON: Good. Okay. Now I'm getting down to some real fuzzy actions at the end of this task list, Arjun, but you may have to help me out here. I think these get into the data validation, data completeness sort of questions, and then actually one of the last items is the SC&A doing an SEC report, which you have not completed, right?

DR. MAKHIJANI: Yes, which I started, which I called you. With your permission, I suspended it, pending getting the data.

CHAIRMAN GRIFFON: Right, because things were a little in flux and you wanted to wait. Right, yes, right. But I think
similarly what we talked about with Pantex, you know, we were in a similar situation of reviewing the Site Profile, now transitioning. Obviously it doesn't start everything over, but whatever report you provide will sort of fill the gaps, I guess, of what you haven't reviewed already in the Site Profile. You know, you're not starting again, is what I'm saying?

DR. MAKHIJANI: No, no.

CHAIRMAN GRIFFON: Right, all right. I just want to make that clear on the record, you know, that that's it.

DR. MAKHIJANI: I mean we have -- and we have finished the quite big pieces. A lot of the, other than neutrons, the big issues.

CHAIRMAN GRIFFON: That's fine.

DR. MAKHIJANI: Petitioner affidavits. The big issue is related to internal dose, and all of those issues had to
be put on the table in an SEC context,\textsuperscript{329} I think.

CHAIRMAN GRIFFON: Yes.

DR. Taulbee: I'm sorry.

DR. MAKHIJANI: I said other than neutrons, the main issue relates to internal dose, and all of those issues have now been put in an SEC context on the table. Both sides, you know, NIOSH has very substantial work in progress, and we put two reports on the table.

CHAIRMAN GRIFFON: So this other item in here for the data validation, which Tim just touched on, a lot of this, some of it, well most of it I think is in perfect agreement. But it says SC&A will examine NIOSH's data validation, and I think now that you've provided us or will provide those pieces, they'll start that process.

DR. MAKHIJANI: Until now, we were only looking at the --
CHAIRMAN GRIFFON: Right. There's one item I'm not sure, and it says NIOSH will give log book listing to SC&A.

DR. TAULBEE: We did that.


DR. TAULBEE: We have it.

CHAIRMAN GRIFFON: Is that log book listing posted on the O: drive?

DR. TAULBEE: That is when I sent you an email back in March.

CHAIRMAN GRIFFON: I remember that. Yes, okay, and that includes. That includes external dose data, the log books or that's -- okay, all right. And then the HPAREH correlation, that's just what we just talked about. Okay. I have external dose complete.

I'm just going through the last little sort of unnumbered issues at the bottom of this document. External dose completeness.
SC&A will look at the affidavits and interviews and compile a list of circumstances. I think you compiled that, right?

DR. MAKHIJANI: Yes, we did that, and Steve just --

CHAIRMAN GRIFFON: And then it says that issues of completeness will be revisited after these initial items are done. I think we still have that.

That's sort of hanging out there, the issues of completeness, because things are in flux as far as the coworker models and stuff. So I think you might want to consider that in your report, your SEC report.

DR. MAKHIJANI: So now do you want me to resume the SEC report, even though the major issues around internal dose are still under discussion, or hold off until we have this, at least this technical call? I'm a little bit unclear, because some very major
items are coming down the pike through August.

CHAIRMAN GRIFFON: Yes.

MR. KATZ: I think he needs, not only need the technical call, he needs the coworker models for --

CHAIRMAN GRIFFON: Right, right, right. But I think if there's, you know, if you can have placeholders. If there's pieces you can start on, I would say proceed. If you have to wait for the technical calls, that's fine, you know.

DR. MAKHIJANI: I'm going to start, but you know I felt the major pieces are going to be these, the ones that are still on the table.

DR. Taulbee: I think one of the things that would help us though a little bit is for you to in one place succinctly define what your concerns are. Even if they're preliminary at this time, because you haven't seen our full coworker models or so forth.
But just to list several items, that when we're developing those models, we can make sure that we try to address them. I think that would help us, to have it all in one report for you all.

DR. MAKHIJANI: We covered that earlier in response to what Jim said, is that they've already given us an opinion about whether these internal dose issues are Site Profile or SC&A. I thought that we were going to deal with the tritium and uranium after 1965 for now, and then --

And I, just my personal opinion, that it would be better to do, to start a full report after those, at least those two items are looked at, because otherwise it's just going and redoing it.

CHAIRMAN GRIFFON: Yes, that's fine, that's fine.

DR. MAKHIJANI: Is that all right?

CHAIRMAN GRIFFON: As long as we...
keep the ball moving, yes.

DR. MAKHIJANI: Yes.

CHAIRMAN GRIFFON: Okay.

DR. MAKHIJANI: Because we've got plenty of items.

CHAIRMAN GRIFFON: Yes.

DR. MAKHIJANI: And I can proceed, you know, as I was before. I actually have pieces of a draft report.

CHAIRMAN GRIFFON: I'm just looking down the rest of this, and I think most of it we've hit on already. Updated matrix. It says SC&A was supposed to update that, but I'm taking that task on, just because it helps me to --

You know, I want to consolidate some issues, I want to be able to understand them better myself where things have gone. So I'll do that. And then the full SC&A review report.

I think that's all I have. I will
take -- if anyone from the petitioners group is still with us -- oh, I'm sorry. One more item here, and then --

DR. TAULBEE: Issue 25. Do you not have that item?

CHAIRMAN GRIFFON: I don't have issue 25, so you can add it on. What is that?

Finding 25

DR. MAKHIJANI: It is environmental dose.

CHAIRMAN GRIFFON: Oh, okay.

DR. TAULBEE: This is the burning grounds, and I think this was the 14 and --

(Simultaneous speaking.)

CHAIRMAN GRIFFON: All right. It wasn't listed on this. I'm sorry.

DR. TAULBEE: Okay, and this is -- well, I don't have a big update here, but I've got a little bit of an update.

We are working this particular issue, and we have identified air sampling
that was conducted down wind of the burning areas, the burning pits and we are currently in the process of coding that particular data. It's air sample data; it's not individual personal data, in order to evaluate the exposures from those burning pits, the solvent burning, to document contamination.

DR. MAURO: This is John Mauro. I think that this is very much related to the other one that I didn't respond to.

CHAIRMAN GRIFFON: Yes, that's what we said. Yes.

DR. MAURO: I couldn't hear you very clearly, but we did not have a technical conversation regarding it.

But I seem to recall now an earlier meeting, that I think the issue is very clearly bounded by -- I believe the problem had to do with the type of model that was used to estimate doses to workers that were near these burning activities that were
taking place, and it really wasn't the appropriate model to use.

Then we were talking about different scale models and you were using a mesoscale model. I think that the problem has to do with what type of model do you use to evaluate exposures to workers that might be close to such an activity? I believe you used some models that were not appropriate. It started to come back to me. I did not look at it since the last time we talked about it.

DR. TAULBEE: Instead of models, we have actual data.

CHAIRMAN GRIFFON: Yes, right.

DR. MAURO: You have actual data.

Well, we don't.

(Simultaneous speaking.)

CHAIRMAN GRIFFON: So yes. They have data now and they're going to -- they're in the process of assessing that. And we'll combine those two items, John.
DR. MAURO: Okay, there you go.

That puts us in a very good position.

MR. KATZ: Does that mean that John doesn't have to follow up on this?

DR. MAURO: Are we off the hook?

CHAIRMAN GRIFFON: Yes, maybe.

You don't have to do the action, right?

(Laughter.)

DR. MAURO: Any way to get out of doing the work.

CHAIRMAN GRIFFON: You're off the hook. Yes, you're off the hook. Okay. Is there any others -- I'm sorry, yes. That's off the list somehow.

I think we're at the end of the issues matrix, but I don't want to, especially if the petitioners have been good enough to hang on the phone call all day here, I want to give them the opportunity to make any comments. Is anyone still with us?

Petitioner Comments
MR. WARREN: I am. I'm Bob Warren.

CHAIRMAN GRIFFON: Oh hi Bob.

Yes.

MR. WARREN: There are a couple of things that we, and I'm not sure --

MR. KATZ: Bob, Bob. Can you -- I don't know if you're on a speaker phone, but you're pretty faint.

MR. WARREN: Okay. I'll move my - - is that better?

MR. KATZ: That's much better. Thank you.

CHAIRMAN GRIFFON: Much better, yes.

MR. WARREN: Okay. I'm not sure that I waive any objections to the pipefitters, because I couldn't exactly understand that scenario. That was one of those earlier ones.

What we had asked for in the
meeting that was January 19th, and we wanted to have a posting of the definition of construction workers, and I don't know.

I can't find anything on the site, but in that hearing, you were going to send the petitioners, make sure that we had the definitions and what was going to be the codes for the rest of the construction workers.

CHAIRMAN GRIFFON: I vaguely recall some discussion about that, on what job classifications that they fall under.

MR. WARREN: That was on page 306 of that last Advisory Board Work Group.

CHAIRMAN GRIFFON: Three-oh-six of the last Work Group? Okay. We'll try to follow up on that.

MR. WARREN: In the incidents that you all were discussing earlier, I've never have heard anybody talk about the May 2008 interviews that NIOSH conducted in North Augusta.
All of those 19 pages, I think, of information need to be followed up on as you see whether or not they have all of the data on lacking film badges and not having any kind of monitors.

I mean what seems to be the argument is that the HPAREH data is some kind of silver spoon or something. But it won't, in my opinion the HP data won't reflect when the workers were not wearing their dosimeters. So in all of these meetings and in all of the statements, you have over and over again workers talking about not having monitors or the monitors working incorrectly. So, you know, it shows zero on their H report, and over the period of time, you find a lot of zeroes or, you know, 10 millirems or just no radiation for a worker because they weren't having the monitors.

So I wish at a minimum, somebody would say that they're looking at this NIOSH
outreach meeting, and analyze all of the statements by the workers.

CHAIRMAN GRIFFON: I think that's an appropriate comment. I mean I think that might be something we can task to SC&A.

DR. CHEW: Well, why don't we -- I mean perhaps --

(Simultaneous speaking.)

DR. TAULBEE: We did look at those --

CHAIRMAN GRIFFON: I believe, yes. You would have looked at them and considered them in the Evaluation Reports, but I also think --

MR. WARREN: It's not enclosed in the Evaluation Report, because they say one wasn't posted and then the other one, it says it's not available yet. That's in the Evaluation Report.

DR. MAKHJANI: What's the date of the Evaluation Report?
MR. WARREN: The date is in November, I believe. This occurred in May, but they still had in the evaluation that they weren't using the outreach interviews.

CHAIRMAN GRIFFON: Okay.

DR. MAHIJANI: Are these interviews on the SRDB?

DR. TAULBEE: Yes, and they're also on the main NIOSH website. This is the worker outreach meetings we conducted back in May of 2008.

CHAIRMAN GRIFFON: I think if -- I'm not going to dispute that NIOSH considered these, but I would ask SC&A -- I think it's worthwhile for SC&A to follow up on these, in a similar manner that you did with the affidavits, where you --

If you can try to consolidate, if there's similar comments made by many different people, consolidate what you identify on those as issues. I think that
would be useful. They may be consistent with another issues already reported. But I think it's worth looking at.

DR. MAHIJANI: You know Mark, and what I'd like to do is we already have that report on issue 23 that's very similar, that Steve reported on earlier.

What I'd like to do is just to defer that and go back to the drawing board and add what Mr. Warren is saying to that, so you don't have two reports on one issue.

CHAIRMAN GRIFFON: Yes, yes. I think that's a good idea.

MR. KATZ: So Bob, do you follow that?

MR. WARREN: Yes I do, and the only other thing I wanted to put in the record was that if you need some tank farm names of people that were there and had, you know, I'll be glad to furnish that. I've been representing hundreds of people since 2002.
So, if you need some records, then somebody can call me and I'll be glad to talk to the claimant and get their information, to give you their records.

DR. MAKHIJANI: Should I --

CHAIRMAN GRIFFON: Yes, go ahead.

DR. MAKHIJANI: Mr. Warren, could you give me your phone number?

MR. KATZ: Well, don't do it on the line here, but --

DR. MAKHIJANI: After.

CHAIRMAN GRIFFON: Yes.

DR. MAKHIJANI: I need to be able to get in touch with him.

CHAIRMAN GRIFFON: Yes, all right.

MR. WARREN: I mean I don't mind giving you my phone number online.

MR. KATZ: It will be in the transcripts.

MR. WARREN: [identifying information redacted] --
DR. MAKHIJANI: Sorry, say that again?

MR. WARREN: [identifying information redacted].

DR. MAKHIJANI: [identifying information redacted].

MR. WARREN: [identifying information redacted].

DR. MAKHIJANI: [identifying information redacted]. Okay. I'll give you a call.

CHAIRMAN GRIFFON: We'll take you up on that offer, yes. All right.

MR. WARREN: Okay. Well thanks for your long meeting.

(Laughter.)

CHAIRMAN GRIFFON: All right. Thanks for sticking with us. All right. Is there anything else anybody else on the phone has a comment?

MEMBER LOCKEY: Mark, you did a
good job.

CHAIRMAN GRIFFON: Okay.

MR. KATZ: Thank you, Jim.

CHAIRMAN GRIFFON: You hung in there Jim. All right. Okay. If there's no other comments, I think we're all ready to adjourn, so meeting adjourned.

MR. KATZ: We're adjourned. Thank you everybody for hanging in with us.

(Whereupon, at 3:59 p.m., the above-entitled matter went off the record.)