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

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ADVISORY BOARD ON RADIATION AND
WORKER HEALTH

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WORK GROUP ON BROOKHAVEN

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WEDNESDAY
JULY 28, 2010

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The Work Group convened at the Cincinnati Airport Marriott, 2395 Progress Drive, Hebron, Kentucky, at 8:00 a.m. Eastern Daylight Time, Josie Beach, Chair, presiding.

PRESENT:

JOSIE BEACH, Chair
HENRY ANDERSON, Member
BRADLEY P. CLAWSON, Member
WANDA I. MUNN, Member
GENEVIEVE S. ROESSLER, Member

ALSO PRESENT:

TED KATZ, Designated Federal Official
TIMOTHY ADLER, ORAU Team
RON BUCHANAN, SC&A
GRADY CALHOUN, DCAS
LEO FAUST, ORAU Team*
JOSEPH FITZGERALD, SC&A
EMILY HOWELL, HHS
JOHN MAURO, SC&A
JIM NETON, DCAS
GENE POTTER, ORAU Team*

*Participating via telephone

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

(8:01 a.m.)

MR. KATZ: Good morning everyone in the room and on the line. This is the Advisory Board on Radiation Worker Health, Brookhaven Work Group, first meeting of the Work Group, I believe, right?

My name is Ted Katz, I'm the Designated Federal Official for the Advisory Board, and we're going to begin with roll call and since we're dealing with a specific site, please speak to conflict of interest as well.

Beginning with Board Members in the room, with the Chair.

CHAIR BEACH: Josie Beach, no conflicts with Brookhaven.

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

MEMBER ROESSLER: Gen Roessler, Work Group and Board Member, no conflicts with Brookhaven.

MEMBER MUNN: Wanda Munn, Board Member and Work Group Member, no conflicts.

MEMBER ANDERSON: Henry Anderson, Board Member, no conflict.

MR. KATZ: And do we have any Board Members on the line?

(No response.)

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

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

MR. CALHOUN: Grady Calhoun, NIOSH, no conflict.

MR. ADLER: Tim Adler, ORAU, no conflict.

MR. KATZ: Any NIOSH or ORAU on the line?

MR. FAUST: Leo Faust, ORAU Team.

MR. POTTER: Gene Potter, ORAU Team, no conflicts.

MR. KATZ: I'm sorry, you both were speaking at the same time. Try that again?

MR. FAUST: Leo Faust, ORAU Team, no conflict.

MR. KATZ: Thank you.

MR. POTTER: And Gene Potter, ORAU Team, no conflicts.

MR. KATZ: Great, thank you and welcome. SC&A in the room?

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

MR. FITZGERALD: Joe Fitzgerald, no conflict.

DR. BUCHANAN: Ron Buchanan, SC&A, no conflict with Brookhaven.

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

(No response.)

MR. KATZ: Great. Then Federal Officials from HHS, DOE, DOL, other agencies or contractors to the feds in the room?

MS. HOWELL: Emily Howell, HHS.

MR. KATZ: And on the line?

(No response.)

MR. KATZ: Very good. And then do

we have any members of the public who'd like to identify themselves as attending? On the line?

(No response.)

MR. KATZ: Okay, then, Josie, it's your agenda.

CHAIR BEACH: Okay. As you know, or if you don't know, the agenda is posted on the NIOSH website. We're going to start with a brief report from NIOSH on the Evaluation Report.

Then we'll go into the review of the matrix with SC&A and NIOSH. And then we'll take some time to look at a path forward for the Work Group for future meetings.

Just for a little brief history on Brookhaven. On December 18, 2008, the Advisory Board tasked SC&A to complete a Site Profile review for Brookhaven. That was completed and sent out in September of 2009.

During the Advisory Board Meeting in Port Jefferson on October 20th, a

recommendation was made to add an SEC Class for Brookhaven from January 1st, 1947, to December 31st, 1979.

And during that same meeting, a Work Group was formed to look at the Site Profile review and to look at the years January 1st, 1980, through December 31st, 2007. SC&A was also tasked, at that time, to do what was called a focused review of the Evaluation Report, and that we have before us.

The other thing I'd like to do is just take a minute to share some thoughts and goals, on the record, with regard to the Work Group meetings.

Kind of what I call ground rules. First, to every extent possible, any White Paper to be discussed, should be made available to the Work Group, NIOSH, SC&A, at least one week in advance of the scheduled Work Group meeting.

If material is provided at the table, a discussion may be limited to just

clarifying what is being given, without actual deliberations on the content.

And then, second, we should use Work Group meetings to deliberate on SEC-related questions, adequacy, completeness and integrity.

Purely technical or historical factual issues may be better addressed in one-on-one technical calls or meetings and notes would be taken during those meetings.

Three, the Board's role includes independent validation of Evaluation Reports, assumptions, and judgment of historical facts and should not be construed as questioning the rigor behind the Evaluation Report.

A discourse between NIOSH, DCAS and SC&A, serve to inform the Work Group and the Board's future recommendations on Brookhaven.

And, fourth, the Work Group's process is designed to use deliberative process to allow narrow scope of the SEC important issues and questions, to the point

where the Work Group is in a position to advise the broader Board on any remaining issues, and should be discussed prior to the vote on recommending, regarding the SEC.

So, that's kind of my standard before each meeting, so that everybody knows, kind of, where we're at and what's expected for the Work Group meetings.

And, with that, I think we're ready, Grady, if you want to give us a brief overview of the Evaluation Report.

MR. CALHOUN: Okay. Basically, when we started to look at Brookhaven, the thing that jumps out is record keeping. But, just some basics is they have a lot of data, a lot of data.

Urinalysis began in 1949. Whole body counts began in 1960. There's a lot of follow-up bioassays for incidents, for, I guess I'll say more exotic-type radionuclides.

It was a very, very diverse, or is a very, very diverse site. There's reactors

on the site, there's a lot of linear accelerators on the site. And there's a bunch of research done on the site.

There are rad facilities and non-rad facilities. There's a bunch of people that never touch an atom of radioactivity, and there's a bunch of people that do.

So it's a, I don't know how many of you have been there. It's laid out kind of like a university, to me, it seems like. And with a wide variety of work.

What we found, when we started looking into the Evaluation Report is, at first, like I said earlier, you know, we've seen the internal and external records and how many of them were there.

The external dosimetry program has been consolidated, and the records have been consolidated, since basically the beginning of BNL operations. Internal dosimetry is a different story.

So usually it was a lot of records,

but your issue became, what's the availability of those records? I know that there's a bunch of records there, but if John Smith needed to get a urinalysis or a whole body count, how do I know if John Smith's urinalysis or whole body count results are available?

So this not only came to our attention because of the Evaluation Report, but not too far away in time we found, in older cases, that we would get responses from Brookhaven that said no bioassay available.

But then we would get bioassay. So, not from them, but we got it from the claimant, is what started us to look more in depth with this.

So basically, after a bunch of interviews and data capture, we had to try to come up with a way to determine when were records available, readily accessible and something that you could count on.

And there's a couple of things that came to our mind. First of all, we found a

letter, it was a 1979 letter, basically saying, you know, we need to centralize whole body counts because they're all over the place.

And when I say all over the place, I mean physically all over the place. They're in the little file kingdoms and different projects across the site.

So that was an indication that they recognized that there was an issue. We needed to come up with a way of how to, to try to verify retrievability of bioassay whole body count records.

And one of the things that we found, doing our data capture, is that we would find memos that would list individuals. And, you know, there may be five people, there may be 25 people.

And it would say these people in your organization need to be whole body counted or have a urinalysis. And this is what the radionuclides are that they need to

be tested for.

So what we did is we got those records and we got 69 names of those records. And these were not necessarily claimants. Some of them may have been, but most of them were not.

And we asked Brookhaven to do a search of, there's basically three repositories that they have there. Give us everything you've got on these 69 people.

And what we did is we broke up those 69 people by decade. And tried to look at the percentage of return that we would get. So if they said John Smith got a whole body count in 1975, we had to see the results from John Smith's whole body count in 1975, to see if it was retrievable.

And what happened is -- the '80s and '90s, is where we really started getting high level of retrievability, '70s, '60s, '50s, it just wasn't there.

We know that the individuals were

requested to get whole body count or have a urinalysis but the data just wasn't there. At least it wasn't there as far as Brookhaven was concerned.

They didn't give it to us. So, we decided that based on those results, 1980 was a good cutoff date.

We had 100 percent retrieval in the 1990s, and the 1980s was off by one individual. We did find a whole body count for that individual, but it was more than a year afterward so we didn't count it.

We counted that to be 100 percent retrieval for that decade as well. We realize it's a small sample size, but that's how we did it. Because we were more concerned about retrievability than just gross numbers.

Because gross numbers don't tell you a whole lot, when we need the individuals dosimetry reports.

CHAIR BEACH: Can I ask you a question?

MR. CALHOUN: Yes, ma'am.

CHAIR BEACH: So in 1980, of the 69 individuals, you got 100 percent minus one --

MR. CALHOUN: Yes, but the 69 were spread out over six years. So it was probably, six decades. So it was probably eight per decade.

CHAIR BEACH: So eight individuals in 1980s?

MR. CALHOUN: Yes, eight or nine, yes.

CHAIR BEACH: I just want to make sure on the number.

MEMBER ROESSLER: Can I ask, add to that question? So in '79, there was this letter indicating that things should be better centralized. Then did you find an indication that there was a follow-up to that?

MR. CALHOUN: Actually, I did, but that's not, that's something I just found in the last couple of days. So, and I'll tell you about it.

MEMBER ROESSLER: Okay, I'll just wait --

MR. CALHOUN: I hate to throw stuff up that's brand new, but I've been spending a lot of time going through this.

MEMBER ROESSLER: What would be an indication to that something took place --

MR. CALHOUN: Well, the first thing is, I think is the retrievability test that we did. As in the 1980s, things started getting a lot better.

In the last week or so, I found a letter in May, 1980. And it was a request from a guy named Miltenberger, and I can give you the SRDB number for these documents, if you need them.

But he was asking individuals at the HFBR, the High Flux Beam Reactor there. He said, you know, we're missing whole body count records.

He's asking this to the Project Manager. We're missing some whole body count

records, could you search your records because we need to update, so I can update our bioassay and dosimetry records.

And what he did was he presented a table of individuals, and he listed from 1973 to 1980, the records that he didn't have. And he, you know, this guy needed a whole body count in this year, we don't have it.

He listed all of those. And then there's a couple back and forths with them. I went through the records that we have. At the time, now this was in May of 1980, this request went out.

And there were only two records missing from 1980. If you go back to '79 and '78, there's many, many records that are missing.

And actually we have the results from those two individuals. They were found and we actually have them in our Site Research Database that we captured on a data capture.

So, everything from 1980, that he

thought was missing, and he went out and made a request to the project manager there, I think his name was Rothman, it says.

We got those two for 1980, so 1980 was complete, '79 wasn't. Big difference between '79 and '80. So that's just another indication that they did something and the records are, the records seem to be a lot more available. That's basically it. That's what, that was what we hinged our 1980 determination on.

CHAIR BEACH: So how many people are we talking about in 1980? You mentioned 69 over the decades.

MR. CALHOUN: I think it was eight or nine.

CHAIR BEACH: So there's only eight or nine people that needed --

MR. CALHOUN: No, no, these were --

CHAIR BEACH: So how many people --

MR. CALHOUN: This was a sample. Now the sample was based on records that we

had that said, they're basically lists. And they would list individuals and say this person needs to be whole body counted or have a urinalysis for these radionuclides.

You took a sample of those and tried to do a retrievability test.

CHAIR BEACH: So, beyond the sample, how many people would you say had bioassay data in the 1980s?

MR. CALHOUN: Oh, I don't know. We may have that, I don't know that, hundreds.

CHAIR BEACH: Hundreds?

MR. CALHOUN: Hundreds.

CHAIR BEACH: And then, and you did a sampling of eight individuals out of that hundreds?

MR. CALHOUN: Out of the 69.

CHAIR BEACH: Out of the, but the 69 was spread over --

MR. CALHOUN: Yes.

CHAIR BEACH: Several years, okay.

DR. BUCHANAN: I can clarify that.

MR. CALHOUN: Thirteen in the '80s.

MEMBER ANDERSON: And then it's spread out over the '80s?

MR. CALHOUN: Yes.

DR. NETON: I think it's important to point out here that the premise here is that Brookhaven, correct me if I'm wrong Grady, but we believe had an adequate radiation monitoring program in place.

I'm assuming that we have evidence of procedures and documents and such saying that the workers were covered when there was a need to be covered, the potential was there.

Now that's something that we can debate, but if that were true, then the question is, what Grady did.

They went back and sampled and said, well, they found memos saying they put program is in place. Here's a record that says these people should have been sampled, can we verify that they actually indeed were.

And not until 1980, did we have any

confidence that the data could be retrieved. They are probably there somewhere, it's just you don't know where they are.

MR. CALHOUN: The Brookhaven Site, because it was so varied, it wasn't like some of the other Sites where everybody who walks into the controlled area, gets a badge. And everybody who walks into the controlled area has a urinalysis.

And everybody that walks into the controlled area has whole body counts. Because of the diversity of that site, it was dependent on the actual individuals and what jobs they were doing.

Back to the, gosh, I want to say the '60s. The policy was that they would monitor people that had the potential of receiving ten percent of the limit.

And so it was always a project activity-specific type assignment of need for dosimetry, whether it's internal or external.

MEMBER ROESSLER: Let me try to know

what we're doing here. You're bringing up things before 1980, but that Class, the --

MR. CALHOUN: Right, they're done. I'm not worried about that. That's done.

MEMBER ROESSLER: So you're more or less confirming what the decision already was.

MR. CALHOUN: Yes, yes.

MEMBER ROESSLER: And what we really need to focus on is the adequacy of the program starting in 1980?

MR. CALHOUN: Yes, that's true.

MEMBER ROESSLER: And so any of these comments about what was done are pertinent only to the one that's already in SEC.

MR. CALHOUN: Yes, yes, yes.

MEMBER CLAWSON: Well, this is one of the questions that I had, because basically looking at the graphs and charts of how many bioassays or *in vivo* and so forth like that, I don't see an increase, you know, or anything else that's around the '80s.

And that's why I'm interested in why the '80s --

MR. CALHOUN: An increase really wouldn't indicate anything. What we're looking at is retrievability because, only if we had a static workforce, that we had a certain number that we are going to monitor, would an increase or a decrease be any kind of indication of the monitoring program.

Because the workforce fluctuated a lot and the different activities fluctuated a lot. So just a gross increase in the number, or decrease in the number of people monitored, really isn't going to tell you much about the adequacy of the program or retrievability.

For sure, it's going to tell you nothing about retrievability.

MEMBER CLAWSON: No, and that's absolutely true, and if you don't have the documentation there or the bioassay it's not going to tell you anything else.

My understanding is they didn't

have any kind of centralized bookkeeping. Everybody was kind of out on their own, is that correct?

MR. CALHOUN: I, like I said, the determination on whether someone would be monitored or not, was based on an activity. So, if you had potential to receive whatever the threshold was, you were monitored internally and externally.

It wasn't everybody. Because, like you said, if you've ever been on that site, it's like walking onto a, it's like walking onto to a university.

And the pockets of radiological activities were, you know, spread out.

CHAIR BEACH: So the original SEC from '47 to '79, that was given to everybody on the Brookhaven Site?

MR. CALHOUN: Everybody.

CHAIR BEACH: Okay. So everybody on site had the potential to come into contact with some type of dose?

MR. CALHOUN: There was no way to determine if they couldn't.

CHAIR BEACH: And did that change after 1979, that theory?

MR. CALHOUN: No, no, we believe that everybody was monitored appropriately. The issue is retrievability of the records.

CHAIR BEACH: Right.

MEMBER ROESSLER: So pointing to that issue, and in the ER here, it talks about 1979, and there's a report by Hall, which I don't have here.

MR. CALHOUN: Right.

MEMBER ROESSLER: It talks about, and we're talking about whole body counting records, switching them from the medical division to the S&EP.

Now apparently that sort of was the evidence that something new has happened and --

MR. CALHOUN: Yes, that was part of our puzzle. That kind of triggered us to, I

mean it actually is independent of, but supports the 1980 take.

You know, obviously somebody felt that there was a need to get a better grip on the internal dosimetry records and centralize them. And that came out in 1979.

MEMBER ROESSLER: That was the indication that there was a need.

MR. CALHOUN: Yes.

MEMBER ROESSLER: Now do you have another indication that it actually took place?

MR. CALHOUN: I believe that our retrievability sample is -- supports that tremendously. And I also believe that this other thing that I just found about them actually going out and saying, hey, we've got missing records, we need to gather these together so that we can update our dosimetry and bioassay records, supports that as well.

Now that's one I just threw at you, because I just found it a couple of days ago.

MEMBER ROESSLER: It would seem like this new division, S&EP is probably Safety and --

MR. CALHOUN: And Environmental Protection, I would imagine.

MEMBER ROESSLER: Something like that.

MR. CALHOUN: I don't think it's a new division, but --

MEMBER ROESSLER: It would seem like there might, I would expect to go there and find some new, in 1980 or '79, some new evidence that they're saying, okay, we're going to square this away.

And you haven't looked for that yet.

MR. CALHOUN: Well, all we have so far, and if you've got anything new, Tim, you can tell me. But is what we have is a memo that said we need to do it.

We have the records that indicate that the difference between the '70s and '80s

is significant, as far as retrievability goes.

And I've also got the memo from May of 1980, that says, you know, we need these records. We found that these records were missing.

If you've got copies of them, send them to me. And I looked through our database and I found all of the records, although there were only two that were missing in 1980, and these are, these are not checkmarks that just say they were taken, these are the actual whole body count results.

And in 1979, not nearly as much. I would say more than 50 percent of them were missing.

MEMBER ROESSLER: So this author in 1980, Cohn, wasn't he the whole body counter supervisor there?

MR. CALHOUN: Cohn, yes --

MEMBER ROESSLER: Well, I guess what I'm looking for is some records there, once this was transferred, to say we, we now have -

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MR. CALHOUN: I don't have anything that says, okay, we've got them all here in one spot. I don't have it.

MEMBER ANDERSON: Or we've changed the procedure, so that's --

MEMBER ROESSLER: Yes, that's what would really --

MR. CALHOUN: I would --

MEMBER ROESSLER: But I'm not sure you've really looked at everything yet.

DR. NETON: Is there evidence that they actually may have consolidated data?

MR. CALHOUN: They are still in the process of doing it. If you look, what you'll find is, you know, sure, I've got individual counts that give the spectrum -- I normally think of as the whole body count result.

But a lot of the results are tabular. You know, I may have 15 people that were counted in March of whatever, 1979 or 1982, and it lists, you know, potassium

results and cesium results and other radionuclides.

So actually, what we're, the one thing we've done, is we're linking those to our NOCTS database. And I know that they're in the process of getting them. Now, we re-request data for many individuals at the Brookhaven Site, based on our findings and we ended up getting data, internal dosimetry data and X-ray data that we had not previously received from them.

Because now they know where to look, you know. So a lot of these whole body counts were in the medical files, and they had not been going through those medical files.

And now we're getting those records and the entire medical file. So, they're still in the process of trying to make them more retrievable, because I believe when they actually did the counts, a lot of the results, like I said, are in more of a tabular fashion.

They were kept that way.

MEMBER ROESSLER: So back to this Cohn reference. It says Cohn, 1980, response to memo of August 27th, concerning Biomedical whole body counter correspondence to Miltenberger. What did that say?

CHAIR BEACH: Gen, are you on the ER Report?

MEMBER ROESSLER: I'm on the ER Report.

CHAIR BEACH: What page?

MEMBER ROESSLER: I'm looking in the reference list now, on page -- which I think is page 82.

I'm just trying to follow through, just looking for something that confirms even more than you have, that in 1980 there was a change. It's very short.

DR. BUCHANAN: Very short.

MEMBER ROESSLER: Okay.

MR. CALHOUN: And I don't know that one off the top of my head.

MEMBER ROESSLER: Have you talked about Miltenberger, about anything that was going on at the time. I don't think he's at BNL anymore.

MR. CALHOUN: I don't know if we interviewed him or not.

MR. ADLER: We did interview him. At the time we interviewed him, we had not talked about the 1980 date. We weren't that far along in the process.

But, I think it's evident, from these memos anyway, that the change did occur certainly. Whole body counting came under S&EP at this point.

It's not -- as I read these memos, that they've now took charge in talking to Bob and some other people, the issue of whole body counts being in medical files is a non-issue after the 1980 time frame.

A little less scattering there, at any rate, and more centralized oversight of the sample retention, to some extent.

Evidently from our study, at any rate.

CHAIR BEACH: So I guess I'm not clear with, Tim, what you just said. You said it was a non-issue, then you said it was a little less gathering.

MR. ADLER: Oh, well, prior to 1980, medical was doing the whole body count. And in this memo, in 1979, from Paul Miltenberger expresses his concern for lack of follow-up and oversight of the whole body count, which is the primary monitoring means for them at that time.

Prior to 1980, if medical was doing the whole body counts, records were being retained by medical and we weren't getting in people's files, as Miltenberger had wished, evidently.

And so he asked to take over the whole body counter being used by Marshall Islands project. And they used that, take over that project, as well, used that counter for all the people under S&EP's purview.

Which was basically everybody, all the HP work. So, there's a complication that when they had to send that counter down to Marshall Islands, they were without one.

That, then spurs this other memo, you'll see, requesting use of the medical whole body counter during the short periods, and they get an agreement, yes, we can still use your counter, but we want to retain the data, sort of thing.

So, after 1980 -- I'm sorry to interrupt. After 1980, the whole body counts don't show up in the medical records nearly so much.

CHAIR BEACH: They show up in personal records?

MR. ADLER: In personal records, S&EP records.

MEMBER ROESSLER: Miltenberger is at Sandia.

MEMBER CLAWSON: So what type electronic databases do we have on this? Is

everything an electronic database or is it in hard copy?

MR. CALHOUN: It's like, I think most of it is probably from a bioassay sample and it is scanned. I know that the external documents have been in one central electronic database for a long, long time.

CHAIR BEACH: Okay, any other questions on the ER?

DR. MAURO: I have just a question.

CHAIR BEACH: Yes, go for it, John.

DR. MAURO: So, now you have a number of claims that have come in post-'80?

MR. CALHOUN: Yes.

DR. MAURO: And how many have you processed so far?

MR. CALHOUN: Post-'80?

DR. MAURO: Well, the ones that are not covered by the SEC?

MR. CALHOUN: So non-presumptives and post-'80, I can look that up real quick.

DR. MAURO: Just give me an idea,

are we talking thousands?

MR. CALHOUN: No, gosh, no.

DR. MAURO: Hundreds?

MR. CALHOUN: No.

DR. MAURO: Dozens?

MR. CALHOUN: Yes, yes, I would say probably less than 200. Brookhaven, this is a bit of a side note -- but Brookhaven is a very low, there should be way more claims than there are.

And, you know, when we were out there, we actually talked to them about that. And it doesn't make sense that there's so few claims.

DR. MAURO: Now when you go through, let's say, a given claim, the dozens or whatever that were done, and you look at this person's work history.

And you say, okay, he worked over here with, I presume you have a pretty good record of where he was, what he did, the function of time.

And you make your own judgment as to, okay, apparently this person had some potential for exposure to this, this, this and this, from your perspective. And you say, okay, on that basis, am I able to go into his records and find the whole body counts or the bioassay samples that you believe are needed to reconstruct the person's --

MR. CALHOUN: And actually one of the things that we're in the process of doing, over the last few days, to try to get ready for this, I started going through all the, not all, through many of the cases that had employment post-1979.

Preferably at the jump. You know, they had a little bit on both sides. And what we have done is, I don't how familiar you are with SRDBs, the documents associated with Brookhaven.

DR. MAURO: No.

MR. CALHOUN: But we've actually linked many of the whole body counts. So we

get, on the return, the re-request, I'll say, we get a much better return for internal dosimetry and X-ray.

But we've also gone so far as to link the documents that we've found, that list John Smith's whole body count in 1969 or '82, or whatever, to our whole body count, to our internal dosimetry records, and we use those.

So, yes, we do, we have them. And there's a, you know, there's never been an issue with the external dosimetry records.

So, certainly if I'm going through the dosimetry records, for those reconstruction, I'm going to look was the guy monitored for external dose? Did have any external dose?

You know, if he had some external dose, or even if he was monitored, there's probably reasonable chance that he should have had some kind of internal dosimetry, or have been monitored.

I'll also look at the CATI, you

know, were you monitored? And it works great if the guy was alive when he gave the CATI, it doesn't work so well when he's not. But, yes, those, a lot of those are in there.

And I think they're continuing to be put in there. Because we've got tons of documents from Brookhaven.

CHAIR BEACH: Yes, I looked.

MR. CALHOUN: Ton, tons, yes.

CHAIR BEACH: Definitely --

MR. CALHOUN: Yes.

CHAIR BEACH: SRDB numbers.

MR. CALHOUN: It was, when we went to the place there was probably, the room was probably four of these and the walls were full of documents.

And we captured most of those that had anything to do with dosimetry --

CHAIR BEACH: Have you done any interviews with any workers to date?

MR. CALHOUN: I don't know if we have or not.

MR. ADLER: We've interviewed a few. I don't have a list in front of me. We've done about 14 interviews, I guess.

CHAIR BEACH: Was it for post-1980 or --

MR. ADLER: Scattered throughout.

CHAIR BEACH: Just scattered?

MR. ADLER: Yes.

CHAIR BEACH: Are those all listed on the O: drive?

MR. ADLER: They would be, all the interviews are in the SRDB.

CHAIR BEACH: Because I wouldn't mind a copy of the SRDB numbers for the interviews, at some point. That would be helpful. I looked on the O: drive and there's so many when you start opening just --

MR. ADLER: Right, yes. They're usually filed under communication documentation. But I'll get you the --

CHAIR BEACH: They just come up under numbers.

DR. BUCHANAN: I believe page 14 of your ER, are these your interviews here on page 14?

MR. CALHOUN: I'd have to look. It looks to me like they are.

DR. BUCHANAN: And they give it here, the number.

CHAIR BEACH: Okay, thank you.

MR. CALHOUN: Oh, yes, absolutely, yes.

MR. ADLER: They do. How many --

MR. CALHOUN: There's ten listed.

MR. ADLER: Ten, okay.

CHAIR BEACH: Well, it looks as if Ron just saved you a lot of work.

MR. CALHOUN: We're all about that, that's good.

CHAIR BEACH: Okay, are we ready to jump into the matrix?

MR. CALHOUN: Sure.

CHAIR BEACH: Okay.

MR. FITZGERALD: Okay.

CHAIR BEACH: Kick it off.

MR. FITZGERALD: Take it away, right. Actually we have two issues, which is maybe perhaps a little unusual for SC&A. And actually one central issue. Certainly we have some questions on neutrons based on what we've looked at in terms of the documentation on-site.

But the central issue is record keeping for internal dosimetry and bioassay. And I actually am comfortable with Grady's description of the conditions in the earlier pre-'80 and where things are going now.

I think, based on our interviews and discussions, you know, we found much of the same thing. This is a site, as Grady pointed out, it's a very diverse set of operations.

You had research reactors. You had medical isotope applications. You had accelerators. So it truly was a campus of sorts, with various activities spread around.

And a long history, a 50 some plus year history. So you had different activities starting up, different activities stopping. Projects beginning and ending. So it is a much different scene than you would have at a production facility, this being a research laboratory.

But, at the same time, particularly for internal, it was a very decentralized system, in terms of how records were kept.

And I'm talking about records. I think, Jim made the point that, from the standpoint of actual monitoring, we didn't see any issues either.

So this is really focused on the accuracy and completeness of the record keeping for bioassay, a very focused question.

And the SEC through '80, hinges on that question, which is certainly before that, as apparently everybody agrees, that that decentralized system of record keeping was such that you could not, in fact, retrieve the

necessary records to support those reconstruction.

We focused on that entire span closely and looked for, not only the programmatic changes. You know, granted, as you got into the '80s, almost anywhere in the DOE complex, people were talking about how can we improve the way we maintain, you know, records and how we do dosimetry.

That led, ten years later of course, to the accreditation program but, you know, certainly that thinking started, you know, late '70s into the '80s.

The energy research labs were a bit behind that curve. You know, just simply because they didn't have the kind of sources and exposures that would be, to provide the urgency of getting handled.

So they did come along, but it wasn't as quickly, perhaps, as some of the production facilities. At Brookhaven, what we focused on was the actual manifestation, the

actual implementation of the directives, the procedures.

Could you actually see record keeping becoming more complete, centralized and retrievable? I think a lot of things that Grady said earlier about going back and looking at retrievability and you know, more or less testing and validating is what we were looking at, looking for in the Evaluation Report, the ER.

We did not see that, and that's the extent of what we have as a basis for our concern is that the ER cites these programmatic directives and memos and what have you, saying that, you know, we need to move forward and do these things.

And we just don't think that's adequate. We think that certainly the intent was there, but knowing how cultures are, safety cultures, not to mention health physics cultures.

We didn't think things would turn

on a dime, certainly at a laboratory like this. It would take some time before that intent was manifest in actual changes and practices.

And then actual change, those practices led to better record keeping. So we wanted to focus on that. When did you actually see the kind of record keeping that would enable you to retrieve the information necessary for dose reconstruction.

And, not to put too fine a point on it, but we, in fact, interviewed the health physicist who, prompted by Grady and NIOSH, was going around the site, and I sort of felt sorry for him a little bit.

He was going around the site trying to find records. And he was going from one operation to another, just trying to figure out where everything was, you know, and he just told us it was a monster.

Because you're going back in time. And, as he said, you know, he had supervisors

who, and this is the way Brookhaven ran.

It was decentralized records. The supervisors kept the records, in a lot of cases, and if they retired they could have thrown them away.

They could have took them home. They could have passed them on to somebody. It was much more of an ad hoc affair. So, the job of trying to pull that together, going back that far in time, was pretty dramatic.

And they were going through and doing a yeoman's job. I'm not to say that they weren't putting the effort into it. I think actually this program, this is sort of a side benefit of this program, has prompted them to actually centralize in a much better sense their record keeping, such that they can respond to NIOSH's requests on the dose reconstruction.

So actually this program is driving a much better system there. But it gave me some pause to talk to this individual because,

you know, he's sort of like a one-armed paper hanger.

And he was running around just, you know, trying to get this stuff together and come up with a centralized record system and he wasn't there yet.

And so, you know, you have to think, well, if you're not there yet and you're not even sure you'll ever be there, because of the questions of, you know, what happened to some of the records? There's a question of the completeness and accuracy then as to, you know, what do you have? When do you know you have it all, if you can't really establish that?

So that was really a lot of the thrust. And I'll certainly defer to Ron, as well, but I did the interviews at Brookhaven, talked to these people, talked to some of the principals. I won't name them but, you know, Brookhaven has some very notable health physicists who I think all of us would be

familiar with, and really talked about this issue. And they were quite candid that, you know, yes, we started thinking about this in the '70s and '80s, and were putting this program in place, but it was a tough job and it took a while to get there. And that's the basis for our concern. When did they actually get there? Not when they were, you know, intending to do something or when they were putting it in place and implementing. But when did the program get to a place that you had a requisite body of records that you could rely on and feel was complete enough to support dose reconstruction?

And I didn't see that in the ER, and I think some of the things that Grady had pointed to, gives me some sense that there is ways to test that.

But, you know, right now I don't think we've seen the results of those tests and it sounds like some of them are ongoing, so I would leave the Work Group with that

notion that, you know, we're dealing with a situation where Brookhaven is putting a lot of effort into getting these records into a place where they could be used, but the question is at what point is there enough there that there's confidence you could use it for dose reconstruction.

And I think, it sounds like NIOSH is moving in the right direction, but we didn't see that in the ER, so this may be something that the Work Group may want to investigate further. Just to see that validation. That's the key thing for me, the validation that given the circumstances at the site, that you have the records. And not the intent, not the procedures, but you have the records. And as that HP seemed to suggest last year, it seemed like a work in progress at the time.

Ron, do you want to walk through the -- any questions on that before Ron goes through the matrix in more detail? We do have

another issue on neutrons, but I just wanted to pass that on since we spent some time last year doing that.

MEMBER ROESSLER: I have just one question. Andy Hall keeps coming up in records as being the one who said we really have to get this squared away.

Did you have any access to any of -- now he died I don't remember when -- anything that he might have written following all of this? Do you have any records from him?

MR. FITZGERALD: We were looking for correspondence, memos, but we did not see anything that he had in the file, necessarily.

And, again, keep in mind, so we were doing a Site Profile, so we were kind of looking broadly speaking and focused on, you know, the broader picture. But I think one of the issues, looking at this hinge point, in 1980, would be to focus in on the implementation aspects, when did that actually

manifest itself.

But more so, you know, the retrievability of the records, I think, and I think -- I would agree, I think that's one way to go. One test is retrievability. Another test, though, is looking at the records themselves. That would seem to suggest that there were actually records missing for certain years, for certain locations.

And I would like to see that laid out as to, you know, what in essence do we have? What records do we have? For what, you know, we know what the, what locations, what facilities had potential uptakes and where they did monitoring.

What's the, you know, what does Brookhaven have in the way of records for those sites? And we don't really have that, per se. And that would be very helpful.

MR. CALHOUN: Do you have any specifics on where, where records were found

to be missing after 1980?

MR. FITZGERALD: No. I was just saying that, you know, given what, this individual, and I can give you the name off the phone, but given what this individual was saying, he was in the process, and this was a year ago, of pulling these records together, I think in response, Grady, to NIOSH's request. And I'd like to see, you know, a sort of snapshot of what he's got right now, you know. How complete is it? Where does he feel it's incomplete? And, you know, he did express some concern that some of these records may not be retrievable because they were destroyed or lost, given the ad hoc and decentralized nature of the program.

CHAIR BEACH: Is that one of the interviewees?

MR. FITZGERALD: Yes.

CHAIR BEACH: Those records are on the website. They're in a file under Brookhaven, that Kathy put together, I

believe.

MR. FITZGERALD: Well, the interview.

CHAIR BEACH: The interview, yes.

MR. FITZGERALD: Interviews, yes, not the records.

CHAIR BEACH: Not the records, sorry.

DR. BUCHANAN: That's reference 71451, Joe is talking about.

MR. FITZGERALD: But I think, you know, again, it would be helpful having that. Because if he's putting together, then I think what you'll have is facilities, time frames and numbers of records. I think there's actually, to look at this issue, the retrievability test is useful. The mapping of what they have now and what they think they don't have would be useful.

And those would be foundations for answering the question, I think. And to go back to Genevieve's comment, any more evidence

of actual implementation of these memos, and I don't know, you know, it's sort of like trying to find some evidence that something happens after the memos --

MEMBER ROESSLER: If you had some date that something occurred, then you'd be able to better focus on --

MEMBER ANDERSON: When the office opened kind of thing.

MEMBER ROESSLER: Yes.

MR. FITZGERALD: And you know, Brookhaven, like some of the energy research labs, it's almost, you almost have to find the right cubbyhole to find somebody's correspondence file, let alone records.

So, in a way, it may mean finding out where Hall's, Andy Hall's, you know, correspondence ended up. And we didn't see it, so I have a feeling it's somewhere on site and we can certainly look for that.

MEMBER MUNN: Well, not only that, you need to have very clear information as to

when a project starts and when it begins.

In a research and development laboratory, those things can literally turn on a dime. And you may start a project one week, with the expectation of running it for a year, and decide the results are not worth doing and it would be gone three weeks later.

And we can probably assume, given the quality of the health physicists who were actually operating at Brookhaven, that any policy, like the one Grady referred to, that anyone who was likely to have more than ten percent of allowable, was going to be monitored.

We could probably assume the monitoring did occur, because of the quality of the health physics that you had there.

But, with respect to whether you have missing records, that's going to be very difficult, I would think, if you identify the missing record to tie that to the fact that the reason it's missing is because nothing was

going on at the time and therefore the monitoring is not taking place.

MR. FITZGERALD: Yes, it's not easy.

MEMBER MUNN: No, it isn't easy.

MR. FITZGERALD: It isn't easy and that's the feedback I think we received from staff.

MEMBER MUNN: It's unlike pointing to gaps in information that may occur in an operating facility, it's totally different.

MR. FITZGERALD: Yes, and the circumstances -- you're doing a retrospective centralization of records over decades. And, you know, in a research lab, if you didn't centralize those records when they were created, the challenge is that there is no way to ensure that those records are going to be --

MEMBER MUNN: Well, even if you're centralizing the badge records, even if you're centralizing the information that we're looking at, without a direct tie to the

operational records and to the research records, it's not easily identifiable, why?

You may think something is missing, when the reason it's missing is because nothing was happening.

MR. FITZGERALD: Right. Well, again, I think everybody, I think there's no disagreement that, you know, the circumstances behind the program were challenging. I think we're just trying to figure out, you know, at what point was the corner turned in the context of this program with dose reconstruction.

We have doubts about 1980. Now, we don't have a clear idea either whether it's '85, '86, you know, it's just one of these things where, until they were certified, which I think was late '90s.

DR. BUCHANAN: '99.

MR. FITZGERALD: For internal. They were certified for internal in '99, and external, I think was '92. You know, there's

a gray area there that I think we'll need, you know, need some validation. Something that gives confidence that the records are in fact reliable enough.

And I think that process, it seems like it's just starting in the sense the ER didn't provide, I think, what I would look for in the way of validation itself. The follow-up on the implementation memos, the actual, you know, actual retrievability tests, maybe some mapping of what records were available.

I think that's what's going to be necessary to know, you know, whether or not we truly have something that we can have confidence in, in terms of dose reconstruction.

I think before that you have programmatic intent. You have steps beginning, but it's not clear if those steps led to something that is solid. And that's the concern that we have.

MEMBER ANDERSON: One source of

information is that cases that are, or have been reviewed or are under review and how many of these have been closed? If you have 200, are they sitting there, because somebody hasn't been able to recapture records at some point?

MR. CALHOUN: Let me tell you, I want to say there was 145 total cases, total that was sent to us from the Department of Labor. And I would guess, if it's typical that, you know, at least 30 percent of those have been taken for SEC.

But let's, hold on a second, let me look. One hundred fifty-three total cases were submitted, 34 have been pulled for SEC purposes, 61 remain active.

DR. BUCHANAN: What were those numbers again, please?

MR. CALHOUN: One hundred fifty-three total.

DR. BUCHANAN: Okay.

MR. CALHOUN: Thirty-four pulled for

SEC, 61 remain active. Fifty-eight were completed.

MEMBER MUNN: Fifty-eight closed.

MR. CALHOUN: And a little bit more than 33 percent of those were comped. Now I can't -- some of these undoubtedly are mixed employment. I can't tell that from looking at this. They may have worked somewhere other than Brookhaven.

DR. BUCHANAN: Fifty-eight of the DRs have been completed?

MR. CALHOUN: Correct.

MEMBER ROESSLER: And how many, that's 30 some comped?

MR. CALHOUN: Thirty-three percent, about. It's about a little bit more than a third.

MEMBER ROESSLER: And then you started to say based on?

MR. CALHOUN: Just based on dose reconstruction.

MEMBER ROESSLER: Do you recall what

working conditions were that, I'm trying to think of the whole spectrum of workers and, you know, things that these are going to be words that will get people going.

But things like bounding and cohort data and that sort of thing, when you're doing dose reconstruction, is that an option then beyond what we're talking about?

MR. CALHOUN: Right now our dose reconstructions are based on the internal and external dosimetry records. If they weren't monitored internally or externally, we go by environmental dose.

DR. MAURO: Okay, that was the issue I wanted to get to. In classic SEC ER review, what we do is we break the site up into time and operation.

And that's typically an operating facility. Here I recognize we have a very different kind of situation. And what we look at is, okay, for this particular time period, this particular campaign or operation or

research activity, how many records do you have -- let's say it's whole body count. And we ask that question because we ask ourselves, are they in a position to create a coworker model? Because very often you find there might be a worker that, if you have 100 percent records, from the workers that worked in that box, you don't need a coworker model. But, it's very rare that that occurs. Then we ask ourselves, do you have the records to build a coworker model? And my question to you is, have you found that you had to build a coworker model?

MR. CALHOUN: We have not undertaken that yet.

DR. MAURO: It hasn't happened yet.

MR. CALHOUN: No.

DR. MAURO: Now, do you feel as if that, given the limitations that you had on, see, in the end, if you can't build a coworker model for a given claim, but you feel that this person did experience an internal

exposure, for that box there's an SEC.

MR. CALHOUN: Right, right.

DR. MAURO: And I guess that goes to the heart of it.

MR. CALHOUN: Right, right. I can't imagine that we won't do that, but right now that's not something we've done.

You know the internal exposure potential was pretty minor, at that site, especially later in the years. I actually found a Tiger Team report that was done in 1990, that reported that as such, that the internal exposure potential was minor at the Brookhaven Site. And that's rare that the Tiger Team would ever say anything like that, right, Joe?

(Laughter.)

MEMBER ANDERSON: So some of the cases that were filed you found no biomonitoring data?

MR. CALHOUN: Correct.

MEMBER ANDERSON: And therefore you

assigned environmental.

MR. CALHOUN: Correct.

MEMBER ANDERSON: But in looking at those do you have any sense of, would you expected there to have been -- I mean were they in jobs where they might have been --

MR. CALHOUN: Typically we do. I can't answer you on all these, but likely that's part, when we do a review. If somebody was a health physics technician and didn't get internal monitoring, we would throw the flag on that. You can't just assign them to environmental.

MEMBER ANDERSON: Well, that's why I'm just, for getting a sense on the completeness.

MR. CALHOUN: Right.

MEMBER ANDERSON: The records, the ones to focus on --

MR. CALHOUN: Especially, yes --

MEMBER ANDERSON: Are not the ones where you found the records, but if there are

some here and you, there was a reasonable expectation they should have been monitored.

MR. CALHOUN: That's the issue of the coworker model, that we might have to go down that road.

DR. BUCHANAN: You don't know how many of those completed had bioassay data available?

MR. CALHOUN: I can't tell you off the top of my head, I can find that out. Yes, but that's changed.

MR. ADLER: Right, that's changed.

MR. CALHOUN: That's increased, because of the re-request that we've done. The amount of bioassay and X-ray data that we got has gone up.

MEMBER MUNN: But, in any case, as long as we have data that we're working on, the issue of coworker and that type of calculation is speculating what might come up in the future, not what's come up in the past.

MR. CALHOUN: Right, right.

MEMBER MUNN: So, we're not dealing with that right now.

MR. CALHOUN: Right.

MR. FITZGERALD: Ron, do you want to just walk through the Matrix. I kind of gave probably most of it, but just to capture that issue in more detail and the neutrons.

MEMBER ANDERSON: The neutrons are the second issue.

MR. FITZGERALD: Right.

DR. BUCHANAN: Okay. On the internal monitoring, our review of the ER, I think most of you have probably received that. And what we tried to do was, okay, first of all, SC&A, in reviewing Brookhaven, really at this point has no problem with the health physics practices that we see at this site.

There were some top-notch health physicists there and we don't doubt that generally samples were taken when they needed to be. They had the equipment to do it, probably.

It was a little surprising they used NTA film up to 1995. But, be that as it may, I would like to just give a little bit of clarification to things, some things they discussed at the table, and see where we're at, at this point.

You know, where are we at? And perhaps it will guide us to where we need to go. The external dosimetry was recorded fairly well in their files.

We really did not see a problem with the external dosimetry records. They were handwritten up through '95, and if I'm wrong on any of these, you can correct me, this is what I've gathered.

And then in '95, the went to the HPRS electronic database for external dosimetry. And then, so that's the system they use today, the HPRS, Health Physics Record System. And so those are available.

Now when we get into the neutron here, we see that Landauer actually did the

record keeping out of Dosimetry Processing and Record Keeping from '85, to '95/'96, in that area.

And they have the tritium data, because at that time it was considered a whole body dose, and so they have the tritium data on record there.

Now the internal dosimetry records, just to cover that briefly again, is that you had kind of, at this research facility, you had kind of, I call them empires.

People controlled their own areas of interest. There was reactor, accelerator, whatever, and they determined what health physics needed to be done and then kept the records locally there, in a lot of cases.

The medical facility started out the whole body counting for medical reasons. They had a medical research reactor there and they had the whole body counter.

And then you had your Marshall Islands, nuclear weapons testing, that whole

body counter went back and forth. So the records were, as we've talked about, scattered.

And then in the '90s, I think, they started using some electronic databases. Some of the departments had electronic databases and they were certified for, they did the DOELAP Accreditation in 1999, for *in vivo* counting.

So this kind of gives you a milestone, stake in the ground, 1980 to 1999, is the area that we are concerned with. Now you really don't have proof, I guess, that the internal records appeared on the HPRS until 2002.

That's when it was mandated that it be -- that it go over to that. So, we assume if it was accredited in 1999, they must have had some sort of data or recordkeeping system, but I still have a question, and this is just some areas that I'm dragging in, because I don't feel that this has been answered as what

1980, through 2001, where are those records at and are they retrieved.

When the DR sits down at his desk in Oak Ridge or in Cincinnati or wherever he's located and does a dose reconstruction, what is the process and where is that data attained from to do that dose reconstruction?

We know that there's the personnel file, there's the medical records, there's the HPRS, and there's this other file that's being knit together to bring some of this together.

There's some old electronic databases. Are they sitting in a basement someplace or are they operational or what?

So, that's just some gray areas that I feel that needs to be addressed. Where is this data actually stored and how is it retrieved?

And so we, that's a little overall picture of where I'm at, anyway, and I guess on the internal bioassay data at Brookhaven.

And so what we wanted to look at

was the 1980 turning point and see when this might have come into effect. And that we've discussed some this morning.

And so, what I did, is I did a two-pronged check on it. Number one, I looked at the documents that were quoted to see if there was an indication that records were going to be improved and did they follow through with it.

And then I looked at the data and I agree that it isn't conclusive. I just, NIOSH had done a very good job of capturing a lot of data, did it in tabular form in the ER.

Myself, I like to see a picture. And so I took the tabular form and put it into plots to see if there wasn't any case, I'm not saying it's proof one way or the other.

But if I would have seen a change in the bioassay data, then that would have been a good indication. You know, rather an increase, decrease or maintenance stabilization or whatever.

And I realize that this is complicated by the fact that it's a research facility, projects start and stop and that sort of thing.

But if there would have some, eureka, you know, wow, that does look like a change, maybe we could have seen a turning point.

And so that's the two-pronged attack I took. And so in my review of the ER, first of all, I'll talk about the documentation. And as NIOSH has stated, that there was indication that this was to be done in '79, by Hall and Cohen.

So I looked at those documents that are available and I'd like to read the first reference, Hall, 1979. It says the principal weakness of our program are suggested by this canvass of general practices or the lack of required initial counts for persons newly nominated to the list and/or a final count for terminals, termination from it.

But it is not apparent. I am also aware that our current program does not specifically provide the diagnostics or the follow-up for positives disclosed either by routine or special body counts.

Although the above could probably be accomplished within our current arrangement with the medical department, which had the whole body count at that time, I feel that there are strong reasons we should assume the program is 100 percent S&EP operation, now that we have the ability to do so.

Now, that's reading directly from his memo, Hall 1979. And I see in it that they want this to take over the routine counting for the workers, not the bioresearch, not the medical research, but for the routine workers and such. And set up their own body counting and such there. I don't see an emphasis on recordkeeping and there's nothing said about records here.

Now, intuitively, you'd say, well,

if they're going to centralize the whole body counting then, now they should probably mean to keep the records.

But I do not see anything specifically that emphasizes, hey, we've got a problem with records here. They're scattered all over. We're going to centralize it so that they're in one place.

Now, the second reference, Cohen 1980, is very short and I'll read the whole memo. The medical whole body counter is always available for monitoring for BNL personnel in emergency situations, as you are aware.

Apparently, this statement is written from the medical group to the S&EP group, when they talked about the whole body counter being centralized.

In response to your programmatic needs in relationship to medical isotope research and production, we will make every effort to accommodate you for interim

services, availability of the counter for routine monitoring of personnel, of course subject to clinical research demands made on the counter.

I assume that you will be -- continue to be responsible for the analysis and interpretation of the whole body counting data obtained during this interim service period.

And so apparently the Cohen 1980 memo was from the medical department to the S&EP department saying, okay, you're going to take over the whole body counting, that's fine.

We'll be available when it's gone to the Marshall Islands to do routine counting if the time is available, of course, our medical research takes first place on the use of it.

And this was from the -- they had a medical research reactor there. Now, a related Hall, 1978 article, mainly emphasizes

the technical, personnel and budget issues associated with him taking over the whole body counting responsibility for routine monitoring.

So reading the memos in detail, I see an intent for S&EP to take over the whole routine whole body counting with the medical facility as a standby in case they needed it.

I did not really see intent or a path forward laid out concerned with record keeping in those memos. I guess you could read into it, but I didn't see anything that really stated that in those.

That was the first prong I looked at. The second prong was the bioassay data. And, again, the bioassay data was, there's a lot of it and if you look at all the tables, it's probably, it's confusing, but there is a lot of information there.

Now whether we can use it to show what they think has changed, I don't know. And that's what I wanted to look at. And

that's why I did the plotting.

I simply took the tabular data, put it into an Excel spreadsheet and did plots on it. And I included those in the report, in our review of the ER.

And do you have, most people have that or do you not have that in front of you?

CHAIR BEACH: I have it. Anybody else?

MR. CALHOUN: We're looking at ER?

DR. BUCHANAN: No, no, SC&A's response to the ER, dated July 1st, 2010. That was a revision. There was an earlier one that came out without the plots, before I had all the data.

CHAIR BEACH: What page are you looking at?

MR. FITZGERALD: I have an extra copy, does someone need it?

MEMBER ROESSLER: Yes, I don't -- I can't find one right offhand.

DR. BUCHANAN: I won't go into

detail, I was just, in case people had questions on it, had looked at it. But just to show what the intent was.

What I did is take the data, plot it, and try to look at if there was a positive indication. I mean, I was, my mind wasn't made up one way or the other.

I just wanted to see if there's some indication, 1980 was the period that we could hang a hat on.

And Figure 1 and 2, I took the data, plotted the information captured by NIOSH and plotted this information and then drew a line at 1980.

What I did, I tried to go both sides of 1980, say ten years before, ten years after. Or 20 years before, 20 years after, and look and see if there was a pivot point at 1980.

Figure 1 and 2, I did not see, you know, a large indication. I see an increase in Figure 2, when the whole body count came

in.

This is a complicating factor, is that in 1980, the whole body counter came into use on a more routine basis. It came in earlier than that, but not so much as routine.

They started in the '60s, did some in the '70s, and then 1980s they kind of came in with a whole body counter that replaced a lot of the time-consuming costly bioassay, you know, urinalysis.

But, and I think that we agree with that, but the fact is the presence of the technology and the use of it, doesn't mean that we have the records for it.

And so, that's what I was looking at, is the records showing an indication of something happening in 1980.

While there was an increase in whole body count, unfortunately it came about, about 1980s, but it doesn't really drive a nail in the wall there saying that that was a date that is important.

And it made quite a bit of fluctuation in the whole body counting in Figure 2, there, did this really tell us anything?

Well, it didn't really tell me one way or the other that 1980 was a pivot point. Now, Figure 3, I guess this is the only one that looks like, you know, is positive in that 1980 was a point.

Now, however, 1973 to 1979, Figure 3 there, from '73 to '79, just to give some numbers to this, we see in '73 to '79, this is 69 people scattered over this period of time that they requested bioassay for.

Now this is somewhat different than routine bioassay. They requested, is that right, this was a special request? Joe needs this bioassay, okay, as opposed to routine bioassay.

MR. CALHOUN: That was more likely the case.

DR. BUCHANAN: So this is special

requests.

MR. CALHOUN: Or this group of people from this particular facility.

DR. BUCHANAN: Okay, so, it's kind of, you know, these need it now, go do it. And then Grady looked at how many of them was completed.

Okay, for these 69 workers, straight over from '40 -- I guess 1950 to 1992. We see that there was very little compliance before '73.

'73 to '79, are 75 percent compliance. '80 to '89, there was 92 or essentially 100 percent, if you count the later one found, and in '92, there was 100 percent compliance.

Now this was, the numbers were about 11 to 16 per bar there, and for example, 1958, two records were found out of 11 requested.

So that was 18 percent. '73 to '79, you had 12 out of 16, which is 75

percent. And then in '80 to '89, you had 12 out of 13, which was 92 percent.

Well, there's a pretty good increase in the '70s, really. And then between '79 and '89, there, there's not a whole lot of difference.

In '92, for these special requests it was 100 percent. That was 11 out of 11 in '92. So, you know, you can draw your own conclusions.

It looked like there was a turning point in '80, maybe some for special request, it looked like they filled the bill better and you can retrieve, the work was done and you could retrieve the data. Some were starting in the '70s.

MR. CALHOUN: Now just let me interject something here. I believe that -- you're calling these special requests. I believe that's how it was done.

You know, I don't think that these, there weren't a big group of routines, you

know. This is how it was done. So, saying routine or special request, I don't think it's much different than how all of it was done.

Because what you'll see is these requests that say these guys need to be monitored. Not because of an incident, but because of their job.

So I don't think these were special requests, I think this is just how it was done. Because everybody is not monitored. This is how I discerned who should be.

MEMBER ROESSLER: Now let me pick up on that because I think back, and I can't remember the years we did this, but when you say special request, I can think of a lot of times, and I was in charge of a whole body counter.

We were doing, not just monitoring, but we were doing cesium-137, that was fallout. That had nothing to do with the work environment. And I think, and I see where you're going on this but, to me, a question

that would have to be answered would be why were they doing these counts and were a lot of them because of cesium?

I don't know whether you looked at that. I don't -- Brookhaven did, I think, a lot of cesium studies. That has nothing to do with worker monitoring. I think we just need to look more into it.

MR. CALHOUN: Right, but the folks that were working at the reactors, you know, the cesium certainly would be a good indicator for them.

So a lot of people that you'll see that were monitored for whole body count would be from the HFBR, the High Flux Beam Reactor.

MEMBER ANDERSON: So, in these 69, is this just there were some biomonitor or some data, or did you look and see that they had complete records?

MR. CALHOUN: I'm sorry, 1969?

MEMBER ANDERSON: No, no, I mean of these 69 people, is it just yes, they had

some?

MR. CALHOUN: There was a request --

MEMBER ANDERSON: A record --

MR. CALHOUN: Yes.

MEMBER ANDERSON: Of a test versus --

(Simultaneous speaking.)

MR. CALHOUN: That was done, it was done because it was requested, okay? So it's not if they had some, if they were asked to get a whole body count in 1979, we had to see a whole body count in 1979, before we checked that box.

MEMBER ANDERSON: Okay.

MR. CALHOUN: Okay. It wasn't just anything. It had to be --

MEMBER ANDERSON: You didn't look at the whole work history?

MR. CALHOUN: It had to be -- no, because that wouldn't help us on retrievability for those records. We were trying to isolate it.

If you were told to get a count, did you get it, do we got it.

MR. KATZ: Can I just say something. It's difficult if you talk over each other, so please try to speak separately, like Andy and Grady just now.

MR. CALHOUN: I'm sorry, it was our passion.

MR. KATZ: But Ben here is trying to transcribe and it's murder.

MR. ADLER: I just want to reiterate what Grady said is correct. I think it would be more proper to view these as requests. That is the way it was done and we have dozens of memos with these sorts of requests.

We pulled out, we tried to pull out ten or so per decade, because of the time we figured we had left to completely search out and see if these requests were fulfilled, but there are many more such memos.

And it just seems to be, that's how they document, it wasn't a routine program, I

want this person sampled, I'm documenting, please get this person sampled.

MEMBER CLAWSON: So there wasn't an established bioassay program or whole body count program?

MR. ADLER: It's not cut and dried, but it general, these things were done by request on an as needed basis.

MR. CALHOUN: But the program was the people that had the potential to exceed ten percent of the allowed limit --

MR. ADLER: Right.

MR. CALHOUN: Or whatever the limit was, be monitored. And then someone had to make that call, and that was done on a project-specific basis.

MEMBER CLAWSON: I understand that, I'm just trying to figure out, we have projects come in, we have, just like Wanda said, projects go out and how this changes.

And people also change into it. I'm just wondering how the program, you know,

worked to be able to make sure they were captured, make sure that they were there.

MR. CALHOUN: But interestingly, like a couple of the folks have said around here, there hasn't been a whole lot of question of the quality of the program, as far as who was monitored and should they have been monitored.

Again, I hate to point out a Tiger Team finding, but that was another finding of that 1990 Tiger Team finding, is that people, they were monitored internally and externally and it was appropriate.

I'm sure there's some findings in that Tiger Team document, but that was very surprising, too. And you know what they hung their hat on, was the quality of the people, like you said, there's some very notable health physicists in the records.

DR. MAURO: There's a premise that we're operating on here, which is I think interesting. And it goes to the point you

just made, Brad.

That is, so there wasn't really a routine program and there was a judgment that there was no need for a routine program.

And the judgments regarding when a bioassay or a whole chest count or a whole body count was needed, was triggered by the manager or the principal investigator making a request.

So what we're operating within is a framework where processes, when that request is made, it's made for good reason, the measurements are made, can we retrieve the data?

If we can do that, we're in good shape. And right now you're saying it looks like we're starting to be able to retrieve that data, when it's needed, beginning in the '80s, it's starting to look a little better.

Okay, now, so everything hinges on the wisdom of the person who makes the judgment that I think we need to measure this

person. Now, and everyone else that's not measured, the premise is there was no need to do one because of this judgment that was made.

Now, my question is that it would be nice to say, at that operation, at that facility, there were continuous air monitors that were in place, that were routinely sampled, you know, and counted. And that there's evidence that the judgment was correct because, not only -- because right now we're just saying, listen, we have to trust this guy, he's a smart guy.

And he knows when to call for one and when not to call for one. And I believe that may very well be true. What would be very encouraging is if along with that, there was some air sampling records that demonstrated that that general working environment for that period, at whatever that location was and activity, had some continuous air monitoring, which are always negative.

And that coupled up with being able

to retrieve the records from when a judgment was made, is some -- it would be assurance that not having a routine, monthly, quarterly chest count, bioassay sample was appropriate.

Because there was no evidence that there was a problem. Have you folks tried to run down --

MR. CALHOUN: I don't know that off the top of my head.

DR. MAURO: Okay.

MR. CALHOUN: I know that we -- you know, there's plenty of environmental samples, but that's not what you're talking about.

DR. MAURO: No.

MR. CALHOUN: And, you know, the Accelerator facilities are not going to pose much of an internal hazard. So you're primarily looking at the operational reactors there, HFBR and such.

So, I don't know. I haven't looked at that recently. I think that, you know, I certainly can search the SRDB to see what's

there, and even though, again I'll fall back on one of the, one of the Tiger Team findings was that the internal dose, and that internal radioactivity at Brookhaven is a minor concern.

MEMBER MUNN: But, John, if you don't have individuals who were monitored, showing high bioassay results, then why would air monitoring be an issue?

If you have bioassays that, it doesn't, it sounds like gilding the lily.

DR. MAURO: Well, I guess I'll put it another way. There's an operation set up, experiment or whatever it is that's being done.

A judgment is made, okay, what type of health physics coverage is needed here? Do we need, if I was the person in charge, let's say, I would ask myself that question.

And, for example, it's a reactor, and there's a potential for some airborne radioactivity under some unusual transient.

We want to have a continuous air monitor to alert you to that circumstance.

And now, and then the person who's running that program, obviously makes a judgment when, I think it's a good idea, we better have a whole body count of John Doe, at a given point in time.

And he made that judgment based on something. Something happened. Now, I agree with you, let's say every time that judgment is made, and they make it, and they perform the whole body count or they take a urine sample, and it comes back negative every time.

It means that that was just precautionary and that will be some evidence that there really was no significant airborne problem at the facility, ever.

Or at least that particular facility --

MEMBER MUNN: Not during that --

DR. MAURO: Not during that period of that operation. See, I'm looking for, I'm

looking for that other piece of information that confirms that the judgments that were made for who should be counted when, was, in fact, a wise decision and was cautionary.

MEMBER MUNN: Well, you know that counts and bioassays are certainly going to be made if there's any incident.

DR. MAURO: Yes.

MEMBER MUNN: And if you have no incident reports and you have no bioassay or internal or whole body count from any of the people that are monitored, that indicates that there's a high --

DR. MAURO: I agree with that, too. See, that would be another dimension. In other words, that would be another piece of evidence that would help us feel confident that everything was under control.

So that, in other words, the fact that maybe the results that do come back are negative. Two, the fact that there are no incident reports. Three, there may have been

continuous air monitors in place, collecting data continuously and they were all negative.

You start to put all that together and all of a sudden you say, you know, there's good reason why they did not have a continuous, a monthly, a quarterly bioassay program.

And they only triggered it when the judgment was made prudently that maybe we better measure it.

And that would, see, we will, for the first half of this meeting, we were talking about retrieving the records for people that a request was made for a whole body count.

And I think we're moving in the direction where it looks like that being able the retrieve those records certainly started to improve in the '80s, okay?

But there's a premise we're operating on that, okay, great. And if we can show that, then everything is fine. But I

say, well, I'm not ready to give that up yet.

I want another, one more thing. That, that -- retrieving that record is only one part of the problem. The other part is that the fact that there was not a routine whole body counting program or bioassay program, was probably okay.

And the reason is, the kinds of things you just said. There were no incident reports. There may have been continuous air monitors confirming that there really wasn't a problem.

And evidence that when we did whole body count these people or bioassayed them, we got negative results. See, that would be the part of the story that closes the loop for me.

Yet, somehow that was in the loophole. That's how I'm thinking about it.

MR. ADLER: We have a brief mentioning of air monitoring data that we did capture examples of air monitoring data that are in the SRDB and that we got through data

capture process.

So, it would be ridiculous to say that we have a complete set of all the air monitoring data, because through the data capture process we might always miss things, but there are examples.

DR. MAURO: And there may be something in the record that says that, not setting up a continuous air monitoring program for this facility at this time, there was some thought given to that, why it was not necessary.

Or some thought given to the fact that we don't really expect there to be any airborne activity. In other words, I believe that all the people around this program were the top notch people.

So they must, so this thought, deliberation, if I were there, I would have, you know, somehow thought about that. To make sure that I'm covered. And that's the part of the story that I guess I haven't heard.

That, you know, that the people that were running it were thoughtful about, listen, we don't need to do this, but we do need to do this.

Right now I think that we limited our discussion to when a decision was made to have a whole body count, and we want to go and make sure we can retrieve that data.

But, in my mind, that's great. But it's not complete. There's a little bit more to the story I'd like to hear.

CHAIR BEACH: So, before we do that, can I jump in and say, let's go ahead and take a break. Okay, so ten minutes.

MR. KATZ: Okay, so about 20 of, 20 of 10:00 we'll start. I'm just going to put the phone on mute.

(Whereupon, the above-entitled matter went off the record at 9:31 a.m. and resumed at 9:42 a.m.)

MR. KATZ: Okay, we're reconvening after a short break. This is the Brookhaven

Work Group.

CHAIR BEACH: Okay, we're continuing on with the internal discussion. I just want to remind everybody that this meeting does end at 12:00. So, just a friendly reminder that we still have several things to go through.

So, Ron, if you want to take up where we left off.

DR. BUCHANAN: Okay, we were discussing Page 11, Figure 3, the requested bioassay and how well they were filled. We found out they started filling them in the '70s and '80s and had a pretty good record in the '90s.

And now there was, is something I'd like to get clarified, is that in my mind I had that the reactors, especially like the older graphite reactor, research reactor and the high flux reactor and the medical reactor and the isotope production facilities, I would assume that they were on a routine bioassay of some sort.

Now, is this not right, Grady, in what you found?

MR. CALHOUN: I would, from what I've seen and I didn't focus a lot on the stuff that was post-1980, or pre-1980, but if you look at some of the memos that I've seen, it appears that big chunks of like HFBR, high flux beam reactor, were on bioassay.

But those were, again, requested by a memo. You know, there may be 25 people in there that say these guys need to have whole body count.

DR. BUCHANAN: So they did not have operators and such, I think the graphite reactor they did that routine, but in later years you did not find that they --

MR. CALHOUN: I didn't see a memo that says everybody from the high flux beam reactor needs to have a bioassay every month and a whole body count every year.

DR. BUCHANAN: Okay. In any of the dose reconstruction, I don't know if you

looked at this detail. Did you find anybody that had routine bioassays or were they sporadic?

MR. CALHOUN: Typically, what you'll find with whole body count is you'll get the current whole body count and then there's a column that says last counted.

So I'll get at least two, you know, if they, when their last count was. If you look through, there's certainly routine tritium samples that were taken of people, tritium bioassay were taken.

Uranium bioassay, I, at least the ones that I've looked at, as a part of this, I don't see any that were monthly or semi-annually or anything like that, you know.

And the whole body counts were typically annually or semi-annually.

DR. BUCHANAN: And now the tritium bioassay, though, I would assume that would have been a set schedule.

MR. CALHOUN: I would imagine, by

looking at the records, there were usually the people who were monitored for tritium had -- usually.

And, again, I think that was more in the earlier years, then in 1980 there was a bunch more.

DR. BUCHANAN: Okay, they, now Figure 4 and 5, are some plots of data. Just trying again to see if there was any information here that showed 1980 was a turning point.

From the information I gathered, you know, there was no obvious turning point there. You can see that whole body counting increased. Tritium analysis fluctuated and somewhat depend on the operations going on.

However, I think when the reactor was shut down, they still had tritium, in fact a lot of facilities when things were shut down you had more bioassays than you do in operation, if you're doing maintenance and that sort of thing. So, really, it was kind of

inconclusive, not an obvious point either towards, not towards 1980.

Now Figure 6, 7 and 8, was some data that NIOSH had gathered for 200 people. And it showed where the data was located in the three major databases, the index files, the personnel monitoring file, the medical files.

And then NIOSH went and took 200, and I think this is correct, they took 200 people, they looked at their records, and see if they found any information that wasn't located in these three major databases.

My understanding, the index file is kind of a new system where you're putting data that's from other systems, is that right?

MR. CALHOUN: I think so, but Tim knows that better than I do.

MR. ADLER: That's correct. It could largely be viewed as a result of this program.

DR. BUCHANAN: Now is this

maintained at Brookhaven?

MR. ADLER: Yes, it is.

DR. BUCHANAN: Is this separate from the HPRS?

MR. ADLER: It is. It's another point, another location that would be checked when a claim comes in. And it's a culmination of the various different record keeping locations that we know have existed.

DR. BUCHANAN: Now is it handwritten or electronic?

MR. ADLER: It's all hard copy stuff.

DR. BUCHANAN: Okay. And so we see here that essentially what this shows is that, before 1980s, there was some indication that NIOSH found some data that was not in the three major files.

And then after 1980, there was less of this data missing from the major files. There was not a whole lot in either pre or post 1980.

Again, just a method to see if there was a change in step functions around the 1980s.

Now we did look at the data storage systems and this is where it gets a little fuzzy on what is, where things are stored.

I did make a chart and attached it, B, I think, that gives an outline of where things were stored when. Page 35, bioassay data issues matrix.

And you see that I list on there where my understanding of the data is stored. And so I guess I'd like to clarify it for myself and for the Working Group, Grady, at this point on the storage of the records.

Now we understand that we, the personnel monitoring files are mainly handwritten and are available, is that correct?

MR. ADLER: Handwritten copies of memos that have results reported on them. It could be analytical data sheets. There's a

variety of forms.

DR. BUCHANAN: Now this was usually from earlier years?

MR. ADLER: The personnel monitoring files?

DR. BUCHANAN: Right.

MR. ADLER: Well, prior to HPRS, yes, that's been going on for decades, there has been a personnel monitoring file.

DR. BUCHANAN: So there could be records, bioassay records in there up to 2001, through 2001?

MR. ADLER: I suppose that's possible.

DR. BUCHANAN: But most of them are earlier?

MR. ADLER: Yes, most of them are earlier.

DR. BUCHANAN: It's when they changed to electronic systems here and there and they quit doing, they quit maintaining the handwritten records when the electronic

systems came in.

Okay, and now are these records, do they, just say that Joe received a whole body count or a urinalysis, or does it have results, what you've seen, do they always have the actual numerical data?

MR. CALHOUN: We can't count them unless they've got the numerical data. So, and any of the samples that we've done, just a checkbox that he's been monitored, we can't count that. We don't count that.

We have to have a count that says here's what he was monitored for and it was either negative or positive and here's how positive it was.

DR. BUCHANAN: Okay, but I'm saying if you go and you open up a folder in the personnel monitoring file, usually are the, is there a sheet of paper in there that says he had a bioassay? Or does it, have you found that it lists the numerical results?

MR. CALHOUN: Both. It will be

both. It will be, and it comes in different ways. I've seen the actual spectrum provided for a whole body count. And I've seen a list that says, you know, John Smith was monitored on this date and his potassium level was this, his cesium level was this and here's, there's usually like three or four other columns, and here's what those were.

DR. BUCHANAN: And does it ever just say he had a urinalysis and whole body count, but no results were there?

MR. CALHOUN: I haven't seen that, that wouldn't be very useful to us.

DR. BUCHANAN: Right, yeah, I just wondered, you know, so if it's there, it's useful to you.

MR. CALHOUN: Right.

DR. BUCHANAN: You found it in the handwritten, in the personnel monitoring file.

MR. CALHOUN: Right. And that's how, the one new thing that I found, came about is that there was a list and it was just a table

of individuals and they were monitored in 1979.

I don't have the results, find them. And so then somebody would send them those results. And we went back through and looked for those results and we actually found them for 1980.

But, again, that was only in May, so they had five months to screw up, so.

DR. BUCHANAN: Okay, now, so that's personnel monitoring. That's one of the major repositories of the data.

The other one is the medical files. Okay, now I assume this generally has physical checkups and blood count and that sort of thing, and X-rays, perhaps.

Does, but it has mainly whole body counts, if it has anything, from the medical department?

MR. CALHOUN: I've seen primarily whole body counts, I don't know what you have, Tim, besides the X-rays, of course.

MR. ADLER: There could be other blood work, but you'll find whole body counts.

DR. BUCHANAN: And this would, again, would have the results with it. And this is probably the one that was performed at the reactor whole body facility, before they switched over to the --

MR. ADLER: The medical building, yes.

DR. BUCHANAN: Okay. And are those, I guess every time you have a request or BNL, I realize you don't do it, but the person at BNL that receives the request for dose reconstruction data, they would check the PM files and they'd check the medical files.

MR. CALHOUN: They do now. Now, they did not. And once we got them on board with that, there was a date. And we re-requested all of the data from that point that we had already received, and they sent us data and they added the additional stuff that they found from the other repositories. And now

they do it routinely.

DR. BUCHANAN: Physically, you got the fence around Brookhaven, now you've got a place where the PM files are stored in some Admin Building and then you've got the medical files that are still stored in a separate building?

Or do they have to go to the two different buildings to retrieve that data?

MR. CALHOUN: I don't know that, I imagine that they do. I just know they call them three different repositories that they look into.

And I can't imagine that they're all sitting in the same file folder, you know.

DR. BUCHANAN: Now the index file, this is data that mainly NIOSH has gathered while they've been working at BNL and this is a copy, it's a, you know, it's an electronic database of copied material?

Or what is the index, physically? Where is it at and what is it?

MR. CALHOUN: I don't know what the index file is.

MR. ADLER: The index file is what we also call Lee Michel's bioassay file.

MR. CALHOUN: Okay.

MR. ADLER: It's a compilation of anything that would be of interest for any, to a persons personnel file. Like the memos, memos with data on it.

They wouldn't necessarily have data on it, but things that have been gathered. It's not fair to say NIOSH has gathered it all, but as a result of EEOICPA occurring, there's been a much greater thrust to get data all collected and retrievable for any particular claim that comes through.

So, it's going to be a combination of things.

MR. CALHOUN: And here, I can't show everybody this, but I'll show you it. This is just an example I just pulled up.

This is somebody that was re-

requested. They had provided us, initially they provided us no whole body counts. And so this individual is one of these, and this is the kind of information we get.

It's not separated. This is one example of the type of information we get. So, these are whole body counts for 1984 and 1985. It was just the first one that I pulled out.

And so this is the guy right here. We see, you know, when he was counted, potassium, cesium, cobalt, zinc, manganese, cobalt-58 and iron-59.

DR. BUCHANAN: Now what file did that come from? Do you know where they retrieved that?

MR. CALHOUN: I don't know where they got it, except for it may have been from the medical file, because I got all the X-ray data.

I doubt that it was from the medical files with this guy, because this is a

compilation of HFBR counts.

DR. BUCHANAN: Okay, so we have the index file, which is a computer-based, a scanned copy of any data that might be important for dosimetry.

MR. ADLER: Computer-based?

DR. BUCHANAN: Yes, I mean, it isn't a hard copy. You don't go in and go through paper.

MR. ADLER: This index is hard copy.

DR. BUCHANAN: Okay, index is hard copy.

MR. ADLER: Yes.

DR. BUCHANAN: Of scanned or originals? Both?

MR. ADLER: Both, I would guess.

DR. BUCHANAN: Okay, and then we move on and we have the HPRS database which supposedly has all the bioassay data on it that was taken from 2002 forward, is that correct?

MR. ADLER: That's my understanding.

DR. BUCHANAN: Okay, now, there are, were some electronic databases maintained in the individual departments. How is, where is that data today and how do you access that?

MR. ADLER: Much of that data, I just asked Rich Reciniello, to go over a lot of this work at the site, just this past week to confirm what I had understood earlier, and it's the same situation. Most of these little ancillary things that we refer to in the report, have now been pulled into PM files or I guess possibly the index file also, as they see appropriate.

Depending on the form of the data. There may be, I think he mentioned there might be one electronic database that they routinely search, in addition to the three that we have in the report.

If there's a reason, they know what's in that database. If there's some indication this person might have data in there, they search it.

Otherwise, there's been an effort to consolidate into the three primary repositories.

DR. BUCHANAN: Are these smaller electronic databases, are they still functional today? I mean are they able --

MR. ADLER: I don't know that.

DR. BUCHANAN: You don't know.

MR. ADLER: I shouldn't say.

DR. BUCHANAN: Okay, so --

MR. ADLER: But I did ask specifically, is there anything in these things that are going to be missed, or could be missed when a claim comes through? And he said, no, that should not be the case.

MR. CALHOUN: It's a little bit more work for them to look for stuff now.

MR. ADLER: Right.

MR. CALHOUN: Because they've got to go to three different places.

MR. ADLER: Three or possibly a little bit more, depending on the person.

Sometimes they search a little bit more. There's the three primary, though.

DR. BUCHANAN: Okay, so, what I've tried to lay out here is what we know and don't know about the internal database, in-house.

To me what's important is in the dose reconstruction. What does the dose reconstruction oversee. And that's the kind of proof in the pudding. Is it available? Now, it does bother me, I guess I'd like to look at ER Report on Page 15.

We had table 4-1, there, and like I say, this is kind of the bottom line. Which, it's the third, and maybe there's an explanation for it.

Now, apparently this has been somewhat updated. This one is effective September of 2009. We had total claims of 92. I think you said 153.

MR. CALHOUN: Yes.

DR. BUCHANAN: So that's increased

quite a bit in the last six or eight months. Total number of claims that fall under this SEC consideration was 92, all of them, of course, it's the whole period.

The number of claims completed. Now, here it was 28, and you say that 58 have been completed.

MR. CALHOUN: Yes.

DR. BUCHANAN: So they've completed about 30 more claims in the last eight months or so. And then the ones with internal dosimetries were attained, was 21.

Now, we need to break that down a little for the details, and external had 43. So if we look at this, we have 64 claims, read on down the text there.

You see we have at least 92 claims, 64 have been responded to. For the records, 64 out of 92, and that 61 had no bioassay data.

Three had tritium data, which came from the external dose records from Landauer.

Tritium was considered external dose or whole body dose from '85 to '95.

And so, and then NIOSH later went back and found an additional 18 bioassay data records. Thirteen of these was of the 64 that we were considering here.

And so that's where this number 21 comes from on the table up there. NIOSH went back and dug some of those out, on their own, I guess. And five of them were for claims that they hadn't worked yet, that was part of the 92.

And so, I guess, you know, to me this is kind of a red flag on that part and now there might be some explanation. Maybe these took place before 1980?

Maybe they were, a lot of them were prior to that, when the records weren't available. Maybe it was after 1980 and the records weren't available, I don't know.

Maybe most of them were office workers or other people that didn't. So, I

can't tell what the explanation for that is.

You know, one concern is that there wasn't any bioassay data for it. And so I assume that probably Grady doesn't have that information at hand.

MR. CALHOUN: Not off the top of my head, I don't, no, I do not.

DR. BUCHANAN: And so, but that leads into, Number one, a concern, and reinforces our first concern about bioassay data retrievability. And, secondly, I think it would be useful to look at these claims.

There's even more claims today. And see why the bioassay data wasn't there. Now, you stated this morning that there's 153 claims, 34 of them were because of, would be removed because of the SEC through 1979, if that's what you're saying?

MR. CALHOUN: Right.

DR. BUCHANAN: Okay, so that leaves 61 remaining and they've done 58. It would be interesting to look at those 58 that was

completed or the full 61, and see if there was, why, did these people have bioassay data?

Did they not? Were they in positions that should have? What the time period was? Was it early or late? And so I guess, this is kind of my summary is that this page here is an area that's still open for debate.

And so, you know, the gray area is '80 to 2001, how the data is actually retrieved and given to the dose reconstructors.

And then the concerns about the bioassay data being available for the dose reconstructor.

CHAIR BEACH: Okay, so, Grady, I don't know if you want to talk to the ER on that or?

MR. CALHOUN: I actually think that's a good idea, going back and reviewing the cases in-house and looking at how they support the 1980 data. No problem with that.

CHAIR BEACH: Okay.

MR. CALHOUN: I've got it written down.

MEMBER ANDERSON: Good action stuff. Clear cut, concise.

CHAIR BEACH: Before we move on to the second item --

DR. MAURO: Oh, just --

CHAIR BEACH: No, go ahead.

DR. MAURO: I think that's good. I like that, because remember the concerns I was raising? I'm sorry, the concerns I was raising, that goes right toward it.

When you hit a person that's in post-1980, that --

MR. CALHOUN: Doesn't have a bioassay.

DR. MAURO: Doesn't have bioassay --

MR. CALHOUN: Is there a reason why?

DR. MAURO: What's the story? Why is it okay that he doesn't have it? At the extent to --

MR. CALHOUN: I actually started doing that, but I --

DR. MAURO: And then that's it, as far as I'm concerned, that's it.

CHAIR BEACH: Okay. And I'm wondering, let's, I think maybe we should review the action items for the first one, before we start into the neutrons.

Because I don't want to get lost and -- so this is just a quick glimpse and of course, the Work Group probably has some other ideas of some of the action items. I know I got some from Joe and talked to Ron a little bit at the break.

So for, on NIOSH's side, we're looking for the retrievability of the records. So the stats, evaluations. I guess the steps, the process that you used to retrieve those records.

The air sampling data for bioassay decisions. And mapping the completeness and adequacy of the records. And I know these are

tall orders, but we have, the need for information on job descriptions, dates of employment.

So, that's one that I talked to Ron about. But, if you go back and look at an individual, what their job was, how long they were on job, and then possibly being able to coincide that with bioassay records. Did I capture that, Ron?

DR. BUCHANAN: Yes.

CHAIR BEACH: Okay.

MEMBER MUNN: But isn't that recent --

MR. CALHOUN: Yes, but I think what they're looking for is a table or something that shows that, okay, this person worked in 1982, he has bioassay, so we're good.

Or, he worked in 1982, doesn't have bioassay, but he was, you know, a rigger that worked outside for 15 minutes, you know, something, it doesn't have internal or external monitoring.

Just a kind of a reasonable explanation as to why there's no internal.

CHAIR BEACH: And this is just for the dates --

MR. CALHOUN: Post-1980.

CHAIR BEACH: Post-1980.

MR. CALHOUN: Correct.

CHAIR BEACH: On to 2001 or even later.

MR. CALHOUN: Let's keep it post-1980 at this point.

CHAIR BEACH: Definitely. How many people employed, were employed that fell into that time frame, the 1980 to 2000?

MR. CALHOUN: Well, I don't even know if that's obtainable.

MEMBER ROESSLER: That's an important number.

CHAIR BEACH: It is an important number.

MR. ADLER: In the human resource database, we've had poor luck getting access

to that.

MR. CALHOUN: How many people or how many claims?

MEMBER ROESSLER: It's the people --

MR. CALHOUN: Why is that important?

MEMBER ROESSLER: Well, because the claims is only, just a piece of data, but I think we're looking at a huge site.

DR. NETON: Yes, but you can't, the number of people that could or should have been monitored, who would never know that.

I mean so say there's 20,000 people at the site and what does that mean? That 20,000 should have been monitored, 500? I mean it's really not very informative, I don't think.

MEMBER CLAWSON: Well, if you have programs, is what you're saying, there should be something in there that this many people are under the monitoring program, as we've had with most of the sites.

DR. NETON: Well, this is a very

different site. I mean this is a research-oriented site that had projects that were started and stopped very frequently.

I mean there was not a continuous process here like you see for a uranium foundry or something like that.

MEMBER MUNN: Not all of which were radiological.

CHAIR BEACH: So is there a narrowing that we can ask for that would make that simpler?

DR. NETON: It seems to me that the relative thing is, the relevant thing is, if we determine that there were 70 cases that need to be reconstructed after 2000, and we can demonstrate that we could disposition each of those cases as to whether or not they required bioassay.

If they didn't, why they didn't have it, you know. That's about as good as we're going to be able to do, I think.

You can't start, you know,

speculating there may be 800 more cases that come in that all of a sudden don't fall into that pattern. And it would be very hard to do that.

CHAIR BEACH: Okay, well I guess it's a start. Steps that NIOSH takes to retrieve the records. So we're looking kind of at what do you do when you go in to start retrieving records?

MR. CALHOUN: A data capture or for DRs.

DR. BUCHANAN: Not that you sent a request and they sent it back. And I don't know that you do this, but the person at BNL, where does he go? We just talked about it. Were the medical records and the PM records all, you know, the same place or is this index file, you know, hard copy?

We just need a comfort level with how it's done or some information on how it's done. You know, when you send a request there, what steps take place?

One guy goes around and he goes to this building, he goes to this building, he goes to this building? All right, how did he decide whether these older electronic databases are going to be queried. Who makes that decision?

If he does are these up and running and can he go and get the data? We don't know how this is done. This is unusual at this site that there are so many places that these things are stored.

You know, most sites you, at least, if they're missing, they might be missing, but they're missing from one place. And so, you know, we don't want to say that the data is missing, if it is available.

And we don't want to say, well, it's okay if there's an electronic database sitting in a basement someplace in mothballs that has data that's no place else.

And so that's what we want to scope out.

CHAIR BEACH: Okay, the last one I wrote down was review the 61 active cases and the 58 closed cases for bioassay data. So, are there others that I didn't --

MR. CALHOUN: I got that one already.

CHAIR BEACH: Yes, he actually wrote that down. I just wanted to make sure that --

MR. CALHOUN: That was the first one. That's my first one.

CHAIR BEACH: That was his first one. And then, Gen, you had something?

MEMBER ROESSLER: I think we've talked about interviewing people and we usually talk about interviewing workers. I think in this case I'd be interested in interviewing those managers, who are still there, are still available, still alive, who were there particularly at that critical time period.

Certainly, they know a lot more. I have big questions. Like when we talk about

bioassay, which we are and specifically Ron has looked a lot and Grady, into whole body counting.

I don't even know how many whole body counters there were. Maybe you guys do. And what were they used for? Clearly, when you look at the research, they produce a lot, the whole body counting was research.

Monitoring of Marshall Islanders and so on. Are there different whole body counters? You know, when you look at these records, I guess really what I'm saying is that I think we need to explore better, talking to the people who were there and know the answers to a lot of these questions.

CHAIR BEACH: So are you looking for a NIOSH interview, SC&A interview or a combination, what are you thinking?

MR. CALHOUN: We share all of our information, so, I'm sure we've done some of these. We might just have to come up with some more questions.

MEMBER ROESSLER: I don't think all the pertinent people have been contacted.

MR. CALHOUN: Right.

CHAIR BEACH: And I guess I would suggest that, a combination because there's always different questions and it's better to give them one interview instead of several, seems to work better.

DR. MAURO: So, in terms of that request, it sounds like a plan would be put in place to followup on some interviews, design an interview program, and it would be a collaborative effort where both NIOSH and SC&A would team up and make the visit?

CHAIR BEACH: Yes.

MR. CALHOUN: Sure.

CHAIR BEACH: I would prefer that.

MR. FITZGERALD: And I guess, again, the focus would be, and we did talk to some folks that covered a time frame, but really keying in on the project or facility managers who would have been making the calls that

we're talking about, in that crucial 1980, just after 1980 period.

CHAIR BEACH: And prior to the interviews, I would suggest maybe a list of questions, if you have questions or if you want to review the questions.

Because, Gen, you might have questions that I wouldn't think to ask.

MEMBER ROESSLER: I have some suggested names that I can come up with questions.

CHAIR BEACH: And could you email that out to the Work Group?

MEMBER ROESSLER: Sure.

CHAIR BEACH: And if anybody else has that same list. So that's all I have, unless there's any other --

MEMBER CLAWSON: I was just wondering, do we have a good handle on what projects actually were going on down there?

I know there was numerous ones, but do we have a good handle on --

MR. CALHOUN: Yes, I've got it, except for the, you know, some of the little things. I mean at the time, in 1980, we've got the high flux beam reactor, medical research reactor, radiation therapy facility started in '91.

These are all on TBD. AGS, that's Alternating Gradient Synchrotron, Tandem Van de Graaff. Another Brookhaven Linac Isotope Producer, National Light Synchrotron, heavy ion collider.

MEMBER CLAWSON: The reason I was wondering is because Brookhaven --

MR. CALHOUN: Mostly accelerators.

MEMBER CLAWSON: Yes, Brookhaven showed up at Pantex as being contacted and I never could get into what it actually was, and I just wanted to make sure that we didn't have some other items sneaked in there.

MR. CALHOUN: We have run into absolutely nothing as classified at this place --

MEMBER CLAWSON: Okay. And see what they might have been doing is, from some of their neutron or whatever else like that, just requesting from them, just running some things by them, I guess you could say.

I saw some correspondence between Brookhaven and Pantex and that's why I was wondering.

DR. BUCHANAN: There was a good point brought up of the number, and you might want to clarify -- was the number of whole body counters.

My understanding is that the medical facility had one whole body counter, which was their original workhorse. And then they had the Marshall Island ones that went out and came back for six weeks at a time or something.

That was the second one which S&EP took over and then later they changed it to sit down and stand up or whatever.

But that was a two main whole body

counter, and I guess still exists today.

MEMBER ROESSLER: So the first one was probably the big four pi liquid assimilation -- maybe. And the second one was probably --

DR. BUCHANAN: Sodium iodide.

MEMBER ROESSLER: Sodium iodide, the portable one.

DR. NETON: The one that went to Marshall Island was a CANBERRA-6000 chair.

MEMBER ROESSLER: That was sodium iodide. But the medical one, what was that?

DR. NETON: It was a CANBERRA chair, it was a sit down chair.

MEMBER ROESSLER: It was a chair.

DR. NETON: Like they use in nuclear power plants.

MEMBER ROESSLER: Yes, okay.

DR. NETON: And then eventually they moved to a standup counter. The one that I also noted with, in the medical department, it was a, sort of a flatbed four pi counter

almost. A sheet of 4 by 4 by 16 inch detectors on top and bottom.

I think 32 on top and 32 on the bottom.

MEMBER ROESSLER: And sodium iodide.

DR. NETON: The person was essentially sandwiched in between. A very nice, beautiful counter, a research type facility.

MR. FITZGERALD: I have a clarifying, just on the list of actions as we're talking about that. The first one she mentioned was one that I was keying in on, Grady, what you had said earlier, you had begun over, I guess recently to do some retrievability-type tests.

And I don't know how far you've gotten along, but I think that would be helpful to know what some of those results are.

You say you're getting some positive results. I think that's what I was

referring to on that first one. That's a little different than the other one.

MR. CALHOUN: The first retrievability is the one that's included in the ER. The next one I talked about was, it's not that I set out to do a retrievability test, I just found a memo that said, hey, we're missing these records, find them.

And so then I, in that same folder, I found that they did, in fact, find the two that were missing from 1980. I didn't look a whole lot in the previous years, but it looks like 80 percent were not retrievable from 1979, but 100 percent were from 1980.

And there's some other years that were better than that. I also looked on my own back through some of the SRDB documents that we have that just are tabular whole body counting results.

Not whether or not you were counted, but the results. And I found those two 1980 results, as well.

MR. FITZGERALD: Okay, so this isn't a --

MR. CALHOUN: That was just a little --

MR. FITZGERALD: This is something --

MR. CALHOUN: That was to get prepared for here.

MR. FITZGERALD: Okay, so that first one, I think that this is helpful validation but I thought that you were going through a process.

MR. CALHOUN: Oh, now, I'm going to do, that I said I started, that I didn't even talk about here, was going through the cases we've got from 1980.

MR. FITZGERALD: Right.

MR. CALHOUN: And I'm going to look in job classification, era obviously, external dosimetry, internal dosimetry and is there a reason why they don't have it?

MR. FITZGERALD: Okay, so that first

one, just to clarify, you can strike that. I didn't want it to overlap or confuse on the other one. The other one is more --

MR. CALHOUN: That's what I'm going to do.

MR. FITZGERALD: The other one was, you mentioned index file. And I won't mention the individual, but we interviewed the same one who is maintaining the index file.

He wasn't able, at the time, and we're trying to figure out if you could somehow, you know, have a compilation of what he thought he had obtained.

You know, he was trying to pull this together to support the requests that were coming from you all. And it didn't sound like -- this was a year ago.

He was in progress. He was running around trying to do this. Is there anyway to get, you know, sort of a snapshot of what the status, and this is what I meant by the roadmap.

I hate to use that word. Mapping of completeness and adequacy of the records. Now, where that stands, I mean is the index file -- I'm not clear on whether there's a, you know, sort of a --

MR. ADLER: Index for the index file?

(Laughter.)

MR. FITZGERALD: Well, just you know, index sounds like a way to get to what is there. But is that a complete listing of what has been obtained, compiled by him, so far?

MR. ADLER: There is, I don't know if it's, there is an index for this index file.

(Laughter.)

MR. FITZGERALD: So, you're not joking?

MR. ADLER: No, I'm not. It honestly doesn't have a great deal of detail in it. You kind of have to go look. But it's

got the list of names for which information has been found.

MR. FITZGERALD: I was kind of thinking, you know, most of the facilities we've looked at in terms of a record, you know, sort of a compilation of what's there is sort of by time and facility.

And, you know, you have all of the bioassay records from such a date to such a date, except for we're missing, you know, they'll give you a gap of some sort.

And that's something we haven't been able to put our hands on.

MR. ADLER: Yes, this file would just be various Excel spreadsheets and the Sheet Title will be, we've got information from 1980, '81, '82, on this one.

MR. FITZGERALD: And it would be by, you will see names of people.

MR. ADLER: Just the people themselves. Then you know what file folder to go to and then see what's actually in there

for that person.

MR. FITZGERALD: Right, so really there isn't anything activity or facility based, it's all just by individual name and then --

MR. ADLER: Yes, for that particular repository.

MR. FITZGERALD: Because I was thinking like HFBR, we don't really have a summary of what the numbers that were bioassay for HFBR by year from --

MR. ADLER: What totals should be available?

MR. FITZGERALD: You know, how many records we have by year for that facility. And that's not available?

MR. ADLER: We have in the ER what we have come across in the capture. But that's --

MR. FITZGERALD: I'm not saying it exists, I'm just saying we haven't found it either, and it just sort of makes it hard.

You're almost forced to go back and see what you happen to have and work backwards.

You know, figure out, you know, this question of should they have been bioassay. But from an operational standpoint saying, here's a facility that handled medical isotopes.

Well, if these people were at that facility and there should be, you know, there should be coverage for that facility. We don't have that sort of top down summary.

I haven't seen it and you haven't seen it.

MR. ADLER: No, no, I think in most cases if you want to determine how much data you have for a particular facility, you would have to go into each individual file of each person that had worked there.

MR. FITZGERALD: You have to work bottom up, okay.

MR. KATZ: Just from what you just said, Joe, and what I was thinking before you

even said that, so Josie had this one action item that, this mapping the completeness, but it's hard for me to imagine.

Is it clear to you how you would map the completeness of data on a facility on an operational basis?

DR. NETON: No, I think the key there is a document that the program was in place to monitor the workers and the ones that were supposed to be monitored, were.

MR. FITZGERALD: I think you answered my question. I was thinking, now let's take an obvious one, like the HFBR and say, okay, you know, what's the monitoring history in that facility.

And what, I'm not saying that, you know, it's easy, because I didn't find anything. And it's kind of remarkable when you go to HFBR and look through their records and you can't find, you know, here's your monitoring history for the facility.

And maybe that's something we need

to take another close look at, but it doesn't appear that, so far anyway, we've found that summary that would give you at least a more top down.

It's really going to be difficult and it's almost sort of an empirical thing, where you're trying to do it by individual by individual.

So, I, that crossed my mind, but I'm not saying it's easy and I'm not saying that it's something that's going to be feasible.

But, I think that would be something we'd want to look for, still. And we didn't find it on the first pass. It was a Site Profile review, so we spent so much time and then stopped.

But somehow, for some of these key facilities, where you would think there would be potential uptakes, it would be useful to get a summary.

And I would think that record would

have to exist somewhere. I haven't seen it, but I just want to make sure that index wasn't it and it isn't it.

So maybe that's less a, you know, it sort of reminds me, it's less a mapping but an exploration of finding that summary or if that information exists, so you have something more than just a bottoms up.

MR. CALHOUN: I believe I've seen a snapshot of a one-pager from HFBR, in particular, that just says these individuals were counted, and it's an entire listing of individuals from HFBR that were counted on this date and here's the results.

I can't tell you how many weren't counted.

MR. FITZGERALD: I guess I would modify that and I think, Ted's got a point, we probably, it's sort of like looking for the documents that Gen was talking about.

I think we need to maybe see if we could find more that's summary top down that

would combine with the bottom up, that would give us a better picture.

CHAIR BEACH: Well, one thing I'll do too, is I'll send this list out to both you, Grady and Joe, and you guys, that would clarify anything that we might have missed or I might have missed in writing this down.

MR. CALHOUN: BNL has been very reluctant to give us data, give us access to any data that weren't claimants. Very reluctant. Actually, they won't.

(Laughter.)

MR. CALHOUN: The only time that we've been able to do that, is when we have found individual names in the files and that's how we did our 69 person study.

CHAIR BEACH: That's interesting.

DR. MAURO: But this goes to what Gen mentioned before, the interviewing the managers or the people that we know were in charge of certain programs.

In terms of the top down story.

They may be able to give you that story. Maybe you can't find the story in the records, but they may be able to say, listen, for this program, over these years, this is how we conceived of the great radiation protection oversight, what it involved.

And whether there's documents that go along with that interview, that's another matter. He may point you in that direction.

So the idea of a top down, bottom up approach, is great. The top down may or may not be successful, the interviews may help us there.

Bottom up, though, seems to be the real --

MR. CALHOUN: I agree, that's where --

DR. MAURO: But if you go both directions, it's almost like single failure proof. You know, you try to get it, you do the best you can.

CHAIR BEACH: Okay, thank you.

We're ready to start in on the second item in the matrix, adequacy of neutron dosimetry. And Ron, Joe are you going to --

MR. FITZGERALD: Well, I can tee it up real quickly. This is part of the data capture we did for the Site Profile. And we were looking through correspondence logs and I found a rather interesting dialogue that had taken place amongst the HPs at Brookhaven, and it was a pretty healthy debate over about ten years, about what particular neutron dosimetry would be, should be used and ought to be used.

And it involved also Landauer, which was the vendor, and some concern that the dosimeter that was being used in the process and wasn't appropriate for the energies involved.

And this was seesawing back and forth. And one reason we raise this as an implication, it wasn't cited in the ER, but it causes some concern about, on the ground what was happening.

And we were trying to interview people and they acknowledged, the people actually were still there, acknowledged that it was this debate and, you know, that they felt that it wasn't a valid scientific question about how they should monitor neutrons in certain operations and getting the energies.

And they felt Landauer wasn't responsive. And, you know, this is all covered in the correspondence. But we raise it because I think it is something that brings into some question about what was happening on the ground and whether the dosimetry was adequate or not.

And, I think this is almost one of these clarification issues as to what NIOSH and its evaluation would say, as far as this question on the neutron dosimetry and whether they have looked into that particular debate and whether or not that causes some concerns about the adequacy of how the measurements

were reported for the operations.

And, Ron, do you want to go through the, I guess the correspondence, just to kind of lay it out a little bit better than that.

DR. BUCHANAN: Okay, this is Ron Buchanan with SC&A, for you on the phone. Okay, I want to lay a little background again, for neutron dosimetry and it's complicated compared to photons. And so there's really kind of two issues here at Brookhaven.

Number one is the adjustment factors or compensation factors or quality factors, what you want to call it, they use through the years and how those were addressed.

And, secondly, is the debate over being able to sort out the assigned dose taken from '85, to '95. So, first of all, let's cover a little bit about dosimetry they used and the problems that they --

CHAIR BEACH: Ron, can I just stop you for a minute?

DR. BUCHANAN: Yes.

CHAIR BEACH: We just lost two key people. Do we need another break? What do you think?

MR. KATZ: Who did we lose?

CHAIR BEACH: Joe and Grady. I just wanted to check, does anybody else need a quick break?

Five? Let's do that. Ron, I didn't want you to get started and not have Grady in the room. So, five minutes.

(Whereupon, the above-entitled matter went off the record at 10:31 a.m. and resumed at 10:37 a.m.)

MR. KATZ: Okay, back on the record. Ron is just about to do the neutron thing.

DR. BUCHANAN: Okay, this is Ron Buchanan, SC&A, again. We're going to cover a little bit about the neutron dosimetry at Brookhaven, so that we can understand some of the questions we had.

Now at Brookhaven they had proton

accelerators mainly up through '95 or 2000 or so. Proton accelerators create neutrons and so one of your external dosimetry problems is neutrons at proton accelerators. Now, later on they switched to a lot of heavy ions or ion accelerators which doesn't create as many neutrons.

They still have the 200 MeV proton accelerator, I understand, operating. Now, the neutron dosimetry at Brookhaven used NTA film, which we discussed in length yesterday at the Mound meeting, from 1950 through 1995.

Kind of late in the game, but they didn't switch to TLDs until 1996, for neutrons, which is kind of unusual, but that was their choice.

And then they used, NTA film, they realized suffers from two problems. Number one, at low energy it misses some of the neutrons, which we talked about yesterday in detail for Mound. At high energy it also starts missing some of the neutrons.

It's good from about 1 MeV to about 14 MeV. NTA film is one of the best detectors. Above and below that, then you have to be concerned. And so above 14 to 20 MeV of neutron energy, BNL used CR-39.

I see there's a misprint on Page 19, that should be 39 instead of 29, which is a track etch detector for plastic and they used Lexan, which is also a plastic material, from '85 to '97.

And so we have two areas to address, the low energy neutrons and the high energy neutrons that NTA film doesn't cover well.

Now, a little background on, when accelerators were first developed, especially in the '60s and such, like at Brookhaven, when they started out with the first one, they didn't know for sure what the neutron energy was.

And some of the references that are documented there say that. They really

weren't sure what was the best quality factor to use.

In other words, if you measure a certain amount of dose rads how do you convert that to rem and dose equivalent. And so it elevated the radiation biological effectiveness or quality factor, later.

And so they said, well, let's use a -- in 1965, one of the references said, well, let's use a quality factor of ten to carry this, because we know we're missing some neutrons at the lower energy, we're not sure what the quality factor of the energy spectrum is, so let's use a quality factor of ten.

And they did some rough calculations and say, well, this is a safety factor for the worse case condition at 2.4 or something like that, so we've covered the bases.

Later on then they added the larger accelerators which on the Van de Graaff and the proton accelerator fed into some of these.

And it's a complicated accelerator system, so I don't know all the details of it.

But then they started generating some higher energy neutrons. So they said, okay, we might have a problem there with NTA film because above 14 to 20 MeV the neutrons start interacting with the carbon and oxygen causing spallation reactions, and so we lose our proton recoil and so we have to use some other type of dosimetry.

So they use CR-39 and Lexan. And this went on, the debate that we're talking about, went on between '85 and '95, because Landauer was doing their dosimetry, their processing.

Now, so let's address first of all the quality factor of ten. I guess what SC&A has a problem with is that yesterday on Mound, we went through in detail on fading, we went into detail on lower energy neutrons.

And it appears that Brookhaven said, oh, we used a quality factor of ten. We

used ten millirems per track recorded, millirems per prong.

And, you know, kind of cover everything. So we don't see that it is broken down in the TBD or the ER, to what, that this RBE ten was appropriate or ten millirems per track, quite covered.

And the only end result was that the bias and uncertainty table given at the end of TBD-0006, says use an uncertainty factor and a quality factor, which I indicated in table 2 on page 21 in my report, using a bias of 1.35 and an uncertainty of 1.5.

And then it has some footnotes there about energy levels uncertainty. And so we don't feel that there's been a quantitative effort put into determining what a dose of record actually represents and what the quality factor covers and what the bias and uncertainty factor covers.

Now, I did do some analysis of the claims. As of about a year ago, we had five

claims that had neutron data on it, and the dose reconstructor only one time used these uncertainty factors and bias factors, in the dose.

They did do the ICRP conversion, as recommended, but not the others. Which is not the fault of this group, but I'm just saying that it's unclear that the dose reconstructor understands what's recommended in the TBD-0006 as far as that goes.

Now, the, so at lower energy and fading, you know, was not addressed really in the TBD or in the ER. Then the, and what calibration sources?

They did go to a two-week exchange cycle to decrease the amount of fading. But it's like we talked about Mound yesterday, what was the calibration?

Was that moderated neutrons or source, what was that, to use, so are we sufficiently covered for fading and lower energy neutrons that were missed by the NTA

film.

At higher energy, I realized that neutron dosimetry above 20 MeV is still an arc, it's still evolving somewhat. However, there was measurable amounts of neutrons above the NTA film response on table 3 on page 24, lists some measurements that were made at the AGS accelerator in 1985.

And in red, and on the black and white copy, it's the lighter numbers. It shows the position around the working end, the target end of the AGS and the mean neutron energy measure and the dose equivalent above or below certain energy thresholds.

And we see that dose equivalent there, in the last column. The percent sign shouldn't be in there. No, the percent sign is correct.

KeV and MeV, okay, what percent is above that KeV and how much, what percent is above that MeV. So we see that quite a few of the neutrons, it isn't a negligible amount of

dose equivalent.

Now, yesterday we were talking about a certain energy, it isn't very important. Well, that isn't the case in higher energy neutrons.

As you get higher energy they become more effective at creating doses. And so we see that the dose equivalent, above 115 MeV, is greater than ten percent position one and so on and so forth. And so it is important, a significant amount of dose at a high energy accelerator at Brookhaven, is due to higher energy neutrons.

And so is it something? Maybe ten percent of the dose equivalent is -- say that that's covered by our quality factor or uncertainty factor.

And so I went through the text here and explained something, but the main gist is that we do have a substantial amount of dose above the NTA sensitivity.

And so this is what prompted these

examples. What I did is went back and pulled out some of the documents on Brookhaven and the exchange of memos that went back and forth between the people, the health physicists and such that were concerned about this, between each other and Landauer, and apparently they did some experiments.

They call them runs. In these examples that they tried to measure and compare the NTA -- because the question was, at that time, should we use NTA response?

Should we use the CR-39 response? Should we use a Lexan response? Or some combination thereof? So that's what they were working through.

And unfortunately there is no one detector that works good for high energy neutrons, and so they use different combinations.

And the problem is they didn't get matching results. One, they send the dosimeters, the exposed dosimeters to Landauer

and they get data back that read high doses for people that were on vacation.

And then they get low doses for somebody that was working in an experimental area. And they couldn't get Landauer to respond to this problem.

And so this brings up an accuracy of neutron dosimetry that is documented for '86, through '95. Now perhaps there was problems before, perhaps there were problems afterwards.

Like I said, a lot of this might have went away when they started using mainly ion, heavy ion acceleration, but you still had your 200 MeV proton accelerator.

And so, I won't go through all these examples. I list them on Page 25 through 28, and then I summarize them in the spreadsheet in the back in Appendix D, that lists, no, that's Appendix C.

In Appendix C, list kind of a time line of what dosimetry would give you where

and some of the problems that exist. And those example numbers are explained in here, and then I gave the reference number, so you can look up and see what the dialogue was.

And so, at this point, SC&A does not find that the neutron dosimetry at BNL has been quantitatively investigated to be accurate.

It may be, but it has not been worked on like the Mound was or Rocky Flats was to show it was.

And that the high energy neutron issue is still somewhat open. I don't see that these problems were resolved. Maybe they were, but I couldn't find documentation that they were.

CHAIR BEACH: Okay, thank you. Any questions for Ron or any additional information?

MR. CALHOUN: Unless anybody on the phone has any comments on that, maybe we can just add a little bit more detail.

DR. MAURO: Ron, I have one question. Most of your discussion went toward the interpretation of the results of the neutron dosimetry that came back from Landauer and what it really meant. What about the coverage? I missed, I was out of the room when you started the discussion.

Is there any areas where you felt that people were not monitored for neutrons when they should have or is there good evidence that people were, in fact, badged, that should have been badged?

DR. BUCHANAN: From the information I've looked at and the type of accelerators these were and having worked with accelerators, I did not find indication that badging was a problem, as far as should they be badged?

There wasn't, seemed to be an oversight or lack of badging, it's mainly the persons that were badged were they, was the dose of record quite what they were exposed

to?

And can we resurrect a realistic dose from that.

MEMBER ROESSLER: I have a question as to the extent of this. How many buildings or facilities at BNL was this actually, was there actually a need to monitor neutrons? It's kind of different.

I'm wondering if there's a subset of the various operations there that where this is applicable.

Because it's not like contamination where you have to worry about workers going from one facility to another. I mean this is just production of neutrons and anybody who's in the building has a potential for exposure.

But you wouldn't then, in another building where it's not a problem. So I don't know, you know, the, I don't know the facility well enough to know how many places this would be a potential problem.

DR. BUCHANAN: Well, I think that

TBD-0002, does outline some of this, facilities and what radiation was present there. But, just briefly, for the time period we're talking about, that you would have the lower energy neutrons, perhaps at the high flux reactor which would be operators, experimenters and maintenance people and stuff there.

You, at the accelerators, the accelerator is a complicated layout, okay. You have a, it's a fenced in area and so you'd have anybody working in the, that went into that area, would be subject to neutrons.

Either working around the experimental area, around the accelerator or from sky shine, from reflected neutrons back. So you'd have some environmental neutrons sort of sneak in that area.

And so you would have a -- and Brookhaven is known for, their main thing is the accelerator and so you would have a substantial, I wouldn't say a lot of people,

but you'd have a fair number, percentage of the workforce that would be in that area on a daily basis.

Because you had Van de Graaff accelerators. You had linear accelerators. You had circular accelerators. And so it wouldn't be just a small group by itself in one building. It encompasses a large area.

Now, I mean, the percent, the number of workers, I don't know. But it's something that would need to be badged, and the people that went in there, I'd have to verify it, but I believe they were badged with neutron badges if they went into the accelerator area.

MEMBER ROESSLER: So I think you're saying it was a subset?

DR. BUCHANAN: Of the total population, yes. Yes, and people, and there was chemical and other research going on, that wouldn't be subjected.

Only if you went into the

accelerator or reactor area, would you require a neutron badge or maybe the calibration facility.

MEMBER ROESSLER: Then my second question is it seems like you looked into a lot of this, but you still have a lot of questions about, you know, the things that didn't match the people who worked in the facility apparently had low numbers and people on vacation didn't.

It seems there are a lot of questions there and I think it would be valid to, again, interview people who currently maybe even work there or who worked there during that time.

And I see a name in here, in the report here that, it just seems you could explore a little further to get their answers to some of these questions.

DR. BUCHANAN: Yes, that's a possibility.

MR. FITZGERALD: During the Site

Profile we did interview people that were associated with that debate, you know, that were named in some of these memos.

The problem is they acknowledge that there was a problem and they were going back and forth. And what we're trying to find is what was the resolution.

And what did you finally get to? And that's where it got a little fuzzy, because I think they were converting to, you know, to final dosimetry.

And I get the sense that no one really had a fix on what happened to that debate. They were aware of it, they were a part of it, in some cases, but there was nobody that could tell us what the heck the resolution was.

And we looked for some paper on that, too, but again it was sort of, you know, we had the issue, we had the correspondence, we couldn't find the closure on it, which was troubling.

And we actually did interview several of the people that are named there and we couldn't get a good, clean answer on it.

MEMBER ROESSLER: And are those interviews on the record?

MR. FITZGERALD: Yes.

MEMBER ROESSLER: Because then I just need to look at it.

MEMBER MUNN: That was a period in time, though, when the whole complex was wringing their hands about which way to go.

This wasn't a Brookhaven issue, necessarily, except that as a national laboratory, the personnel there would have just naturally felt that it was their responsibility to work this out, one way or another.

So the debate might have been hotter.

MR. FITZGERALD: Yes, and the sense we got looking at the correspondence was the frustration on the part of the research staff.

The very, fairly renowned HPs who were dissatisfied with the vendor, because they kept getting, you know, getting the answers back that they knew weren't appropriate.

And so they were going back and forth and trying to get them to be responsive. Even talking about bringing it back inside the lab, as opposed to outsourcing.

So there was just that kind of a problem, as well.

MEMBER MUNN: Which might have been a better thing, had it happened.

DR. MAURO: Is there any benefit to interviewing Landauer people involved?

MR. FITZGERALD: Well, I think, you know, again, you know, with a Site Profile you go as far as you can go and then sort of, you know, just put the issue up and tee it up.

Now we're in a focused review, we have two issues, one of which is this. I think we have a better mandate to bore in and focus in on the issue from an SEC standpoint.

So, I think it would be appropriate to follow up, much like what Gen was saying, and try to find more people and make it a full investigation of that particular issue, which we didn't, you know, in the Site Profile we did not do.

We characterized it as a potential question or issue, and left it at that.

DR. BUCHANAN: I think that the introduction of TLDs in '96, kind of, everybody kind of fought this back and forth for ten or 11 years, and then it got kind of dropped when TLDs were introduced in '96.

They had gained some experience on the neutron dosimetry and moved on from there. And so it was just kind of left there, I think.

From the documents I've received, Landauer wasn't responsive. They went back and forth, no resolution and they moved on to the next thing.

And so that's a point that we are

at.

MEMBER ANDERSON: The question is are those valid records and results during that ten year period? When they moved on to a new measurement technique, there was no reason for them to pursue further trying to figure out what happened. It was already too late.

DR. BUCHANAN: And as a DR question is what do we do with the data that is recorded? Is it useful? Can we make corrections for it?

If not, is that an SEC issue?

MEMBER ANDERSON: Is the anticipated exposure enough that it would be a significant contributor in some individual cases?

DR. BUCHANAN: Yes.

MEMBER ANDERSON: I mean it's an interesting scientific issue, but if the exposures were --

MEMBER ROESSLER: Well, and we face that all the time. I think we have to recognize it and grab onto that too. Was the

exposure significant that we were willing to pursue it?

MEMBER MUNN: The feeling at the time, as I recall it, is that quality factor of ten ought to cover any shortcoming in the measurement techniques.

And I was hearing Ron saying he didn't think that was so in a couple of cases that he was looking at, at the table.

DR. BUCHANAN: Well, yes, because, to expand on that a little bit, I don't know if it's so, you know, whether it would cover it all. But the problem is even if you use a quality factor of ten, if you're missing neutrons registering on the film, either at low energy or high energy, no quality factor is going to compensate for that.

And when you look at the chart I put in there, the percent of dose equivalent above the 20 MeV is substantial. At some of the locations the actual measure, I mean in this case we do have some field measurements.

DR. MAURO: For the actual dose reconstructions that were performed, where neutron dosimetry was estimated, using the NTA film, given all of its limitations, was the contribution to the dose experienced by the worker dominated by neutron exposure?

So to answer the question that Henry just asked, is, you know, are we seeing neutron exposures, even though they're flawed, might be flawed, are they important, from the ones we looked at.

MEMBER MUNN: It would seem unlikely that they would be the driving factor, in view of the fact that it only is applicable when the machine is up and running.

It's not up that much. Once you hit the switch then neutrons are no longer an issue.

DR. BUCHANAN: Now, I did look at that and the number claimed at neutron dose reconstruction was limited, okay. And the, and I have it somewhere in here, but I won't

take all the time to dig it out.

But I looked at the neutron contribution and it wasn't non-significant.

DR. MAURO: It wasn't non-significant.

DR. BUCHANAN: Right, yes.

(Laughter.)

DR. BUCHANAN: At any proton accelerator you're going to have a neutron dose that is similar to your photon dose, okay? And it's not going to be a hundredth of it or something like that or a hundred times.

It's going to be around, your photon dose, if that person is exposed to just the operating -- you know. Now, if he's a maintenance worker that goes in a tunnel after it's shut down, he's going to be mainly photon dose.

But if it's an operator or experimenter that works around during the operation of the accelerator, you're going to have a neutron dose that is somewhat

comparable to the photon dose.

DR. MAURO: One more question related to that. I guess, I'm not familiar with accelerators but when it's on, everyone is aware, this is a very serious situation.

And you have controlled access, you have interlocks, you have shielding. But also, I presume, that in the areas that are being occupied, that beside the fact that they're wearing NTA film, I know that there are various devices that are survey instruments to characterize the neutron field in potentially occupiable areas. Was there like mapping that is when this machine is on, outside of the controlled, where the area, the accessible area is where the workers might be, a control room, for example.

Were there special investigations to understand the radiation field that is in place, at the time the machine is on, so that you understood what the, because I know you were talking about, these machines certainly

would produce.

And when the accelerator strikes the target, you've got this now. But then, of course, outside of that location, what actually makes it out where people might be?

DR. BUCHANAN: Your photons and neutrons.

DR. MAURO: You do get photons, but the energy distribution.

DR. BUCHANAN: Yes, they did that --

DR. MAURO: They did do that?

DR. BUCHANAN: And also, at Brookhaven the energies are high enough, you had muons on the outside too, which you generally don't experience in health physics.

But the muons are low LET, they rest here on the photon field. I did have some problems with Landauer correctly measuring the muon dose, but it wasn't substantial.

So, outside the shielded accelerator while you're operating, you've got

your photons and your neutrons. And they did have, and I'm not sure of all the systems at Brookhaven, but they did have a thing called the Chipmunk they did use to do surveys with.

And I presume they had area monitors of those sitting around, you know. So there was, you know, not really questioning the health physics control around accelerators and stuff and, in fact, you know we think they did health physics, they were identifying these problems. You know, they weren't just taking the NTA value from Landauer. And they did do measurements to show that their instruments measured something and Landauer --

MEMBER ROESSLER: I think what John is suggesting, though, is something comparable to before when he talked about air monitoring in lieu of bioassay, is there some monitoring going on when the machines were on, that would serve as a to do dose for those workers, even if that film badge or the other badges were not adequate.

DR. BUCHANAN: Not, not.

MEMBER ANDERSON: Can we bound the exposure?

MEMBER ROESSLER: Is that what you were getting at?

DR. MAURO: Well, I wanted to get a better understanding, because I know when you talk about these machines and what they are capable of producing, but what is actually being experienced where people are, are two different things.

DR. BUCHANAN: You don't have spallation products and charged particles impinging on the workers outside the shield.

DR. MAURO: That's where I was headed. But now, I didn't intend my question to be that, but I like what you, where you took it.

In other words, here's the way to get a handle. Here's where you can get a handle on how serious a problem might have been.

Apparently, the research is more serious. The debate that occurred between Landauer and the researchers probably emerged from the fact that they had reason to believe that we're dealing with very high energy neutrons and other emissions in a potentially occupiable area.

That the NTA film or the other dosimeters that were used, were not going to be very adequate. So, but the hook on this problem might be, okay, what was the field that might have been there and what adjustment factors you might need to make to -- in a claimant favorable way to the NTA film readings that, and so the hook for solving the problem might be these surveys that were taken with these -- whatever the detector was.

That would have captured what these, the neutron exposures at these high -- I'm presuming that, you know, the Bonner sphere with a shield.

If you had a 10 MeV or 20, whatever

the neutron, I don't know what made it out. I'm not sure how they would know the spectrum.

I guess that's my question, I'm not quite sure. Do they know what the spectrum was outside in potentially occupiable areas?

DR. BUCHANAN: Yes, they did, they did a pretty good job of that and that's the way this table 3, I had in here, listing the dose as a function of energy above a certain MeV, they use a Bonner sphere.

So they did characterize the film and that's the reason they were able to say, to use these different dosimeters and say, Landauer, you're missing the boat, and that sort of thing.

Now, but you have to, accelerator, you have to depend on this type of experimental measurements to do any conversion of recorded dose, meaningful dose, an area monitor and accelerator is only a gross indicator.

If they've got one mounted on the

wall. It kind of tells you if it's going up or down.

But there can be a crack over here 100 times more than that up there. And in experimental -- you've got experimental blocks and stuff shielding it.

So as far as reconstructing a worker's dose, area monitors are not very practical.

DR. MAURO: So that may not be the hook, okay.

DR. BUCHANAN: And the experimental data is what would enable us to go back and say, okay, this is the energy spectrum and you can even say this is the worst case they measured.

And so we multiply the dose by a certain factor and so we can put a limit on what the person will get.

MR. FITZGERALD: The energy spectrum in the occupiable space -- I mean it's modeled for what would be in fact an occupational

exposure.

DR. BUCHANAN: Right.

MR. FITZGERALD: So it's very much relevant to this.

DR. BUCHANAN: Usually done at three or four feet above ground level. It's usually done at the pace a person can get without breaking the interlock.

MR. FITZGERALD: Right.

DR. BUCHANAN: And it's usually done at, say, a junction of the shielding or something, where you might get screening.

And so, knowing the people that work there, these were probably good measurements.

MR. FITZGERALD: Yes. Which gets to your point, I think. This is really where the worker would be.

DR. MAURO: Where the worker is.

DR. BUCHANAN: And you can look up on this where I got this data. They actually make a diagram of the accelerator and the one,

two, three, four, five, 17 points around.

DR. MAURO: So what I'm hearing is that you would have liked to have seen in the Evaluation Report, a development of the, a narrative explaining this issue and the way, the strategy that those NIOSH proposals as being guidance to the dose reconstructor on dealing with these issues.

That's not there.

DR. BUCHANAN: All the way back to TBD-0006. And I think TBD-0006 needed this information. Because the dose reconstructors left without any real feel for what he's supposed to do.

MR. FITZGERALD: Just a footnote that we just, in the Site Profile review, did not get to the bottom line of the resolution and how it was recorded.

So that piece we were trying to find out, but again we couldn't find that out.

DR. BUCHANAN: And TBD and the Site Profile review, we did identify these

problems. And then we went back for the SEC and you did a finer combing of it and a more logical sequence of events.

Because it takes quite a while to go through these memos and see who is saying what to who over this ten or 11 year period. So, it gets kind of wound up if you don't go through and filter it all out.

CHAIR BEACH: So the action item that I gathered from this is that NIOSH needs to go back, look at SC&A's concerns and then, and you would owe a White Paper or something on neutrons to the Work Group at some time.

And that's the only action I have, other than maybe clarifying questions if you have, for SC&A on some of their questions.

DR. BUCHANAN: And the interviews, should we consider --

MR. FITZGERALD: And the interviews, and we can certainly --

CHAIR BEACH: Thank you, I didn't --

MR. FITZGERALD: The interviews plus

the names of the individuals that were relevant to this issue, we talked to.

CHAIR BEACH: And that would be an effort between both SC&A and NIOSH, hopefully, to interview together?

MR. FITZGERALD: Yes.

CHAIR BEACH: Yes, it seems reasonable. Hopefully, definitely coupled with the other set.

MR. CALHOUN: Leo, do you have any input on that?

(No response.)

MR. CALHOUN: No wonder he doesn't have any input on it.

MEMBER ANDERSON: He's not there.

MR. FAUST: I can't talk with mute on, I guess.

MEMBER MUNN: Oh, you can, but we can't hear you.

(Laughter.)

MR. FAUST: Okay. Anyway, I think Ron has pretty well laid out some of the

problems that we were kind of aware of when we first put this TBD together.

And I'll be the first one to admit that there's some holes in it. Mostly because we couldn't find any data at the time.

But, I think right now we should do, we could answer some of those questions much better if we relooked at it. That's about all I can say right now.

CHAIR BEACH: Sounds good.

MR. FAUST: One thing I might bring up, we're kind of shying away from White Papers. We would rather, I think, answer this in the form of a formal report.

CHAIR BEACH: Okay.

MEMBER MUNN: Why are you shying away from White Papers?

CHAIR BEACH: What's the difference between a White Paper and this report?

MR. CALHOUN: It's because we haven't been able to reference them. When we come up with a White Paper, it's not quite as

trackable.

And if we make it a formal report it's a trackable record in our little world.

DR. MAURO: You get a number. I agree with that.

CHAIR BEACH: That's perfect.

MEMBER MUNN: When the time comes when it's all electronic anyhow, the reference will be easy.

MR. CALHOUN: Yes, yes.

CHAIR BEACH: Yes.

MR. CALHOUN: For now that seems like a good approach.

CHAIR BEACH: Okay, so that takes us through the matrix. The next question for this Work Group is we were tasked with the Site Profile review and I guess, I know SC&A has a report on the table.

And my question will be to NIOSH of how much energy or where you are on the Site Profile review? The questions to SC&A's response.

MR. CALHOUN: Well, basically, it's going to be kind of a general response in that John just gave me, last week or two weeks ago, a list of outstanding items that you guys have that SC&A has.

And we work with a really detailed chart to try to allocate our resources appropriately. And so we're trying to meld those.

I've forwarded that information to ORAU last week or whenever, right after John had given it to me. And I believe that we're supposed to give you something, you, the Board, not just this Work Group, an overall outline of where we think this is going to be and how we can make these match our priorities as well as yours.

I think by the end of this week.

MR. KATZ: That's good.

(Laughter.)

CHAIR BEACH: So that's not a specific Brookhaven --

MR. CALHOUN: It will be. It will, no, it will be. It will be, it has to be. It has to be line by line so that --

MR. KATZ: Not just Brookhaven?

MR. CALHOUN: Yes, not just Brookhaven, right.

CHAIR BEACH: So that will give us an idea of when to expect the report.

MR. CALHOUN: Yes. Because what we're trying to avoid is, you know, somebody calls us and says we want to have a Work Group meeting next week.

And we're like well, hell, this was never on our priority list and now we've got to go. Because we do have other things that we do.

So, we're going to try to make those match now so that your expectations and our expectations are kind of in sync.

CHAIR BEACH: Well, just history, we formed the Work Group almost a year ago. So I thought I was being --

MR. CALHOUN: It's nothing on you. But there's times when we've had, you know, we've had a Work Group scheduled, or not a Work Group scheduled, but a Work Group established and haven't had a meeting for years, years.

CHAIR BEACH: So, we'll wait for that report on the Site Profile.

MR. CALHOUN: Yes, yes.

CHAIR BEACH: What about kind of a time line for the action items from the matrix for this meeting?

MR. CALHOUN: Well, when would you like to get back together again? That's certainly how we should do this.

MEMBER CLAWSON: Next week?

CHAIR BEACH: It won't be until, it won't be for me until after October, so, but how much time do you need?

MR. CALHOUN: Then we shouldn't need that long, you know.

CHAIR BEACH: Okay, so is anybody

ready to pull calendars out or do we want to do that?

MEMBER MUNN: You can't do it in September?

CHAIR BEACH: No, I'm out of the, out of the country.

DR. NETON: Well, some of this neutron stuff, Grady, might take a while. It's very complicated.

MR. CALHOUN: Well, then we need to discuss with the guys who are going to do the work.

DR. NETON: I think we need to --

MR. KATZ: At the Board meeting.

DR. NETON: We'll be prepared at the Board meeting to provide some dates.

CHAIR BEACH: So, put the calendars away.

DR. NETON: I think there's substantial, probably, modeling efforts are involved in some of this neutron data.

MR. KATZ: That's okay.

DR. NETON: I think we should wait.

CHAIR BEACH: That's fair.

MEMBER MUNN: For your information, Josie, Procedures is tentatively scheduled the 13th of October, as their next meeting. So that middle week in October is one that we were thinking would be about the time people would start to meet again.

DR. MAURO: And along those lines, it's always convenient for us to, well, for me, to have them back-to-back. Have a Wednesday-Thursday, Tuesday-Wednesday-Thursday.

CHAIR BEACH: So before, if we're finished with Brookhaven, let's go ahead and adjourn this meeting, then. So this, consider we're adjourned.

MR. KATZ: We're adjourned. Thank you everyone on the line.

(Whereupon, the above-entitled matter went off the record at 11:19 a.m.)