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

+ + + + +

ADVISORY BOARD ON RADIATION AND
WORKER HEALTH

+ + + + +

WORK GROUP ON WELDON SPRING

+ + + + +

MEETING

+ + + + +

TUESDAY,
SEPTEMBER 13, 2011

+ + + + +

The Work Group met in the Zurich Room of the Cincinnati Airport Marriott, 2395 Progress Drive, Hebron, Kentucky, at 9:00 a.m., Richard Lemen, Chairman, presiding.

PRESENT:

RICHARD LEMEN, Chairman*

ALSO PRESENT:

TED KATZ, Designated Federal Official
ROBERT ANIGSTEIN, SC&A*
RON BUCHANAN, SC&A
JOE FITZGERALD, SC&A*
MONICA HARRISON-MAPLES, ORAU Team*
STUART HINNEFELD, DCAS
KAREN JOHNSON
MARY JOHNSON
JOSH KINMAN, DCAS Contractor*
JENNY LIN, HHS*
JOHN MAURO, SC&A*
ROBERT MORRIS, ORAU Team*
GENE POTTER, ORAU Team*
BRYCE RICH, ORAU Team*
MARK ROLFES, DCAS
JOHN STIVER, SC&A*

*Present via telephone

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

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

(9:12 a.m.)

MR. KATZ: All right. We have an agenda. It's on the NIOSH website under the Board section in the meeting section, and we have one small change to it, but we'll get to that.

That's under Item 4, which is discussion of open SEC issues, NIOSH and SC&A. We have switched around the order of what was first listed, first bullet, and I think, Mark, the fifth bullet?

MR. ROLFES: Yes.

MR. KATZ: And the fifth bullet. So that's the only change in the agenda, and so let's get started. Dick, do you want to -- do you want to say anything before we get going? Otherwise, we'll turn it over to Ron to --

CHAIRMAN LEMEN: Not at this time. Let's go ahead.

MR. KATZ: Okay. Ron, would you kick-start this for us?

DR. BUCHANAN: Okay. This is Ron Buchanan from SC&A. I know we've all done other things since we met in May, so I just want to go through a brief run-down of Weldon Springs, the related documents issued and the recent exchange of papers to bring everybody up-to-date.

Then I'll go through a summary of the SEC issues to bring everybody up-to-date. Then Item 4, we'll do an discussion of the issues that are still open.

So, first of all, just a brief history. We know that Weldon Springs processed uranium or yellowcake from 1957 through December 31 of 1966.

In addition, in the early sixties they had some recycled uranium, and in the mid-sixties they had some uranium and recycled uranium, and these facts are relevant to our

discussion of some of the issues that we'll go into later.

In 1967, there was a transition period in which the plan was shut down, and then they had some activity there. It appears the main cleanup activity and changeover started in '68 and '69, when the Army was going to make a herbicide there, but that did not materialize, and so our SEC period is '57 through '67.

That was monitored and maintained 1970 through 1985. 1985 through 2001, there was a D&D effort. There was an engineering disposal pile in which there's a -- 2002, there's a large pile of rocks there with everything cemented underneath it from the plant, the quarry, and the pits. So that brings us up-to-date on the physical facility.

Now, in June of 2005, NIOSH issued TBD-28, Parts 1 through 6, which describe the site and how it is going to do dose

reconstruction. In March of 2009, SC&A issued their Site Profile review.

In September of 2009, SEC Petition 143 was qualified, and in October -- excuse me -- April of 2010, NIOSH issued its Evaluation Report of the SEC. In October of 2010, we had our first Workgroup meeting.

December of 2010, SC&A issued a review of the Evaluation Report, and then we had our second meeting in January. Then our third meeting in May, 9th of May, was our last meeting.

So that is the documents that were issued. Now, the exchange of papers have been taking place since then, and I want to go over briefly over those so everybody's on the same grounds here.

On April 21, 2011, NIOSH issued a paper that covered a number of the SEC issues and a few of the Site Profile issues. This was just before our 9 May Workgroup meeting,

and so SC&A had not had time to completely review all of these.

We did review some of them at the last meeting, and we also clarified some issues. So after the meeting, the action items for SC&A and NIOSH were drawn up and sent out, and I will cover those so to make sure that we are all addressing the same issues.

NIOSH replied to the recycled issue, recycled uranium issue, in the first of November -- I mean, excuse me -- first of July of '11, and that was in response to one of the issues number five, which we'll address here soon.

So SC&A then issued their response to NIOSH's April paper and evaluation of that meeting and paper and the recycled issue and a new matrix as of June. We issued that in the 3rd of August and sent that out, and I hope everyone got those documents.

Today we will do an update on the recycled issue, because that was kind of a fluent issue, and so we have reached a decision on that today, the recommendation, and then at the May meeting SC&A was charged with coming up with a initial plan to look at the data completeness for Weldon Spring.

We looked at the accuracy, or we're supposed to look at the accuracy and the completeness. NIOSH states that only the copies of the original documents will be used. No electronic database will be used.

So we looked at the completeness. We devised a method, and we did do an initial data completeness test, which we'll have some handouts here today, and we'll discuss today. That was sent out on the 15th of August.

Then, on the 7th of September NIOSH issued a paper, the latest one that I've received, and that was the daily weighted exposure error or what they call blunders in

the data, what was originally copied and calculations made. So that was issued a couple days ago, and we've looked that over.

So that brings us to the current status of what papers have been issued back and forth, and, fortunately, as you can see, there has been quite a bit of work done on it since our last meeting.

So, to summarize on what is left to do, at the action item list from the May meeting SC&A was to look at issue -- SEC Issue 1A and 1C, which was the accuracy and completion of the internal and external dose data. Like I say, we will discuss that shortly here.

Issue 1B was the daily weighted average, and, again, I touched on that, and NIOSH will present some results on that. 1D was coworker, coworker data, and what SC&A would like to address on that is that we have found in several of the responses from NIOSH

they recommended perhaps using some of the workers data for people that weren't monitored, so we'd like to get a definite response from NIOSH on what the coworker model is that they plan on using or not using or how they're going to bridge that gap.

SEC Issue 2 was lack of egress monitoring. We closed that during the last meeting, and 3 was lack of records for 1967. That was closed last meeting with the idea that we'd use the 1966 information or previous operating information, and that -- one reason, it leads to the coworker model.

Number 4 was the no radon measurements being made. NIOSH did come back in their April response with a more defined model, and we'll discuss that today.

Number 5 was the validity of the recycle uranium assignments, and so we're going to discuss that first off. We're going to get into the details. Number 7 was the

quarries and the pits, and we closed that in the May meeting.

Number 8 was accidents and incidents, the impact on dose reconstruction. We pretty much wound that up in the May meeting. We did have one lingering question, a statement made about that the group by last days was claimant favorable in accident and incident situations, and NIOSH is going to provide a clarification on that today.

The last one was -- Number 9 was geometry and extremity monitoring. There was no conversation for different geometries at Weldon Spring in their monitoring system, and NIOSH was going to present how they could use geometry factors from other similar sites to correct for geometry dosimetry, and so I expect we'll hear from that today.

We did have one Site Profile issue that was responded to, and that was Issue Number 24, which had bearing on the SEC

issues, and that was the amount of enrichment of uranium that was used at Weldon Springs. SC&A requested documentation to show if it was less than one percent, because that affected the neutron issue.

Okay, I did skip over that, SEC Issue Number 6, lack of neutron data, which we wish to discuss today.

So, if it's less than one percent, then that affects our neutron N/P ratio, and so we did look up that reference and did verify according to the documents at this time that it was one percent or less, so that answered some of our questions on that, which is relevant to our SEC issues.

So, that takes us through points one, two, and three on the agenda, and so that brings us to issue four, number four, item number four, discussion of the open SEC issues, and you can see we have Issue 1, 4, 5, 6, 8, and 9, which we wish to discuss today.

We are going to put Number 5 at the beginning. John Stiver, are you on the line?

MR. KATZ: John?

DR. MAURO: This is John Mauro. Yes, John Stiver should be on the line. Perhaps he stepped away for a moment, but he will be joining us.

MR. STIVER: Okay, I just had my mic turned off.

DR. MAURO: Okay, there you go.

MR. STIVER: Yes, I'm on the line.

DR. BUCHANAN: Okay. Thank you, John, John and John. We do -- go ahead.

MR. KATZ: Before we just go charging into this, just let me say for the petitioners I don't know how familiar they are with processes with Workgroups, but Karen and Mary I believe we have. Maybe we have others at this point who are interested, but we'll at times get through quite a bit of technical material.

If you have questions, don't be bashful. Ask them, and we'll try to address your questions as we go along. Okay? Again, Karen and Mary, are you on the line with us still?

MS. KAREN JOHNSON: Yes, we're here.

MR. KATZ: Okay. So do you have any questions at this point about what the agenda is for today?

MS. KAREN JOHNSON: No, not at this point but I appreciate the opportunity.

MR. KATZ: Okay. Thank you.

DR. BUCHANAN: Okay, before we dive into the individual issues, is there any comments, corrections, additions anybody wants to make?

MR. ROLFES: This is Mark Rolfes. No, Ron, you did a great job summarizing what we've covered in the past year and a half or two.

DR. BUCHANAN: Okay, so that brings us to Issue Number 5 we're going to start with, recycled uranium, and the gist of this is that when the natural uranium had essentially no plutonium in it, but when they started processing recycled uranium in the early sixties, it could have some carryover plutonium.

The workers at Weldon Springs was only monitored for uranium, and so the way dose reconstruction is done is you add in a certain amount of parts per billion of plutonium into the uranium intake and calculate the dose then from both the uranium and the plutonium.

The question has been what is this number. What number limits the dose? There's been a number of numbers kicked around, 2.6 or so or 10 or 100 or perhaps 400, and so what SC&A has done, has looked at this at Fernald.

Because this material came from

Fernald, Weldon Springs, they wanted to put a limit on it, and Fernald Workgroup has been working on this. So we've been trying to find, you know, what is a practical number which would limit the dose to the Weldon Spring worker.

So John Stiver of SC&A has been working on this with Fernald, and we originally asked -- NIOSH originally, in the end result has recommended 100 parts per billion plutonium be added. Is that -- that's our latest stand, right?

MR. ROLFES: Yes, that's correct. In the original TBD we defaulted to use surrogate data from the Fernald site.

However, in our SEC Evaluation Report, when we actually went back to look at the concentrations of plutonium and the recycled uranium being sent from Fernald back to Weldon Spring, the average concentration of plutonium on a uranium mass basis was

approximately 2.9 parts per billion on a uranium mass basis.

The bounding 95th percentile value for the materials at the Weldon Spring plant was about 6.3 parts per billion uranium. However, since we've been using the default surrogate data of 100 parts per billion for the Weldon Spring plant, we said that we would continue to use that just because we had completed so many dose reconstructions with that 100 parts per billion.

DR. BUCHANAN: Okay, and so at this point I would like for John Stiver to present SC&A's current evaluation of this situation. John, would you do that?

MR. STIVER: Certainly. This is John Stiver from SC&A, and if I could back up just a bit to the May meeting, at that point we were somewhat concerned, because we had -- in our dealings with NIOSH and exchanges of White Papers and reviewing the mass balance

reports, we had come to a point where we felt that the concentrations in the initial feed materials really weren't the primary concern for worker exposures, but it was really the concentrations they were experiencing in the jobs in which those kinds of materials could be concentrated.

The one set of data for which that was probably the highest would have been metals production, and this would have been the material that was entrained in the magnesium fluoride slag reduction pipeline during the metal reduction process.

Those values came in at about 400 parts per billion plutonium at the 95th percentile of allowed normal distribution, and due to a lot of back-and-forth discussions with NIOSH we came to a point where we felt that that for Fernald was probably a pretty good number for most of the workers.

There was still some concern about

these people that might have handled the material on the front end, the unblended materials, but most of that material was blended down before the metal reduction process, although because of that we were kind of concerned that maybe at Weldon Springs, while the 100 parts per billion certainly seems to be a high number given the concentrations in the group 6A, you know, the PUREX materials that were coming in in the 1960s, we thought that because we really didn't have a good handle of the amount of concentration that took place in this material that maybe that 100 parts per billion wasn't really a bounding number.

I believe it was right before the August Workgroup meeting for Fernald that DCAS had posted a position paper on what they believed to be bounding defaults for Fernald, and along with that were about 50 citations. SC&A began reviewing those before the meeting,

and we're kind of still in the process of putting together a response to this position paper.

The one thing we did discover was that there is evidence in some of the citations that some unblended materials were actually, indeed, processed through to metal, and so that kind of put our concern to rest to some point, because that would indicate that when these highly contaminated materials came in in the seventies and eighties, we were initially, based on the references we were able to find, believed that pretty much everything was down-blended before it made it to the metals process.

So what you would actually be seeing in the metals reduction process would be no different from some of the materials that came in earlier, which were a relatively low contamination level, but these other references cast some doubt on that.

There may very well have been some unblended materials that were processed through to metal, which would indicate that then the 400 was more indicative of what took place at Fernald in the seventies and eighties.

So, based on that, I think, you know, while there is still some uncertainty regarding what that number should be, whether it should be 100 or something higher, we feel that this is really a Site Profile issue and that the 100 is probably going to be okay.

Like I say, we're in the process now of responding to the NIOSH paper, so I don't want to say anything conclusive at this point, but I would say that the evidence would indicate that 100 is probably going to be pretty good for Weldon Springs based on what we know at this time.

It would be about a factor of ten higher than the 95th percentile of the

materials that were actually received, I believe, up through about 1967. So that's where we stand at this point.

MR. ROLFES: Thank you, John. This is Mark Rolfes. I was just going to clarify in there that the 400 parts per billion magnesium fluoride concentrations, that was the 95th percentile. That was observed in the 1980s following the processing of the highest transuranic contaminated material ever received by the Fernald site.

MR. STIVER: Mark, you are correct in that. Yes, that's true.

MR. ROLFES: That was -- that was the plutonium out of specification material. It was Paducah Tower ash.

MR. STIVER: Right, and that's what we were kind of concerned about. You know, was this material all down-blended before it made it to the metals? That was really kind of a pivotal issue, and I think what we had,

as I said, we found a reference that indicated that some of that materials was processed without blending.

MR. ROLFES: Okay.

MR. STIVER: So what we see in that magnesium fluoride may actually be indicative of some unblended materials, as well as blended.

MR. ROLFES: Well, this material was never sent to the Weldon Spring plant.

MR. STIVER: Yes, exactly, and because it was never sent to Weldon Spring, this was far, you know, beyond the time period we're interested in. We feel that it was probably a pretty solid number that you guys were using.

MR. ROLFES: Really, the only concern that we have regarding recycled uranium is primarily from 1970 forward. The concentrations of the transuranic contaminants increased in the more recent era, from 1970

and 1980. That was tied to the Paducah Tower ash, some of the other processes at the gaseous diffusion plants.

The period of concern for the Weldon Spring plant is primarily -- the processing time period is 1957 through 1966. However, we don't have any indication that recycled uranium was processed at Weldon Spring until 1961, at least 1961. That's all I had to clarify. Thanks.

MR. STIVER: Okay, Ron, that's really all I had to say if there's no more questions to be entertained here.

DR. BUCHANAN: Okay. Well, thank you, John. So that brings us up to -- it looks as if 100 parts per billion plutonium is limiting at Weldon Springs.

Now, I did want to clarify where we're at. I went through and found five cases at Weldon Springs, I think back in February, that only one they actually did that, assigned

the 100 parts per billion, and I sent those case numbers to you. Where is that at?

MR. ROLFES: We did take a look at that, and you're right. There were, I think, four -- was it -- refresh my memory a little bit.

DR. BUCHANAN: One out of five was assigned. Four were not.

MR. ROLFES: Four did not have it. We need to go back and look at those in more detail to see if there would be any kind of impact on the outcome of the dose reconstruction, and if there is going to be an impact, meaning that it would go from less than 50 percent to greater than 50 percent Probability of Causation, we would issue a program Evaluation Report, and we would rework those dose reconstructions.

So, yes, that is something that we do need to make sure that we write down as an action to determine whether or not those cases

would be affected, and if they are, we would definitely rework those dose reconstructions.

MR. HINNEFELD: Well, this is Stu Hinnefeld. Sounds to me like we should take a look at Weldon Spring, completed Weldon Spring cases in general. I mean --

DR. BUCHANAN: Not just a --

MR. HINNEFELD: -- a sampling of four out of five, four out of five, then we've got to look at all of them.

DR. BUCHANAN: Right.

MR. HINNEFELD: That will be our action.

MR. ROLFES: And a Program Evaluation Report.

MR. HINNEFELD: Yes, we'll do a Program Evaluation Report or something.

DR. BUCHANAN: Okay, are there any questions or comments on the line? Okay, so we have the action item of that, and that's where that stands on Item Number 5, recycled

uranium.

So now we'll start down the list of Item Number 1, Issue Number 1, which is data completeness, and, again, this was -- came out of the fact that we had talked about at Weldon Spring there is the original data, which is on hard copies, and in the files there is actual photographs of the scannings of the hard copies.

They're legible, for the most part, and I haven't found any that's hard to read. So the accuracy, since NIOSH stated that the dose reconstruction would only use the copies of the original bioassay and external monitoring data, therefore the accuracy is acceptable.

Now, however, the completeness is another issue to be addressed. All of the files there or most of the files there, of course, you probably never will get 100 percent, find all the files, but is there

enough there, number one, to do dose reconstruction on an individual worker? Number two, is there, if you need to create a coworker model, is the data sufficient to be used?

So, what I did -- at the May meeting we were charged with doing an initial test. We don't know whether it's a problem or not with the completeness, so we didn't want to spend a lot of resources if there isn't a problem.

So we did a initial limited test to see if there is any indication of a problem, and so today I'd like to present to the Working Group what we found, and then you can judge if anything else needs to be done further on it.

So what I did was I went and took 15 cases from Weldon Springs during the period '57 through '67 for workers that job categories indicate that they were potentially

exposed to external radiation or intakes, and these were such as operators, chemical operators, and such as that, because we wouldn't expect secretaries and guards at that time to have been monitored, so I looked at the ones that we thought should be monitored.

So I went through, and I looked at their records. There was 15 cases, about 500 DOE files, about 5,000 pages of does records, and I have a copy of those results here. I don't know if any of you need it. Do any of you need a hard copy?

MR. ROLFES: We've got the --

DR. BUCHANAN: You've got it?

MR. ROLFES: You sent the email out, I think.

DR. BUCHANAN: Yes.

MR. ROLFES: Okay.

DR. BUCHANAN: Okay.

MR. ROLFES: Let me just pull that up here, though.

DR. BUCHANAN: Okay, let me get my hard copy so I can talk from it. This was sent out on the 15th of April -- I mean, excuse me, 15th of August, and so went through and looked at it two ways, individual case basis and also collective dose.

So, first I'll talk about the individual cases, and we see that Figure 1 on page five of the report illustrates the number of years that the worker was monitored. Now, these workers usually worked most of this period. Sometimes they'd start a few years later or a year or two earlier, but there was a pretty good span of ten, eight, ten, 11 years for each worker there.

So you see C1 through C15 are the 15 cases, and in Figure 1 it illustrates the number of years that they -- the percent of years that they worked that they were badged. See the average, that's 91 percent badging for the 15 workers, and the bioassay you see

in Figure 2, about 94 percent of the time we had bioassay.

Now, I did not go down on this initial test and say how many months or how many weeks out of the year they were badged. If they were -- if they showed badge records for 1959, well, I put that year as being badged.

That takes a lot more resources to go down and see what percent of the year they were badged, but, generally, if they were badged, they had a string of badge information there. There usually wasn't just one badge result or something, and I did scan and glance at the records to see that that was true.

Bioassay, again, if they was bioassayed one time, well, then it counted. If they was bioassayed ten times, it still counted as a point. They were bioassayed sometime during that year.

You see that about 94 percent of

the years that they worked they were bioassayed. So that gives me information on an individual person, but we also want to look at the year.

So if you do a collective monitoring analysis, you look at the per year, and you see in Figure 3 there is the external monitoring per year, and so I added up all the worked years for 1958 or whatever the year it was and then told the number of badged years.

So you see those two bars in Figure 3 illustrate the number of years badged versus the number of years worked total for these 15 workers, and more illustrative is what year -- what percent of a year weren't they badged, and so that's in Figure 4. You can see that they was badged pretty much 100 percent there in the middle years.

We see that '57 and '58 they were badged around -- they weren't badged about 40 percent of the time. 1967 they weren't badged

at all. We have already discussed that. We know there was no badging and no monitoring, bioassay monitoring in '67.

Now, 1957 shows that about 38 percent were not badged. This was their startup year. Now, '58 was kind of a different year in the records. Apparently, '57 had some cycle data. 1959 had cycle data. 1958, they had no cycle data, but they had summary data.

Now, this plot does not show summary data. They'd have the '57 total. They'd have the '58 total, and then '59 they'd have cycle data plus total.

So if you extract the '57 and '58, that gave you the dose, and then you could calculate the maximum missed dose. So it's actually, if you include that summary data, that drops down to 15 percent, okay, rather than 45 percent not monitored during '58. So '58 does have data there. It just wasn't in

the cycle form.

So, in summary, for external monitoring on a collective basis we see that 1957 you had about 63 percent of the time the workers were monitored. 1958, it was 54 percent if you don't include the summary data, 85 percent if you include it. 1967, there was no external monitoring, and the average for all 11 years was 91 percent for external monitoring.

Then we go to bioassay. Was there any question on external monitoring?

MR. ROLFES: No. No. Thank you.

DR. BUCHANAN: Okay, then on bioassay monitoring we see I did the same thing. The number of years worked and number of years bioassayed there is shown in Figure 5. That's about 94 percent were bioassayed.

Then in Figure 6 you see that that shows the years not bioassayed, and that was about six percent average for the 11 years.

Again, '67 there was no bioassays.

So the bioassay was only urinalysis. It did not include any breath test or in vivo counting for thorium. This was strictly uranium bioassays urinalysis.

So, in summary, it looks as if the external and bioassay monitoring was about 90 percent through most of the years. 1957 and 1958 were lower, and, of course, there was none for '67.

Now, we did -- SC&A independently did this work, and then I went back and checked the 15 cases as a cross-check with what NIOSH had done in dose reconstruction to see if our results matched our results.

So I pulled up each case. Each case, our final report has accompanying files, which you can go back and see how they broke down each year's worth of monitoring data in bioassay, and I checked to see if my results agreed with what the dose reconstruction did,

and I found that there was agreement.

There wasn't any problems, conflicts between what I found and what was used for dose reconstruction in 15 cases, except one minor thing I found was that in one dose reconstruction they did use a 454 millirem of beta and 374 millirem of gamma from the CER database, which wasn't in the original files.

Now, this case was compensated, and so it didn't affect it, but that was the only discrepancy I found between our -- in the 15 cases. So I present that information to the Working Group, and, you know, they can decide whether they want any further work done for data completion for Weldon Spring.

MR. KATZ: Mark, do you have any comments or questions?

MR. ROLFES: No. No, I don't. I think the only thing that comes to mind is I know we exchanged some emails trying to figure

out where that 454 millirem came from, and I think we're okay.

I mean, that case was over 50 percent Probability of Causation. We added it in, because there was uncertainty whether we might not have received a DOE file. I don't recall.

You know, we gave the benefit of the doubt to the claimant, because that information was included in the case file that we received, and since we didn't have a DOE response filed that showed that 454 millirem, we thought it might have been possible that they received that as a covered exposure at the Weldon Spring plant.

Maybe we didn't receive that particular film badge result from DOE, and it was included in the CER database, which had been provided to us somewhere in the claim file. I don't know if it was in the DOL initial case file or in the DOE response file,

but that data was identified to us. We included it.

Whether or not we included it wouldn't have made a difference in the outcome of the case, so we just went ahead and included it, and ultimately we didn't have to, but we did.

MR. HINNEFELD: I just think as a general practice if we have two sources and one indicates more exposure than the other, we'll go with the higher exposures. That's just a matter of practice.

CHAIRMAN LEMEN: This is Dick Lemen.

MR. KATZ: Yes, go ahead, Dick. We can hear you.

CHAIRMAN LEMEN: In relationship to Issue 1, then, what is the bottom line that's going to happen now that SC&A's report is done? Where are you going at NIOSH to go with this information? Can you be a little bit

more specific?

MR. HINNEFELD: Well, this is Stu Hinnefeld. If I understand the report here, it appears that we have somewhere over 90 percent of employee years monitored. Is that right?

DR. BUCHANAN: Correct.

MR. HINNEFELD: And so at that level of monitoring our position would be that we have essentially a fully monitored population, perhaps, that certainly if there are people who are not -- who don't have exposure information in the file who we think from their job history they may have, I think we would be confident to say that the data that we have would be representative of the workers there.

It would seem hard -- it would seem kind of farfetched to believe that the six percent or nine percent of people who were not monitored were the most highly exposed, and

therefore -- I mean, they specifically excluded those people. It seems like the people who were excluded were probably, you know, in likelihood administrative, I would guess, employees who --

CHAIRMAN LEMEN: So the bottom line would be that you would go ahead and do dose reconstruction and therefore not designate this as a SEC. Is that correct?

MR. HINNEFELD: Yes, our position is that with this rich a data set we believe we have -- the data is complete enough that we would believe dose reconstruction is feasible, so we don't believe this issue -- I guess, from our position, this issue would not lead us to conclude that the data is insufficient to do dose reconstruction --

CHAIRMAN LEMEN: Oh.

MR. HINNEFELD: -- with this rich a data set with this high a percentage of people monitored.

CHAIRMAN LEMEN: So the bottom line of action on this would be that NIOSH would recommend not to establish an SEC in this group.

MR. HINNEFELD: Based on this issue.

CHAIRMAN LEMEN: Right.

MR. HINNEFELD: Speaking for this one issue, yes, we don't believe this issue argues for an SEC at all.

CHAIRMAN LEMEN: Okay. That's what I wanted to know.

DR. MAURO: This is John Mauro. Just to add in, I think the only thing -- certainly, I agree with Stu's position. The only question I think, and perhaps we'll discuss it a little more, is -- and this is more of a Site Profile issue -- is because there are some people that aren't monitored or have incomplete monitoring, whether it's external or internal, there is a need for a

coworker model to address those people, and how will that be done?

But I agree that that is a Site Profile issue that needs to be dealt with, and I don't know whether or not -- Ron, is there a coworker model, or is that something that's on the table?

DR. BUCHANAN: No, there isn't, and that is the next issue for discussion.

DR. MAURO: Okay, very good. Nice segue.

DR. BUCHANAN: I forgot about that. Thanks for bringing it up.

DR. MAURO: Okay.

CHAIRMAN LEMEN: Back to one thing John just said -- this is Dick Lemen again -- then one action item would be that NIOSH would come back and talk to us about how they would use coworker data, right?

MR. HINNEFELD: That sounds like it's the next issue here. This is Stu

Hinnefeld, and before acquiescing to that we do want to hear the discussion on the next issue that there is a possibility that the people who were not monitored were truly not exposed, that they walked through the administration building, and they stayed in the administration building, and they went home, in which case there may be what we call the environmental.

They received the exposure that people receive just from being there, from being in the proximity to the radioactive materials that were used there, and so they would receive an environmental assignment, rather than a coworker. That is a possibility.

I don't know where we are right now on this, and I don't know how strong that argument -- how strong an argument we could make that that is the case, so I'm just saying that that's another alternative besides the

coworker approach for the unmonitored people.

CHAIRMAN LEMEN: So we can't really resolve this coworker issue today, right?

MR. ROLFES: This is Mark Rolfes, and in our original Evaluation Report we've gone through a similar data completeness analysis, which basically SC&A has now agreed with us. We have stated that we feel a coworker model is not needed, because the people who needed to be monitored were appropriately monitored.

As Stu had indicated, there is information showing that there were people who did not enter into the production area who were outside of the controlled production area at the Weldon Spring plant performing administrative functions that did not need to be monitored.

So our position is that a coworker model does not need to be produced, there really is not anyone who should have been

monitored that was not monitored.

MR. HINNEFELD: So, now, that is a position that is subject to verification every time you get a claim where there is no monitoring data, you know, so each claim I think has to be sort of considered on its own merits in terms of what information you have about that claim.

CHAIRMAN LEMEN: Yes, and so this issue of coworker data may come back up at some point in time on individual cases. Is that what you're saying?

MR. HINNEFELD: It could. It could.

CHAIRMAN LEMEN: Okay.

MR. ROLFES: NIOSH just has not identified a case where a coworker model has been necessary to complete the dose reconstruction at this point.

CHAIRMAN LEMEN: And how can -- how can you assure yourself that those that Stu

was talking about that you don't think had exposure indeed did not have exposure? Is there any way to verify that?

MR. ROLFES: Well, right now SC&A's report has indicated that 94 percent of people were monitored, and basically we have not received many cases where there are people that are unmonitored.

CHAIRMAN LEMEN: Well, that still leaves six percent, and how do you handle that?

MR. ROLFES: Well, it would depend upon the individual's employment, their job duties. If an individual was not in the production area, they would be assigned environmental intakes. That's something that's evaluated during each -- in the process of each dose reconstruction.

We just haven't identified anyone who would be in a position where they were -- had a potential for exposure and were not

monitored appropriately. We haven't encountered that in the dose reconstruction process. I mean, 94 percent of the cases or 94 percent of the cases evaluated by SC&A had monitoring data.

CHAIRMAN LEMEN: So does that mean that at the very minimum everyone would receive at least the environmental?

MR. ROLFES: That's very true, correct.

CHAIRMAN LEMEN: And that there would be no one left out?

MR. ROLFES: Correct. At the very minimum in a dose reconstruction process, the very minimum that an employee or a claimant would receive in the dose reconstruction would be environmental intakes, medical x-rays.

CHAIRMAN LEMEN: So is there any way that a person could file a claim, and I understand they can be denied because of the dose reconstruction, but is there any way

anyone could file a claim and not at a minimum have it considered for dose reconstruction, either environmental or otherwise?

MR. ROLFES: If we -- if NIOSH receives a case from the Department of Labor with a cancer that's diagnosed following their employment, there are some instances, for example.

We would still complete a dose reconstruction, but there are some instances, and we would still find a dose for that case. There could be instances where the Probability of Causation would be very low.

CHAIRMAN LEMEN: Well, I understand that. I understand that, but I'm just saying there wouldn't be any worker that would slip through without having some consideration.

MR. ROLFES: We would -- there would be no case where we would assign no dose, so we would always assign at least environmental doses and medical x-ray doses at

the very minimum for any dose reconstruction that we would complete for the Weldon Spring plant.

MR. HINNEFELD: Now, Dick, this presumes the case gets to us, you know.

CHAIRMAN LEMEN: Right, I understand that, Stu. That completes my questions. Thanks.

DR. BUCHANAN: Okay, this is Ron Buchanan, SC&A. Dick, I just wanted to clarify something here. So SC&A feels that the data, especially for '57 through '67, that earlier period, was fairly complete for Weldon Spring, 90-some percent.

So I think, to answer your question, I think that fairly well closes that. I don't want to speak for the Advisory, the Working Group, but as far as SC&A is concerned, we don't have any further thing to offer on that, unless you direct us to do some other study.

Now the other issue was coworker data, and so we had to kind of hinge was this data set complete so that a coworker data model -- a coworker model could be constructed, if desired. So I think, you know, we've answered that, so our next issue is coworker, so I would like to spend a little more time on that from my point of view.

The coworker model, now, in your April response NIOSH did provide some intake coworker data in your tables there, Table 1 through 4, for environmental work, and so but the external, you had some external for later on.

Now, I guess my question is when you've got a person performing a dose reconstruction and he comes to one of these cases, and the person worked '57 to '66 or whatever or '67 and he's got some years filled in, as we've seen, but there are some years, like in '57, '58, he might not have some

information.

We've seen the average was 91 or something, so that means ninety percent of the years he wasn't monitored, and we don't have an external coworker model built up. We don't have a table he can go and select anything from. What is he going to do at that point?

I mean, you say there's not a need for a coworker model, yet in a number of the responses it said, "Could be bound by monitored data." So I guess I'd like clarification on this coworker, especially external.

MR. ROLFES: Okay. Yes, in those cases, that's something that's encountered pretty routinely or fairly routinely in a case. When a dose reconstruction is completed, any DOE response information on radiation exposures -- we'll keep it limited to external for this discussion, I guess -- NIOSH would receive that information, upload

it into a system.

ORAU would go in and perform data entry of that external dose information. During the dose reconstruction process they would evaluate whether or not that data was complete. It gets down into the details of the individual's employment history, I guess.

If you have someone, say, that was hired outside of the production area, for example, as, you know, an administrative worker, possibly, that didn't have a potential for exposure, you can make an argument that they likely didn't need to be monitored for external exposure.

If there's a job change, say, in 1959, and that individual starts being monitored for external exposure, then you can make an argument, yes, that the 1957-1958 time period, they probably didn't need to be monitored.

In the worst case, if that person

wasn't monitored and we don't know what his job was for the first couple of years that he wasn't monitored, we could use doses from the years that he was monitored to assign, you know, a bounding exposure for those earlier years.

That's something that's done on a case-by-case basis. We can use, you know, data from, say, you know, 1960 to fill in a gap from 1959, or we can interpolate, you know, from an earlier year and a later year to fill in a gap for a year or a badge cycle that they weren't monitored. So those aren't really coworker models, per se.

DR. MAURO: Mark, this is John Mauro. I have a question related to this. I understand that you did not develop a specific coworker model for these circumstances when and if they arise, but you do have certain procedures, OTIBs, I believe, that provide overarching guidance regarding both external

and internal coworker model development, which has broad applicability.

To what degree do you feel that those what I would call generic protocols would help and provide sort of a standardized process when you're in a circumstance like this?

What I'm getting at is that one of the things that are of concern, and this is purely a Site Profile issue now, I agree that all regard to this data adequacy, completeness and regard to your ability to build a coworker model should one be needed, I do not believe -- we do not believe that we have an SEC issue.

What we have here is how are you going to do the dose reconstructions if and when these circumstances arise? I guess my question to you is in a circumstance like this where you have not developed a specific coworker model, is the dose reconstructor aided in any way by some of your other OTIBs

that might provide him with some guidance so you have some consistency on how that's done on a case-by-case basis by individual dose reconstructors?

MR. ROLFES: Yes, there's definitely OTIBs out there available, and even before some of the OTIBs were written, some of our implementation guidance on dose reconstructions.

For example, the implementation guideline -- I can't remember if it's 1 or 2 -- on external dose reconstruction information, we discussed some of the methods to estimate external doses to people that were monitored for some years but not for all years.

That information is discussed in there, and that is something that is considered in the dose reconstruction process for every dose reconstruction. If you look at our dose reconstruction references, I believe that external dose reconstruction

implementation guideline is one of the first or second references in every dose reconstruction report.

MR. HINNEFELD: This is Stu Hinnefeld. I'll offer this. John, I think, if I can paraphrase your point here, it is that for this instance, Weldon Spring, knowing what we know about Weldon Spring, your question is should we have a consistent set of guidelines to dose reconstructors for dealing with this situation where you have a person monitored for a portion of their employment but not all --

DR. MAURO: Yes, that's a good way to --

MR. HINNEFELD: -- so that the outcome of the claim is not dependent on the luck of the draw, which dose reconstructor picks it up and happens to use one of several "acceptable approaches."

So what you're saying is that let's

define what will the approach be, or what are the approaches? You know, given this condition, this is the approach. Given this condition, this is the approach, something like that. Isn't that -- is that what you're saying, John?

DR. MAURO: You hit the nail on the head. That was the only concern I have, and my question went a step further.

Do you believe that some of your overarching coworker guidance in OTIBs somehow will help ensure that you have a consistent approach, or is there a need for a coworker model, because there are -- clearly we have some years and some people that you are going to have to fill in some gaps, which may not -- where environmental dose may by itself not be sufficient.

MR. HINNEFELD: Yes, John, I think that's a good point, and I think it's something we need to pursue. I don't know

that it's something we're particularly well prepared for today, though --

DR. MAURO: Okay.

MR. HINNEFELD: -- to talk about that very long today.

You know, we kind of come in here with the SEC on our mind and trying to address sufficiency at this step. And while we certainly understand the importance of the dose reconstruction following on and getting that part right, I don't know that we're prepared today to go very far down that discussion.

DR. MAURO: Okay, thank you.

MR. KATZ: So I just -- I think maybe that would be a good thing to follow up. We're going to need to have another Work Group meeting with at least one other Board Member, as in the Chair, so that Dick isn't all by himself here trying to make judgments for the Work Group, so I think that would be a

good follow-up item to touch on a little bit more when we have that.

MR. HINNEFELD: And we can recap the whole --

MR. KATZ: Yes, we can recap, and he can read the transcript so that he knows what happened here, and then you can help him recap, but then he can get that information on that matter, which might help settle --

MR. HINNEFELD: Well, I want to make sure we get the right dose reconstruction expertise in the room because we have Site Profile and SEC expertise, and then we have some -- you know, well, you're familiar with the dose reconstruction experts that we bring to the DR Subcommittee, so I want to make sure we get the right kind of people engaged in the discussion from our side in order to come up with a position.

DR. BUCHANAN: Yes, I just think we need a clarification on the coworker model.

We haven't pressed it too much because we didn't know about the data set.

Now we know about the data set, and we just -- because several times it's been referred to, "Well, we don't need a model." "Well, we could use the 50th percentile" is quoted in one of the documents, so we just need to assure that however the dose reconstruction is done you have a set policy and it's done uniformly and have to fill in the gaps. Excuse me.

MR. KATZ: Go ahead, Mary.

MS. KAREN JOHNSON: I have a question. This is Karen.

MR. KATZ: Oh, Karen, I'm sorry.

MS. KAREN JOHNSON: We do have quite a few office workers who were not monitored who have been denied. I guess I'm confused as to why or how they are being dosed. They are getting a very low Probability of Causation.

Can you talk about that a little bit? And I do want to state, too, that these people, including Mont Mason's secretaries, state they had full access to the entire facility and could walk wherever they wanted and did so.

MR. ROLFES: This is Mark Rolfes, and, yes, if there are individuals that were not monitored, we would look to see if they entered production areas or were involved in productions and had an exposure potential above the ambient exposure potential.

To date, we haven't found any cases where there were people that should have been monitored that were not monitored. Most of the time we've found that the assignment of continuous exposures at ambient environmental levels is representative of the individual's actual exposure.

So, yes, the environmental doses would typically be pretty low. The

environmental doses are relatively low for the Weldon Spring plant, and so that would be the reason for the low Probability of Causation.

MR. HINNEFELD: This is Stu Hinnefeld, and I think that, speaking for NIOSH, we will look into what you've said here about access to the plant and how that would affect, whether that affects our argument here, and so we will do that going forward.

I don't know that we'll be able to achieve a better outcome for very many cases if we do something different, but we will take a look at, you know, the propriety of that, whether that's an appropriate decision to make as to people who were not monitored were de facto not exposed except to environmental.

We will look at that based upon evidence that we can find that these people did, in fact, have free access to the entire plant. Is that helpful?

MS. KAREN JOHNSON: Yes, that does

help, and I don't know if you've ever spoken to Mont Mason's secretary.

MR. HINNEFELD: I personally have not.

MS. KAREN JOHNSON: Okay, but she did have quite a bit of information that was very helpful as far as administrative workers and their access.

MR. HINNEFELD: Okay. I don't want to get into discussing people's names on the phone here, but if you could maybe in a later call could to Ted or a phone -- do you have Ted's email or my email or the OCAS email?

MS. KAREN JOHNSON: I can't recall if I do or not, probably somewhere.

MR. HINNEFELD: Well, I'll tell you what. We will -- we will contact you from our email address and ask you to send us that name and then make sure that we look at the information that person has provided us or speak -- is she still able to speak to us?

MS. KAREN JOHNSON: Yes, she is.

MR. HINNEFELD: Okay.

MR. KINMAN: This is Josh. If you want to provide that to me directly, she has my email address, and I'd be happy to pass along any information.

MR. HINNEFELD: Okay. You have Josh Kinman's email address, ma'am?

MS. KAREN JOHNSON: Yes, we do.

MR. HINNEFELD: Okay. Send it to Josh; it'll get to me.

MS. KAREN JOHNSON: Okay. Thank you.

MR. HINNEFELD: Sure thing. Thanks, Josh.

MR. KATZ: So that's another action item, I guess, for DCAS.

DR. BUCHANAN: Okay, so concerning the coworker model, Issue 1D, NIOSH will summarize their method they plan on using at Weldon Spring and also look into the access to

the plant by non-operation chemical operator personnel.

So if we're done with that, we can move on to 1B. The reason these got divided up, there's one all issue considered data, and this got divided up into sub-issues here.

So look at 1D, which is the daily weighted average exposure from air concentration. I want to give a little bit of background. Then I'll turn it over to NIOSH on their results.

This came about, again, connected with Fernald. Now, I would like to state that the data actually used is Weldon Spring data.

However, there's been a debate on the method to be used to use daily weighted exposures, and that consisted of taking air samples, either lapel or area monitors, at a work station and determining how long a person worked there, what the concentration was, and then what that corresponded to intake.

Then the validity of this applied to dose reconstruction, and this, of course, took place at Weldon Spring and Fernald, and so the method was developed for Fernald, which was more complex than Weldon Spring.

So we have been working at Fernald, and SC&A has been working with NIOSH on getting a model or a method defined. I think in the last year or so we came to agreement on the method to exchange, about three revisions, but then at the May meeting I understand that NIOSH was charged to look at the accuracy of the data and calculations.

A lot of these are handwritten. They're typewritten data sheets, and sometimes there was errors in them, mistakes in the math, mistakes in the equations, or transposing numbers or something.

So we wanted to -- the Work Group wanted to know what effect this would have on dose reconstruction. Number one, what's the

magnitude of these errors?

Are they significant or insignificant? If they are significant, then how would NIOSH compensate for this when doing dose assignment using air intake concentrations?

So NIOSH presented a -- sent out a paper on this last week, the 7th of September, and we've read it over, but we would like for NIOSH to present their findings at this time.

MR. ROLFES: Thanks, Ron, and just to give you a brief summarization of what we did, we went back and looked at the calculations that were used to develop the daily weighted exposure concentrations that we would use to assign intakes of thorium for the Weldon Spring plant.

I believe we have Robert Morris on the phone from ORAU. I'd like for him to maybe go through a brief summarization of what the analysis looked at and what the ultimate

results of the analysis of the blunders that were discovered in the calculations that were used to develop the daily weighted exposures. Bob?

MR. MORRIS: Okay, this is Robert Morris. I'd just like to -- I'm having a difficult morning, just as some of the other people are. My computer just turned off as I opened this up, so I'm rebooting, actually, to my default.

In summary, I can tell you that we looked at the numbers of arithmetic calculation errors and the number of data transcription errors for the full data sets that we could find representing daily weighted exposure.

I guess we have to acknowledge that we are constrained by the data that are available to us, because usually the reports that we had were only at the summary level, you know, after they had been received by the

typist and gotten the final signature.

So it was rare, actually, to find the working papers associated with those reports because many times they would point back to a set of air samples, and the air samples, then we would have to go into the record to locate those, and once we did that, then we could see the handwritten arithmetic that was associated with it. But, as I said, there were probably only a half dozen really robust sets of things we could compare to.

Blunders are a technical term, actually, if you can believe it. It's not stupid mistakes. It's mistakes that are associated with things that are more mechanical like transcription errors, rounding errors, and arithmetic errors. Now, as you can imagine, in the `50s and `60s arithmetic errors are more common than they are now when we have access to calculators.

I think the bottom line is that we

found an error rate, but it was not a large error rate, and we found a -- then we looked at where those errors occurred in the process, and it turns out that most cases that we saw, it was one spot where a technician had divided by a number instead of multiplied by a number. Fortunately, it didn't have much impact.

So, you know, as I said, my computer stopped right as I covered the top here, and I don't have the numbers open in front of me right now, but, Mark, you probably do -- that data, I assume.

MR. ROLFES: Yes, Bob, I do have the report here. I can just go ahead and read the results section, and that should summarize basically what we found. This is on page five of 15, the results.

Nine SRDB documents containing dust studies and DWE evaluations were located. There were 81 pages that contained calculations of interest. These pages

contained an estimated 1,405 operations that contributed to the assessment of error rate.

Typographical blunders occurred 12 times, resulting in an error rate of .08 percent. Arithmetical errors occurred 54 times, resulting in an error rate of 3.8 percent. The reviewer was unable to identify any blunders of the self-contradicting type.

Of the 54 arithmetical errors, 41 of them were made by the same individual at the same place in the calculation process. This error resulted in the calculated concentrations being too low by a factor of approximately two.

The remaining errors impacted the specific calculation by less than ten percent with three exceptions. The error shown in line 78 of the attached database was dividing by 105 instead of 10.5, resulting in a weighted concentration being too low by a factor of ten.

However, the report that accompanied the calculations called out that the individual area concentrations near the test stand were in excess of the maximum allowable concentration and recommends corrective action, so the blunder in this case likely had little impact.

The error identified in line 71 appeared to be a typographical error in that the correct answer was 600, but the handwritten answer in the table was 60. This page contained 15 calculations for air sample results but no indication of whether the results were used in any other calculation.

The error identified on line 17 in the time-integrated calculation being too low by a factor of four, but when combined with the other value and reduced to a relative maximum allowable concentration, the value was 1.6 instead of the correct 2.14, a 33 percent error.

In summary, the typographical error rate was .08 percent, while the arithmetic error rate was 3.8 percent. If the 41 identical errors made by the one individual were removed, the arithmetical error rate would have been .9 percent, very much in line with the typographical error rate and with the expected human error rate of about one percent.

So we've gone through and provided all of the data from pages seven through 15 showing where we -- showing which document we reviewed from the Site Research Database, what the title of the document was, the date that the data were collected, the page in the Site Research Database, the number of operations represented in that report, the number of typographical errors or blunders, the number of arithmetic or mathematical blunders, and the number of self-contradiction blunders and the impact of each of those. I don't know,

Bob, if you have anything to add.

MR. MORRIS: Well, I guess the last thing I would add is that this is not out of line with what Strom and his associate Davis -- in the paper that defines the DWE uncertainty method and called to our attention the fact that blunders can be an important part of the analysis.

In fact, it's probably pretty close right in line to where you would see in the AWE site's data that they never quote on. So my sense is that there's no surprises here, and, if anything, the error rates are a little bit lower than what, in terms of their impact, than what Davis and Strom found in the AWE project.

MR. ROLFES: Thank you, Bob.

DR. BUCHANAN: John Stiver, you had worked with this at Fernald on the DWEs and the data accuracy and the blunders. Would you like to comment on this particular application

to Weldon Springs?

MR. STIVER: Yes, sure. We received a paper. We found it posted. I believe it was last Wednesday or Thursday, and so we made some -- looked at it and made some preliminary observations. However, we have not had an opportunity to provide any kind of a detailed analysis of this report.

We believe it's important because, you know, this is kind of in the overarching issue in a way because it's applicable to any particular site or reconstruction where these air samples or, you know, weighted average air samples are going to be used to assess intakes.

We came up with some preliminary observations here. I mean, basically what Bob and Mark say are pretty much true. The data is quite limited. However, the report doesn't really provide an identification of which of these particular -- I'm looking back here now

from the SEC 143 for the Weldon Spring site looking at the uranium air data and the thorium air data.

I went through and did some kind of preliminary correlations here, but it's not entirely clear to me which -- really, the bottom line here is that there is no explanation in the paper of how these -- the uncertainty and variability that's due to these blunders is going to actually be wrapped up in the overall uncertainty estimate.

The way I would assume that would be done would be that there would be some kind of -- since we can assume these are uncorrelated to the measurement errors that there would be some kind of an error propagation and log space to account for the geometric, you know, the fact that this is really based on a log-normal distribution, but that's something that obviously NIOSH would have to come up with.

It was interesting in this limited data set that the average error rate was about a factor too low, which is exactly what Davis and Strom found. The worst was about a factor of ten, so there is consistency there.

The error rate about four percent, there really wasn't much of a discussion about that in Davis and Strom, but it would appear to be about what you might expect given the time period and that these were all hand calculations.

So, you know, I really hesitate to make any definitive statements on this until we have a chance to really do a more in-depth review. I guess my main concern is the data are limited and that the paper doesn't really provide a method for integrating this into the overall uncertainty terms. That's really my preliminary ideas at this point.

MR. MORRIS: Robert Morris one more time, Ted, please. My only comment is that,

you know, Davis and Strom did include the idea of propagated uncertainties in their paper, and the GSD -- that is, geometric standard deviation, pardon me -- that is associated with the DWE uncertainty analysis is already quite generous. Our information here doesn't lead us to think that we need a different value.

MR. STIVER: Bob, this is John again. I understand the GSD, the derived, was quite generous, but that's really -- if you recall, the paper stated that they did not include any analysis of blunders in their data. They basically went through and corrected it all because they had the raw data, and then they used that data to generate the uncertainty distribution.

So this is really, in our case, we have a couple of different additional uncertainties. We don't have a complete set of raw data, and what we do have indicates

that, you know, we may be off by up to a factor of ten.

Because this is an uncorrelated type of additional uncertainty, SC&A's position would be that that would have to be factored into the overall uncertainty term.

While the factor -- while the GSD of five is clearly -- would appear to be generous, it's really based on the corrected data, and so it reflects the actual variability that were in the data that were collected, it doesn't account for these arithmetical errors of that sort.

MR. MORRIS: Well, I think you kind of overstated it, John, when you said that the factor -- that the -- I agree in the extreme situation that we explored here there could have been a factor of ten error, but in the great majority of data there was not a factor of ten error.

MR. STIVER: Certainly, that would

be a -- probably reasonably you would assume that it would be fairly unlikely. However, because we have such a small data set, it's kind of hard to say. It becomes a subjective judgment.

I can't tell you. It's certainly not our position to tell you how to go about doing this, but I would assume that you'd want to try to factor it in in some kind of a log-normal error propagation scheme.

If it turns out that it becomes 5.1 instead of 5.0, then it's kind of a wash, but I don't think we can just ignore it all together based on the variability in the data that Davis and Strom looked at.

MR. MORRIS: Well, okay, granted, but at that point I think it becomes a TBD issue.

MR. MORRIS: Oh, I agree it's a TBD issue, but it becomes a matter of how do we properly account for the uncertainty.

MR. ROLFES: This is Mark Rolfes, and from what I'm hearing SC&A is going to take a look at what we've provided and get back to us with a report. Is that -- is that what I'm hearing?

MR. STIVER: We haven't been formally tasked, but I would assume that would be the logical next step.

MR. KATZ: Sure. John, certainly, you're tasked to do that.

MR. STIVER: Okay.

MR. KATZ: Thanks.

DR. BUCHANAN: Okay. So we will -- SC&A will provide a response to the recent paper. Of course, obviously, we have not had time to correspond too much on this and get anything out, but we'll get out a paper on our take on their recent DWE blunder and issue that as soon as possible.

Any other questions on Issue Number 1? I think that we've covered A, B, C, and D

at this point.

MR. HINNEFELD: Anybody else thinking about a comfort break?

DR. BUCHANAN: Anybody need a break before we go to 2 or 4?

MR. KATZ: Yes, why don't we do that? So what's the time right now?

DR. BUCHANAN: 10:30.

MR. KATZ: 10:30?

DR. BUCHANAN: Yes.

MR. KATZ: So why don't we take a break until quarter to 11? I'm just going to put the phone on mute here.

(Whereupon, the above-entitled matter went off the record at 10:29 a.m. and resumed at 10:44 a.m.)

MR. KATZ: Okay. Short break, Weldon Spring Work Group. Let me just check in and see if we have our Board Member. Dick, are you there?

CHAIRMAN LEMEN: Yes, I'm here.

MR. KATZ: That's great, and, Dick, I heard from Mike. He's got a family issue going on. That's why he's not with us today.

CHAIRMAN LEMEN: Okay.

MR. KATZ: I'll bring him up-to-date, and we'll figure something out going forward for another Work Group meeting.

CHAIRMAN LEMEN: Okay.

MR. KATZ: Okay.

CHAIRMAN LEMEN: I was wondering, do you want to go ahead and complete all of these issues, or do you want to save some of them for another Work Group when Mike's here, too?

MR. KATZ: No, I think we should go through them all. He can read the transcript, and that'll make the next meeting, which I think we could probably do by teleconference, much more efficient.

CHAIRMAN LEMEN: Okay.

MR. KATZ: That way, if there are

more action items to capture, too, we can get that work done for the next Work Group meeting.

CHAIRMAN LEMEN: All right.

MR. KATZ: I think that would be good. Ron?

DR. BUCHANAN: Okay. Thank you. This is Ron Buchanan, SC&A again, and we are -- we've addressed SEC Issue 5 and 1, and we're ready for SEC Issue Number 4, which is lack of radon measurements, and I'll recapture that issue a little bit and then give our evaluation of it.

There were no radon measurements at Weldon Spring during the operational period either inside or the environment, and so what NIOSH has proposed is a method to determine what the limits of exposure could be.

So what I want to do is briefly describe that method -- if I have it wrong, Mark, you'll correct it -- and then give our

evaluation of the method and the path forward from there.

The initial TBD provided a simplistic general model for radon, and we debated that at one of the meetings. NIOSH came back in April 2011 and gave a more detailed, actually, I understand, two models, one for indoor where the highest point would be and then one for environmental outside.

So we evaluated this to see if it was claimant-favorable, and, essentially, what it boils down to, like I say, there was no radon measurements made, and so they used the uranium throughput and made certain assumptions, a model that assumed that so much -- that one percent of the activity was due to radon or radium.

The activity in the ore was one percent due to radium, and radium decays to radon, and so generally it doesn't come out well, but in the digestion building would be

the maximum point of release. It could -- they assumed 100 percent of it was emitted into the room and that it was in 50 percent equilibrium with its daughter products, and there was no ventilation. It built up to some concentration, maximum concentration, which SC&A looked at this.

The details are in Appendix A of their April paper. We looked at their model and went through and don't have a problem with the model in that it appears to be very favorable.

We realized there would be ventilation. There would be leaks and that sort of thing, so it probably would build up at that point.

Now for external of the building in the environment, environmental radon, they used a stack emission of this material from the uranium throughput and then a dilution factor as it drifted away from the plant in

another model.

So people that were in the assigned environmental dose would be assigned a radon intake according to the environmental model, and the people that worked in the operations buildings would be assigned the higher dose for the indoor model.

So we -- is this correct?

MR. ROLFES: Yes, that's correct, Ron.

DR. BUCHANAN: Okay. So we looked at this, and also the same theory would be applied to the thoron emission. So we looked at this and agree that it's claimant-favorable, the model is, and so we presented that to the Working Group Members.

Now we would like to add is that the radon model has not been accepted by the Advisory Board at any of the DOE sites. And so because there was no radon measurement, it was based purely on a model.

So that's where SC&A stands on it. We don't have a problem with the model. I don't know that the Advisory Board will accept the radon model, the assigned dose.

Dick, do you have any questions on that?

CHAIRMAN LEMEN: Not at this time. I do have one question not related to your presentation, but will this be brought up to the full Advisory Board about the radon soon, Ted?

MR. KATZ: So, Dick, I mean, once the Work Group closes out all its issues or finds it can't close any issue, whatever might be the case, when the Work Group is finished, and I'm guessing the next Work Group meeting will probably take care of that, then everything will be brought to the Advisory Board.

CHAIRMAN LEMEN: Maybe I misunderstood. I thought you said the radon

model had not been considered by the full Board in general, not just for Weldon Spring.

MR. KATZ: Right. What Ron was referring to is that there have been radon models proposed for other sites. Dick, I think you were present and on the Board, for example, with Blockson.

That's an example. In Blockson, it was a different situation, but there was a radon model, and the Board didn't accept it, despite the fact that I think SC&A was comfortable with that radon model in that case.

CHAIRMAN LEMEN: I guess my confusion is is the Board going to consider the issue of radon model when -- in general are they going to do it by each Work Group?

MR. KATZ: Right, and I think the answer to that question is, if I recall the discussion of the Board, the Board did not say, "In all cases we will never accept a

radon model," but they said in the case before them they didn't accept it. So I think it's a case-by-case determination.

CHAIRMAN LEMEN: That's all I wanted to know.

MR. KATZ: At least, at this time until the Board considers otherwise.

CHAIRMAN LEMEN: That's all I wanted to know.

MR. KATZ: Sure.

CHAIRMAN LEMEN: So we're not going to separate this out. We will consider it when we present this whole thing to the Board.

MR. KATZ: Exactly. I would think that the Work Group would report to the Board all the major issues, how they were closed out, and since this radon issue is an issue that the Board has, you know, dealt with differently, you know, I'm sure the Board will take that up and consider it --

CHAIRMAN LEMEN: That's fine.

MR. KATZ: -- as a particular case.

CHAIRMAN LEMEN: That's all I wanted to know. Thank you.

MR. KATZ: Sure.

MR. HINNEFELD: I guess, perhaps, the discussion of the radon model for the other site and the transcript of that might be instructive or -- you know, in terms of similarities among sites or differences among sites.

MR. KATZ: Yes, I mean, I think that's up to the Board, but the Board, it makes sense to me the Board may want to consider, compare the situation they had with Chapman Valve to the --

MR. HINNEFELD: Blockson.

MR. KATZ: I mean Blockson. I'm sorry. Those two always switch in my head, but Blockson with the situation they have with Weldon Spring, and they may decide that they're significantly different, and they may

decide that they lump them together and they have the same issues. We'll just -- that's up to the Board.

DR. MAURO: Dick, this is John Mauro. This might be helpful. The way I see it is that, you know, there was concern by the Board regarding Blockson, as you are well aware.

This model is more conservative than the Blockson model. It is still a model, very much a model. It is a simplified version of the Blockson model, and it's extremely conservative in that it doesn't take credit for the fact that radon is being ventilated and removed.

You could almost visualize. In the Blockson model, you had radon becoming airborne, continuously, and it was continuously being exhausted at some rate. In this case, the radon is continually emerging and entering the building air space, but it's

not leaving, and the only way it leaves is by radioactive decay.

So, I mean, I think that that -- when I look at this and I say, "What is the distinction, the important distinction between the two models that needs to be taken into consideration to ensure consistency in the judgment as made as applied to, let's say, Blockson, as opposed to as is applied here?" that is, I would say, the fundamental difference between the models, which I think might be important to be a subject for deliberation by not only the Work Group but also by the Board.

CHAIRMAN LEMEN: Thank you, John. That helped a lot, and I think maybe when we present this to the full Board we ought to maybe have that discussion at that time.

MR. KATZ: I agree, Dick, and I think even as a prelude to that in our next Work Group meeting, at least you and Mike can

have that discussion on the Work Group.

CHAIRMAN LEMEN: Yes, thank you.

MR. KATZ: Absolutely. So that should sort of be an item to note for the next Work Group's agenda.

CHAIRMAN LEMEN: Okay. I don't have any more on that issue.

MR. KATZ: Thank you, John Mauro.

DR. MAURO: You're welcome.

DR. BUCHANAN: Okay. So, on the radon issue, we will -- like I say, SC&A doesn't have any further material to present on that, so we'll let the Work Group discuss that.

So that brings us to Issue 6, which is neutrons, and a little background on this is that generally natural uranium does not have enough neutrons to be a dose issue. However, when you get enriched uranium, then you do have uranium-235 and some carryover 234, which have alpha emissions, which

interact with the material and emit neutrons.

The interaction depends very much on the material that it's mixed with, how well it's mixed, and everything, a lot of variables. So there are neutrons produced -- do have enriched uranium, and this is one reason that the Site Profile Issue Number 24 was addressed, because what was the enrichment, we found out it was one percent or less at Weldon Spring.

So how do we monitor neutrons or assign neutron dose for Weldon Spring during the period that they did use enriched uranium and -- workers were in those buildings?

So the Weldon Spring did, apparently, issue some NTA neutron films when it had enriched uranium, but there is no record of them on the DOE files, and so we can't use the recorded dose. I don't know if they developed them or didn't record them or what the issue was, but, anyway, how do we

assign neutron dose?

Well, at other sites, obviously, a lot of the sites besides uranium sites, even, we use the N/P method, which means that the neutron is assigned as a ratio to the photon dose. If the worker was monitored or assigned a photon dose, and say your N/P value is .5, then you assign him a .5 rem for every rem of photon dose.

This is an acceptable method, provided the N/P value has a solid base to it. So since there was no values measured at Weldon Spring, the TBD recommend using the Fernald N/P value of .1 as a mean and .23 as the 95th percentile.

I objected to this last -- a couple meetings ago because of the way the values were obtained. When you do N/P values, you want to try to do them at the same time, same place, under the same conditions to get the best value you can, and this was not done at

Fernald.

Now there was a problem in that SC&A did sign off on Fernald neutrons in the past. However, when this came up, then SC&A has revisited that and decided that, indeed, this was not a scientific method to determine N/P value.

The way I understand it and the way it's documented in the TBD is the neutron dose was determined, measured in 1995 on some canisters, and then in 2001 the gamma dose was measured on some drums of UF4.

We don't feel that this is correlated data, different time, different place, different geometry, different attenuations within the material itself, different material that the alphas interact with, so we don't feel that this is a scientific method to determine N/P values.

So we don't feel that the method used to determine N/P is scientifically sound,

and so that's the point that we'd like to bring up. We have brought up some, but this is -- we would like to discuss that today.

MR. ROLFES: Okay. This is Mark once again. I think we've provided everything that we can. We do agree with you that that wouldn't be the best way to develop a neutron-to-photon ratio.

However, assuming nothing was done to the materials at Fernald, there really shouldn't be any difference in the -- there definitely wouldn't be any difference in the neutron dose rates, and there wouldn't be much of a difference in the gamma dose rates if any at all.

The separation in time, we agree that, you know, it's best to collect all the data at once, but we don't feel that this invalidates the N/P ratio in any manner, and, plus, for the other reasons that we had discussed, the materials at Fernald, there was

material above one percent enrichment at Fernald.

That wasn't the case at Weldon Spring, so the source term from the Fernald site included materials above one percent enriched green salt. The Weldon Spring material, I think the highest enriched uranium at the site was still under one percent enriched.

So, yes, you know, there is some separation of the measurements. However, we don't feel that it invalidates the neutron-to-photon ratios that would be developed.

DR. BUCHANAN: SC&A also looked at some of the dose reconstruction at Fernald and Weldon Spring and found that in one case they was assigned .1, which was the mean N/P value of .1, and in another case they assigned the 95th percentile, .23, and also the same thing at Fernald. One case was .1, and one case was .23.

So, you know, I guess this is where SC&A stands to the Working Group. We just -- we don't believe that these are solid numbers, and we don't think that they're being applied uniformly.

MR. ROLFES: Well, to discuss the difference in which neutron-to-photon ratio was applied for a Weldon Spring plant dose reconstruction, the individual possibly could have worked in an area that didn't have significant quantities of slightly enriched green salt. That would have been one of the areas that an employee would have had to have worked in to receive a higher potential neutron dose.

With that being said, neutron dose wouldn't have been -- even in the Fernald study, I believe they had pretty extreme difficulty. They had to leave bubble dosimeters in contact with the enriched uranium green salt canisters for months, I

believe, at a time to receive any kind of recordable neutron dose that was observable by the dosimeter.

That's, you know, in direct contact inside of a warehouse full of enriched green salt, so, really, it's very difficult to get any kind of measurable neutron dose from large quantities of green salt, enriched green salt at the levels that were processed at Fernald.

That would be the bounding value for the Weldon Spring plant, so we feel that the 95th percentile of .23-to-1.0 neutron-to-photo ratio would be bounding for the Weldon Spring plant given the source term, given the quantities of material that were processed at Weldon Spring in comparison to Fernald and also the enrichments.

DR. BUCHANAN: But you're not necessarily saying that .23 would be applied all the time.

MR. ROLFES: We wouldn't apply the

95th percentile value all the time. Definitely, we would not do that. We would have to take a look at the facts of the case.

If there is an individual who would be in the category that would have the highest potential for neutron dose -- for example, in the Fernald Site Profile we have some information on the facilities that produced enriched uranium, and it would be in those facilities that we would assign the 95th percentile neutron doses.

That would be the same for the Weldon Spring plant. We would go back and look to see if we had information to determine if the individual whose dose is being reconstructed worked in an area where there was either enriched green salt being stored or enriched uranium being produced during that time period.

If that's the case, if we have no other information, in order to bound that

employee's neutron dose we would apply the 95th percentile to that employee. If we had no information, we would apply the 95th percentile if there was a potential for a worst case neutron dose exposure.

If we believe that the employee, you know, possibly had some employment or some work in an area where enriched uranium was being stored or produced, then we would likely apply the 50th percentile, but that would depend upon the facts of the individual's exposure history and the information provided to us. So, no, we wouldn't automatically default to the 95th percentile.

DR. MAURO: Mark, this is John Mauro. It turns out that SC&A had an internal conference call on this subject yesterday, and Bob Anigstein was very much a part of that conference call.

Unfortunately, he had a medical situation that he had to attend to this

morning, but I'd like to try to capture where we feel that maybe there is a disagreement on the .23 number that you have selected.

So I think Ron told some of the story, but as I understand it, you'll be using the .23 as your bounding neutron dose ratio. You know your gamma. You multiply that gamma dose by .23, you get your neutron dose, effective dose.

I believe the bottom line is we came away based on looking at real paired data and running some models, MCNP simulations and for various enrichments, recognizing that Weldon, probably one percent is probably a reasonable number to use, as opposed to two percent enrichment, as was used at Fernald.

We come in, and, Ron, correct me if I'm wrong, that when all is said and done, the work we've done and the data we looked at seems to indicate that a number perhaps twice as high as the .23, maybe something closer to

.4 or .5, would be more appropriate for Weldon. I tell this story simply because this is what I got out of our internal conference call yesterday.

Unfortunately, as I said, Bob Anigstein is not on the line, but Ron and the other John and Joe, if you're on the line, when we discussed this yesterday, did I package that up correctly? Is that the way where we stand right now on this matter?

MR. STIVER: John, this is John Stiver. I think the issue was that we had the modeling exercise, and I think the one configuration that gave the highest neutron-to-photo ratio was the array of 81 drums stacked up. That we came to about 4.2. That was for two percent enriched uranium.

DR. MAURO: Oh, okay.

MR. STIVER: What we're -- the concern we had was there is a very limited data set, and I believe it was this Robinson

2001 position paper on neutron monitoring had some actual pair data, 15 measurements that were taken, I believe, at the retention support structures at Fernald, and this was for the green salt, which had previously been stored in another area and was moved to these support structures.

So they took measurements there, and the highest measurement they came into was about one. It came in at about .96, and this was also for two percent enrichment.

So I guess the way I interpret the discussion we had a couple days ago was that here you have a model value, a complete construct using MCNP with a particular arrangement, and we come in at .42. Here we have some actual measurements where we have a high value of almost one for green salt.

The actual configuration for the support structures, we really don't know what that was, so we have this uncertainty about a

factor of two or so just based on that limited data set and our modeling at a given percent enrichment.

So, when we try to look back to the one percent enrichment, that doesn't just scale linearly, as Bob described. I believe it was -- I can't remember exactly how he described it, but there are some other processes going on that are non-linear, and so it's fairly close.

I mean, even looking at the model you can see from .7 up to 2.0 percent. It's pretty much a factor of two increase in the -- for each different configuration that Bob ran.

So, just as a ballpark figure you could say, "Okay, factor of two, maybe," and so that brings us down from one to about .5, so that's why we thought that maybe, you know, there is some uncertainty here that hasn't been factored in.

.23 appears to be reasonable for

one percent, but just based on the actual measurements that were taken, it could be higher, and I think that's why we came in thinking probably about .4 or .5 might be probably a more realistic bounding value, you know, given this data that we've looked at.

MR. ROLFES: This is Mark. Keep in mind in the dose reconstruction process that if we have a photon dose that we would multiply by the .23 95th percentile neutron to photon ratio, in the dose reconstruction process we'd also multiply that neutron dose by ICRP-66 quality factors and organ-specific correction factors.

So the ICRP-66 quality factors or neutron effectiveness factors are almost 2.0. They're 1.91, so we're essentially doubling the neutron dose right off the bat here.

DR. MAURO: Is it possible that we are just miscommunicating? Perhaps when Bob made his runs, and, John, you seem to be a lot

more knowledgeable about this than I am, did Bob calculate the adjusted, in other words, what I would call the effective dose equivalent?

MR. STIVER: Actually, we did look at that, and the idea being is that, you know, we're going to have those factors in any case. It's really the -- I think he was looking at -- yes, it was an H-10. It was a deep-dose equivalent.

DR. MAURO: A deep -- okay.

MR. STIVER: Yes, it was.

DR. MAURO: With the correction factors for the quality factor or RBE or whatever term we're using these days, because what I just heard is that when NIOSH -- after NIOSH multiplies the photon dose by .23 to get the neutron dose, that's just an absorbed dose, you know, rads.

Then they -- what I'm hearing is then they multiplied by another factor of 1.9

something or close to 2.0 to get it into rems. Is it possible that Bob was calculating rems when he came up -- in other words, when we made this comparison, this factor --

It seems to be sort of coincidental that we're coming in a factor of two higher, and maybe it's because we incorporated this quality factor when we finished our work, but NIOSH didn't, and, as a result, we're really not arguing about it? We are in agreement?

I mean, I'm not sure. Unfortunately, you know, Bob isn't here. I thought that we were sort of comparing apples and apples, but maybe we're not.

MR. HINNEFELD: This is Stu. I'll just offer that the ICRP-60 correction factor that we described is, you know, is a change in the quality factor, what we used to call RBE for neutrons of certain energies in the ICRP-60 recommendation, whereas most recorded DOE doses, certainly up through some period, would

have used prior, which was probably 26, recommendations for quality factors for energy.

So it's rems to rems. It's not rads to rems. It's rems with the ICRP, the old ICRP rems with the ICRP-60. That's a minor point, but the factor is still about two from those common IREP energy bands. It's about two from those commonly assigned IREP energy bands, so just as a minor clarifying factor.

Now, I'm curious about you've discussed your internal telephone call yesterday about a modeling exercise that Bob did. Is that among the things you've provided to us, that modeling he did?

MR. STIVER: Stu, this is John Stiver. I can tell you that. That was done, actually, in 2007. That was the original analysis that Bob did.

MR. HINNEFELD: Okay. Okay.

MR. STIVER: So we've already discussed this, I believe, in the May meeting, as well. This is not a new analysis. I mean, he went through and did a review of that after the May meeting. I believe we finally published it.

MR. KINMAN: This is Joe. John, John, Bob Anigstein did indicate he was available upon a quick phone call, so he is available if we want to get him on the line.

DR. MAURO: You know, I have my cell here. While we're talking --

MR. KINMAN: Go ahead and give him a call. He can certainly describe it better than we are.

DR. MAURO: Let me see if I can give him a call. I'll try to get -- I'm going to try to get him on the line right now.

MR. MORRIS: Bob Morris here.

MR. KATZ: Yes, Bob?

MR. MORRIS: Could I propose a

question here? When Dr. Anigstein did this analysis was in 2007, I think you said, John. I recall that he had modeled an array of drums in order to get his values, and we discredited that as being contradictory to the criticality safety practices at Fernald at the time. I think that he quickly agreed and said, "Oh, yes, that's a mistake. We'll change that."

MR. STIVER: Yes, Bob, after we had that discussion -- actually, I'm looking at Bob Anigstein's report from, I think, May 18, and he discusses this issue, the challenge, the MCNP analysis.

He's not questioning the processes that were in place during Stu's tenure at Fernald, but he ran some calculations that showed that the array would not have been critical at two percent enrichment.

MR. MORRIS: I don't think it --

MR. STIVER: He also found two

different references from Fernald in the mid-sixties that showed two and five percent enrichment. I'm sure that was actually stored in that same type of configuration, and so it becomes an issue really not of if it would have been a critical arrangement but mainly more of what the policy may have been in later decades compared to the earlier decade.

MR. MORRIS: So, what's in the transcript from Fernald from, what, three years ago you're now saying where you said, "Oh, yes, we agree that that would not have been a" --

MR. STIVER: Yes, John can probably speak to that.

DR. MAURO: Yes, I will take a --

MR. MORRIS: Let me ask the question, please.

DR. MAURO: Yes, I will take a --

MR. MORRIS: Can I finish the question?

DR. MAURO: Oh, I'm sorry. Go ahead.

DR. ANIGSTEIN: This is Bob Anigstein. I just called in.

MR. MORRIS: Okay. The question I had is, John, I think you were, in fact, the one who said this a few years ago --

DR. MAURO: I was.

MR. MORRIS: -- that we no longer hold the position that the two-drum-tall stack is a valid modeling arrangement. Do you recall saying that?

DR. MAURO: Bob, you recall correctly, and --

MR. MORRIS: Okay. The second part of the question, then, for Dr. Anigstein, who just called in, is when we're talking about this --

DR. ANIGSTEIN: I'm going to have to call back, because this is a bad connection.

MR. MORRIS: Okay. When we're talking about this model that has come up in the last five minutes of the conversation, are we still holding to the two-tall, two-drum stack, or is it down to a one-drum stack?

DR. MAURO: This is John. I will maybe try to deal with the first question, and the second question I don't have an answer to you. Bob probably could help out.

With regard to the first part, yes, you are absolutely correct. When we discussed this matter at Fernald a number of years ago and we pointed out, well, we felt that, you know, .4 or something on that order would be more appropriate for the two percent enriched material -- UF4, I believe it was -- and Stu Hinnefeld at that time --

DR. ANIGSTEIN: Okay, it's Bob Anigstein. I'm back.

DR. MAURO: Bob, yes, you probably want to step in. I'm just taking a mea culpa

right now.

At that time, it was pointed out to SC&A that Fernald would never configure storage of UF4 at two percent in that form because of criticality concerns. I immediately said, "Oh, never mind."

You know, I accepted that statement, and at that point I let go of the issue. I said, "Okay, that being the case, you know, if you're not going to do that, and you'd be closer to something greater than one percent under their policies because of criticality concerns, we let it go." So you're right. At that time, we closed the issue at Fernald.

Now, as it turns out, during the process of discussing Weldon, for obvious reasons, this issue came back to life again. We re-discussed it again, and that's where we are now.

We're really at a point now where I

guess we're sort of resurrecting the Fernald discussion and seeing, you know, were we -- was SC&A right or wrong in letting go at the .23 at Fernald, and how does this matter now play out as applied to Weldon?

It was Friday, I believe, not yesterday, that we had this conference call, and thank you, Bob, for joining us, because we are in the middle of discussing this matter, and we're really at a place where we're agreeing to disagree right now, whereby NIOSH is standing by their .23 factor.

We are saying that at Weldon we think perhaps a number that might be about twice as high as that, something closer to .4 or .5 would be more appropriate. We made reference to some of the work that you had done, and that's why I called you to see if maybe you could shed some light.

DR. ANIGSTEIN: Now, the answer to the criticality issue was that based on

research that I had done, back in 1966 -- or this is -- the reference is from 1966 -- they did use a two-ton -- a ten-ton cylinder of 2.1 percent enriched uranium hexafluoride at Fernald, and it was much bigger than the stack on the photograph. In my report I estimated the cylinder to be about five feet in diameter.

So the fact that what was said maybe in later years they would not have done that, but here is one evidence where they, in fact, did do that. So, basically, this is a much greater quantity than this stack of drums three drums high.

Another reference stated that up to five percent enriched uranium hexafluoride was stored in ten-ton cylinders 48 inches in diameter, 119 inches long. This contradicts the fact that it could never happen.

MR. HINNEFELD: Well, this is Stu Hinnefeld, and what I said was that storing

drums, you know, 55-gallon drums two high of two percent enriched would have violated the criticality safety controls when I was there and I think probably earlier, and that is fact.

That would have violated. It doesn't mean that would have gone critical. That would have been a long way from critical, but that was the controls that were established there to make sure they stayed well under. Bob is exactly right that Fernald did, in fact, handle enriched UF6 in large cylinders in the sixties.

MR. ROLFES: This is -- this is Mark, and I was going to add, though, this is all new information to us that you're presenting from your call on Friday, and we haven't seen any of the analyses.

We're not prepared to discuss any rebuttal to what you've developed within the past couple of days, so I don't know if we

want to discuss this issue until after we've seen the report, possibly. That would probably be the best use of our time.

DR. BUCHANAN: Well, I wanted to ask one critical question of Bob. This is Ron Buchanan, SC&A. Bob, when you say neutron-to-photo ratio like .42, are you including the --

Well, what we just stumbled on before you got on the phone was, see, NIOSH says .23, and then you multiply it by a factor of 1.91 because of ICRP-60. So --

DR. ANIGSTEIN: Oh, no, no, no. This is the dose using -- we ran MCNP, and we used the ICRP-74 dose conversion factors for neutrons and photons.

DR. BUCHANAN: So you wouldn't multiply this by any additional quality factor, correct?

DR. ANIGSTEIN: No, it's already built in.

DR. BUCHANAN: It's already built

in, so if they had a .23 and they multiply it by two, that gives a .46, which is almost what you arrived at, correct?

DR. ANIGSTEIN: Yes, which is actually even a hair higher than what we got.

DR. BUCHANAN: Well, theirs is actually 1.91, so it would come out almost the same.

DR. MAURO: Is that what we've got here? I mean, that's an important -- I mean, we may have just put this issue to bed if that's the case.

What I mean by that is if Bob's .4 is not really the same as the .23 that NIOSH uses and the reason is that our calculation has embedded in it a multiplier, a quality factor, RB or whatever term you want to use --

DR. ANIGSTEIN: It's not -- it's not a quality factor.

DR. MAURO: Go ahead.

DR. ANIGSTEIN: It's a dose

conversion factor. In other words, we have the dose already. Dose includes quality, and it was effective dose.

DR. MAURO: Okay. That's what I thought. I thought that was what NIOSH was doing, also, but what I'm hearing is perhaps they're not. Maybe that .23 is not the same number as our number. I guess I could use some help here.

MR. HINNEFELD: Yes, John, this is Stu Hinnefeld, and I am pretty confident that the .23, the neutron measurements collected at Fernald would not have incorporated the ICRP-74 correction factor or dose conversion factor, whatever you want to call the conversion from rads to rems.

DR. MAURO: Right. Right.

MR. HINNEFELD: That would not have incorporated that. That would have been in an earlier version, and therefore that's why we apply the 1.91 for this particular IREP energy

band, the more common one, to adjust recorded doses using old, the old ICRP system to adjust those to the current ICRP system, which is the basis for the risk in IREP.

DR. MAURO: Got you.

MR. ROLFES: This is Mark.

DR. ANIGSTEIN: Stu, when you say old, you mean earlier than 1994?

MR. HINNEFELD: Yes. The DOE sites changed practice when the DOE rule told them to, and so the regulation that was existent in 1994 would have been --

That would have been before 835, right? No, it would have been 835, probably. It was about that time that 835, 10 CFR 835 became effective, and 835 finally adopted ICRP-26 and 30.

DR. ANIGSTEIN: Well, okay. Okay. Okay, but here our calculations use ICRP -- just look that up -- Table A.42, and if I can -- give me a second. I'll pull it. I have it

right here.

Okay, this is the ambient and -- this is the ambient dose equivalent per neutron, so it goes directly from neutron per square centimeter to 8*10.

MR. HINNEFELD: Right.

DR. ANIGSTEIN: And this is, of course, using -- this is ICRP-74, so it certainly uses the ICRP-60 methodology of both the tissue weighting factors and the radiation weighting factors.

MR. HINNEFELD: Right.

DR. ANIGSTEIN: So, if they had been doing something using the older numbers, then it's correct. They would have to have a multiplier to increase it, but the calculations that we did don't require that multiplier, because it's already -- we're using the right numbers to begin with.

MR. HINNEFELD: Correct.

DR. ANIGSTEIN: So there's nothing

to correct.

MR. HINNEFELD: That is correct.

DR. MAURO: Okay. Am I hearing that --

DR. ANIGSTEIN: I was -- what are we -- do I understand correctly that we just discovered that we're really talking about the same thing? We're really coming up with the same values?

MR. HINNEFELD: That almost sounds almost too good to be true, but it almost sounds that way.

DR. MAURO: Yes, it sure does.

DR. ANIGSTEIN: Because here we are comparing millirem to millirem.

MR. ROLFES: We are now in the dose reconstruction process. As Stu had said, basically, and I said earlier, we would take that neutron-to-photon ratio, the .23 to 1.0.

We would multiply the recorded and missed photon dose by the .23. Then we would

apply basically a biological effectiveness factor, quality factor, whatever you want to call it, for 100 keV to 2 MeV neutrons.

We would assume that all neutrons fell into that energy category, because that has the highest correction factor. We would apply the ICRP-60. I misspoke earlier and said 66 -- ICRP-60 correction factor, 1.91. It's in the organ dose.

DR. MAURO: That makes our numbers identical.

DR. ANIGSTEIN: So it comes up on my calculator at 2.44, and we get .43.

DR. MAURO: We just put -- sounds like we just put this one to bed.

MR. ROLFES: Okay.

DR. BUCHANAN: Okay, so --

MR. MORRIS: This is Bob Morris here.

DR. BUCHANAN: Go ahead, Bob.

MR. MORRIS: When you present your

findings, John, on this, could you make sure that you provide us the source, MCNP source code input file so we can check that, please?

DR. ANIGSTEIN: Sure.

MR. MORRIS: Thank you.

DR. MAURO: This is good, though. I mean, I think we may be on a trail putting this to bed.

DR. ANIGSTEIN: You want all the files or just that limiting case, the, you know, the big stack of drums? We had the -- we did a single drum. We did something like 48 drums, and then we did a conical pile, which is actually unrealistic.

MR. MORRIS: What I would really -- you know, I don't care about the geometry so much as the input details.

DR. ANIGSTEIN: Okay. Fine.

MR. MORRIS: So any one of those would be fine, Dr. Anigstein.

DR. ANIGSTEIN: Very good. We'll

get that to you.

MR. MORRIS: Thank you.

DR. BUCHANAN: Okay, so let's summarize the neutron Issue 6 as the fact that SC&A adapted to way it was derived. However, SC&A has done some Monte Carlo calculations that show that we agree with the outcome, which is actually what is applied in dose reconstruction.

So I think that we will write up a summary of this, but that's our present position. If it changes, we'll let you know in the summary, but that's the way we see it at this point. So we'll write a short summary on our position on the neutron issue, and it looks like at this time that it has been resolved.

MR. ROLFES: Okay. Thank you, Ron.

DR. BUCHANAN: And Bob is going to send that code to Morris, right?

MR. KATZ: It sounds like that

could just be a memo. It's not even really a White Paper, right?

DR. BUCHANAN: Yes, just a memo? Okay. SC&A will send a memo.

DR. ANIGSTEIN: We can attach it. Is there a larger writeup needed or just --

DR. BUCHANAN: Well, Bob, provide that code to Morris, and I will write up a summary memo and send it around. Is that okay?

DR. ANIGSTEIN: Okay.

DR. BUCHANAN: Okay.

MR. KATZ: Sure, absolutely.

DR. MAURO: Let's make sure, though --

DR. ANIGSTEIN: Who do I -- sorry, who do I send this to?

MR. MORRIS: You can send it to Mark. That would be fine.

DR. ANIGSTEIN: To Mark, okay.

MR. ROLFES: Yes, I'll make sure

that Bob Morris receives it and that the ORAU team receives it. Thank you, Bob.

DR. MAURO: Yes, I think it's -- I think it's -- this is John. I think it's important that after Bob has a chance to look at it and confirm that, yes, there is no disagreement, that --

DR. ANIGSTEIN: I mean, from what I'm hearing, they're already.

DR. MAURO: I am, also, but I think that since Bob wants to -- you know, if Bob takes a look at the DEC -- we'll call it the DEC.

DR. ANIGSTEIN: Wait, who are you talking about?

DR. MAURO: Bob Morris. I'm sorry.

DR. ANIGSTEIN: Oh, I'm sorry. You said Bob. I thought you meant me.

DR. MAURO: Yes, Bob, Anigstein, after you send it out and after Bob Morris has a chance to look at it and say, "Yes, we're

calculating -- they included for all intents and purposes the 1.91 while our .23 does not, which we apply later, and, as a result, we actually are coming in at the same place," something .43 or whatever the number is, and that confirmation from Bob Morris I think will put this thing to bed.

DR. BUCHANAN: Okay. Well, then Bob needs to send that to me so I can summarize it and close the issue or give SC&A's final position on it.

MR. KATZ: I think that would be good, so if, Bob, you can write up something, however DCAS wants that to be done, but get something final to Ron Buchanan, and then he can close the issue as might be appropriate.

DR. ANIGSTEIN: Okay. So the mechanics of it, I should simply send this directly to Mark Rolfes?

MR. KATZ: Sure. Yes, Bob.

DR. ANIGSTEIN: Okay.

MR. MORRIS: This will be a very quick review for me. I just want to double-check it.

DR. BUCHANAN: Yes, and then, Bob Morris, if you could send me an email with your opinion, and if it's okay, then I'll send a summary email around with SC&A's current position on it.

MR. KATZ: The Workgroup.

MR. MORRIS: I think our protocol will be that Mark will actually communicate with you.

MR. KATZ: Right.

DR. BUCHANAN: Okay. Whatever.

MR. KATZ: However this needs to be done by DCAS.

DR. BUCHANAN: However.

MR. KATZ: Right.

DR. BUCHANAN: Okay. Make a few notes here. Okay. Now, so that takes care of Issue 6, neutrons.

Okay, the other issue on Issue 8 was we discussed the accidents and incidents and these unusual occurrences. We went through some files and discussion at several of the meetings on how we can do dose reconstruction that's favorable and takes in these situations.

We fairly well had closed this out except that NIOSH had made a remark at the end of their April 21, 2011 paper. Under Accidents and Incidents on page three it says, "In fact, Working Group monitoring data likely to result in more favorable dose estimate." I asked for explanation on that, and so, Mark, do you want to --

MR. ROLFES: Yes, and the short answer is that the use of Workgroup monitoring data to estimate dose for unmonitored workers is likely to result in a favorable dose estimate. It just needs to be clarified in our opinion that we should specify to estimate

dose for unmonitored workers.

DR. BUCHANAN: Okay, to unmonitored workers. Making a few notes here. Okay, then that makes sense if it's to unmonitored workers.

Okay, Number 9 was geometry factors, and this issue is that Weldon Spring just record the photon dose. It calibrated film against calibrated film that were -- and the badges were mostly on the upper chest area, lapel pocket area.

So, obviously, if the person is irradiated in the lower torso, it wouldn't be the same dose as the upper torso and extremities. Dose would be different than the lapel dose.

So we had discussed this briefly at some of the other meetings, and I believe that NIOSH is going to show how at other sites, similar sites, they had geometry factors to compensate for this if necessary, but this was

not addressed in the TBD or the ER.

So we wanted to have NIOSH give us a summary of how this is going to be applied in the dose reconstruction, and there will a modification to the TBD to reflect that.

MR. ROLFES: Yes, I think SC&A had looked at geometry correction factors for the Mallinckrodt site, and I believe NIOSH had developed some specific geometry correction factors for Mallinckrodt Chemical Works. SC&A had provided some comments on that geometrical correction factors that we had recommended, and we had a specific TIB for Mallinckrodt.

Since we had received those comments, I believe in late 2010 DCAS had revised that TIB specific to Mallinckrodt and made it a more broad scope document. It's DCAS TIB-13, Revision 1, and it's Selected Geometric Exposure Scenario Considerations for External Dose Reconstruction Considerations at Uranium Facilities. So this information

contained in here would be applicable to the Weldon Spring plant, as well.

DR. BUCHANAN: That was TIB-13, Revision 1.

MR. ROLFES: That's correct, DCAS TIB-13, Revision 1, and the title is Selected Geometric Exposure Scenario Considerations for External Dose Reconstruction at Uranium Facilities. I can give you a little bit additional information.

It says, "This document is applicable to Weldon Spring, and use of geometric correction factor of 2.1 to all organs within the lower torso would be applied to claimants who performed hands-on work with uranium or equipment contaminated with uranium.

"This would include operators, material handlers, and trade workers, including maintenance personnel, pipe fitters, welders, electricians, sheet metal workers.

"The correction factors assumed have a log-normal distribution with a geometric mean of 2.1 and a GSD of 1.34. The value of the GSC is discussed in DCAS TIB-13, Rev 1, and it is based upon data developed in DCAS TIB-10, Revision 3, Best Estimate External Dose Reconstruction for Glove Box Workers."

DR. BUCHANAN: Now, that will appear in the revised TBD. Is that what you read, or how will that be applied?

MR. ROLFES: We might need to put a statement in the revised TBD that says, you know, consider information in DCAS TIB-13, Revision 1, for applicability in the dose reconstruction process of Weldon Spring.

DR. BUCHANAN: Will there be a PER on that?

MR. ROLFES: That would something -- that would be something to consider, as well, yes. We'll certainly take a look into

that.

DR. BUCHANAN: Okay, so that's SC&A's discussion of the SEC issues and the action items that we're to take from that. There is -- there was a number of Site Profile issues, which we've been discussing along with SEC issues.

I guess at this point, unless there's something specific we want to discuss, what I have found that we had 28 Site Profile issues, and most of those have funneled down into the SEC issues. They've been addressed during the SEC issue process.

There are about four, I believe, that were going to be addressed by changes in the TBD. I could look at that and see if Mark agrees that's what's going to be done if you give me a minute here to pull them out.

MR. ROLFES: I recall I think one of them, Ron, was related to uranium daughter products. I think that might have been one of

them we needed to clarify a statement about --

DR. BUCHANAN: Yes.

MR. ROLFES: Let's see. Our result here says --

DR. BUCHANAN: Number 18, uranium decay products, P-18, incomplete assessment of uranium decay products. At the January meeting you said there would be a revised TBD on that.

MR. ROLFES: Correct. That's correct. Let's see here.

DR. BUCHANAN: And different solubility types, again, on the January meeting you say there would be clarification in that these were all the possible, that they didn't necessarily all exist, but there would be a possibility that these type could exist. There was confusion there that you had different solubilities for the same isotope.

MR. ROLFES: Right. We would clarify. In the dose reconstruction process,

we choose the solubility of the uranium that results in the highest dose or probability causation for that specific target organ, and we can put a statement in the TBD that more formally documents that.

DR. BUCHANAN: And then there's several secondary findings on the 14 and 15. I have a note from the January meeting that you would also put -- that that would be revised, that the -- and I forgot exactly all the details.

I have here stated uranium, thorium, radon ratio should be used with caution. Let's see. On the main matrix maybe we have further explanation of that.

Okay, this has been superseded, I think, by your environmental report of 4/21, so I think that the S-14 actually was answered by your 4/21/11 environmental paper.

MR. ROLFES: Okay. You said there were four, and so you should have one more.

DR. BUCHANAN: One more. It's 15, and that was the thorium and thoron, okay, and we've addressed this issue of the pits and the quarry and when the material was handled, and so I think that that issue has been addressed, also. I would say we close that.

We can close those two, the secondary findings 14 and 15, and you will incorporate the revisions for primary findings 18 and 20. The others have either been closed or have been addressed during the SEC issues.

MR. ROLFES: Okay.

DR. BUCHANAN: Okay. So, at this point, then, that was Item 5, and we've addressed those, the SEC issues. So 6, then, is decided to fast forward, since our Chair is not with us today. I guess Dick and Ted and all of us decide what we want to do next.

MR. KATZ: Right. So, Dick, are you on the line still?

CHAIRMAN LEMEN: Yes, sir.

MR. KATZ: So, "Yes, sir," I should be saying to you, but, so, I mean, my suggestion is, as we've discussed before, we don't have Mike with us today, but once we have a transcript from this meeting Mike can get completely up to speed with this, and that'll also give folks time.

My sense was that all of the remaining action items are pretty brief ones in terms of how much work is required --

CHAIRMAN LEMEN: I think that's true.

MR. KATZ: -- to close them, so as soon as we -- we know it's sort of roughly 30 to 45 days to get the transcript to you. Actually, we can get the transcript to you before we PA clear it or anything, so closer to 30 days.

I will give Mike a brief update. I may even have Mike speak with Ron, too, just so that he can hear something orally, and then

he'll get the transcript, and we'll be setting up then a Workgroup meeting. Sounds like that would fall also in the November time frame, and you're back, then. Is that true, Dick?

CHAIRMAN LEMEN: I am back after the first of November.

MR. KATZ: Okay, so that'll probably work out well, and with some luck we can then close out the Workgroup's work and prepare in that meeting, as well, to report out to the Board, which meets in December.

CHAIRMAN LEMEN: That'll work for me.

MR. KATZ: And as everyone both on SC&A's side and DCAS goes forward with these, if there's any fly in the ointment that nobody recognized before that means we might need more time, just please holler so that we know it's coming.

DR. BUCHANAN: Do you think the next, the final Workgroup meeting will be like

a phone conference, then?

MR. KATZ: So, I think there's a good chance we can do it by phone conference, but part of that will depend, too, on what Mike's comfortable doing if he wants to be -- he tends to like to meet face-to-face, but we'll see. So we'll just leave that open, an open question.

Let me ask, Karen and Mary, whether you have questions at this point or comments, if we still have you with us.

MS. KAREN JOHNSON: Not right now.

MR. KATZ: Okay. So, Karen and Mary, you'll be kept abreast, too, of scheduling of the next Workgroup meeting, and any of these papers that come out, we'll get those PA cleared so that you can see them.

MS. KAREN JOHNSON: Okay. Thank you.

MR. KATZ: Okay. You're welcome. So, Dick, anything else for the good of the

order?

CHAIRMAN LEMEN: No, nothing good for the order.

MR. KATZ: Okay, and nothing bad, I hope, as well.

CHAIRMAN LEMEN: Nothing bad, either. I appreciate both SC&A and NIOSH for their presentations today. I think it was a very good discussion. At least, it helped me and clarified questions that I had, so I appreciate the good work that both groups are doing and thank you.

MR. KATZ: Yes, and I echo that. I think everyone was incredibly efficient and to the point and clear, and that made for excellent discussions. Thank you. So, we are adjourned. Have a good day, everybody.

(Whereupon, the above-entitled matter was adjourned at 11:48 a.m.)