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

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ADVISORY BOARD ON RADIATION AND
WORKER HEALTH

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JOINT MEETING OF THE
SAVANNAH RIVER SITE (SRS) WORK GROUP
AND THE SPECIAL EXPOSURE COHORT (SEC)
ISSUES WORK GROUP

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WEDNESDAY
AUGUST 16, 2017

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The Work Group convened via teleconference at 10:30 a.m. Eastern Time, Bradley Clawson and Jim Melius, Co-Chairs, presiding.

PRESENT:

BRADLEY P. CLAWSON, Co-Chair
JAMES M. MELIUS, Co-Chair
JOSIE BEACH, Member
JAMES E. LOCKEY, Member
GENEVIEVE S. ROESSLER, Member
PHILLIP SCHOFIELD, Member
PAUL L. ZIEMER, Member

ALSO PRESENT:

TED KATZ, Designated Federal Official
NANCY ADAMS, NIOSH Contractor
MATT ARNO, ORAU Team
BOB BARTON, SC&A
RON BUCHANAN, SC&A
NANCY CHALMERS, ORAU Team
JOSHUA FESTER
JOE FITZGERALD, SC&A
WARREN JOHNSON
TOM LABONE, ORAU Team
MICHAEL MAHATHY, ORAU Team
JIM NETON, DCAS
MICHAEL RAFKY, HHS
JOHN STIVER, SC&A
TIM TAULBEE, ORAU Team
BOB WARREN

Contents

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

(10:30 a.m.)

Welcome and Roll Call

MR. KATZ: Welcome, everyone. This is Advisory Board on Radiation and Worker Health. It is an unusual joint meeting at the SEC Issues Work Group and the Savannah River Site Work Group.

And just to explain that a little bit, we're having a joint meeting because we're discussing both coworker modeling, and specifically the coworker models that have been developed for SRS and other material for SRS.

SRS had sort of been chosen as one of the sites where they'd be sort of a field trial of approach, the methods that the Board and NIOSH agrees upon for using for developing coworker models going forward. So that's why it's a joint meeting.

The materials for the Board for this meeting are posted on the NIOSH website under this program, the Board section, scheduled

meetings and today's date. So if you go there you can see all the background reading materials that are going to be discussed.

The agenda's there as well, and you'll see it's a long agenda. It seems unlikely to me that we'll get through it all, but it's good to have it anyway to see what's on our plate. And there's even more material than is showed on the agenda on our plate, at least with SRS. So you have that there to follow along with the discussion of the Work Groups.

The Work Groups also have access to Skype if people want to show anything to each other or present slides or what have you. That's not available to the public because it has to be that way for Privacy Act matters, but anyway that's there too.

And last thing, just to note, for everybody, except when you're speaking to the group, please keep your phones on mute and if you don't have a mute button, press *6. *6 will mute your phone for this conference line and then *6

would unmute your phone as well. Please don't put the call on hold at any point because that causes problems for everyone.

So that takes care of preliminaries. We'll do roll call. Well, first of all, for the Board Members, I know we have both our Chairs, that's Jim Melius, who's also Chair of the full Board. Dr. Melius is Chair of SEC Issues Work group. And for SRS, we have Brad Clawson, who is Chair of SRS.

We also have, for SRS, Dr. Lockey, Jim Lockey, who's present already. Josie Beach, present already. And let's see. For SRS, who are we missing? And Dave Richardson, I don't believe is on the line yet. Or Phil Schofield, are you on line?

(No response.)

MR. KATZ: Okay, we're still awaiting David and Phil from SRS. From the SEC Issues Work Group, we already have, as well as the Chair, Paul Ziemer and Gen Roessler, who are on the line.

So that takes care of any -- and

there's no conflicts of interest for the Board Members for SRS, with respect to SRS, and it's not an issue to SEC Issues Work Group. But please speak to SRS conflicts, for the rest of the folks, as we go through roll call. And let's start with NIOSH/ORAU Team.

(Roll call.)

MR. KATZ: Okay. Very good, thanks. Okay, then. Again, reminder to mute your phones, press *6 to mute your phone if you do not have a mute button. And Jim and Brad, it's your meeting.

MEMBER SCHOFIELD: Hey Ted, this is Phil.

MR. KATZ: Alright, Phil.

MEMBER SCHOFIELD: No conflicts.

MR. KATZ: And then let me just check one last time, David Richardson, you on the line?

(No response.)

MR. KATZ: Okay, no. Here we go.

SC&A Review of SRS Subcontractor Bioassay

Data Completeness

CO-CHAIR MELIUS: This is Jim Melius. Brad, why don't you chair the first two items, which are relevant to the SRS and the SEC, or more relevant, maybe more specific for it, and then I take over for the coworker.

CO-CHAIR CLAWSON: That sounds good. I appreciate that. Well, I'd like to welcome everybody here today and I appreciate you getting together with us.

The first thing that we've got on the agenda today is the review of SRS subcontractor bioassay completeness. It was done by SC&A. So, Joe, I'm going to turn this one to you and let you go from there.

MR. FITZGERALD: Okay. Thank you, Brad. Good morning. I think everybody has the report and the details. I'm just going to walk through the highlights.

As you know, the Board tasked SC&A back in September 2016, I think it was, to conduct what essentially is a broad-based review of

bioassay data completeness for subcontractor trade workers, the subcontractor CTWs.

And essentially the goal was to look at that in terms of completeness given that that database and other databases are the cornerstone of the dose reconstruction when you're talking about coworker models.

And, again, that's the context of the discussion today. This is an open question. Subcontractor data completeness has been around for a few years. You know, Tim and I had interviewed a senior HP at Savannah River a few years ago where it became pretty clear that they had maintained subcontractor records in a separate file. They called them company files and they were eventually merged into the overall current electronic database. But, again, the question was, well, how complete were these separate files and were they merged in a complete manner?

So, anyway, without going into some of the history, I know certainly Tim and his folks

have looked at this question and have looked at several possibilities.

Our approach, after we were tasked, was to frankly take an approach that was fairly analogous with what Tim and his team were doing with the Building 773 high level caves.

Instead of looking at a construction job plans, per se, we made it a broader review of available RWPs. And as we quickly learned, they come in a variety of flavors in this timeframe at Savannah River, so we looked at a number of those different RWPs for individual CTWs, subcontractor CTWs to be specific.

And it's basically a means to ascertain whether one could find a corresponding job-specific bioassay result in the SRS internal dosimetry records. So that was the approach.

And our objective, I think we briefed the Board and NIOSH on this going back to some earlier Board meetings, was the survey for RWPs across a wide variety of facilities, operations, and timeframes.

We wanted to try to expand the scope of this review and we tried to find as many RWPs as we could for the period of '72 through '95. As it turns out, what we did locate were predominantly RWPs for the early '80s through '95 with the vast majority of records for '89 through '95, which, you know, happens to correspond to Westinghouse's early tenure at Savannah River. They took over from DuPont in that timeframe of '89.

And I guess it's not too surprising that we were looking at more RWPs, more entries, in that timeframe. I think it's pretty clear that Westinghouse expanded or increased the formality of the SRS safety program, including the radiation protection program and the RWPs so that certainly you had more expanded use of RWPs.

And at the same time, that coincided with things like K Reactor restart and D&D. And so there was a much greater outsourcing of work, much greater use of subcontractors onsite. So there was a lot of that going on in the early and

mid-'90s.

In any case, our review commenced in January of 2017 after, you know, arranging access through Savannah River. We had two onsite data captures in February and the review was essentially completed in the May-June timeframe. So it was a fairly expedited review after SRS cleared the information for use.

So the idea was to do a basic sampling but one that was a pretty simplified process, one that would not take -- was not a research exercise, was something that could be done certainly in several months. And that was also because, again, Savannah River really was facing some burdens on their EEOICPA program and we wanted to facilitate the reviews so that burden would be minimized on them. So, essentially, we had two onsite opportunities to look at records and to match some of those records accordingly.

And I guess the other thing I want to mention, and I do so in the report, was a particular challenge in conducting the sampling.

This is something we had not foreseen, was the relative scarcity of RWPs and the lack of uniform RWPs.

You know, you go in on something like this and you sort of expect to see more or less your traditional RWPs with, you know, timeframes, nuclides, jobs, hazards, and everything pretty well defined. That wasn't the case here.

We found a variety of RWPs in different levels of detail, some of which included explicit bioassay -- shift bioassay requirements, some that were silent on that even though it was the same kind of work and involving the same kind of workers.

So, in any case, we located for the timeframe of '72 through '95, we located only 13 permits. This included some rather extensive check -- I guess they call them sign-up sheets, involving thousands of names, but nonetheless, given the breadth of operations, it was surprising that we could only locate those, and those few numbers.

And we don't really have an answer for that. I think we discussed this with Savannah River that there's a possibility that a number of the RWPs were discarded. I think we mentioned a report, there were some reports, at least on the subcontractors' side, of records being destroyed after DuPont left. Or, you know, possibly they were filed in locations that we're just not aware of, that they were either at the operations or elsewhere, but certainly were not available to the EDWS searches that we conducted and the discussions we had at the site.

So in any case, that was a pretty significant limitation, but one that we worked through. And I'll get into that. In any case, there were a variety of RWP forms and some of these were extensive, some of these were just sign-up sheets.

And the sign-up sheets were a challenge because they, I think, came into vogue at a time when you had a large influx of workers and workers were standing by for radiological

work. They do not indicate a specific job, a specific date, where that job was done, or a specific hazard. They were just sign-up sheets.

We wrestled with that and decided to include them, but to offer results for ones that were only explicitly having -- explicitly reported bioassays as a requirement, just to distinguish that we had a large number of these entries that were not specific but embodied radiological work. And apparently it did entail some degree of follow-up, but there was just not that specificity or clarity on those.

So, again, it was a challenge. It turned out there wasn't a one-to-one relation where you could actually do a clear tracking between all the RWPs and job-specific bioassays that would have been conducted. And that certainly hampered some of the review.

Once RWPs were identified, the likely subcontractor CTWs on those RWPs were identified and sampled. For the large standing RWPs, we did that in a random way and tried to match them, all

of them onsite with the SRS bioassay records.

And these came in either electronic, on fiche, or in physical files. So there was a variety of sources of where this information would be. And we looked at all of them. We had the help of the Savannah River internal dosimetry staff, excellent staff, worked closely with us to make sure that we were able to match what we could match.

We started with about 360 subcontractors CTWs. And that's a number we successively culled down as duplicates were found or where it was determined that in fact they weren't subcontractors.

The coding system that's used at Savannah River, that enabled us to try to distinguish between subcontractors and prime workers or employees. And I think that was the process that we used to do that.

And we also culled out any RWPs where the job dates were not clearly recorded, just to make sure that we had some clear matchups. And

that got us down to about 300, 306 thereabout, entries.

For those that could not be found at all -- and at first that was a relatively high number. I think we reported to the Board last year that, at that point in time, we were looking at 18 to 19 that we could not locate at all in the dosimetry system.

We went back to Savannah River, as we said we would, and went back and forth, and they ran various permutations. You know, one of the challenges on these RWPs is these were handwritten and the numbers and the names are often not as legible as you'd like to think. And abbreviations are used, incorrect numbers were actually written down. And with the help of Savannah River and using the various permutations, they were able to identify, I think, 13 or 14 of them. Ultimately, we only had five in the end that we could not find. They were unaccounted for. This was out of the 300-some.

As far as the bioassay matching process, we chose a simplified process, and I think it essentially reflects the scope of the review that we were taking. And frankly, the disparity of the RWPs themselves, as well as the limited time that we had onsite.

And essentially we focused on just the question, is there a job-specific bioassay result on record that corresponds to a RWP for a subcontractor CTW within the 30-day or 90-day grace period following that specific job, that specific RWP?

And, again, we simplified this in the sense that we did not consider the specific nuclides involved in trying to marry up the -- if the RWP happened to mention a nuclide, we then tried to marry that up with a corresponding bioassay.

I think we had some concerns about the RWPs in terms of their completeness, whether or not they were including all the nuclides in the first place. So, without going through and

trying to delineate that, we just looked for any bioassays and provided, I think, a fair amount of leeway. And we simplified again that, because the RWPs were not uniformly explicit about an end-of-shift or follow-on bioassay, we provided two sets of information.

One that reflects or recognized the fact that even if the check-off wasn't there, a bioassay could have been very well expected in the process. And this was borne out, I think, in the body of the Notice of Violation that came later, that a lot of the forms lacked a check-off even though, certainly, for example, in tritium work areas, you would be expected to provide urinalyses and what have you.

So, because of the ambiguity, we wanted to provide both sets of data and provide at least a measure of what that would tell us both ways.

In terms of the thoughts on matching, as far as numbers, as far as looking at the total RWPs, this is both those that were somewhat more

ambiguous, those that had explicit bioassay follow-ons. At a 30-day point, we found 105 of the 306 total lacked a bioassay result in the records, which would be 66 percent, if you want to call it a success rate or completion rate.

At 90 days, that was 62 out of 306, and that would 80 percent complete, if you want to again use that term. Focusing only on those RWPs that were unambiguous, had a clear bioassay requirement upon completion of work, we found, again, the denominator drops down to 197. So it's about 200, or two-thirds of the total, were ones with the more explicit follow on bioassay. We found a 71 percent success rate, 57 out of 197. Where at 90 days, 84 percent.

At any rate, I mentioned the Notice of Violation only because it was something that -- it wasn't something I was aware of, and something that I had been aware of that Board or NIOSH had discussed previously.

And in the course of looking at documentation of Savannah River, certainly there

was a fair amount of documentation on that issue. And certainly, from our standpoint, we thought it had some pretty important implications for this discussion.

And in some respects, frankly, it overrides them, or possibly even renders moot some of the limited sampling we were able to accomplish. However, you know, again, I won't go into all of the details of the NOV, the violation.

I think all that's covered and quoted and cited in the reports on the -- we call it the NTS, Noncompliance Tracking System, that the DOE has, and it has a fair amount of details on the findings as well as the history as well as the corrective actions.

But just to summarize, Westinghouse was cited by DOE's Office of Enforcement in 1998, and I'm quoting, for deficient work processes with respect to full worker adherence to established WSRC -- that's Westinghouse Savannah River Company -- bioassay requirements.

DOE found that up to 79 percent of all

-- and this is not a sample -- of all workers with job-specific bioassay requirements did not participate over a quarter, a three-month period in '97.

This was on top of an earlier Westinghouse self-assessment in 1995. That was the first assessment they did, that found that 67 percent, two-thirds, of a more limited sample lacked participation by workers. And this was something, as I suggested or indicated in a report, this followed a 1990 Tiger Team finding that focused on delinquent bioassay samples looking at the follow-up program for those delinquent bioassay samples as being deficient.

So, anyway, the corrective actions that were completed toward the end of 1998, I think it was December of 1998, addressed the various issues or gap or needs in the procedures and the tracking system. The RWP formed manager and worker training programs and a self-assessment program for job-specific bioassay.

So it's pretty much soup-to-nuts in

terms of upgrading the program that was responsible for administering the job-specific bioassays at Savannah River.

In any case, we closed in our report with some discussion regarding an appropriate success rate. I'm not sure it's the best word, but maybe completion rate.

And this was a key issue that was raised, as I recall, at one of the earlier Work Group meetings on the subject. I think Jim, Jim Neton raised it initially. And certainly the question was, you know, we can do all this work, but in the end, what's the certain acceptance criteria, what's the success rate that would be a determining consideration?

And at the last Work Group meeting, we had, I think, it was in September this past year, Tim also broached the subject. And I included the exchange by Tim with Brad on this topic in the report. Because I thought actually it was a pretty reasoned attempt to find a basis for a metric. You know, we haven't had much discussion

on that, but certainly it was one discussion that got into that.

And I think that discussion actually illustrated that it's not just the percentage but also the considerations that go into making a judgment. You know, considerations go into making a judgment on how complete it is, sort of like how adequate is adequate in terms of coworker model development.

I guess, I've got to say, I'm not comfortable with 25 percent incompleteness in a key database in this way, but in the end I think what we point out in the report, the apparent incompleteness that we found and practically all of these surveys -- and I, in looking at Tim's report, and Tim will speak more specifically about it, the percentages are still pretty, I think, pretty telling that you don't really have a complete database when it comes to job-specific bioassays.

And certainly, in the end, I hope we can all agree that, you know, 79 percent of non-

participation equates to, from our advantage point, in terms of coworker model development, you know, a pretty high level of incompleteness.

So if the question that the Work Group had tasked us with was, you know, whether the subcontractor CTW bioassay database was complete or not, I think, if nothing else, this would be a punctuation point on the conclusion that it's not complete.

So, in any case, given the simplifying assumptions we had to make and the uncertainties imposed by the disparate and pretty incomplete RWPs, again, I hope we don't spend a lot of time wrestling over the mechanics or the statistics of the sampling exercise.

I think we'll be the first to admit that, given the limitations, it was a rough sampling exercise, but I think we can focus on the obvious bottom line result. Certainly, beyond that, I think it's going to be up to NIOSH and the Board to determine how that data gap should be addressed going forward.

Let me just finish by saying that, and we don't do this very often, but I think we got a considerable amount of work appreciation in terms of work that was done by DOE and the Savannah River folks that host us at the site. And I want to make this clear next week, as well, that we had full access to the internal dosimetry staff at Savannah River and I doubt we could have gotten as far as we did without that very close coordination on their part, and that was a big help.

And also I think, particularly since we have the NIOSH staff here on this line, I thank Tim and his team because, again, he provided, his team provided the early data capture records that jump-started the review in the first place.

They had gotten a leg up on this issue and were able to give us information that was able to facilitate our review as well. He and his team attended both onsite reviews with us, and ORAU basically scanned all the documentation for uploading to SRDB in realtime at the site.

So, you know, again, there was a considerable amount of help and collaboration in terms of getting this thing to happen in realtime, and I just want to say I appreciate all that. It was a very open review and I think that helped a great deal. That's it.

CO-CHAIR CLAWSON: Good. Sorry, I was talking on mute there for a little while. Are there any questions from the Work Group?

MEMBER LOCKEY: Joe, Jim Lockey. In your summary you said at least from '89 forward, what about before '89?

MR. FITZGERALD: Well, we definitely find some RWPs with entries before '89, but we were, I think, surprised that there weren't more. We did find some relatively small ones with relatively small numbers of entries, I think in '86 and a few in '82. But in terms of the 300, that's a small minority, you know, of the total.

And I don't have a good explanation for that, and neither does Savannah River, why outside of really the construction of the job

plans that, I think, Tim and his team found for 773, we just didn't really find very many before about '88. We did find some for '88.

So, again, there is no clear explanation for that except they're either in a location that nobody knows about, maybe Tom LaBone might know about it, but those records just weren't accessible through the search mechanism that we were using in conjunction with the dosimetry program at SRS.

MEMBER LOCKEY: So, just so I understand, so before '89, you had no data, so you had nothing to rely on before --

MR. FITZGERALD: We do have data but the vast majority of it is '89 and beyond, almost coinciding with, as I indicated, the Westinghouse Savannah River tenure.

We do have some data points, as does obviously NIOSH, for 773-A, but when queried, Savannah River, when queried about that first specific topic, "Where are the 1980s in terms of RWPs?", they could not answer that, and we could

not locate them after a number of searches.

We did search physically at the site through the document control facility. That was done in conjunction with NIOSH, and we just weren't successful in finding RWPs for the -- more RWPs for the 80s. We do have some limited number.

Certainly, there were a larger number of RWPs once Westinghouse came onboard, because I think they instilled a more formal set of procedures, more requirements for RWPs. But I don't think that alone answers the question of why so few RWPs before '88/'89.

MEMBER LOCKEY: Thanks.

MEMBER ZIEMER: Joe, this is Paul Ziemer. Can I ask a question even though I'm not I'm on the SRS Work Group?

CO-CHAIR CLAWSON: Sure, go ahead, Paul. Yes.

MEMBER ZIEMER: Joe, do you recall whether or not the Tiger Team review of 1990 listed the work permits or not? Did they have

any statements on that? You listed the Tiger Team reports, right?

MR. FITZGERALD: Yes, I did. And actually, their focus was more on following up on delinquent bioassays, whether or not, you know -- I think the report itself cites some -- let's me just go back and take a look real quick.

The report cites the Tiger Teams as saying that basically there was a number of delinquent -- let me just see if I can find this exactly here. Yeah, they were cited -- oh, here it is.

They were cited for noncompliance with DOE Order 5480.11 because -- and I'm going to quote you this: "the mechanism for follow-up and collection of delinquent bioassay samples is not working," and also that not all positive bioassay results are investigated and many investigations are incomplete because of the problem with delinquent bioassay samples.

So they didn't look per se at RWP follow-up. They looked at whether or not the

program had addressed bioassay samples and making sure that there were no delinquent samples, that wasn't working as far as they were saying.

MEMBER ZIEMER: Okay. Thanks. I didn't recall. It's been many years since I saw that report.

MEMBER SCHOFIELD: This is Phil, I've got just one question. On a lot of these samples, how many were taken at the completion of job, you know, within a day or two after completion? Or was there a real time-lag of three months, six months before they had them submit samples?

MR. FITZGERALD: Actually, in most cases, we found the bioassay the day of or the day after. Obviously, the grace period that we were providing, we were picking up others that came later, but particularly with the tritium bioassays, they were happening in realtime.

So, no, we didn't see too much of a lag. Now, I recognize in looking at the RWP breakout. about three-quarters involved tritium, which if you think about the outsourcing at

Savannah River in the early '90s, it makes some sense because you're bringing in workers into places like K Reactor or in the K Area.

So, you know, you're talking about potential tritium exposure, and so there certainly would have been a fairly large scope of tritium sampling being done. But by and large, we found that sampling, when it was done, was done pretty promptly.

MEMBER SCHOFIELD: Okay, thanks.

CO-CHAIR CLAWSON: Hey, Joe, this is Brad. I just wanted to make a clarification here in stuff like this. Now, NIOSH, because I was looking at your data on this, and basically both you and Tim came in pretty close to one another on percentages when you did your investigation. But NIOSH, basically, and Tim you can chime in on this, you mentioned basically looking at 773, correct?

DR. TAULBEE: That's correct. We looked at the job --

CO-CHAIR CLAWSON: Okay.

DR. TAULBEE: -- on 773.

CO-CHAIR CLAWSON: Okay. And SC&A's was kind of a more broader spectrum of, you basically took all these RWPs and looked at them from there. You weren't restricting it down to a certain facility or area, were you?

MR. FITZGERALD: There was relatively a few RWPs so in a sense, we just took all we could find. I think originally we were thinking about statistical sampling but that became a little bit beside the point once we found out how few we could actually locate.

I also might add that, in terms of comparison, keep in mind that we did make that distinction on those that had very explicit bioassay follow-up. So, certainly the second set of percentages, if you want to call it that, would be more appropriate, where we had about 197, I think it was 197 that we had a clear bioassay tag.

Again, what made this thing difficult was the -- even though you had radiological work

by subcontractor CTWs, the actual RWP forms varied in content. And some had very clear bioassay requirements, some had less clear bioassay requirements, some had none. The sign-up sheets had none, even though it was the same kind of work.

I think this was -- if you look at the Notice of Violation of '98, that was one of the key findings, was a need to make the RWP system uniform and have a uniform bioassay check-off, and which I suspect the investigators were seeing as contributing to this ambiguity about whether or not bioassays should have been left.

In any case, but that's certainly the reason.

CO-CHAIR CLAWSON: Well, this is what I found interesting, because 835 had been implemented in '96, and you know, we're getting into this area of '98 and we're still into this situation.

But this Notice of Violation, to me, they did a 100 percent check, isn't that correct?

MR. FITZGERALD: Well, yeah. The history on this is in the NTS, but this is all kind of interesting. I didn't know this history and I was actually at DOE when this was all going on.

But there was a fairly significant Notice of Violation, a Level I Notice of Violation at Mound Laboratory in, I think it was '96 or '97. And that's where they found a similar issue where you had RWP required bioassays that were not being done.

And once that, again, civil penalty and violation was levied by DOE, apparently Savannah River took notice and began doing their own self-assessments. And Westinghouse did a self-assessment in, I think it was '95, to frankly review its own program and see where things stood.

And that's where the result of, I think, essentially two-thirds non-participation by workers in job-specific bioassays was a finding. That, frankly, precipitated a self-

reporting under Price-Anderson, and I think eventually led Westinghouse to go back and actually do what appears to be a 100 percent verification where they actually looked at, for one quarter, all job-specific bioassays in terms of completeness. And that's where they found 79 percent, almost 80 percent non-participation.

And that was what actually cited in the Notice of Violation when that was levied in '98. So all this was engendered from self-assessments done by Westinghouse but it was sort of on the onus of how Price-Anderson was being implemented, where if one was aware of an issue, one was responsible for, you know, ascertaining the degree of that issue, self-assessing, and self-reporting.

And certainly that was what happened by, well, for the mid-'90s. Certainly, the 835 was promulgated January 1st. This all took place in '97/'98, so it was on the heels of that.

So I guess it's fair to say that even though 835 was implemented in January 1st of '96,

there was a lag to some extent on the actual implementation of that aspect of the program until the corrective actions were taken by the end of '98.

DR. TAULBEE: Brad?

CO-CHAIR CLAWSON: Okay, go ahead.

DR. TAULBEE: Can I make a comment on this?

CO-CHAIR CLAWSON: Sure.

DR. TAULBEE: Okay. I popped up what I think is on the presenter screen here the actual Notice of Violation. I do want to point out in the report that my DOE 1998a is not the correct link for this particular Notice of Violation.

I can send everybody the link for that, for the particular report. The second, the 1998b, has a different Notice of Violation, as well, but the correct report would be EA-98-09R1.

When we're preparing a response to the SC&As reports here because -- well, before I get into that, I will say that up to section 3.3 in the results of the SC&A, they did what I consider

a really good job of analysis with the data that they had. And I don't have any concerns with what they really presented, you know, from that initial part.

I do have some issues with the sign-in sheets, but that's okay. Where I have my major concern is with section 3.4 of the report on the chronic problems with bioassay. Because I feel there's a couple of big omissions on their report and I'm -- can everybody see the screen that I've got up?

CO-CHAIR CLAWSON: I can't, but that's fine.

MEMBER BEACH: Yeah, I got it. Tim, can you make the screen bigger?

DR. TAULBEE: Make it bigger?

MEMBER BEACH: On your end?

DR. TAULBEE: Let's see. How about this?

MEMBER BEACH: Yeah, that looks good. That helps.

DR. TAULBEE: The green parts that

I've highlighted here is what's from SC&A reports. But the first one that I feel is something that requires some follow-up here is that they talk about, you know -- I'm going to start with the last sentence from the first green block.

DOE-SR identified bioassay sample submittal deficiencies for the job-specific portion of the bioassay program to Westinghouse Savannah River Company as early as November 1995. So there had to have been some kind of an assessment to have known that.

The next part, which in the SC&A report is just dot-dot-dot. It says internal WSRC audits and assessments during '96 and '97 confirm that these deficiencies still existed as late as mid-1997 when WSRC conducted the self-assessment that Joe was talking about.

So we know there's at least three assessments that were done: '95, '96, and '97. We've requested those assessments from the Savannah River Site. We made that request July

27th after we saw SC&A's report.

They go on, and I'm strolling down here, because the last sentence is the green portion here, is the part that SC&A emphasized, it says, "as a consequence, the job-specific bioassay non-participation level rose to 79 percent in the second quarter of 1997."

However, the next sentence states, however, in late 1997 and 1998, WSRC identified that, for 1997 -- I'm assuming this is the whole year but we won't know until we get the assessment -- 256 workers failed to submit job-specific bioassays as required. Westinghouse Savannah River Company undertook corrective action to resample these individuals and the results of which indicated that none of these workers had had an identifiable uptake of radioactive material.

So while they had people that were not submitting bioassay at the end of the RWP job-specific bioassay, it appears that they did follow-up on these particular workers and they

got bioassay results for them.

Now, what ends up happening here, and Brad you mentioned 10 CFR 835 violation. This Notice of Violation was not 10 CFR 835. This was 10 CFR 830 under quality assurance programs. So that's where the violation was. This is not a violation of 835.

I'm going back, it appears, while doing these resampling of these workers, I don't know for sure, but if they got bioassays for 256, then they got bioassay for everybody there at that site.

Another point that I want to mention here that is really critical, is if you look at -- let me pull up the report and make it bigger here -- in the report, and I've highlighted here, that the NTS report points out that when they did their assessment in that first part of 1997, they looked at 3200 bioassays that were reviewed. Ninety-five percent of the workers were covered by a routine bioassay program and had submitted bioassay samples as required. Five percent of

the workers were requested to submit job-specific bioassay samples and only 33 percent complied.

So they had a 33 percent success rate, and that's what dropped down to 21 percent by that second quarter of 1997. So there's a large number of workers, construction trades workers as well as, obviously, the operations workers, that were on a routine bioassay program.

And so I think these are important points to identify here with regards to this Notice of Violation, that, one, it was not an 835 compliant issue. It was an 830 of them not following procedures and having to go and get follow-up bioassay because the workers were not leaving the samples as directed by the RWP.

MR. FITZGERALD: I'd like to interject, if I could. I think, if you look at the NTS information, though, it was a discretion by the enforcement staff to base this on 830 versus 835. I don't think it was any declaration that this had little to do with 835. I think it was, again, when you're talking about a

regulatory or legal process it's certainly at the discretion of the enforcement staff to decide what the basis for the violation would be.

So I just wanted to clarify that. On the other point, we do provide information on the 3200, and this is a quote from the NTS. The 3200 bioassay requirements reviewed, 90 percent of the workers were covered by the routine bioassay program. That's on page 17 of our report.

DR. TAULBEE: That's correct. That's what ---

MR. FITZGERALD: I'm just -- we were very clear that, you know, there's some qualifying issues. We want to make that clear where it came from. And, again, we're not making a judgment so much as to, you know, the ins and outs of this, and there's more documentation that could be had on this, but just to report that as far as a survey of completeness, this stands as a pretty important one, and one that was contemporary with the 1990s as opposed to sort of limited backward-looking sampling that we were

forced to do.

So that's why this is included, because it is relevant, because it speaks to a question of participation because it was significant enough that it was the basis of an enforcement action.

And I think one has to keep in mind, if we're keeping try to, you know, ascertain completeness, this may very well be one of the few Notices of Violations we'll look at that focuses on that subject, the completeness of bioassays being done for what effectively is a CTW class. So this is very relevant.

DR. TAULBEE: I don't disagree that this is relevant to look at, Joe. But I believe that the impression that only 21 percent of the people ended up in the database is incorrect. That from the 1997 evaluation with the follow-up, it appears -- and I don't know until I get the report back from Savannah River -- that 100 percent of those people who did not submit the job-specific bioassay were followed up, they got

bioassay.

And so from that standpoint, that would be complete. So did they have issues with collecting samples? Clearly they did. They would not have been fined or a Notice of Violation would not have taken place.

But, again, from the ORPS report, if you look at the conclusion there, I popped this up on the screen, it says, to date, there is no evidence that workers have received an intake that has previously gone undetected due to the problems identified above. Doses not assigned by job-specific bioassays. Radiological controls at SRS exist to monitor levels of radiation, contamination, and airborne radioactivity. If unanticipated elevated levels are measured, work is stopped until corrective action is taken. Any concern that a worker intake of radioactive material may have occurred is assessed as part of the special bioassay program.

Now, I would like some more clarification on this, and I would like to

propose that as part of our follow-up, when we get these reports back from Savannah River, that we interview some of the folks at the site to get more details about this particular event, and then we got a better understanding of what was going on in '95, '96, and '97.

MR. FITZGERALD: Okay. One comment I'd like to make on that. And I certainly don't disagree with that. I think the more information the better on that. But, you know, they did a validation. They went back, and certainly given the implications of these findings under the regulatory body, they had to go back and ascertain whether there was any real impact.

But by the same token, one could not speak to the results, the lack of bioassay results, going back in time. I mean, you can't speak to 1993, 1994, you know, whether or not the lack of participation of those bioassay programs resulted in any exposures that were missed. I mean, this certainly validates for the exact current time.

I mean for the survey done in quarter of '97 perhaps that, you know, there were no apparent exposures missed, but how does one -- when you have a system that is not working, which is what the basis for the NOV is, how does one ascertain whether that's the case going backwards in time?

So that's kind of the question that we're sort of raising is, if you don't have a system that's working, how does one have that information going back other than to surmise that we checked it in '97 in this one instance and we're going back-extrapolate that level of assurity.

And beyond, you know, this piece of information, I think I want to bring us back a little bit and, you know, certainly our conclusions are based on the extent of the surveys, not just simply one survey.

This one was pretty pronounced because it certainly caught us by surprise, certainly, the lack of participation in the program. But

certainly the Westinghouse surveys as well as the limited survey that we were able to conduct, and we're still talking about a fairly high percentage of results not being there, whether they're because of non-participation or for other reasons.

I think, and I would say the Work Group would need to grapple with that question, you know, quite apart from the source of the results being lacking, what does one do with a level of incompleteness such as what we're looking at, whether it's 70 percent, 50 percent, 60, 40?

I mean, I don't believe, in the course of our discussions for other sites, we have ever gotten into percentages like that. I mean, as I recall, we were debating, you know, 5 percent maybe, you know, was that good enough or not.

But here we're debating whether 25, 30 percent is that adequate, and can we somehow ameliorate a report of 80 percent by looking whether or not they had validated the actual

bioassays as not being positive.

So I think that, you know, that perspective, I think keeping one's focus on the bottom line which is the completeness question is also an important imperative as well as getting additional information regarding this particular NOV.

I don't want the NOV to distract from the overall question that was tasked by the Work Group, actually to both NIOSH and as well as SC&A.

DR. TAULBEE: I would like to, I guess, follow up on that comment. Again, we're talking about the job-specific bioassay and subcontractor bioassay here. And so, you know, I just want to make sure the Work Group is clear from that standpoint. That, you know, even from SC&A's report, I think it's page 17, where they talk about the routine bioassay that was going on, I would like to again point out that a significant number of people, of construction trades workers, follow under that routine methodology, under that routine monitoring.

So, in this particular case, you know, we're looking at 5 percent, which would be 160 people from that 1997 evaluation. And you know, as I pointed out, of the remainder of that Notice of Violation, they indicated they went back and sampled 236, so I believe they looked at the whole year.

But your point is taken there, Joe. You know, we shouldn't be using, really, the Notice of Violation as a distraction here, although I do think we need to get to the bottom of this, because this does have implications for some of the discussion that went on yesterday during the Los Alamos component where you pointed out Savannah River had this serious problem. And so this does play a role, you know, into this latter time period where we are assuming the 100 millirem cycle limit.

And the data that we've seen so far is consistent with that but we do need to track this down further.

MR. FITZGERALD: Right. I agree. And

I think we're in the same boat with Los Alamos in terms of -- and what's interesting, again, I think I pointed out in the Los Alamos discussion, is that they actually in 1999 brought in Savannah River health physics staff and MJW, which I would assume came from Mound, to frankly do an external review of their bioassay program, I think, for similar issues. And it's certainly a question of self-assessment to assure themselves that the program was adequate.

And some of the findings were, I would say, pretty reminiscent of what was found at Mound and Savannah River. So there seems to be a lot of connectedness at this time in terms of trying to grapple with the question of enrollment and participation in bioassay programs. It seems to be a broader issue than just one site.

DR. TAULBEE: That is correct. So as I indicated at the beginning of my comments here, we are preparing a response to SC&A's report. I would love to get that out to you next month, but since the site hasn't responded yet, I'm

expecting that we would get it to the Work Group sometime in, hopefully, mid-October.

But like I said, we do have some concerns with the conclusions from this report. Kind of going back to what Joe was talking about in the results of what they found, you know, from the 90-day standpoint, you're looking at 80 and 84 percent success rate. And I find that that falls within the guidance that we started discussing. Because 75 percent is not a hard and fast, by no means. And I'll get to some of that in my talk on the next topic in just a minute.

But I think that, from this standpoint, in the use of the coworker model, 80 to 84 percent is reasonable and we could apply the 95th percentile dose from that particular coworker model for any unmonitored workers.

Back to you, Brad, unless there's more questions for Joe.

MR. FITZGERALD: So, frankly, we're expecting more documentation and an expanded review on the Notices of Violation aspect of

these.

DR. TAULBEE: That is correct.

MR. FITZGERALD: Alright.

CO-CHAIR CLAWSON: By what time? You said mid-October?

DR. TAULBEE: Well, we made the request to the site on July 27th, is when we sent the request to the site for all of these assessments. We know there is one in '95, '96, and '97. So we requested that particular information and have not received it yet. We do know the site is working on it. We do know it's their number one priority of deliverables back to us. So that is where we're apparently sitting with that.

CO-CHAIR CLAWSON: And when you get a copy of those, I'm sure that SC&A is going to be able to get them at the same time, correct?

DR. TAULBEE: Oh, absolutely. We'll be posting everything to the SRDB.

CO-CHAIR CLAWSON: Okay. Is there any more questions for Joe, Work Group Members?

MEMBER SCHOFIELD: I don't have any, Brad.

CO-CHAIR CLAWSON: Okay. Well, that being said, Tim, the next one is up to you then, evaluation of construction worker monitoring in high level caves jobs. Hello?

DR. TAULBEE: Sorry, I was on mute.

CO-CHAIR CLAWSON: I understand. I've done that numerous times.

NIOSH Evaluation of Construction Worker Monitoring in High Level Cave Job Plans

DR. TAULBEE: Just a second here. I'm pulling up the report. There's a few places that I want to kind of highlight a little bit of what we've done, and what we did. So I'm pulling directly from the report and I popped it up here on the screen.

To give an overview, we specifically went to look at subcontractor bioassay -- or subcontractor monitoring, actually, not just bioassay. We looked at the external, too, based upon the job plan.

And to give a little bit of

background, again, to everybody on the call, as Joe pointed out, we'd heard some concerns from a former HP that there were company files versus individual bioassay records, but the individual who we had interviewed indicated that he felt all of those records had been moved into individual files and the databases.

So he didn't feel that it was a continued issue, but we decided we needed to verify this. So that was why we were looking for ways to try and do that and tried multiple different assessments looking at some of the records provided by CPWR, the links that they had been using and had been sending to the Department of Labor, and none of that really gave us a population that we can go follow up on.

And at the last, I believe, it was June of 2016, it was over a year ago, during the data capture out at the site, we ran across what we believed to be a pretty comprehensive set of job plans for one area, the high level caves on that 773-A, that identified workers and

identified the work that was going on, and whether respiratory protection was required.

And so we took that grouping and decided to try and evaluate it. Okay, how were these workers monitored, both externally and internally?

For the external results, as you can see here on the screen that I've popped up on the Skype here, we got really good agreement overall. The total number that were monitored between DuPont construction trades workers and subcontractors, DuPont was 99.5 percent and the subcontractor construction trades 96.8 percent. So those were both very good.

So what I really want to focus on here is the internal monitoring. And so a key point here is that DuPont construction trades workers, these would be your electronics and instrumentation technicians, your mechanics, are the two main job categories within that group. They were part of a routine monitoring program in accordance with the bioassay control procedures.

For other worker that were intermittently present in the controlled area, these would be some subcontractor CTW, bioassay monitoring was based upon the job plan. And so that was how these individuals were monitored.

And so what we did was we went through and, let's see, we looked at all of the job pairings that we had within the group. And what we found was there were 550 subcontractor CTW job pairings. This is not all CTWs, this is just the subcontractor CTW job pairing. But we could not find bioassay results in any of the logbooks that we had.

It came up to a total of 255 unique subcontractors that we could evaluate and can look at what their bioassay monitoring was. And so we performed an analysis of these job pairings. And we originally selected ten workers from the 255 to try and get a feel for collecting their personal monitoring data during the data capture and what level of effort it was.

But in total we selected an additional

100 workers at random from this particular group. Both of these are random samples, we just did them in two different permutations. The main reason was that the ten workers we were supposed to get the data before we got onsite to do the data capture so we could do some better planning. But in reality, all the results came through at the same time, so we had 110 workers.

Some of the workers were paired in jobs with multiple use so it resulted in 133 distinct subcontractor CTW job pairings with no bioassay records that we had in-house.

So, from this, we looked at the 133 job pairings with no bioassay records and then we looked at the ones where respirators were required. And so we had 88 of these job pairings where respirators were required.

And so in November of 2016, we went down to Savannah River and we searched the bioassay data for these 110 workers in the given years and collected the records.

And of the 110, we found bioassay

records on 105 of them. The graph that I've got populated right now is showing the breakdown of the job trades of these workers. And you can see the majority of them were pipefitters, electricians, and carpenters.

You do have a pretty good mix. You've got iron workers, painters, boilermakers, laborers, and millwrights, and even some concrete. And as I said, I'm scrolling down here, I'm on page 13 now of Report-83, and the very top.

During the data capture, we found bioassay data for 105 of the 110 workers we were looking for.

Moving on to our results here on page 14, we found bioassay records for some of the workers who were not required by the job plan to use respiratory protection. So we really just focused on, again, these 88 CTW job pairings where workers were required to use respiratory protection.

And I'll get to the results here on

Table 4-2, but before I get to that, I really want to show a couple of indications of where somebody might wear, at least one, of where somebody might wear a respirator but not be required to leave a bioassay sample.

So our indication of respiratory protection being a requirement for bioassay isn't always a one-to-one type of correlation. And forgive me just a second here to get to that particular graph I want to show. Here we go.

And for those who have access, can you see this particular radiation survey log sheet? I'll read it out, but who's on the line can see the presentation, can you --

MR. MAHATHY: I can.

DR. TAULBEE: Okay. This is a radiation survey log sheet from January of 1986. And it states, surveys for construction pipefitters to complete jobs started yesterday on the off-gas exhaust line was bagged up and cut into -- I believe that's two sections, it might be more than that, but it's hard to read.

No problems were encountered during the job. Construction and operational health physics wore two pairs of coveralls out of cloth, and plastic shoe covers, cloth hood, rubber gloves, and full face respirator for the job. No transferrable contamination was detected during the job. Impactor air samples taken during the job calculated to less than .2 times ten to the minus 12 microcuries per cc. So that's less than a tenth of the DAC, is what the job stated. And the last line there is, job was completed at this stage.

So here's a case where construction pipefitters were wearing respirators, they didn't run into any contamination issues, health physics was there, they took air samples, and there was no indication of an exposure.

So, in this particular case, these pipefitters may or may not had been monitored for bioassay. So this is part of that discussion where Joe was talking about, you know, needing a high percentage of follow-up bioassay in order to

have a valid coworker.

In this particular case, I don't believe that we would need to have a super high efficiency, something like 70 to 75 percent, or maybe even 60 percent would be reasonable from this standpoint. And that's for the Work Group here to discuss.

So I wanted to point this particular issue out to you all. The other thing that I want to point out before we get to our results is you're going to have some instances where construction trades workers won't leave a bioassay sample.

And to give an example of that, here we go. Here's another example from the radiation survey log sheets at the Savannah River Site. And I won't read out the name here, but this is from the 321-M Area in April of 1986. And it says per, I believe this would be the supervisor, two employees of a particular company, which is a subcontracting company, of Wilmington, Delaware, refused to leave bioassay samples as

requested.

They identified who these two individuals were and one stated as his reason that he was exercising his rights to not leave a bioassay sample. And the other one stated time is money.

So you're never going to get 100 percent compliance with these bioassay monitoring, especially amongst subcontractors. So, you know, these are just two quick examples that I wanted to point out to the Work Group when considering these results and the response of how many people we were able to find bioassay.

By and large, I would say the two examples that I just gave you -- well, the second example, is probably rare. I will acknowledge that most people probably conformed with -- if requested to leave a bioassay sample, they did so.

In the first example that I showed you where there wasn't a need to leave a bioassay sample, that's what I'm probably -- that's what

I'm believing to be the main reason why we have a lower participation rate based upon our methodology of saying, if you wore a respirator you had to leave a bioassay sample. Because if there wasn't an indication on the job, and there was no contamination, then did they really need to leave a bioassay sample? And so that, again, is for the Work Group to consider.

So when we did our evaluation, we did this over the entire time period, there were 88 subcontractor CTW job pairings where workers were required to wear a respirator. And we found 59 of those, 59 of the 88 subcontractors, did leave a bioassay sample from wearing a respirator.

And it's also important to point out that a significant fraction of those people were actually on a routine bioassay. Again, construction trades workers, even if they were subcontractors, some of them were on routine bioassay. They weren't all job-specific. They were a mixture of people who were there kind of, you know, jumping from one job in 773 and going

to K Reactor or going to the canyons and so forth.

Some of the people that kind of routinely worked there, even though they are a subcontractor, were on a routine type of bioassay. So the CTWs, the bioassay for subcontractors, is a mixed bag of both job-specific requirements from the job plan, if an event happened where there is an indicator and health physics required it, and routine. You've got all three associated with the subcontractors.

And so those are the main things here that I wanted to point out with our report, that we got 67 percent, which this is the '81 to '86 time period, based upon our evaluation of one area where we had an comprehensive listing of job plans.

So, in our conclusions, 97 percent of the subcontractors evaluated were monitored for external dose. In relation to monitoring for internal radionuclides, bioassay data showed 67 percent of the randomly selected CTWs wearing respiratory protection were monitored for intake

radionuclides from 1980 to 1986. Almost 38 percent of these were on a routine monitoring for one or more radionuclides according to DuPont procedures.

So that's kind of a conclusion of our report in that we have a population where we just looked at the subcontractor CTWs. Again, we did not look at the DuPont CTWs which we are combining in the coworker model, because they were monitored from that standpoint. And we'll get into the coworker discussion hopefully later.

I've got examples showing the difference between DuPont's construction trades workers and the subcontractor contraction trades worker type of jobs. And you can see that they were doing very similar work. The difference was really scale of work more than anything.

And so our conclusion is that when you develop a coworker model and combining the DuPont construction trades with the subcontractor contractor trades, we are seeing 57 percent based upon a random model which appears to coincide and

agree with what Jim was seeing, as well as what some of these assessments, with the exception of that 1997 Notice of Violation they we're going to go look at.

It appears that three-quarters -- excuse me, not three-quarters -- two-thirds of the subcontractors CTWs were in fact monitored. So, with that, I'll be happy to answer any questions.

CO-CHAIR CLAWSON: Tim, this is Brad. You made a comment back there that you gave your example of where you didn't feel like the construction people were going to have to leave a bioassay. And my question to you, because something you said kind of struck me a little bit, that you believe this is why we see this difference. Do we have anything positively telling us this is what the difference is? Do we have any documentation of it?

DR. TAULBEE: No, we don't. We did an evaluation of workers on the job plans and looking at, you know, the same job plan had four

workers on there, and so, you know, we looked at each individual person.

And we did find, and this is in our report, that -- I'm looking for where that particular -- but we did find that, of the people who did not have bioassay, one of their coworkers did.

So, Mike, can you help me out, what page was that on?

MR. MAHATHY: I don't have --

CO-CHAIR CLAWSON: Because I'm just --

DR. TAULBEE: Yeah, we don't have that, Brad.

CO-CHAIR CLAWSON: I'm just, you know, I know that you've made it very clear to me in some points and I am surmising something that, you know, we need to have something to kind of document that, what you're feeling on that somehow.

I understand what you're saying, and that's a fine example, but you can also take the

other example where people that weren't wearing respiratory that should have been and so forth like that.

I just, if we could come up with something, it would be very good to be able to put that in there, but I appreciate what you've done on that. Is there any questions for Tim from any of the Board Members?

DR. TAULBEE: Before we get to questions, Brad, I want to note in Section 6 we speak exactly to what you just talked about, people who were not wearing respiratory protection and should have been. And if you look at Section 6 we've got a whole listing of incidents that we found.

CO-CHAIR CLAWSON: Tim, this is Brad. I'm sorry, you were cutting out on that. What section was that?

DR. TAULBEE: Section 6 of our report.

CO-CHAIR CLAWSON: Okay.

DR. TAULBEE: And to give an example that I can read here is that in February of 1980,

a subcontractor CTW working on a multi-week project to dismantle equipment in B-147 was found to be working with high airborne alpha radioactivity without a respirator by health physics, which was monitoring for work intermittently. Results of fecal, urine, and in vivo bioassay indicated the worker received an intake of less than 10 percent of the maximum permissible body burden.

So here's an individual that was working in an area, was not supposed to be working in the area without a respirator, and was found and they did follow-up bioassay. His data would be included in the coworker data set and it would not be excluded, and this is what comprises that upper 95th percentile that we would be assigning to all coworker models.

And again, we've got one, two, three, four, five, six examples -- I'm sorry, five examples here of construction trades workers that got contaminated and talking about the follow-up of them with regards to bioassay.

So, clearly, accidents and incidents happened. I'm not saying it's foolproof, by no means, but these results would end up in the coworker model and typically comprised these incidents are the highest results, that's what we would end up assigning into the coworker model for an unmonitored worker. Does that help?

CO-CHAIR CLAWSON: I appreciate that. Are you done or are there questions ---

CO-CHAIR MELIUS: This is Jim Melius. I have a question for both Tim and Joe. I'm just trying to make sure I understand the two reports.

Tim, you covered an earlier time period that has very little overlap with Joe's. I mean, you're up to '86.

DR. TAULBEE: That's correct.

CO-CHAIR MELIUS: And I think Joe said that most of his data was from '87 and on, from Westinghouse.

MR. FITZGERALD: That's pretty much correct. We did get some RWPs that were in the early '80s -- one for '82, for example -- but as

far as the entries, number of actual subcontractor CTWs, predominantly '88 and beyond.

CO-CHAIR MELIUS: Yeah. And just to make sure I understand, I guess this is a question is for Tim, why was your data only up to '86?

DR. TAULBEE: That was the set of job plans that we have that we felt were comprehensive for that area such that we can grab a random sample.

CO-CHAIR MELIUS: So there weren't job plans after '86 or --

DR. TAULBEE: No, there were. Well, in going through what Joe did in trying to find them, they weren't readily available.

CO-CHAIR MELIUS: Okay.

DR. TAULBEE: These were readily available in November -- of not November, but June of 2016 when we captured them.

CO-CHAIR MELIUS: Right. Okay.

DR. TAULBEE: So basically we found a whole set of job plans intermixed with radiation survey log sheets, is how these were identified.

So, you know, from that standpoint, they weren't really labeled in the EDWS system easily. And that is one of the things, you know, Joe's task was very hard because the job plans, RWPs are filed with radiation survey log sheets, you could be looking through hundreds of boxes for, you know, one folder of RWPs type of scenario.

So it's not something that can easily be retrieved based upon the EDWS system. It would take significant effort to go through and pull the RSL box for all of those areas and those time periods and look. And that's very tedious.

CO-CHAIR MELIUS: And then again, there are '87, '86/'87 is sort of when Westinghouse came in?

DR. TAULBEE: Westinghouse came in in 1989.

CO-CHAIR MELIUS: '89, okay. And so then -- and I think to understand what Joe said, was there were more use of subcontractors then, mainly due to, you know, differences of procedures as much as difference in the type of

work that was being done, is that --

MR. FITZGERALD: Yeah, I think it's fair to say that the DuPont system versus the Westinghouse system was pretty different. I mean, I think DuPont did make use of in-house contractors, and chosen subcontractors were much more unified and much more controlled from a contractual standpoint, whereas Westinghouse -- and this is not just Westinghouse, this is across DOE -- went to a system where more use of outside subs came into being, more outsourcing of work.

This also coincided with the K Reactor restart. There was a lot of work being done then on restart, '90, '91, '92, that kind of thing. And so there was a number of things that were happening that led to both the influx of outside contractors, but also because Westinghouse brought in its own approach which was more formal and disciplined in terms of procedures and RWPs. You know, it was an expansion certainly of all that. So there were a couple of things happening at the same time.

CO-CHAIR MELIUS: Okay.

MEMBER BEACH: Brad, this is Josie, can I ask a question of Tim?

CO-CHAIR CLAWSON: Yeah. After talking I muted. Brad.

MEMBER BEACH: There's been some discussion on the criteria for the sample rates, Tim. Seventy five percent was what I think I've heard in some of your presentation. But in this one you kind of said maybe 60 percent, I think you said 75, 70, 60 would be okay. And I just wanted to know if you could expand on that and what your thought is there.

DR. TAULBEE: My thought on it is that we saw 67 percent of the subcontractors, from our analysis. When you combine in all of the, what I would call DuPont construction, those E&I technicians, which are really electricians, mechanics who did a lot of pipefitting work as well as sheet metal work. Then that number is going to increase quite a bit, such that I feel the combination of the subcontractor population

with what I'm calling DuPont construction trades workers would provide a sufficiently robust worker model such that when we take the 95th percentile of that on a given year, or in combination of a couple of years, that the end result would be bounding for any unmonitored construction trades worker.

Keeping in mind that whenever an incident happened, these construction trades workers were included in the coworker model, that's these follow-up bioassays, and some of them were very high.

One individual, as we pointed out in our report, ended up in the Transuranic Registry for such a high intake. So these are significant events that were monitored. And the thing that you notice through virtually all of the job plans that I hope I can get to this afternoon -- or shortly, it is afternoon now -- is that health physics had a presence at these job plans, and that there was either intermittent coverage or continuous coverage depending upon the risk of

potential for exposure.

And so the workers were checked in the workplace. Subcontractors were checked. And if there was contamination found, then they did follow-ups from that standpoint.

MR. FITZGERALD: Tim, this is Joe. Just to follow on Josie's question. Again, the 773-A review, this has come up in, I think, four discussions in the past, focuses on the high level caves, a very specific operation I think involving transuranics and what have you. Is that subcontractor milieu transferrable, I mean, in terms of site-wide practice, site-wide experience? I guess I would wonder if one could draw a conclusion just based on that one facility.

DR. TAULBEE: I believe it could be but that's just my belief. You know, I don't have data to support that, from that standpoint. I don't have sampling of all of the, you know, job plans in other areas in order to do that.

MR. FITZGERALD: Yeah, the reason that

I raise that, because, you know, other sites, you're dealing with vaults, high level caves, the radium cave at Mound comes to mind.

I mean, these were fairly high exposure potential facilities and locations, so I was wondering if there might be some kind of a possible bias as far as the monitoring regime or the degree of stringency applied. I don't know. I'm just speculating, you know, whether one could actually extrapolate from that one facility for that one time period.

DR. TAULBEE: Well, one other things that you'll see, I think, with the examples that I've got, and in fact I can actually pull some of those up now if you would like, is that it wasn't just inside the caves.

And that's an important point here to make, that it wasn't just inside of those high level caves. It was other areas in the general vicinity. And to give the example here, I just pulled it up here on the screen, this is, example one, is the fan motor where it was millwrights

and electricians, these would be the maintenance mechanics and the electronic instrumentation mechanics. And this is an example of the job plan. And it says installed motor and fan housing on air sampling fan.

So this would be -- this is a DuPont construction trades worker job plan, and it talks about coveralls, two pairs, and a respirator for protective clothing. HP monitoring at the start of the job and intermittent monitoring during the job.

And then if you look at another job plan, very similar, and this would be the next day where they continued on with this particular job. Let's see. And then we got for construction here that is check out fan motors for motor control station of startup in the basement of the area.

So it's not just the high level cave areas. You've got the basement of 773 and some of the labs and corridors. And so, again, this would be a construction trades job. And again,

they're wearing an assault mask and two pairs of coveralls. And these particular individuals that I'm showing up here on the screen, these are all electricians.

So it's the exact -- it's very similar work that is going on. One, they worked on one motor and here they're checking out multiple motor control centers, fan motors.

So, now, I don't actually know the percentage of work that would have been inside of those high level caves versus the outer surrounding areas. The examples that I've got generally are in the surrounding areas, not inside the actual cave themselves, although there is some penetration work that I talk about in these examples with both.

MR. FITZGERALD: Yeah, I guess my question, because of the fact that it's just one facility, even though, as you say, there's some diverse operations at that one facility; if you were to go to the waste management operations, tank farm or whatever, and look at the CTW

bioassay results there, you know, would one expect to see at least 67 or whatever percent one can come up with there? Or, you know, given the questions that we've raised earlier about participation and some of the issues you've mentioned about maybe reluctance to leave samples, whatever, what's the confidence level that, you know, going someplace, say, not a high level cave operation, but going to the tank farm, you would see maybe only 50 percent or even maybe perhaps less in terms of actual bioassay result?

I think that's the only question regarding the scope, the scoping issue, of how could one extrapolate the experience.

DR. TAULBEE: I understand, and I don't have the answer to that. But I could also speculate, just like you did, a 50 percent or less of 85 percent or more.

MR. FITZGERALD: Yeah, I mean, it's an unknown. I guess that's the question when you don't have a lot of data points, it's sort of an unknown.

And the other thing I'd like to mention is, you know, I think it's clear DuPont had a pretty centralized management system, as you point out. You can, you know, treat the in-house CTWs and add the subcontractor CTWs because the management, DuPont management was pretty well known as a fairly strong centralized management system.

That obviously changes in '89. And I was wondering if -- I think it sounds like your approach of conclusions sort of focuses on the DuPont era, given the information you have. Would that be something you would take forward past '89?

DR. TAULBEE: No. I guess I really wouldn't, because I really want to see what's coming out of this request that we've got here from the site, you know, from these internal assessments that were done. You know, looking at the 3200 bioassay samples from 1995, did they look at, you know, this larger fraction of the whole site and did they see differences in

amongst areas, was there one area more compliant than others? I don't know the answers to any of that at this time.

MR. FITZGERALD: Yeah. But clearly I think what you're saying is that you can speak to '81 through '86, I guess.

DR. TAULBEE: That's correct. That is correct, which was the sampling period that we had readily available that we could assess. Yeah.

I will say, from the interviews that we conducted in worker outreach at the beginning of the SEC, one of the clear messages from the construction trades workers that we interviewed at the time indicated that, under DuPont, they said that they actually felt pretty well covered.

Their biggest complaint was their monitoring was based upon OJT, and that the problems with it were they weren't really taught and they didn't do the rad training that they had to do under Westinghouse. And so they were more uncomfortable with that particular aspect of the

radiological control.

But they said that the rad techs at that time who had been around DuPont for years and years, and when they'd go into an area, they would point to this area, stay away from there, don't drill into this wall. You know, as long as you stay over here, you're not going to get contaminated, you know, things aren't going to happen.

And then they indicated that when Westinghouse came in, these old DuPont rad techs that were covering them well went away, they got younger folks in that didn't know the areas as well, and they found that while they had more training of activities at the time, that they were potentially getting into areas and problems, more contamination, more than what they should have been due to that change.

So that's been documented in our interviews that we conducted with workers.

CO-CHAIR MELIUS: This is Jim Melius, I have sort of a follow-up question, trying to

again to understand some of these time periods involved.

But, Tim, for your questions, I guess, about the compliance and evaluations that were done, this sort of covers a time period of '95 to '98, sort of the end of this time period that the SC&A report covered.

But my question is, does it say anything about the previous, '89 to '95, or whatever the cut off is for here? Because to me this would be, again, you know, anecdotally, a time when new contractors coming in and new procedures and new implementation and so forth, and to me would be a more critical period in terms of at least potential for problems.

Now, a lot of that can also obviously depend on other factors like what kind of work was being done and so forth. But I guess, in terms of your follow-up review of the SC&A report, you appear to be focusing only on the later, at least what you've told us, on the later time period.

DR. TAULBEE: That was what we focused on immediately when we read that, but if you desire, after seeing our report up to '86, that we follow up on that other time period, what I suspect is that in the rollout of 5480.11 in '89, and then the Rad Con Manual, is that there was probably some internal assessments that were conducted that we don't know about. But we have not asked that question yet of that site. Maybe Joe has, I haven't.

MR. FITZGERALD: I was going to add that, actually, as I said earlier, the timeframe for what RWPs with multiple entries that we could find falls in that time period, '89 to '95. And again, we came up with roughly the same percentage that Tim came up with for -- and this was not preplanned -- about two-thirds. And that can be improved somewhat if one looks at the RWPs per say and tries to clarify the follow-on bioassay.

But roughly two-thirds seem to be the completion, completeness rate for that time

period for the RWPs that we did look at as well. So, 60 percent, 65 percent, you know, 70 percent. Given the error margin, I think that's what we're talking about, 60 to 70, 75, somewhere around there.

DR. TAULBEE: Of subcontractors.

MR. FITZGERALD: Of subcontractors CTWs, exactly.

MR. BARTON: Tim, this is Bob Barton. I have, well, two questions really. The first, you had mentioned that example of the worker who did not wear respiratory protection but was in a high alpha air concentration, and indicated that while, you know, it was discovered, that sort of, I guess, we'll qualify it as an incident and that person was followed up on, and that person's record would likely be on the high end.

You mentioned one was even on the Transuranic Registry, and that would be included in the upper tails of the coworker model. But isn't it, you know, common practice or a guideline that when you have those known

incidents and documented uptakes, those are actually removed from the coworker distribution, isn't that correct?

DR. TAULBEE: It depends upon the situation. You know, if there's chelation involved, absolutely, because that really messes up to the bioassay requirements. But in general incidents, no. We don't remove them.

Now, we will go through with the time-weighted OPOS that we are doing, where we will kind of back-extrapolate to the date of the incident. But we don't remove them.

The chelation ones, absolutely. Those have to be removed because excretion patterns are all different. You know, the chelating agent really messes with the ICRP models, if you will. So those are the only ones that we actually remove, Bob.

MR. BARTON: The reason I ask, and I know maybe these individuals were chelated too, but when you look at the transuranics, the americium, californium, curium coworker model, it

talks about three individuals that were removed because their bioassay results were a lot larger than the rest of the coworker model.

It doesn't exactly say they were chelated, but I guess we can assume they probably were, that's the reason why ---

DR. TAULBEE: It came out of the comments from SC&A in the past where we had included them. And it was discussed and agreed upon that they really shouldn't be in there, so that was why.

DR. NETON: Bob, this is Jim. I think a number of those coworker models were developed before the weighted OPOS technique came into play. And that technique kind of obviates the need for really scrutinizing a lot of these incidents, because you do get a time-weighted exposure for a less period of time.

And you're absolutely right. The chelating people are taken out and others evaluated on a case by case basis, but the bottom line is we don't know the great lengths to parse

out incident results. Many times it's not even possible. I mean, you have a whole set of bioassays and you don't know the individual sample.

MR. BARTON: Okay, I understand. The other question, I think it's probably in there somewhere, you know, I guess we're talking about completeness, a positive match after the job was completed in some timeframe. I know SC&A did one month and then three months.

Did we sort of parse that out by what the actual bioassay was looking for? Because obviously that's important. If you're in an area where plutonium is the hazard, you want to make sure that you have a plutonium bioassay as opposed to, you know, maybe a tritium bioassay from another area somewhere down the line.

So I guess that's my second question. When we're matching these up and saying, well, this person was monitored internally, it's not as simple as the external component where they were wearing a badge, so they're going to catch all

the external radiation.

I guess when we say we have a positive or a covered match, that it is for the correct contaminant that we should have been looking for based on whatever job they were doing.

MR. FITZGERALD: Yeah, Bob, that was our report. And Ron, you can jump in too, but we explained in there that once we found the RWPs were in a variety of forms, let's put it that way, in terms of specificity and whether they listed at all the nuclides -- and sometimes they did list a primary nuclide -- at that point we just decided it just wasn't really feasible to pin that down in the kind of review we were doing.

It would have required a lot more research and time onsite which we weren't able to have, frankly, in terms of SRS workload. So, at that point, we decided, yes, there would be some leeway provided clearly by just using the 30 and 90 days. But that's an artifact of how we would have to do this review, this sampling review.

It was probably more liberal from that

standpoint because there are credits being given where maybe credit wasn't due. But I don't think -- and Ron jump in, you looked at these numbers as well -- I don't the numbers are that great. It wouldn't sway it that much.

DR. BUCHANAN: This is Ron Buchanan with SC&A. No, Bob, we started to do that at first and we'd seen that that was going to take up too much time. And I don't know that you could really do it because the RWPs did not specify the radionuclide. And if it had been, you know, in the 95 range, we maybe would have pursued it further, but when we were down in the 60s and 70 percent compliance range, whether it was for a particular isotope might have made it change a few percent, but we didn't think it was worth the resources to chase that down.

DR. TAULBEE: This is Tim at NIOSH. We did not parse it down at that level either.

CO-CHAIR CLAWSON: Bob, do you have any more comments or is that it?

MR. BARTON: No, I guess I just wanted

to point that out, that that's one more sort of element of uncertainty when we're talking about numbers or percentages. But I kind of want to make it clear what those percentages really represent and what we can actually infer from them. And that's one complicating factor, again.

And I understand absolutely why it didn't make sense to try to match a specific job to, whether it be fission products, you know, your transuranics, or tritium. I understand why we went the path that we did. I just wanted to pointed out that added uncertainties.

CO-CHAIR CLAWSON: I understand.

DR. TAULBEE: With regards to our analysis, we did not look at tritium. Ours is all the other radionuclides, everything except for tritium.

CO-CHAIR CLAWSON: Tim, when you were talking to Josie just a little while ago, you were throwing out the 75th percentile and 65. Now, that is not cut in stone anywhere; these are just your personal feelings on it, is that

correct?

DR. TAULBEE: That's correct. This is from our discussion last September, Brad, of ---

CO-CHAIR CLAWSON: Right. Well, and I just want to make that because sometimes it comes up, oh, we've already agreed on that, but that is not the case. I don't want to be put in a situation that this is what we said it was.

This is what your feelings are on it, because basically it comes down to the Board to make that determination and also this is why part of the SEC group is here with us too.

I do have one question on the bioassay. And this is for Tim or Joe. Because I'm going back to my other knowledge of what we got into with Hanford up there. How were these bioassays, were these bioassays delivered to people that worked at Savannah River or did they have to stop in and pick them up?

How were they done? Because I'll tell you the reason why. Because at Hanford, they would deliver the bioassay samples to your home.

And if you were outside of the area, out of the Richland or Pasco area, they would not deliver them to you. So a lot of construction trades people out of Portland or Seattle and stuff like that would not get them delivered to them.

So I'm just wondering, because this was kind of an eye-opening thing to me at Hanford on this. So I was just wondering how these were delivered. Does anybody know how this was handled? Did they have to go in and pick them up or any of that?

DR. TAULBEE: I don't know. But this is something that we are wanting to try and follow up as well with doing some interviews with people who are involved in this. Because my understanding is that that was one of the contributing issues with regards to the Notice of Violation, in that where people were to leave samples and whether there was a control associated with that. And it was that part is what actually resulted in the Notice of Violation, that was a contributing cause here.

So we don't know the answer to that -- at least I don't; maybe Jim does -- yet, but that is something we do want to follow up on.

MR. FITZGERALD: Yeah, in my experience, Hanford was, it was a pretty unique situation where they actually brought the, you know, brought the sampling to the workers themselves. That's pretty rare. I don't think I've seen it anywhere else. And I don't think we have the explicit information on this, but I think we can find out through some interviews.

CO-CHAIR CLAWSON: Well, I know that we've got a subject matter expert was on this, so if you could look that up, I would appreciate it.

DR. TAULBEE: Yes, we will.

CO-CHAIR CLAWSON: Okay. That being said, do we want to continue or do we want to break for lunch? I'm good, but I just wanted other people to get a feeling. What's the census of everybody?

CO-CHAIR MELIUS: Brad, since we're changing topic, so to speak, a little bit, about

to go into the coworker model issues, it's probably a good time for a break.

CO-CHAIR CLAWSON: I could sure use a comfort break right now. So would it be all right then, Ted, if we go for an hour? I'm trying to think what your time would be, it'd be 1:30?

MR. KATZ: Yeah. I mean, that's fine here. Let's take a quick survey of our Board Members and see. Does that work for all of you, breaking for an hour? I know we're losing Lockey at 2:00, maybe -- or maybe that was 4 o'clock our time so we're all right.

CO-CHAIR MELIUS: How about a half hour? Is that a problem?

CO-CHAIR CLAWSON: No, I could do that.

DR. NETON: Half hour would be good.

MR. KATZ: Okay, so how about we if we reassemble at 1:00 Eastern Time?

CO-CHAIR MELIUS: Yeah.

CO-CHAIR CLAWSON: That'd be fine.

MR. KATZ: Okay, see you all then.

Lunch

(Whereupon, the above-entitled matter went off the record at 12:27 p.m. and resumed at 1:04 p.m.)

MR. KATZ: Okay, well, why don't we go ahead and get started. And we can catch Gen up if we need to when she joins. So I think I'll turn it back to you, Dr. Melius.

CO-CHAIR MELIUS: You're all caught up in attendance and everything?

MR. KATZ: Yeah. The NIOSH folks and SC&A folks are all online.

CO-CHAIR MELIUS: Okay.

MR. KATZ: And we have most of the Board Members.

CO-CHAIR CLAWSON: Hey, Jim?

CO-CHAIR MELIUS: Yes?

CO-CHAIR CLAWSON: Jim, this is just Brad. Could I just make one comment before we go on to the next phase? Because, you know, we spent a lot of time this morning on this data completeness and stuff, and I just want to make

sure that everybody understands that we ran into a lot of different things in there.

But the bottom question that we have got to come up with is, is this data complete? And that's our main concern, is if we've got enough data to be able to do what we need to be able to do. And, you know, we're checking for completeness, and that's what we're down to the wire on with this.

And I just want people to realize that, because these reports come out and stuff like that, we cover a lot of different stuff. But is it complete? Is it enough to be able to do a coworker bioassay program and stuff?

I just wanted to say that because I know we've covered a lot of different stuff. So, with that being said, I'll turn it back over to you, Jim.

NIOSH SRS Internal Coworker Dosimetry Data Report and SC&A Review

CO-CHAIR MELIUS: Okay, thanks, Brad. So we'll start on the coworker model issues. And

I just want to say Ted and I have talked, and Brad and I talked about this a little bit, but I guess, given the number of reports here, we're not going to attempt to cover everything during this phone call. I just don't think it would be efficient or wise.

So we'll see how far we get for a period of time, and see. And we'll still have to leave time for the petitioner comments and some wrap-up on this. But we are planning on, if the two Work Groups are agreeable, to holding an in-person meeting, at least a full-day meeting to sort of deal with these issues, because I think that's probably a much more efficient way of dealing with these.

I think we can make progress today, particularly on what still needs to be done or what's happening in terms of comments and review and so forth. But I think we'll be planning a full-day meeting, in-person meeting to, I don't want to say to finish things up ,but to at least give a more, you know, try to get through all the

reports that need to be addressed, and particularly the coworker issues.

So, with that, I don't know who's planning on presenting from NIOSH on Item 3?

DR. TAULBEE: I certainly can. This is Tim Taulbee. We have prepared -- SC&A had a number of findings in their report on the coworker models. There was a total of six findings and eight observations.

And we have populated the Board Review System with each of the findings and our responses to them. Actually, not all of them. Findings 3 and 5 we are still working on. So we've got 12 into 14 total. We've got responses out there on the Board Review System.

And what I was going to proposed that we do is SC&A to kind of go through their review and their findings. And then we could address each of the findings individually and walk through those, and hopefully close some of them out. And some of them I think we'll be able to put into abeyance, and trying to work it through

that way.

This is kind of new in using the Board Review System, especially with the SRS Work Group. And I'm not sure how much the SEC Issues Work Group has used it in the past. I know we haven't yet, but with the large number of findings, I think that we really need to have something to track it. And the Board Review System actually works quite well for that.

MR. KATZ: Can I just interject here, Tim? It's great to use the BRS system for exactly that reason. So I think that's standard. The one issue which I try to, as each Work Group picks it up, let folks know is that some Board Members have access, some Board Members do not.

So whenever we do populate the BRS with responses, for example, we also, at the same time in parallel, you can copy stuff out of the BRS if that's where you're putting it originally. But we need to send those out to the Work Group in an email or what have you so that they get that too.

DR. TAULBEE: Okay.

MR. BARTON: And this is Bob. As you were kind of saying there, one of the things I did in sort of prepping for this meeting is I put some slides together. They're nothing new, really just stuff pulled out from our report from the OTIB-81, the Implementation Guide, and also the Board Review System responses that you had provided on those Findings 1, 2, and 4.

So, if it's amenable to the Work Group, as Tim indicated, I can kind of lead us through that discussion of what our review findings and observations were and we can talk about them as we go.

And like I said, I do have some slides. It's not an official presentation, but again I'm just sort of pulling out discussion points from our reports to kind of -- well, to keep me focused anyway, but hopefully it's helpful for everybody else.

So, as a suggestion, if that's amenable, I can put those up on Skype and go from

there.

CO-CHAIR MELIUS: Okay, let's get going then.

MR. BARTON: Alright. Let me just quick put my PowerPoints up here. Okay, can everybody, the people who do have Skype, can they see? This should be the title slide.

MR. KATZ: Yeah, it shows.

NIOSH SRS Internal Coworker Dosimetry Data Report and SC&A Review

MR. BARTON: Okay, great. Alright, so we're talking about, for those of you who don't have Skype, we were talking about the review of OTIB-81, which is the internal coworker dosimetry data for the Savannah River Site in its Revision 3.

Both that report and SC&A's review are up on the website. And I'll try to refer directly to page numbers as we go along so that people on the phone can also see what we're looking at.

I guess as sort of a preamble, I note that other coworker models have been developed

that use the time-weighted, one person one sample method. But I believe this is the first, I think you could call it a test drive of the draft coworker implementation criteria, which I think the most recent revision is, I believe, Rev 4 which is dated in 2015.

It was sort of approved on a trial basis to see how that criteria could really be addressed when developing a coworker model. So our review of OTIB-81 really focused on how that document and the discussion contained therein met the criteria as laid out in what we kind of call the Implementation Guide.

So that guidance is really split into four main criteria. You have the data adequacy, completeness, you have characterization of the monitoring program, and you have stratification. And that's really how we structured our report, so that's how I'm sort of going to be presenting it here. It'll jump around a little bit, but for the most part it just goes in order of those four main criteria.

As a quick refresher, when we talk about adequacy we're talking about did the actual measurements we have, the data that forms the basis of the model, whether that be bioassay or in vivo measurements, did it effectively measure the contaminant of interest?

And to follow under that is, do any adjustments to the numbers that we have have to be made, for various reasons, which will vary depending on what type of measurement we're talking about and what contaminant, et cetera.

Completeness we're really talking about -- usually we're talking about the temporal spread of the data; does that actually represent the operations and exposure potential at a site?

For example, if you saw a gap for a number of years, that could be because data is missing or because that particular project was shut down and that is reflected in the exposure records. Besides temporal concerns with completeness, you also have were critical job categories or areas missing from the data we have

in hand?

As a follow-on to that you have characterization of the monitoring program, whereas when we talk about completeness we're really just talking about what data we have in our hands. The characterization really looks at the monitoring program as a whole to see were they actually monitoring the correct people, locations, was that program effective as planned, et cetera.

And then the last criteria is stratification, which is simply is there the need to parse coworker intake analysis by a particular job type or area based on exposure potential?

So, our review, we had six findings and eight observations, as Tim pointed out. And the BRS contains responses to Findings 1, 2, and 4. At least the last time I checked it yesterday that's what was up there.

So we'll move on from there. And, again, I'm going to go in order of these categories of adequacy, completeness, review of

the monitoring program, and then stratification.

Okay. Does everybody see a different slide now? It should say "Adequacy: findings and observations."

DR. TAULBEE: Yes, we see it.

MR. BARTON: Okay, great. Alright, so Observation 1 really related to variation in the sample results that we saw. And this issue goes back, and there were a number of discussions at previous meetings.

Essentially, what you have here is the americium, curium, and californium bioassay data. It's urinalysis data. And what they did is they would take a sample of voiding and break it out into several disks or aliquots. And then they would measure each disk and then the site would average the results. And they would either report that result, or if it was less than the reporting level or MDA they would report that.

And what we noticed is that there were very large variations in the measurements of the same voiding among different aliquots of

essentially the same samples. And these were even at levels that were far above the MDA.

OTIB-81 had concluded that these observed variations is due to the effective chelation treatment, which causes a heterogeneity among portions of the same voiding. And that was something that I hadn't heard of, but that's nothing new.

But that forms the basis of Observation 1. What we're really requesting is clarification or documentation that, you know, when you have that single voiding -- we're not talking about different urine samples, we're talking about different portions of the same urine sample -- you would have a significant variation again among the same voiding.

So we're asking for maybe a little bit more discussion or some references to sort of back that up. Because, again, it's something that I certainly was not aware of. But, you know, if that can be backed up, then that certainly would explain some of the variations that we did

see. And that's for -- again, this is for the trivalents. And also thorium because those bioassay data are used for, at least in part of the current thorium coworker methodology.

DR. TAULBEE: Can I interrupt here to ask you how you -- or how the Work Group wants to handle this. Because we have a response for this one and we could discuss that now, or we could move on to the next one. And I guess I'm just asking for what process do you guys want to use?

CO-CHAIR MELIUS: If you want to respond, let's do the response now.

DR. TAULBEE: Okay.

CO-CHAIR MELIUS: I think it would be easier. Good idea.

DR. TAULBEE: Okay. Our response is that -- the hypothesis that the heterogeneity occurs as a biochemical process, not analytical chemistry process. And it is just simply a hypothesis.

These data are not used because they are not representing the normal worker's exposure

and cannot be used to calculate an intake, the chelation. The heterogeneity observed in some of these samples is, in our opinion, really not relevant.

So we would like to propose just closing this. These chelation data are not used in our coworker model.

MR. BARTON: Well, I guess my immediate thought on that is the point of the original finding way back in, I believe, 2013 was it called into question if the sampling techniques are really all that accurate for measuring the contaminants that we want.

Now, if the variation that we're seeing is solely because of chelation, then I think you're right, those are going to be taken out anyway. But if it's not and it's some other, you know, mechanism at work, then, to my mind, that would still keep the issue open because it does call into question the effectiveness of the measurement technique.

DR. TAULBEE: Well, from the 2013

finding, you know, that was our big -- in that we removed those chelation data points, and we also switched to a time-weighted OPOS. Both of those took place in this latest model from the initial finding.

Now, do you still see the variation in there? I don't believe that we do. But as I've gone through and looked at all of the observations that Joyce had pointed out before, I believe -- Matt Arno, please tell me if I'm wrong here, but it was all dominated by the chelation. Isn't that correct?

MR. ARNO: Yes, the vast majority.

DR. TAULBEE: Okay.

MR. BARTON: Well, I think part of the reason for that is those examples stood out to us just because they were so far above the detection limit. So you wouldn't have a lot of noise in any sort of measurement that might explain such variations.

Again, it doesn't sound like all of them were chelated. So, again, I think we need

to have an actual, you know, reference to back up the assertion that that variation we're seeing is simply due to chelation effects.

I mean, just thinking about it myself, I mean, you're talking about a single voiding, the act of which I would think would help to homogenize the sample anyway.

So I'm not sure this closes the issue simply because of the chelated samples are out of there unless we can firmly establish that that variation that we saw was because of chelation.

DR. TAULBEE: Let me put this in. Why don't we go back to the 2013 evaluation and look at which ones are still in the data set, and then look and see whether there is a variation.

(Simultaneous speaking.)

MR. ARNO: Can you hear me all right?

DR. TAULBEE: Yes, we can hear you.

MR. ARNO: Oh, good. Okay.

DR. TAULBEE: So, you know, whether you want us to go through and figure out which ones we've excluded due to chelation, or if you

want to go through Joyce's initial list and figure out which ones are still in it, I don't care. Whichever way, it doesn't matter.

MR. BARTON: Well, again, I'm not sure that the point is whether those samples with the observed variation are removed or not. I think the question is whether the technique is sound. I mean, if we take out the chelation the issue is -- simply removing the sample doesn't really answer the question of what the mechanism is behind the variation that was observed.

DR. TAULBEE: Well, okay. If we look at -- if there are any remaining, then what is your basis that there is an issue?

MR. BARTON: Well, you're measuring different portions of the same sample and still getting significantly different results that aren't the result of chelation. Or if we can't find any reference to this phenomenon, then I would say there's still questions about how effective the measurement technique is.

DR. TAULBEE: Okay. I'm trying to

figure out, how do we test it? What would satisfy SC&A here? What do you propose that we do to demonstrate that the analytical chemistry process was reasonable here? The observations that you saw of the large variation, and we are saying that the vast majority of them are a result of chelation.

So we take those out. Do you want us to look at the other ones, the ones that remain? Which I think there's just a handful. You're not going to get any major statistical power out of it, but we can do that.

MR. BARTON: I think that would certainly be helpful. Really, what we were looking for was any sort of research that was done to support the hypothesis that it is the chelation that's causing that.

I mean, yeah, a lot of the samples that we gave for examples were chelated because they were just so high and above the MDA. So that's really why those were the examples we pointed to.

The fact that a lot of them turned out to be chelated samples may explain it or it may not, but I'm not sure that we can simply say, well, it's probably because they were chelation samples and the chelating agent causes heterogeneity -- that's a mouthful -- in the same voiding.

We're not talking about one sample that was in the morning and then one sample that was a few hours later, and then one sample that was the next day. This is a single voiding.

MEMBER ZIEMER: Do we know if the chelating agent is excreted, I assume that, in those urine samples or would affect the chemistry of how they're prepared?

DR. TAULBEE: That I don't know, whether it would or wouldn't.

MR. ARNO: This is Matt Arno. I think the point is that there's little value obtained from evaluating what's going on with chelated samples. We don't use them because they're chelated, because you can't, the models aren't

valid anymore.

The only applicable question is, what variation is there in samples that are actually usable? So I would say we would need to exclude chelated samples from any review we do to see if they're still an issue simply on those grounds. Why would we look at a variability in samples in non-usable data?

MR. BARTON: I can agree with that. But, again, that's sort of assuming that the effect we're seeing is from chelation.

MR. ARNO: Actually it's not making that assumption at all at that point. It's just simply excluding irrelevant data and focusing on what is going on with the actual usable data. Maybe there's an effect, maybe it's not, but why would we look at that data if it's not usable?

MR. STIVER: Bob, this is John. I would say that I agree that that's probably a good way to approach this, look at the data that's still being used. If you still see there are a lot of variations on aliquots from the same

voiding, then the problem still exists. But I kind of agree that you certainly need to look at the data that actually are going to be going into the model.

MR. BARTON: That's certainly acceptable to me. Again, I was pointing out that -- Tim kind of threw it out there that the reason is because they were chelated samples. It sounds like that was a hypothesis.

(Simultaneous speaking.)

MR. STIVER: If you take out the chelated samples and still see the problem, then you can't use the chelation as the explanation.

MR. BARTON: Right, right. I agree with that.

DR. TAULBEE: Okay, I've taken the action item here that we will remove the chelation samples and evaluate what variation -- well, we'll look at the situation where we remove the chelated samples and evaluate if any are remaining, the variation amongst them, and report back. Is that acceptable?

MR. BARTON: Certainly is to me.

MR. KATZ: That sounds like a go, Tim.

DR. TAULBEE: Okay.

MR. BARTON: Okay, moving on to observation two, this was strictly for tritium. We noticed that 1958 doses showed a marked increase. And 1958 is significant because that was the year where the site changed from -- or changed to liquid scintillation counting, whereas before they were using ion chambers.

So we're really wondering what is the cause of the increase in tritium doses. Is it actually related to site activities, is it related directly to the measurement technique?

It seems like something, when you had such a marked change in 1958, you know, what's causing that and what effect might that have on any derived coworker doses?

DR. TAULBEE: Okay, this is Tim again. Can I, I guess, interrupt your presentation and put up a graph that we're talking about here, with regards to this one?

MR. BARTON: Sure.

DR. TAULBEE: Okay. This is the Board Review System. Can people see that?

MR. BARTON: Yes, I can see it.

DR. TAULBEE: Okay. And so we'll click down here in our response. Basically in our opinion there's no substantial increase in the derived worker doses beginning in 1958.

Both non-construction trades and construction trades workers data indicate an annual increase in dose each year from 1954 to 1964, followed by a gradual decline from '64 to the early 1980s, with a substantial drop in 1986 when the bioassay method changed again.

The CTW dose increases more from 1956 to '57 than it does from '57 to '58. We don't really see a step change associated with the change in bioassay methods. Therefore there's no reason to think that the method prior to '58 was insufficient. The data appear to be more indicative of a gradual increase in contamination levels and thus uptakes during the period than

anything associated with the bioassay method.

And I'm going to click here on the graph, and hopefully you all can see this. But the annual tritium doses. I'm not seeing a big step increase from '57 to '58 there in this particular graph.

MR. BARTON: So any increases are essentially -- I mean, it's a site ramp-up in activity or in exposure potential. And so there's really no difference in the MDA between liquid scintillation and ion chamber counting?

Again, this is an observation because we thought we had seen a difference, and so we noted it as an observation. And based on that, it sounds like there was maybe a ramp-up in site activity but not, nothing to do with the actual measurement technique.

DR. TAULBEE: There was a big ramp-up of activity as they began to really run all the reactors hard. And so you're going to have the heavy water, you're going to have a lot more tritium being produced. And so more, greater

exposure potential, yeah.

MR. BARTON: Okay. Again, it's one of those things that, when you look at it, you know, you want to ask questions about the measurement technique changing. And that seems like a reasonable explanation.

So during that period in the late '50s, early '60s it was basically because of the site, as you just said, the reactors were really ramping up and so you're just going to have a lot more of it around. And so your annual doses are going to go up.

DR. TAULBEE: That's correct.

MR. BARTON: Okay. I don't know if anyone has any --

DR. TAULBEE: So is this particular issue or observation closed?

MR. BARTON: I'm fine with closing it, yeah.

DR. TAULBEE: Dr. Melius? I think you're on mute, Dr. Melius.

CO-CHAIR MELIUS: I'm sorry. I'm fine

with it.

MR. BARTON: I guess I'd just ask Ron Buchanan, if you're on the line, I know you had looked into some of the tritium stuff. Did you have any other comments on this? Or else we can move on.

DR. BUCHANAN: No, I'm fine with that explanation.

DR. TAULBEE: Okay, then I will close this item. Alright, I'll stop presenting here and kick it back to you, Bob.

MR. BARTON: Okay. I'll just take this over again. Okay, let's see here. Put this in full screen. Okay. I believe we are back. Let me move on to the next slide.

Okay, now, these weren't actually any observations or findings, they're just something we discuss in the report. And so what we just note here is that results below the reporting level for tritium were found in the 1980s. And NIOSH had concluded in the report that that's likely indicative of the true MDA and that what

we were seeing before was really the reporting level.

And we just point out that, you know, if we could document that this was the site practice at the time, and a discussion of what the true MDAs were for tritium, it would be beneficial to the document. And, again, that's not really a finding or an observation, but we wanted to point it out.

And also the TIB references the 1990 Technical Basis Document, which describes quality control and assurance activities. But, again, that's in 1999. So it would be, again, beneficial if we could find earlier references which describe that QA/QC procedure, if those are available at the site or if those have been captured or if they're even available to capture.

So, again, that's just a note. That's one of the things that the implementation criteria talked about is documenting those QA/QC procedures that were used for the bioassay program.

And there's discussion of it for tritium, but again it references a 1990 Technical Basis Document. So it would be beneficial to find earlier references, if that's at all possible. I don't know if NIOSH wants to comment on that. Again, it's not a finding or an observation. Again, just a suggestion, I guess.

DR. TAULBEE: If we find them, we will include them and take your suggestion. But I don't know that we're going to be digging hard to try and find them.

MR. BARTON: No, I understand. It's certainly a lower priority. And again, that's not a finding or an observation, but we wanted to note it since we do discuss it in our report. And it is sort of part of the coworker Implementation Guide.

So we can move on. That really took care of -- we only had two observations about data adequacy issues. So the next section deals with completeness. And I want to change slides here.

NIOSH Report on Assessing Exposure to Thorium 232 from 1972-1989

Okay. Observation 3, and this is related to the trivalents and thorium. We couldn't figure out, based on the report, what was going to happen post-1989 as far as unmonitored intake assignments. At the time I was kind of preparing this, we hadn't had a response. I don't know if NIOSH has a response.

I would note that, at least for thorium, their method has changed a little bit. But, again, it's the method described Report-70, which came out fairly recently, where urinalysis data can be used from '73 to '80 and then a fraction of the derived air concentration from '81 to '89. But I don't believe it describes anything after 1989.

So that's Observation 3. I don't know if NIOSH has a response on that one.

DR. TAULBEE: Yes, we do. And this is basically the coworker intake rates after 1988 -- or after 1989, will be evaluated at a later

date. I guess that would be Rev 5, if you will.

And the reason for this is we're switching kind of databases at this time period, from we'll most likely be using the HPRED data that Joe definitely got to see a part of when he was doing his subcontractor review.

And then we have not used that in OTIB-81, even for Rev 4 yet. Rev 2 did use the data from 1991 on forward time period, and it showed a reduction in the calculated intake rates for all radionuclides.

Although some of the methodologies used in the coworker study have changed, we're not anticipating that any of these changes will result in a significant change in the relative magnitudes of the intake. This is calculated with HPRED from data sources we're using for 1990 and earlier.

The issue of why we cut it in 1989 for Rev 4 right now has to do with being able to identify construction trades workers. Under the DuPont era, it's really easy for us to identify

a construction trades worker. We have complete worker histories, and the external dosimetry delineates subcontractor construction trades from construction -- I'm sorry, from DuPont construction trades workers.

What we have to use for this latter time period, which is what's causing the delay, is -- and Joe saw some of this database as well, where, if you recall, we could go and look up some people's name and they could identify who their contractor -- which contract they worked for, whether they worked for Westinghouse or whether they worked for Bechtel, who was the prime construction trades worker contractor at that time period.

We haven't done that yet, we're trying to get Rev 4 out the door right now. But that is kind of our next step. So that is why we didn't address post-1989. And so what I would like to recommend to the Work Group is that we put this in abeyance until we get Rev 4 out the door. And then we will be issuing a Rev 5 that has just the

1990 or '89 -- yeah, it would be the 1990 through 1994 time period.

So is it okay if we put this one in abeyance for now?

MR. KATZ: Just to be technical, Tim, you wouldn't put it in abeyance, because it's not been done yet, but you'd just put it in progress.

DR. TAULBEE: Oh, okay. I thought abeyance meant --

MR. KATZ: Abeyance means that everybody agrees that everything's good and they just want to see the final paperwork, basically.

DR. TAULBEE: Say again, Ted. I'm sorry.

MR. KATZ: So when you put them in abeyance it's because the Work Group has decided it's all good, they just want to see it written up.

DR. TAULBEE: Oh, okay. Got it.

MR. KATZ: That's what abeyance means, the issue's resolved and they just want to see it written up.

DR. TAULBEE: Okay. I'll put this in progress. And when we get Rev 4, or Rev 5 out, then the Work Group will have the opportunity to review the '90 to '94 time period.

MR. BARTON: Okay. Moving on to Finding 1. And this was, when we looked at a comparison of the reported samples, to what, basically what I call it is the samples you have in hand. So, basically we have the data that's going to form the basis of the coworker model. And to see to what extent it's complete it was compared against health physics reports essentially saying how many samples we should have.

And we noticed that the analysis in OTIB-81 had ended in 1981 as far as comparing the two. But, obviously, the proposed coworker model extends through 1989. And so we were asking, well, we should probably look at the completeness for those later years, especially because one of the things we have seen is that the number of samples we had in hand was less than what was

being reported in that latter period.

So Finding 1, 2, and Observation 4 are really all sort of interrelated and all sort of relate back to a response in the BRS. So if it's okay, I would like to move on to Finding 2 and Observation 4. And then on to NIOSH's response to those items, if that's okay, since the response really relates to all three of them.

DR. TAULBEE: Okay. I'll try and keep my responses tied to each of the findings and observations. Go ahead.

MR. BARTON: One of the things, when we noticed those later years that you had less data in hand than what was reported, in OTIB-81 it had said that that was likely due to the inclusion of fecal sampling in the Works Technical Report totals.

So even though you have -- assuming we have less data, if you added in the fecal samples they should more closely match. We didn't think that was really credible for, you know -- and you'll see why in a moment.

And then Observation 4, this is just dealing with the earlier period where actually you have a lot more data in hand than what was reported in the Works Technical. And even though that's obviously a lot better, you always want more, more data than what was reported, we just wondered why that was the case. And that's why we made that observation.

One possibility that we talk about in our report is that perhaps they weren't putting construction trade workers in those totals. That was based on a single example, we can't say that that's actually the reason.

But, again, it's an observation because we actually have more data, just on the basis of the coworker models and what they have in those Works Technical Reports. And so we're going to move to NIOSH response here for Findings 1 and 2.

Okay, and here's the chart sort of showing the red line is the number of reports that were listed in the Works Technical versus

the amount that we have in hand. And you can see, you know, sort of later years, you've got some years where it's significantly less and then the earlier years you generally have more.

And then the next slide, this one is sort of dealing with the notion that the fecal samples were included in the totals, but then here's a table that shows that they were actually broken out separately.

So again, that's why -- and it talks about the fecal sampling being the reason why we see a discrepancy where the Works Technical Report has one value that's significantly higher than what we have in hand, but that turns out to not be the case. And Tim will talk about it.

And what you have in front of you is the entry, at least as of yesterday, on the response to Findings 1 and 2. So everybody can see that. Tim, I'll let you take it from here.

DR. TAULBEE: Okay. Yeah, as you see here on the slide here, we agree it would be beneficial to extend the completeness analysis.

Bioassays we've received that cover most of the 1980 and provide similar information are available. And we've updated Table 4-1 and we've got it reproduced. Did you provide that table on your next slide?

MR. BARTON: Yes, I did.

DR. TAULBEE: Okay. You can see, if you go to that particular one, and you can see we've got, you know, typically in the '90s --

(Telephonic interference.)

DR. TAULBEE: Generally we have more bioassay folks than what the Works Technical reported. So we have extended this through 1987 here, as you can see in the revised Table 4-1.

MR. BARTON: Right. And everyone, remember, the original concerns was more, A, we didn't see the data past 1981. Now that has been provided. And also those numbers between 1969 and 1981 certainly improve when even the unusable samples were included in the totals, which is obviously the more correct comparison.

When you say unusable, those unusable,

they would have been included in the Works Technical total. We're not talking about unusable as in, like, a not submitted sample or something like that.

DR. TAULBEE: No. In the Works Technical Report they're more reporting what the bioassay lab saw. And so if the sample volume was too low, that would be unusable. And some samples are lost in processing and you do a follow-up. So, you know, that occurs as well. And so you see that within the logbooks. You'll see routine monitoring, special monitoring, follow-ups, that kind of thing as a designation.

And, you know, what all went into the actual Works Technical Report value, we're really speculating from that standpoint. The logbook for americium, that was that data that we were using. And those, you can see, it generally over-reports what was found in those summary tables.

I would also like to point out that in some cases, the number of samples for americium are really limited to bioassays. They don't

correspond well on a month-by-month basis either. It depends upon, I guess, when they considered samples -- or when it was actually analyzed. And so we do see some variation from that standpoint. Sometimes those samples were held for a quarter or so. And so you'll see that in there as well. Definitely month-to-month and year-to-year.

But we feel that this matches pretty good, you know, from what we're seeing here in that post-'81 time period. That one year, '82 where there's less in the logbooks than what they're sampling.

MR. BARTON: Given the history of --

(Telephonic interference.)

CO-CHAIR CLAWSON: Somebody here needs to put their phone on mute.

MR. KATZ: Right, right. Bob, are you still there?

MR. BARTON: Yes, I'm here.

(Telephonic interference.)

MR. BARTON: Is it safe?

MR. KATZ: I don't know if it's safe.

(Simultaneous speaking)

(Telephonic interference.)

MR. KATZ: We'll give it another shot, Bob.

MR. BARTON: Okay.

(Telephonic interference.)

MS. ADAMS: Ted, it's Nancy. I --

MR. KATZ: Nancy, I can't call Zaida without getting off this line. Will you just please call her and get her to cut the line?

MS. ADAMS: Yeah, I dialed zero but nobody picked up. But I will do that.

MR. BARTON: Okay, tentatively, I'll continue the discussion here --

(Telephonic interference.)

MEMBER ROESSLER: Hi, this is Gen. Is anybody on the line?

MR. KATZ: I'm on the line. I sent Zaida an email, too, so one way or another, hopefully she'll -- if she hasn't cut that line she'll be cutting it.

MEMBER ROESSLER: Okay. I missed roll

call earlier, I think.

MR. KATZ: No, yeah, glad you could join us.

MEMBER ROESSLER: I didn't want to butt in on things before, but now I'm back on.

MR. KATZ: Okay, good. Yeah, and we have Paul back on, too. Or we had him on. Okay, Bob, you want to give it another shot?

MR. BARTON: Okay. So, again, the concerns were, one, that the comparison and completeness between the Works Technical and totals that we had in hand only went to 1981. That's been expanded to 1987.

And also the counting of only -- the inclusion of the samples that wouldn't actually go into the coworker model but would have been included in the Works Technical certainly improve the percentages that we see here in front.

I guess the only question and/or comment I would have left is, based on the operational history of the site, do we have any reason to believe, or any reason why in, for

example, the 1980 and 1969 were down in the 70s where other years were either above 100 or in the 90s, or really above 100 or in the 90s it looks like.

(Telephonic interference.)

MR. KATZ: Okay. I think they cut that line. Bob, are you still there?

MR. BARTON: Yes, I'm still here.

MR. KATZ: Okay. It sounds like they just cut the line. I got an email from Zaida that they were working on it.

MR. BARTON: Alright.

CO-CHAIR CLAWSON: Come on, Bob. You can do it, Bob, this time.

MR. BARTON: I'll just talk really loudly. My question, remaining question was, for the three years there where the totals are more into the 70s -- 70 percent, not the 1970s -- 1969 at 77 percent, '80 is 70 percent, and '82 is 74 percent. Do we know anything specific about those years as far as operationally and the exposure potential to the trivalents that would

give us pause?

And/or is that information available that we could say, well, you know, it looks like maybe we don't have as many samples in hand as what's reported, but there's no reason to think that the potentially missing samples would unduly affect any sort of derived coworker values.

DR. TAULBEE: This is Tim. The only thing -- and I'm going to kick this to Matt Arno in just a second here for his opinion on it. The only thing that I know of from an analysis standpoint would be the 1969 type of era where they began to change their bioassay technique with regards to how they did some of the separations. But that's the only thing that I know of, and that happened in the '69 to '70 type of timeframe.

But the other years, no, I'm not aware of any other operational type of changes that would affect that. Matt, are you aware of anything?

MR. ARNO: No, I'm not.

DR. TAULBEE: Okay.

MR. BARTON: I'll take myself off mute there. Obviously the question of what is an adequate percentage to have is sort of a matter of professional judgement.

Like I said, most years it looks really good in that we have, for most of the years, we have more samples than what was being reported, and it's just those sort of three outlier years where you're down in the 70 percent.

You know, there's really no reason to think that those years were any different than the other ones. There's no reason to think that missing data points would change, effectively, what your time-weighted OPOS values end up being for that timeframe.

I'm not sure what else there is to do except ask the Work Group what their opinion is as far as the percentages we're seeing right now and whether that's sufficient to close those two findings.

And really Observation 4 is just noting that we saw, like there was a number of years prior to 1969, we have a lot more samples than were being reported. You see in 1963 there's 173 percent; 1968, 160 percent.

MR. ARNO: There's only 19 samples in 1963. I don't think you can say much about a percentage on such a small number of samples. But one thing to keep in mind with these percentages is that, more than a particular percentage, the real key thing to think about is, is there enough data to do a statistical analysis for your cohort or your strata?

If you have enough data to do that analysis, even if perhaps the percentage is not as high, you should still consider that you have enough data to do a coworker study.

MR. KATZ: Whoever was just speaking, can you just please identify yourself for the court reporter?

MR. ARNO: Matt Arno.

MR. KATZ: Thanks, Matt. I thought

so, I just wanted to be sure.

MR. BARTON: I understand that point of view. But when we're talking about completeness, we're talking about do we have all the data in hand, or do we have sufficient data in hand? And that's not just so we can meet statistical requirements such as, you know, the recommended 30 OPOS results in a year or what not.

I mean, if there's a significant portion missing, you have to ask yourself, what could that be from and how might that effect your end value? So while I agree, you need to be able to have enough data to fit your distributions, I don't think just saying, well, we have enough data to perform a statistical analysis is the same as the data is complete.

MR. ARNO: Well, we've never said that the data has to be complete. It has to be representative.

(Simultaneous speaking)

MR. ARNO: -- would be relevant that

there's a bias in why there's data missing.

DR. NETON: Right. This is Jim. I think that's a good point. Is there a differential bias in those samples that we don't have? Is there some database of incident reports or something that we're missing? And then if we can't, if that doesn't happen, or that doesn't exist, then I think we're okay. But I'd be interested to hear more discussion on that.

MR. BARTON: Well, I think we're sort of at a point -- again, we're only talking about those three years where it sounds like we don't have any information really at all to say what those missing samples might have been.

So there's no reason to think they were all the high one, and then there's no reason -- really we just don't know for those years. And I guess in the end game, if the surrounding years are similar in process and there was nothing special going on during those years to make us worry about the missing records, then that's sort of where we're left and it's really

a professional judgement or sort of a policy decision.

DR. TAULBEE: This is Tim. If you look at the intake model that Matt has developed for these particular radionuclides, you don't see any big drops or increases in those years.

So, you know, from our standpoint, you know, we do the intake modeling, we're combining workflow, we've got individual data points but we're actually doing a modeling of a chronic intake over that time period. So, you know, I don't think that this really has much of an impact on the final coworker model.

MR. BARTON: I agree with that. And that's the only reason I brought it up again is to see if there was anything special happening in those years that would make us think that there might be a problem with completeness there.

And what I'm hearing is that all the values look pretty similar, and we really don't know why they were a little bit lower in those years. But it doesn't -- we have no reason to

think it will actually impact the resulting coworker model.

I mean, I'd like to hear the Work Group's thoughts on that, but I'm not sure what else we can do other than to say we don't have any information to suggest that those years are problematic.

PARTICIPANT: Hello?

MR. BARTON: Hello. Is everybody still with me?

MR. KATZ: Yes.

DR. TAULBEE: I guess I would ask the Work Group, what do you feel --

CO-CHAIR MELIUS: This is Jim Melius.

(Telephonic interference.)

CO-CHAIR MELIUS: There's a foghorn on Ted's boat, you can ignore it. The yacht.

No, I think the question is did we adequately investigate that, and document it?

DR. TAULBEE: Do you think we have here?

CO-CHAIR MELIUS: Well, I'm asking. I

think that was Bob's question, too. And I sort of hear, you know, speculation around the numbers. But it's also, you know, what was happening at the facility in those areas at that particular point in time, or those three years.

Again, it may not be a big deal in terms of the overall, you know, coworker model, but for people working in those years, it makes a difference.

DR. TAULBEE: Well, when we modeled the intake, we actually, for those particular years, we're smoothing over the intake model. So for a block of time we assign a particular intake, daily intake, as pointed out in our coworker model report.

So, people who worked in those years would get the same as the people in the adjacent years, basically. Whatever that intake model predicted.

CO-CHAIR MELIUS: We can come back to that.

MR. BARTON: If I might, maybe one

possible way to sort of put this to bed is to have some sort of an official response about what we see in the data. Where we are right now is we're not seeing a large change in magnitude of bioassay results in those three years.

And off the top of our heads, we don't have any reason to believe that anything was different in those three years. Maybe it would be beneficial to sort of officially put this to bed, to have a discussion of what activities were ongoing, and why there's no reason to think that those years would be problematic. No special campaigns or anything like that, is what I mean.

DR. TAULBEE: Okay, I guess we could do that. That is certainly something we could do. Alright. I will mark this one then in progress as well.

MR. KATZ: Right. Thanks, Tim.

DR. TAULBEE: Okay.

MR. BARTON: Okay. And then obviously we were saying this trivalent, these data were also used for thorium. At least in 1969 this

data would have been used for thorium.

In the 1980s, I just wanted to note that currently NIOSH is not -- I believe a change occurs in 1981, is that correct, Tim, for thorium?

DR. TAULBEE: Actually, these would not be used for thorium, because the site is already an SEC due to thorium through October 1972. So we are not using those values for thorium. If you look at the thorium coworker model, it starts in '72. So '69 doesn't effect it. We only use the coworker model through May of 1980.

MR. BARTON: Okay. I just wanted to note that there was sort of a change in methodology there. Prior to this, intakes were using urinalysis all the way through the '80s. But that method has recently changed. So I just wanted to note that for the Work Group's benefit.

But I think we can move on. Let me go to the next slide here. This is Finding 3, and again we're still talking about the

trivalents. And this was the combination of multiple years of bioassay data for the purpose of coming up with your OPOS result which then gets modeled to an intake.

And I just wanted to read specifically from the Implementation Guide. It says, "if because of data limitations it is necessary to consider time intervals beyond one year in the coworker model, any changes in site practices or operations should be evaluated to ensure that data can be validly combined. In general, group time intervals should not exceed a three-year period unless there is stringent justification to do so."

So, during the 1980s there were a couple years that were grouped together, but they weren't really discussed in the context of, again, what operations were going on that would allow for the combination of data? Simply because we don't have enough statistically is only part of the equation. But when you do combined longer periods like that, there should

be some discussion of what the operations were occurring at the site to say that the combination of those years is technically appropriate.

DR. TAULBEE: This is Tim. Findings 3 and 5 are the two responses that we are currently working on. And we are trying to gather that information that you pointed out there. So we are still working on those two responses for Finding 3 and Finding 5.

MR. BARTON: So for those two we would have those be in progress.

DR. TAULBEE: Actually, Ted, correct me here. There's an open status, what is that for?

MR. KATZ: Well, that's for before it's discussed. So actually it doesn't matter. You can say in progress because you guys are following up on it. It's open generally before the issue's been raised in a Work Groups.

DR. TAULBEE: Okay. I was going to leave it open since we hadn't responded yet.

MR. KATZ: In progress is fine. It's

fine, because you're acting on it.

DR. TAULBEE: Okay, alright.

MR. BARTON: Okay, moving along to the next slide. This is Observation 5. I'll just read it. It is not clear to SC&A why the date of the bioassay sample is not considered a critical field for the purpose of performing QA tests on transcribed datasets for trivalent actinides as well as tritium, because the date of the sample is a crucial component to correctly performing the time-weighted OPOS calculation for the trivalents. And obviously the calculation of the annual tritium dose also depends on what the sample date is.

DR. TAULBEE: Okay. And this is Tim. And if I can pull up my desktop I can share our response to this.

MR. BARTON: Okay, I'll hand it over to you.

DR. TAULBEE: Alright. And basically we want to point out to the Work Group that all fields relevant to calculating the time-weighted

OPOS result are subject to quality assurance, including the bioassay sample date. A qualitative judgement was made regarding the field as to which to subject the one percent criteria to in which to evaluate to a five percent acceptance criteria. So, all of the data have to meet the five percent error acceptance criteria. I mean they've got to be 95 percent accurate.

When evaluating censored data, which is the majority of this particular data, the variability of precise date has less of an impact on the time-weighted OPOS result than the magnitude of the bioassay results.

The date is a single value impacting only part of the time weighting determination of the time-weighted OPOS result, because if a person's got four bioassay samples in a particular year, and, you know, one of the dates is off, it really doesn't have a huge impact on that particular time-weighted OPOS result. It just kind of shifts a little bit within that year.

So, that result is then only, you

know, like I said, only one value in determination of the distribution of results for a given year. That date, then, is just one person within a given year. We have typically 30 or more people within that year that are making up the distribution.

The geometric mean and geometric standard deviation of the distribution are in turn one data point that's used in the calculation of the intake rate where look at over a larger interval.

So this impact of the maximum five percent error -- and typically, if you look at all of our results, the results or the actual error is less than three percent, even with a five percent criteria because we have a confidence interval about it, we don't think that it has a significant impact on the final calculated intake result, because of all of the averaging that's going on. And the critical fields to us were the bioassay value, the individual magnitude of the result.

MR. BARTON: Okay. Obviously, I'm just seeing this today. It's not immediately clear to me that it doesn't have an impact. I mean, if you weight the magnitude of a bioassay sample by one day instead of 60 days, or a week instead of 90 days, I mean, that's going to significantly decrease that value's impact on the time-weighted OPOS.

Or if you had a wrong year in the date, they you have a bioassay sample that's not even being applied to the correct year. So I'm not sure --- like you said, it's a qualitative decision, not necessarily a quantitative one.

DR. TAULBEE: But also keep in mind that it is subjected to acceptance criteria. The error rate in the sample date has to be less than five percent, otherwise we go back and recode part of the data and fix it. And then subject it to -- you know, find out if it's a systematic error. There's a lot of things that we do. So, 95 percent of those dates are absolutely correct.

MR. BARTON: Okay, I understand what

you're saying. I guess my feeling is that, based on how the date factors into weighting the bioassay results, it seemed, at least to me, at least as though -- it seems important, just like the actual bioassay results itself, because it's a multiplier to that bioassay result. Again, I guess it's a qualitative judgement, and I would like to hear others' thoughts on that.

MR. ARNO: This is Matt Arno. One of the points we're making regarding the censored data is that, for most of these individuals, their bioassay consists of a string of less than MDA, or less than reported level results.

And if you have a string of those, and you're off on the date of one of those by a week or three months or however long, it actually has no impact on the time-weighted OPOS calculation being done.

So obviously if it's greater than MDA, it does have more impact. But for a string of less than MDA data, the date really being off by weeks or months doesn't really change it.

MR. BARTON: Now hold on a second because yes, most of the data is below the censoring level, but we're using those data as is. The numerical results that are below the detection limit are being averaged and fed into the coworker model. So it does have an effect.

If we were just going to say that it's less than the MDA and everyone's less than three, then I agree with you, there's no effect. But since we are using the numerical results that are less than the MDA ---

MR. ARNO: What I'm saying is most of that data is censored, you have a string of censored results.

MR. BARTON: And I'm saying that the way, at least I understand the data is being used, you're not actually using the censored result. You're using the actual numerical value reported which is below the censoring level.

MR. ARNO: It's available. It's not always available.

MR. BARTON: Well, for the trivalent

database, and correct me if I'm wrong, that information is available.

MR. ARNO: It's available for a number of years for that data set. But this same process is being used for all the data sets.

MR. BARTON: So, wait. It is relevant for trivalents then, correct?

MR. ARNO: You're still dealing with numbers over a small interval of values. It has an impact, it just doesn't have much impact. We were never making an argument that it has no impact, we're just making the argument it has a very small impact, and therefore not worthy of a higher degree of rigor.

DR. BUCHANAN: This is Ron Buchanan. I would like to make a clarification here and say that the dates can't be off by more than five percent, well, okay the individual date can be off more than five percent. It's just the overall error, typo error cannot be off by over five percent.

But any certain date can be off a year

or ten years. It's not limited to five percent variance in the actual date.

DR. TAULBEE: That is correct. But again, 95 percent of that data, the sample dates, are correct.

DR. NETON: And we're using the 95th percentile of the distribution.

DR. BUCHANAN: This is Ron again. Yes, on some instances the date is very important, some instances it -- so it's hard to make a blanket statement of whether a date is going to impact the results --

DR. NETON: What I'm trying to say, Ron, is that if five percent of the data are wrong and they're biased low, the 95th percentile is still okay. Right?

DR. BUCHANAN: Yes, okay. What I'm saying just as a general rule is that on an individual dose reconstruction, a date is usually fairly important. When you're doing coworker where you have a lot, or you're mingling a lot of data, then it depends on whether the date is

important or not.

DR. NETON: Well, I think 95 percent rides a pretty good degree of importance to it. You have to make a value judgment, like was said, whether you pick 95, 99. Ninety five percent is a very good acceptance criteria. I mean, it's a very rigorous acceptance criteria. It's not like we're at, say, 50 percent.

MR. BARTON: Well, I certainly don't want to beat this to death. I just -- my point was that given the way, due to the OPOS calculation where the date really could be fed in anywhere from, you know, one day to the full year. But it appears to me numerically it would be at least as important as the actual sample result, which is held to the one percent criteria.

We can disagree on that point, and I would certainly like to hear the Work Group weighing in on that.

CO-CHAIR CLAWSON: To be honest with you -- this is Brad --- I'm totally confused on where we're at --- on everything. So just, maybe

in laymen's terms, just rough it up for me here because I am under the impression that the dates do matter, myself. But also, too, I'm understanding that if there's a small variance, okay, it's not that critical. But I'm a little bit --- what the issue is here, so.

MR. BARTON: Alright, I'll try to take a crack at it. When you do the time-weighted OPOS, let's just say for a certain value, you weight it by the number of days in between samples.

So if you think about it, if the date was off by, say the samples are two weeks apart, but the date says --- was input incorrectly and now they're only a week apart. That sample is going to be -- have a weight that's essentially one half what it should be. I guess you're only weighting it over a one week period versus where it should be weighted over a two week period.

CO-CHAIR MELIUS: This is Jim Melius. I mean, I think I tend to agree with NIOSH. I think it's yes, from the individual calculation

it may be important. But you know, given the five percent criteria and given the 95 percent utilization of this, you know, 95th percentile.

I just can't see where it makes a significant difference unless you have a very, you know, weird set of data. And somehow I think that would be picked up by, you know, other means.

DR. TAULBEE: This is Tim. The question I had, were there any Work Group Members that care to share their opinion of it?

(Telephonic interference.)

MR. KATZ: Jim, I don't know if others can hear you, but, Jim Lockey, but you were very hard to listen to for me. You weren't coming through. Jim Lockey?

CO-CHAIR CLAWSON: Okay, way to make him feel bad. Now he's not going to talk.

MR. KATZ: Now he doesn't want to play at all.

CO-CHAIR CLAWSON: No. Hello.

(Simultaneous speaking.)

MR. KATZ: Jim Lockey, you want to

repeat what you were trying to say?

MEMBER LOCKEY: Can you hear me now?

MR. KATZ: Yes.

MEMBER LOCKEY: Okay. So I know I haven't done any research that relates just to these types of databases' relationship to radiation exposure. But in relationship to other occupational circumstances. The outline that Jim sort of eluded to, 95 percentile and one week difference or two weeks. It's not going to make a big difference from what I currently understand. So I sort of agree with Jim, in that I don't think it's going to make a --- this type of date is not going to --- fluctuation in date is not going to make a big difference in this particular database.

DR. TAULBEE: Okay, can we consider this one closed then?

CO-CHAIR MELIUS: Yes, yes you can.

DR. TAULBEE: Thank you.

MR. BARTON: Okay. Should I take back over here?

(Simultaneous speaking.)

MR. BARTON: Yes, Tim, I think you're going to have to either give me control or stop or something.

DR. TAULBEE: Sorry about that, I apologize.

MR. BARTON: No problem at all. Just get this loaded back up here. So that was again, that was Observation 5. Okay, in a similar vein, Observation 6 we're requesting a little bit of clarification on what aspects of the tritium coworker model were subjected to the QA criteria.

When we looked at the appendix where that information is contained, it appeared to us that the only thing that was subject to a QA process was the delineation between construction and non-construction workers.

This one is a little bit unique. Again, this is an observation, it's unique because we're basing it on claimant records. But I was wondering things like the transcription of those data from the -- their claimant dose

reconstructions, you know, how were those transcribed and what QA criteria did the compilation of that data which originally went into a dose reconstruction undergo, and how does that really relate back to the QA criteria we're talking about when we formulate a coworker model.

DR. TAULBEE: Okay. This is Tim. And basically the result is checked as a critical field, the construction trades worker designation, the date, and the area were checked as non-critical fields.

The result was checked at the one percent criteria. The designation, the date, and the area were checked as non-critical or five percent criteria.

The results for QA checks for fields other than the CTW designation were inadvertently admitted from Revision 3 that will be included in Revision 4. And so I guess my question to Ted then, would this one then fall into the in abeyance scenario?

MR. KATZ: Yes. It sounds like that's

exactly what that would be.

DR. TAULBEE: Okay. Does that answer your question, Bob?

MR. BARTON: It does. And I guess, a sneak peek, I'm assuming that it passed the QA criteria.

DR. TAULBEE: Yes it did.

MR. BARTON: Okay. So we can place that one in abeyance. Okay, here again these are not really findings or observations, but just some suggestions or issues that we sort of discuss in the report so I didn't want to omit them here.

And we just discussed the tritium coworker dose based on claimant records. So, by definition it's not complete. But how do you get around --- get your head around whether it is truly representative. I mean, one would think that it would be a cross section, but how do you really know.

One of the things that was presented was a table, Table 81. And I put this into visual

form here, this appears in our report on Page 16. And this is one way you can try to get around -- like, figure out if what you have when you use a claimant population is truly representative.

One thing you want to look for, first off, is how do the -- what is the comparison between construction trade workers and non-construction trade workers. And what you want to really look for is how do those trends on a yearly basis follow.

And as you can see in this figure, they actually follow quite well. So it doesn't appear that for certain time periods you don't have a representative sample of construction trade workers and the proportions between who was monitored as a non-construction trade and a construction trade, the relative magnitude of each, and the variation year by year is pretty good. So that's one way to do it.

The second figure, we'll go to the next slide. So this is one we put together. And what we did is just to put it visually out there

was to compare the total tritium samples reportedly taken by year versus the total tritium workers we have in the claimant population which we're using as a representative sample.

And really what you want to look for here is the trends. So for example if you had a situation where the total site-wide tritium samples was going way up, but our worker population is going way down, that might be problematic.

But here, the trend that is sort of the delta between years looks pretty consistent except for when you get into I guess the late '70s here.

Another thing that might, you know, be suggested -- again, these are not findings nor observations --- but if you could compare the total site-wide tritium samples to the total claimant tritium samples, that would provide an even more meaningful comparison.

Or if it was possible, to compare the number of site-wide monitored tritium workers to

the number of monitored claimants we have, and again compare the temporal trends.

I know we, when we talked about this in the report we had found at least one report from 1968 that listed there was approximately 1,400 tritium workers at SRS. We have about 250 claimants who have tritium monitoring data in that year. So that's eight percent of the total site.

So I mean, if it was possible, if we could do that on a year-by-year basis and see how that 18 percent holds up, you know, for example if it stays right around that 18, 20 percent, whatever it is, you could say well, by proportion we have a consistent proportion of claimants relative to the number of workers who were monitored.

Again, we only found that one report, so I don't know to what extent that could be done for other years. But since this is a claimant coworker data set and not a site-wide data set, these are just some things that could be done to

show that the use of the claimant data set is truly representative.

And again, these are just suggestions. I don't know if anyone has any comments on that or if NIOSH knows whether those sorts of comparisons are possible, whether -- I would imagine that the total site-wide samples, not workers but samples, could be compared against the claimants, but we didn't have information as to the total number of tritium samples by year that were used.

And I assume that's because really we started with annual doses that had already been calculated via the dose reconstruction process. So again, these are some things we discuss in the report about how, when you're trying to establish that the data set you have is representative of the exposure potential to all workers, these are some ways you can go about building a case for that. And so we just wanted to point that out.

If there are no comments or questions, I can move on to --

CO-CHAIR MELIUS: I just have one comment. Steve Melius. So I would just reiterate that sort of request from Bob. I think that would be helpful in sort of at least make some of us like me, who is uncomfortable with using the claimant's database as being representative, feel better about it.

And I think there's enough data at this site that -- enough workers that it could be done. Whether --- how accessible the NOCTS data is for doing this kind of analysis, I don't know. So I'm not sure how feasible it would be.

DR. TAULBEE: I guess let me ask you for a clarification. Are you wanting us to compare the number of samples in the NOCTS data set to the total number on site for trends? Is that what you're asking?

CO-CHAIR MELIUS: Are they parallel. Do the lines -- they're obviously going to have different numbers, I mean, but if it's representative then it should parallel the overall samples.

DR. TAULBEE: Okay, we'll look into this and get back to you as to whether it's something that we can easily do, or if it's going to take a significant effort. Is that okay?

CO-CHAIR MELIUS: Yes, that's fine. I don't expect you to be able to answer that. But I think it would be supporting what Bob was suggesting.

DR. TAULBEE: Okay.

MR. BARTON: Okay, moving on to -- that ends the findings and observations about completeness, so we'll be moving on to monitoring practices.

And so for monitoring practices we have two findings and an observation. Here we have Finding 4, and I'll just read that, in the SRS bioassay procedures the routinely monitored workers during the early periods -- so that would be 1954 to 1970 for tritium and '64 to '67 for exotic trivalents --- are not addressed, SC&A's review of the bioassay control reports referenced to this period.

They didn't provide any sampling schedules or bioassay, I guess protocol is probably a better word than procedures. Therefore, it would be advantageous to have that additional information concerning the bioassay requirements for the earlier period. And we do have a response from NIOSH on that, so I'm going to quick skip ahead to that and let Tim talk about it.

DR. TAULBEE: Once I get off of mute and finish making a note from the last finding. Okay, just a second here, I'm sorry. Okay, we're basically, as Bob's pointed out here, we acknowledge it would be advantageous to have more information, as always, I mean that kind of goes without --- however, no additional information has been found.

Summary reports in the americium logbooks don't indicate an increase in the number of samples collected in 1969, which is consistent with americium being added to the list of radionuclides addressed in the bioassay control

procedures in the time period.

And, also, as I pointed out earlier, keep in mind that this is when kind of the methodology that the sequential type of extraction began as well.

The fact that the samples were collected, analyzed, and were reported in the summary reports prior to this time period, that indicates the sample was, in fact, occurring and was routine enough to be included in the summary reports.

And this will conclude that the monitoring program did exist even if not formally documented in the bioassay control procedures as to, required as to who was sampled and when.

I would also indicate that, and, Mike, please speak up here whenever I -- if I am misspeaking here, but I believe that the major campaign with producing americium, curium and californium really began to kick in in the late 1960s, which is part of why you see this large increase from that particular time period.

Mike, is that correct or not? Oh, wait a minute, I don't see Mike Mahathy's name on the --

MR. MAHATHY: Oh, yes, I'm here. I got kicked off the list and I can't get back in, but that is correct.

DR. TAULBEE: Okay.

MR. MAHATHY: It was the curium 1 and curium 2 programs.

DR. TAULBEE: Yes, that's -- I wasn't sure if that was in that exact time period or not. I just wanted to make sure.

MR. BARTON: Okay, and I understand, you know, like you said you always want to have that documentation, again, we're talking about the overall monitoring practices of a site and characterizing those to assure that you're looking at the right people.

That information doesn't exist, or hasn't been discovered to date so that sort of, it is what it is. I guess I would say one thing that might help us put it to bed is documenting

that response that we just heard that, you know, it wasn't maybe a formal procedure about who was going to get monitored, well that's because the use of the isotopes was maybe, you know, bench scale or something like that and there really wasn't a need for documentation of a formal program.

I think that argument could be made and I think it would be helpful to make that argument when we don't have a formal documentation about who was supposed to be monitored and for what reasons.

DR. TAULBEE: Okay. So you're suggesting we kind of incorporate this into the, a revision of a worker report, is that what you are proposing?

MR. BARTON: I think so. I think when you look at the coworker implementation guidelines, these are sort of the aspects that should be discussed to really round out that this coworker model, you know, we touched on all the issues within, you know, maybe the reference

documenting who was supposed to be monitored isn't for the entire period we are interested in, but for reasons A, B, and C, you know, it's not really an issue because the program, or the operations at the site really just didn't warrant it and that's why we don't see any discussion of it and that's the reason why we are okay using later procedures which really delineate who is supposed to get bioassayed and when.

DR. TAULBEE: Okay. We can certainly do that. So I guess then, sorry to keep bugging you on this particular thing here, Ted, but I'm trying to -- this is the first time I have really used this, so then we would put this one then in abeyance until it's incorporated into REV-4?

MR. KATZ: Yes, if that sounds good to the Work Group then that's what you would do.

DR. TAULBEE: Yes.

MR. BARTON: So I guess the only thing I would add is we really haven't seen the full rationale for it yet, so --

DR. TAULBEE: Oh, okay.

MR. BARTON: Yes.

DR. TAULBEE: We'll put it as in progress and we will -- well, we'll incorporate it in there and then you guys will be able to see it. Okay.

MR. BARTON: Okay, I'm going to jump back a slide because I kind of glossed over Observation 7, and this is really quick. This is about the V&V activities for construction trade workers.

Now I think we can just probably wait on that one since, obviously, there was a lot of discussion and some action to move forward on that about to what extent the construction trade workers, especially subcontractors, are adequately represented.

So that's definitely an issue. It's an observation here because we know that activity was ongoing when we wrote those reports and it appears that it is still ongoing.

So if anyone has any further comments on that we can move ahead.

DR. TAULBEE: Give me just a second here to catch up. Just a second, please.

MR. BARTON: No problem.

DR. TAULBEE: This is Observation 7.

MR. KATZ: Yes, so that's in progress.

DR. TAULBEE: Yes, okay. Alright.

MR. BARTON: Okay. Moving along, we are at Finding 5, which relates only to thorium, and I'll read this in.

While evaluating monitoring practices related directly to thorium it is not possible because SRF did not directly monitor for thorium. A discussion of a relationship between trivalent actinide monitoring practices and thorium exposure potential is warranted to establish that the trivalent urinalysis is appropriate for thorium.

And this is something that was discussed at a Work Group meeting back in 2014 and one thing we had suggested is if we have a known list of people who were really involved with thorium work and then we could take that

list of people and look to see if they are included in the trivalent coworker database and that would be one, again, piece of evidence that, since we are using these trivalent actinide urinalysis that it is appropriate for those thorium workers.

On the other hand, if we have a list of thorium workers and none of them appear to be in this bioassay program, I don't think that's likely, but if that's what we found then obviously that would be problematic.

And, Tim, you had indicated that this one you all are still working on formulating a response to.

DR. TAULBEE: This is Tim. That is correct. This is one that we are still working on and doing that comparison that you were just now mentioning.

The harder part is establishing the people who were working on the thorium projects and then going and jerking them up for the americium curium californium.

So we are in the process of working on this particular finding.

MR. BARTON: Okay, very good. Unless anyone has any other comments on this one we can keep moving forward.

Hearing none, onto the final criteria, which is stratification, and this is Finding 6, and it's derived coworker intakes for stratified into construction and non-construction workers for each of the three revised coworker models.

It says three, I separated out thorium from the trivalent but really it's the same data set.

However, we did not see the statistical basis in OTIB-81 that stratification was necessary, as is detailed, how you do it in Report 53, and is also talked about in the Implementation Guide, which is Neton 2015.

Now there was an analysis that was done, I believe it was in 2012, and that is in Report 55 where a comparison of the data sets were made, but I believe that was before we had

accepted the time-weighted OPOS methods for analyzing bioassay data, so I'm not sure if that comparison really still has a lot of meaning in the current way we derive coworker models.

So, again, the stratification was done and it might be necessary but we didn't see any statistical basis for that, so I open that one up for discussion.

DR. TAULBEE: This is Tim. And if I can grab the screen here, because I mean it's -- our response is rather lengthy and I want to read it here.

MR. BARTON: Okay.

DR. TAULBEE: If I can get it here. Okay. For the coworker models for a priori stratification, we base it on either differences and similarities in the radiological work being conducted, exposure potential, if you will, or known differences or similarities in the radiological monitoring methodology.

At Savannah River there were three main groups of radiological workers. There was

operations, which I am going to call production, there was maintenance, which was DuPont construction, and then you had the construction workers.

For stratification of the coworker models NIOSH chose to stratify based upon the type of radiological work being conducted as all three groups have a variety, or a hybrid, if you will, of health physics monitoring, as I will discuss here a little bit below.

The main difference in exposure for different types of radiological work is based on normal operations versus off-normal operations, if you will.

With operations you get people who are routinely processing material inside the glove box or a hood or on a fence top type of scenario are working with the material, but you've got a different exposure potential, as has been pointed out by this Work Group and at other times throughout the past few years.

The construction trades workers

exposures are different. That's when they are getting into the non-controlled type of environment.

And so that was why we primarily a priori stratified here, and as I said in the case of Savannah River there is significant exposure potential differences between CTWs, maintenance and construction, and the operations.

That warranted considering them in two different distinct cohorts or strata regardless -- with regards to coworker models. And so to elaborate a little bit on that, as I said the operations and production workers, chemists, physicists and operators, initially the material handlers, generally work with larger quantities of radioactive materials.

And the materials were also well controlled in glove boxes, fume hoods, to prevent or minimize worker exposure. Radiological work conducted by construction trades workers on the other hand typically involved contaminated equipment.

So they are not working with raw or, you know, bulk quantities of materials, so they are dealing with smaller quantities, but the engineered controls in the glove boxes, cabinets, fume hoods or duct work that contain the radioactive materials are sometimes intentionally compromised to conduct a renovation or repair. So you've got a tradeoff of two different mechanisms for both groups.

As a result the CTW exposure potential could, one, be less than the operations workers, especially dealing with smaller quantities and if they weren't working with much contaminated material.

It could be equal to the operations workers. You've got that balance going back and forth, they are more exposed to it, or it could be greater than the operations workers, depending upon the work being conducted.

And further complicating the total exposure is the duration of a specific job. In some cases the magnitude of the exposure for

construction trades workers could be greater due to the duration, that the duration, you know, is -- the magnitude of exposure for CTWs would be greater, but the duration is shorter.

This could result in a similar total intake experience by operations, but the delivery is different. In general the exposure potential for CTWs is viewed as being potentially greater but of shorter duration.

The difference in exposure potential from the type of work they have conducted is the main justification for the stratification. Based on the past reports comparing operations versus construction, and, again, as Bob pointed out, this was before the time-weighted OPOS methodology, there do not appear to be a significant difference in the total intake between the stratified models, documented in the ORAU Report 39, Report 50, Report 55, Report 56, and Report 58.

As Bob pointed out this was all before time-weighted OPOS. However, you know, NIOSH

recognizes the limitation with the statistical test conducted, and we discussed that in past Work Group meetings and the Advisory Board SEC issues Work Group also opined that the power was insufficient to observe any differences in the models.

So we have kind of, you know, scrapped that particular statistical approach, because when we did it the power was too low. As a result we can tell you the a priori stratify operations from construction trades workers models for the Savannah River Site.

The decision was simplified. There is an abundance of data available for both strata for most radionuclides, including in the coworker study.

So stratification is also viewed as more timely compared to herding additional data and conducting additional statistical tests, so we didn't conduct additional tests.

We a priori stratified the two groups based upon exposure potential. With that I will

leave it open to discussion.

MR. BARTON: This is Bob. I think from my own point of view that sort of discussion and the rationale for why, as you said, a priori, the two groups were stratified. I think that is something that is quite helpful and probably should be included.

When we are looking at these coworker models through the view of satisfying the implementation guidelines, I mean it's almost -- I almost see it as sort of going through a checklist, you know, okay, we're going to stratify here and these are the reasons why we are stratifying, whether it be statistical or, you know, more judgements based on the different exposure potentials between different groups as you just said and I think that sort of justification is warranted whenever you are developing the coworker model.

DR. TAULBEE: But -- so you're suggesting our rationale that I just discussed be incorporated into the coworker model into REV-4,

correct?

MR. BARTON: Yes, but I'd certainly like to hear the Work Group weigh in a little bit on it and see how they feel about it.

I think it's a fairly reasonable approach that, you know, you don't have to always perform the statistical analysis but if you don't and you are still stratifying you should probably explain and document why that's the case. But I would like to hear the Work Group weigh in.

CO-CHAIR MELIUS: This is Jim Melius. I mean I think it can, it ought to be referenced. I don't think it needs to be as lengthy as what Tim just read to us for each report.

So, I mean, I think you refer back to other reports and so forth, so it doesn't need to be a lengthy discussion item for comment.

CO-CHAIR CLAWSON: This is Brad. I agree with Jim on this, you know, in dose reconstruction we are always been wanting to know the terminology as to why this was done, and I agree it doesn't have to be that lengthy, but

just so that we could better understand what was done with it.

DR. TAULBEE: Okay.

MR. BARTON: The only thing I would point out is I believe those reports that Tim talked about during the 50 series reports those were a statistical analysis, correct?

DR. TAULBEE: They were, but the SEC issues Work Group had pointed out, and, you know, there is a lot of discussion of power, including observe an actual difference if there was, and so, yes, they were statistical analyses, but they're not being used anymore.

MR. BARTON: Alright. So I guess my main point there was that I think currently the rationale for stratification is not necessarily the statistics that went on in those reports but really the more qualitative analysis of the different job types and what those people were out there doing.

DR. TAULBEE: That is correct. What we were trying to do with those reports was to

demonstrate that there really wasn't a major difference so we could combine them, but it just basically didn't have the power, so, therefore, we were just going to keep them separate, that's all. That's fine.

So Dr. Melius, if I understand correctly the -- some of the responses here for Finding 6 that's up here on the screen, basically I can take out kind of most of that last paragraph, really shorten this down, and just incorporate that into the REV-4. You okay with that?

CO-CHAIR MELIUS: Yes. And if it's easier to just to cut and paste what you have already written that's fine, too.

DR. TAULBEE: Okay.

CO-CHAIR MELIUS: But for future reports or whatever it doesn't need to be as --

DR. TAULBEE: Less detailed, okay.

CO-CHAIR MELIUS: Yes.

DR. TAULBEE: Alright. So then can we mark this finding in abeyance?

MR. KATZ: Yes.

DR. TAULBEE: Thank you.

MR. BARTON: Alright. If I can steal control from you, Tim, again, and if you need a minute I can hold off.

DR. TAULBEE: Thank you.

MR. BARTON: Okay, moving along if we are ready to. Okay, this goes to our last observation and basically we felt that there was sort of contradiction in the language and we felt it warranted a little bit of discussion and this goes back to sort of the stratification issue and what we are talking about in sort of different monitoring protocols.

So I have two quotes up here that are both from OTIB-81, and I'll read the first one. That SRS construction trade workers were deployed temporarily but frequently for short periods to perform specific tasks usually pertaining to facility construction and modification, system maintenance, and decontamination.

These types of jobs were performed by

workers in both categories, prime construction trade workers and subcontractor construction trade workers.

Workers from both categories, worked around the site, while production and operations staff normally worked at six locations. That's the first quote.

And then the second quote is both of these types of monitoring programs can be considered to be variations on routine representative sampling.

Coworkers normally present in an area, i.e., non-construction trade workers and Roll 2 construction trade workers, which are prime workers, the monitoring was specified on an annual basis in bioassay control procedures.

For workers intermittently present in an area, i.e. some construction trade workers, the monitoring was based on job plans.

And I'm just going to move to the next slide, here is Observation 8. OTIB-81 appears to contradict itself on whether prime construction

trade workers represent a similar monitoring protocol as the subcontracted construction trade workers.

Prime construction workers are described as being exposed temporarily but frequently for short periods, but they are also on an annual bioassay schedule that was specified by the control procedures.

Meanwhile, the subcontract workers were monitored on a case-by-case basis depending on the local requirement of the job.

So I guess this is -- again, this is Observation 8. It's really a question of if a combination of those two groups of workers, if the subcontract workers were really on a, on sort of an intermittent monitoring schedule, or even more extreme, more of an incident-based if something happened during the job then they were going to submit a bioassay sample, is that really comparable to the regular prime construction trade workers which were actually on a routine schedule the entire time.

Then again I pointed out those two statements because at least they appear to be a little bit contradictory. But, again, this is a question of the monitoring protocol when you combine groups of workers.

In this case we are talking about the prime and the subcontract construction trade workers.

Are those prime construction workers, even though they are doing similar tasks, and more frequently and are routinely monitored, are they reflective of the subcontractors which may be monitored on just a case-by-case basis, which is really more analogous to a sort of incident-based monitoring protocol. So that's why we brought this up for discussion.

DR. TAULBEE: This is Tim. There is -- You're looking at mixture of the actual monitoring at the Savannah River Site, but really what the bottom line is, the fundamental part is, you know, and we put some of this out this morning, let me back up here a little bit.

With the subcontractor construction trades worker evaluation we did in the early 1980s that we reported on this morning, some of those subcontractor CTWs were on a routine monitoring. Not a huge number of them, but some of them were.

So you've got some that are on routine monitoring, you've got some that are on incidents, where radiological conditions changed and the health physics folks required them to leave bioassay samples, and then you've got some that are specified from just the job plan, so it's a mixture.

But it's also a mixture for the prime construction trades workers as well if they are all routine bioassay for the most part. However, if an incident happened they were on an incident sampling as well from that standpoint.

They have their routine and then an incident happened and the did follow up bioassay to see if they got an intake. So from that, you know, dual monitoring, what we don't see a great

deal is of the prime CTWs being on kind of just a job-specific type of monitoring.

You do see a little bit of it, but most of, if they were on a routine monitoring then they isn't a job-specific associated with them if the routine would be picking that up.

So the workplace monitoring is really a hybrid amongst both groups, you know - or, I'm sorry, with regards to the personal monitoring, not the workplace monitoring.

The workplace monitoring for both subcontractors construction trades and the prime construction trades weren't the same, and this was the examples that I alluded to some this morning that we can go through as to how often, how physics was covering, and I'd like to try and walk through some of these examples if that's okay with the Work Group. Is that acceptable?

CO-CHAIR CLAWSON: Yes.

DR. TAULBEE: Okay. Okay, then I will -- Let me get to where I have, that screen again. And, like I said, I started to go through some of

this this morning a little bit, but as you can see the different types of work is being done by the prime construction trades workers and I guess the subcontractor construction trades workers.

So we talked a little bit about the fan motors example this morning where they are both wearing two pairs of coveralls and respirators.

Let me jump to kind of Example Number 2 here, because this one here we hadn't, and this would be work on a high level drain, and this is pipefitters.

In this particular example maintenance workers were, or DuPont construction, if you will, were cutting a 4-inch section of the high level drain, and I'm showing this here in Figure 6, the pipe ends were to be plugged and taped and the workers wore two pair of coveralls and a respirator and had continuous coverage from health physics.

And you've got here on the screen, those of you who are able to see it, you'll see

the two DuPont construction trades workers here. These were mechanics.

In a similar job, subcontractor construction trades pipefitters, B.F. Shaw, were connecting a cell line to the high level drain in laboratory. Like the maintenance workers, the pipefitters were required to wear two pair of coveralls, respirators, when the line is being connected, and health physics also covered this job in a continuous manner. And here you can see that radiation control permit and the prescription here associated with it Continuous monitoring I've highlighted, and the individual subcontractor construction trades workers.

The example illustrates that similar work with similar exposure potential is being conducted by both DuPont construction, the maintenance guys, and the subcontractor pipefitters on the highly contaminated drain lines from the cells in radiological areas.

The workplace protective clothing requirements and workplace monitoring were

similar. So we believe these two groups should be in the same coworker model and so they should be combined.

Example 3 is ceiling tile work. This would be electricians and these would be the DuPont maintenance workers and they are removing contaminated ceiling tile. They were to wear two pair of coveralls and respirators to clean the overhead area. And there was monitoring at the beginning of the job and intermittent health physics monitoring throughout the job.

Now if we look at similar subcontractor construction trades workers, these would be the electricians from Miller-Dunn, also removed ceiling tiles to install electrical conduit. In this example the electricians wear a single pair of coveralls and the respirators when working with ceiling and drilling holes. Health physics coverage was at the start of the job and intermittent except when drilling holes in the cell walls.

During the drilling operations health

physics provided continuous coverage illustrating additional coverage based on the risk of the potential for exposure. And here you can see on the job plan where this is highlighted with an asterisk, the respirator to be used while working in ceiling and drilling holes.

So, again, these two examples illustrate that the type of work being conducted was similar, working with contaminated materials. And we feel they should be part of the same coworker model.

Example 4 is work with master-slave manipulators. This would be on the hot cells that Joe was talking about earlier. And this is to remove the end and repair the master-slave manipulator. And it indicates from the job plan that radiation control survey required when disturbing any part of the slave end. This would be the part that's connected to the hot cell. And at that time period masks would be required as dictated by the Rad Control survey, which is DuPont maintenance.

When you look at -- actually, in general, I note here that very few construction operations mention the MSM. One job did note the removal of MSM covers, thus exposing the workers to the cell. This would be a similar exposure to maintenance workers that were working on the slave end. In this instance pipefitters, sheet metal workers, and laborers all participated in the same job, they wore two pair of coveralls and respirators. In addition, the health physics provided coverage throughout the job.

And this kind of speaks to another issue here of, you know, they all wore two pair of coveralls and respirators, in addition health physics provided monitoring. The continuous coverage was likely due to the cell contaminant being breached. Stratification by craft in this example would not be appropriate as all the workers had the same potential for exposure.

They were all exposed to this open cell when they were doing this work. They've got pipe, sheet metal, and laborers. Again, we've

got the individuals listed there. And so, you know, the multiple crafts involved were monitored similarly and we believe they should all be part of that same coworker model.

Example 5 is the low-level drain, very similar to the high level drain. This is all in the Board Review System.

CO-CHAIR MELIUS: Tim, can I interrupt you a second, though, because I think the issue wasn't whether they anecdotally did similar work. I think the question is sort of the distribution of work and the distribution of exposures and were those similar, you know, or should the overall model be stratified by two types of construction workers or more.

And then how has that changed over time in terms of how subcontractors were used and so forth? I don't think it's a very easy question to answer and it may be that, you know, sort of a construction worker coworker model may, you know, address it fine with the appropriate limits of the 95 percentile or whatever.

But I guess I'm a little concerned that we're trying to address it just through sort of anecdotal data of, you know, groups of workers, unless you are taking a sample of all the work that was done over a period of time by the different groups of workers.

DR. TAULBEE: What I tried to do here is to look at multiple examples of different types of trades. And, you know, I've got seven examples here of similar work being conducted between the DuPont construction trade and the subcontractor construction trade to try and give a feel, because you are absolutely right, you know, to try and do a robust analysis I don't really view as possible.

So it's kind of a weight of evidence. And so when you look at these -- I mean, you can certainly look at others, and I mention that on the Board Review System here, you know, you are welcome to go through all of these job plans and look at them.

I was trying to point out where the

work was similar such that why we believe that we can combine these two particular groups, keeping in mind that they have similar exposure potential as well as similar monitoring.

The workplace monitoring was definitely the same. The major difference would be the personnel monitoring of some of the maintenance guys were more on a routine schedule, whereas the subcontractor construction trades who were not there all the time were more on a job-specific monitoring.

Both of them were on incident-based monitoring. When an incident happened both were monitored. That's what I wanted to try and relay to the Work Group.

CO-CHAIR MELIUS: But I just don't think a sample of seven examples, you know, is going to address that issue in a satisfactory way.

DR. TAULBEE: Okay. How many more examples would you like then? I mean --

CO-CHAIR CLAWSON: No, no, Tim --

CO-CHAIR MELIUS: 7,000 examples, Tim.

CO-CHAIR CLAWSON: Part of the thing that I want to make clear, too, is you told us how electricians are going to do electrician's work, pipefitters are going to do pipefitter work, but the difference between the construction trades and the construction trades with Savannah River might see a lot of difference.

I mean, if you talk to any of them, a lot of the construction, not the Savannah River construction, but the construction trades, they use them to turn and burn them, too. They'd bring them in to, if you remember right, in some of the interviews and stuff like this as we've been through, that they'd bring them in for the tanks and be able to pull out the pumps and everything else like that, and those guys are burnt up for the year.

And so I understand what you're trying to do there, but I don't think that you can really do that, because from what I have seen and in the interviews and everything else, there is quite a

bit of difference. I don't think you can just lump them all into one thing. I really don't. But, you know what, that's just my opinion. This is Brad.

DR. TAULBEE: You know, Brad, I do understand, you know, what you are saying. And do we have evidence of some areas where they did bring in construction trades for some of the hotter jobs and do what you just said, burn them out and move them on? Yes.

And we also have examples of them using maintenance on high level jobs because of the potential risks. So we've got both counteracting there going on.

And I believe that combining the DuPont construction and the subcontractor construction is appropriate. And I'm kind of at a loss as to what it's going to take for me to, I guess, in a sense demonstrate or prove this to you. Do you want to see more examples of --

CO-CHAIR CLAWSON: You know what, you could go on like that for hours and stuff and

then we could go on up there and turn around and do the same on the opposite direction.

I don't think that we can really put this -- well, I'm at a loss, too. I don't know how to be able to prove to you that we can't, so I guess we just need to keep going.

MR. FITZGERALD: This is Joe. Just a comment. You know, we had a similar discussion, if you recall, and this is going back into ancient EEOICPA history, but we were discussing whether or not the D&D workers at Rocky Flats represented a different group, a different cohort base, based on their exposure potential and their operations, versus the line workers.

My perspective was, at the time I recall, that, you know, it just appeared D&D workers were doing just radically different work. They were going into hotter spots tearing down buildings, so we were pretty skeptical at the time. And I think the resolution was to look at the dose distribution of both groups. And I think NIOSH at the time demonstrated that the

distributions were very similar, and that's how that issue was resolved, you know, with some finality. And, frankly, it was a tough one up until then.

I don't know if that's possible here, but that was the tack that was taken back then.

DR. TAULBEE: We can certainly show from an external standpoint that type of comparison, if that would be helpful. I don't know that we can for an internal, as most of the results are zero.

I mean, we could break them out and do a comparison of the, you know, 95th percentile, I guess, of the internal, if that would be helpful. But I'm actually not sure that we've got enough positive data in order to do that. But we definitely could compare the external dose, that can be done.

MEMBER BEACH: I don't think comparing the external is going to be helpful in this case, though.

MR. FITZGERALD: Yeah. But just going

back to what Jim was saying, to get beyond the subjective anecdotal, really what you have is either I think dose distribution or something a little harder than that, maybe -- I don't know if we actually have interviewed both sets of workers, but, you know, something that would give you some I guess better sense of the operational history than looking at work, you know, job profiles basically.

CO-CHAIR MELIUS: Yeah. This is Jim. I think it would be -- problem one is 3the statistical analysis and are the distributions similar and so forth.

And I think the other piece of evidence is, you know, to what extent has work changed over time for the two groups of workers? You know, sort of the distribution work. And to what extent that's available I don't know.

That may require a lot of digging to the extent it is there, because it's going to differ by type of work and so forth. But I think those are what would be needed to be looked into.

MEMBER BEACH: What about the large data gaps, does that play into this at all?

CO-CHAIR MELIUS: Yeah, that's another. It could. And, you know, what changes over time? I mean, there's lots of variables, which makes this a very hard issue to get at.

MR. FITZGERALD: Yeah, certainly, in the '89/'90 timeframe I would think the use of the outside contractors, the subcontractors, the outside CTWs, changes radically. And I think DuPont did have a pretty unified system where the CTWs, DuPont CTWs, were doing similar work. I don't think that persists, though, into the '90s.

DR. TAULBEE: I would kill to agree with you on that, Joe, but I think the differences I've looked at here from these job plans, there's virtually very little difference I see between DuPont construction and subcontractor construction during the DuPont era.

When you get into the Westinghouse era, really, kind of all bets are off. I really don't have a feel for that.

CO-CHAIR MELIUS: Well, I mean, the one thing you can do on the earlier time period, the DuPont time period, is see what is possible to do with any of the internal exposure.

DR. NETON: This is Jim. I think we've got a couple issues here. One is the one at hand, which is, you know, do we need to stratify or consider stratifying the different, the prime versus the subcontractors? But we talked earlier about were the construction trades adequately monitored to begin with?

CO-CHAIR MELIUS: Yeah.

DR. NETON: And I'm not sure which one takes precedence. I mean, this whole debate may be moot if the other one determines that they weren't monitored adequately to begin with. We just need to prioritize.

CO-CHAIR MELIUS: Right, right. And I think the one is, yeah, what time periods are involved, which overlap with the DuPont/Westinghouse issue.

DR. NETON: Right. It almost feels as

we should solve the first issue -- or the issue we talked about earlier today before we invest a lot of statistical analysis time in this second issue, but maybe I'm wrong.

CO-CHAIR MELIUS: Yeah, I think that's fair.

MR. FITZGERALD: No, that's right.

CO-CHAIR MELIUS: I was going to get back to where we go with that issue, because I guess I'm concerned that -- to me, that's the critical issue, in terms of SEC issues, because if they weren't adequately monitored then I'm not sure that -- and we know that, you know, sort of operations changed. I'm not sure that our current -- you know, that a coworker model will address that adequately. At least there would certainly be more concern about that.

So we're going on at a little over two hours. I don't know where people stand in terms of fatigue and wanting to go on.

I would suggest on these two issues, particularly the one we just talked about.

whether there's adequate monitoring, you know, during at least the earlier years or the initial years of the Westinghouse era, you know, that we think about that and maybe just sort of revisit it when we have the presentations at the meeting next week. I assume we're not going to have time to address it between now and then.

MR. FITZGERALD: While we're on that subject, I guess we have an hour and a half next week. How would you like to handle this and give yourself enough time, you know, for the Board to discuss it?

CO-CHAIR MELIUS: Well, I think we need Tim's presentation of his report -- the two reports, yours and the other, NIOSH and the SC&A report, we need presented.

That's going to take some time. And then probably Tim's ought to include an update on the coworkers models and sort of where we stand overall at the site.

And I think we have to leave plenty of time for Board discussion of where do we go from

here? You know, again, it's been over ten years on this SEC request, and I think I would be careful about, hesitant about committing to lots of long term projects or evaluations that may or may not yield data relevant to that SEC decision.

And so we'll see what the Board Members think. And as I said, I want to regroup, we probably should anyway, and have a better discussion of the coworker issue and some of these other reports that we probably are not going to get to today. Is that reasonable with the other -- Brad and other --

CO-CHAIR CLAWSON: Yes. This is Brad. I agree with you on that.

MEMBER BEACH: Yeah, I do, too, Brad -- Jim.

CO-CHAIR MELIUS: Yeah. You can agree with Brad, too, that's okay.

(Laughter.)

MEMBER BEACH: Jim, thanks, and Brad.

MR. KATZ: Jim, my suggestion on that is that I'm not sure -- I mean, we should still

give an opportunity for the petitioner to speak -- I'm not sure you want to go on with the other documents at all today, then, give we have the Board meeting coming up and Tim and Joe have to prepare something.

CO-CHAIR MELIUS: Yeah. I was not -- I had not forgotten the petitioners.

MR. KATZ: No, no, no, I didn't think that.

CO-CHAIR MELIUS: But I guess I didn't want to make a unilateral decision on stopping further evaluation. But I think both Tim and Bob are probably talked out.

MR. BARTON: So, really, that was the last observation. I had a couple of comments, but they really were related to implementation about, you know, who are we going to assign our monitored doses to and at what level? But that's not really an SEC-related issue.

CO-CHAIR MELIUS: Okay. Well, then let me open up for -- are the petitioners still on the line or --

MR. JOHNSON: Yes, sir, we are.

CO-CHAIR MELIUS: Okay, fine. You deserve something for endurance.

(Laughter.)

CO-CHAIR MELIUS: So, whoever wants to speak first can go ahead.

Petitioner Comments

MR. JOHNSON: This is Warren Johnson. I thank you all for the opportunity to speak. As was noted earlier, we're approaching a decade on this petition and certainly we hope a decision will be reached soon. As I mentioned earlier, I'm quite frankly somewhat concerned at how adversarial NIOSH appears to be relative to the petition.

Rather than state the facts and a scientific position, it seems to have morphed into an advocate against the workers. The decision seems to be to ignore the lost and incomplete records, ignore the inaccurate records, ignore the 294 violations and safety concerns noted in the Tiger Team reports, ignore

the fact that the culture that had developed is what prompted the Tiger Team investigation process, which, obviously, pre-dates 1990, and ignore the fact that records have been destroyed by SRS. And so is assume compliance and starts there, assuming the accuracy of all the records that are present.

And I don't think that's appropriate. I think that's exactly why we have the vehicle of the SEC. And I don't think it's what Congress intended. If you look at the history of the Energy Act, Congress recognized that the workers that supported our Cold War effort were put at risk without their knowledge or consent for reasons that, documents reveal, were driven by fears of adverse publicity, liability, and employee demands for hazardous duty pay.

It further recognizes that secret records have since shown documented unmonitored exposures. From there, it says they're going to create efficient, uniform, and adequate compensation for these workers. DOE and the

contractors broke that basic promise to their workers, which was to provide a safe environment and workplace.

Because they broke their promise Congress just wants to essentially step in. And they made a promise to the workers that they're going to provide compensation to at least make the remainder of your life easier, and that included home healthcare, it included the ability to, since they had lost their dignity, not to rely on their children to provide, changing of diapers and so on.

That's what these people are going through and they're now 10 years past. You're talking about people who are given success in cancer treatment on a 10-year survival rate. They're past that. We're losing people every day that you don't make this decision. And, quite frankly, as I listened to the discussion today it still needs looking at records that can't be recreated. You can't go back and force people provide bioassay samples.

You can't recreate that, so you're left with assumptions. Well, as I understand it, the assumptions that were made in the proposed models are still going to be assumptions that everything was done correctly, they just didn't document it well enough.

And that's just simply not appropriate. It's still a guess, it's speculative, it doesn't get us to sufficient accuracy, and it certainly is not claimant-favorable.

In addition, you have to look at feasibility. Feasibility is generally viewed in terms of how long is going to take and how much is going to cost? Now, I don't know what it costs, but I know how long it's taking. It's taken over ten years and we still don't have an end in sight.

What I heard was there will be a rebuttal from NIOSH to SC&A's report that we'll get sometime in October, if we get the information from the site. And then from there

we still don't have a direction.

And so, quite frankly, I think that it's proving that it's not feasible to bound a dose with sufficient accuracy and give these people the relief that Congress intended.

In addition to that, the records and monitoring, it's proven to be unreliable to suggest you can rely on a 1997 Notice of Violation relative to the 79 percent noncompliance because they were monitored later and found to be below the MDA. I makes a number of dangerous assumptions, one, because it assumes that the workers were tested for the appropriate radionuclides.

Two, it doesn't tell us when the follow-up tests were even performed. If they were below the MDA on the subsequent test date that doesn't tell us what the exposure was on the date of the uptake.

You spent a lot of time discussing why the subcontractors failed to submit the bioassay tests, and that it wasn't SRS's fault, it was the

subcontractors refusing.

But, quite frankly, fault's irrelevant. And it has nothing to do with it because there's a large number of workers in a radiation control area with potential exposure, actual exposure, and we have no record of their monitoring. It doesn't matter why, it's just it's missing and that affects your accuracy.

The last point I'd like to make is that the contractor is the person or the entity that's responsible to demonstrate compliance with the radiation safety standards. Throughout its history the contractors failed to do that. You can look going back to '52 to as recent as 1990. The Tiger Team points out that this is a widespread problem.

You have 294 instances or violations of safety and health procedures. I think that's pretty clear evidence we can't just presume that any other documents that exist are done correctly and all the other monitoring was right.

You have seven anecdotal examples to

support the proposed models. I'd submit to you that I have a number of clients that were involved in incidents that there was no testing reflected in their bioassay history. There was not data kept on it. If I dig deep enough, in some cases, I find the incident report that shows testing, but it's unrecorded.

I think that's pretty clear that, given that you know the records are incomplete and you know that they are inaccurate and now we know many of them have just been destroyed, you can't assume the lack of an incident report means a lack of an incident. You can't assume that lack of a test didn't just mean that test got discarded.

And so where it leaves us is a lot of guessing, and a lot of guessing seems to be pointing in the direction of lowering the person's exposure. And I think that's a dangerous assumption. It's certainly not an appropriate assumption when it comes to radiation safety.

And going back to the timeframe, if you look at the executive summary from the Tiger Team, it notes that failures to address and implement appropriate nuclear and national standards to assure that operations were conducted in a safe and environmentally acceptable manner. Investigations of several incidents involving the reactor operations highlighted how far the site had fallen below the commercial nuclear industry.

I don't know how we can hold them to a lower standard than we do the commercial nuclear industry. The workers are the same, they certainly are just as susceptible to cancer caused by exposure to radiation. In the 1990 the Tiger Team was pointing out the standards at this site had fallen well below the rest of the industry. That doesn't warrant the benefit of the doubt. That doesn't warrant assuming everything in favor of proper procedure and proper monitoring.

I think it's clear that there was not

proper monitoring. It's clear we don't have the appropriate records. And the only way to get us to fulfill the promise that Congress made is to grant the SEC and give them the efficient compensation that they deserve.

My co-counsel has a couple of comments to add.

CO-CHAIR MELIUS: Okay, go ahead.

MR. FESTER: This is Josh Fester, also for the petitioner. I have discussed it in previous Advisory Board meetings, and at the expense of belaboring the point, the main focus or the inquiry of whether to grant the SEC is feasibility. Co-counsel, Mr. Johnson, discussed it.

The key word here is feasibility. 42 U.S.C. 73.42(b) states that an SEC may be designated if it is not feasible to estimate with sufficient accuracy the radiation dose that the Class received and there's a reasonable likelihood that such radiation dose may have endangered the health of workers.

Two issues considered when determining feasibility are time and resources, which, again, I think Mr. Johnson just discussed. Ten years has passed here. The SEC petition to the SRS has been before the Board for going on more than a decade, close to two decades since the EEOICPA was created by Congress.

Certainly, from a time standpoint, it's not, and it has not been, feasible to reconstruct a dose for the class of employees named in the petition.

I've been patiently and intently listening throughout the course of the day, and among the things I have heard is that NIOSH and its representative is -- from them, is that we think that the records for internal monitoring and monitoring for specific radionuclides is substantially complete but that we need more information or, you know, we need to track these things down.

You know, there are a few problems with this. First, while it would be ideal to

have the time and opportunity to continue to delve throughout this information, to do data captures from the SRS, it's not feasible in terms of time consideration.

Every day, week, month, year that passes I have clients that are suffering though just horrendous diseases, cancers, and they're denied, you know, the basic rights under the Act, and basic dignity, and they are dying during this process.

The longer this goes -- I guess, again, I just want the Board to understand the human element of this. I have, anecdotally, one client that's terminal with cancer out at the site. He's still working, he has a death sentence essentially, being denied the healthcare to, you know, just basic healthcare. He has to keep working to be able to afford the insurance to have a chance of surviving.

And I just wanted to say one thing, you know, the class of people, employees out at this particular site, you wouldn't find workers

and people anywhere else in our state even that you have at the SRS.

But now you're talking about extending the completeness analysis when we know already that the data is incomplete, not sufficiently complete to accurately perform the dose reconstruction for these individuals.

During the discussion of the completeness of internal modeling, a representative from NIOSH stated -- basically there was a lot of reliance upon assumptions that DuPont properly monitored and protected its workers. The analysis was only for a certain set of subcontractors for a few years in, I think, the early to mid-1980s, '81 to '86 I believe it was.

Even during the snippet of worker monitoring history, the records considered by NIOSH, the records are not complete. Most of the RWPs are not found for the DuPont years, and I think you'll see that they were either discarded or shredded.

At one point a representative for NIOSH attempted to rely upon an anecdotal incident where the worker was not monitored because it was assumed that they weren't in areas where they would have needed follow-up monitoring.

And using that one anecdotal incident to explain away a large percentage of noncompliance with the monitoring procedures, that's just inappropriate and I think not good science. It certainly wouldn't pass a Daubert standard in any court of law in the United States.

It's not adequate, also, to assume based on the track record in monitoring failures at the site and this kind of situation is responsible for noncompliance.

Today's completeness or reliability of monitoring, when monitoring is mandatory, on an assumption that DuPont/Westinghouse would have monitored if there was radiation, if they were in radiation areas, improperly gives the contractors and subcontractors the benefit of the doubt, when

under the Act the claimant is supposed to have the benefit of the doubt. This is supposed to be claimant-favorable.

Even if there was always monitoring in all the areas that the subcontractors and contractor workers worked in, there's no indication that they were monitored for the appropriate radionuclides and if the workers were tested for the appropriate radionuclides. I have seen nothing to that effect.

What we know is that, for the early Westinghouse years at the very least, there was a very poor compliance with internal monitoring, 80 percent noncompliance.

Another assumption relied upon is this idea based solely on conversations with former employees who relate that DuPont was somewhat better centralized than Westinghouse and better at keeping monitoring records.

However, nothing in the record since the beginning of this SEC petition indicates that. It indicated the contrary. And that's

made evident through the -- the evidence is clear now that that's just not a good assumption, through the Tiger Team report, the findings in 2005, and the 2005 SC&A report as well.

Another issue that I wanted to bring to the Board's attention is the seemingly arbitrary distinction between construction trade workers and other subcontractor workers, other folks that, you know, weren't necessarily electricians or construction laborers, might have been escorts, janitors, security personnel that would have been in the same areas, worked for the same subcontractors, and for which there's also a dearth of any monitoring records.

If you want anecdotal examples of that I could probably give you 20 just out of my office. We've heard, again, a lot of anecdotal evidence in support of -- excuse me.

CO-CHAIR MELIUS: Excuse me. Can you please wrap up relatively soon?

MR. FESTER: Sure. I think that's all I have for you, unless my co-counsel has anything

further to add.

CO-CHAIR MELIUS: Thank you.

MR. JOHNSON: Again, I guess the last thing I'd say is I believe I understood, in the presentation on the last proposed model, I believe I understood NIOSH to say that robust analysis is not possible, it's sort of a weight of the evidence.

Well, we agree, and we would submit that the weight of the evidence is that where we are it's not feasible to bound a dose with sufficient accuracy, that the records don't exist, and for those reasons the SEC should be granted.

And, certainly, I thank you for you all's hard work and thank you for your patience today.

WG SEC Recommendations and/or Path Forward on Discussion Items; Plans for August Board Meeting

CO-CHAIR MELIUS: Thank you both for your comments. And I think as you know the entire

Board is meeting next week and there's an hour and a half session on the Savannah River Site. I believe on Thursday, correct, Ted?

MR. KATZ: Yes.

CO-CHAIR MELIUS: Okay. Good, thank you. Ted, anything else we need to do?

MR. KATZ: No, I think that takes care of it.

CO-CHAIR MELIUS: Okay, good. Thank you everybody for your patience and contributions and we'll see most of you next week in Santa Fe.

Adjourn

CO-CHAIR CLAWSON: Thank you everybody for joining us today.

(Whereupon, the above-entitled matter went off the record at 3:37 p.m.)