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CENTERS FOR DISEASE CONTROL AND PREVENTION  
NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH  
ADVISORY BOARD ON RADIATION AND WORKER HEALTH  
TBD 6000 WORK GROUP MEETING

WEDNESDAY, FEBRUARY 14, 2024

The meeting convened at 1:00 P.M. EST  
via teleconference,  
Dr. Paul L. Ziemer, Chair, presiding.

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Members Present:

Ziemer, Paul, Chair  
Beach, Josie, Member  
Clawson, Brad, Member  
Frank, Arthur, Member  
Kotelchuck, David, Member  
Lockey, James, Member  
Martinez, Nicole, Member  
Roessler, Genevieve, Member  
Valerio, Loretta, Member  
Anderson, Henry, Member

Registered and/or Public Comment Participants:

Roberts, Rashaun, DFO  
Adams, Nancy, NIOSH contractor  
Barton, Bob, SC&A  
Behling, Kathy, SC&A  
Buchanan, Ron, SC&A  
Calhoun, Grady, DCAS  
DeGarmo, Denise, Petitioner representative  
Fitzgerald, Joseph, SC&A  
Gogliotti, Rose, SC&A  
Lorenzen, William, Member of the public  
Nelson, Chuck, DCAS  
Ostrow, Steve, SC&A  
Rafke, Michael, HHS

Rutherford, LaVon, DCAS

Registered and/or Public Comment Participants Continued:

Taulbee, Tim, DCAS

Unknown, Member of the public

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## PROCEEDINGS

(1:00 p.m.)

**WELCOME AND ROLL CALL**

DR. ROBERTS: I have the time, it's 1:00 p.m. Eastern, so I'm going to go ahead and get started. So, good morning or good afternoon, depending on where you are, and welcome everybody. I'm Rashaun Roberts. I'm the Designated Federal Official for the Advisor board on Radiation and Worker Health, and this is a meeting of the TBD-6000 working group. We do have an agenda today. You can find it on the NIOSH website under scheduled meetings for today's date, along with the meeting material, which were -- which was disseminated to the working group and others in advance. I want to officially welcome everybody to this video conference.

First off, let's address conflict of interest. And I can speak to that with respect to the members of the Board who sit on this particular working group who cannot have conflicts of interest to serve on it. So, with that, let me move into the roll call for the work group members, starting with our chair, Ziemer.

CHAIR ZIEMER: Yes, I'm here.

DR. ROBERTS: Anderson?

MEMBER ANDERSON: Here.

DR. ROBERTS: And Beach?

MEMBER BEACH: I'm here.

DR. ROBERTS: Okay. Now, with regard to the rest, as you register, as I continue the roll call for those of you who are here outside of the

working group, as you register your attendance, please be sure to acknowledge and make known any conflicts of interest relevant to this working group that you might have. And, of course, recuse yourself from discussions accordingly. So, let's start with the ORAU/DCAS group.

DR. TAULBEE: This is Tim Taulbee. I have no conflicts with Joslyn.

MR. RUTHERFORD: This is LaVon Rutherford. I have no conflicts with Joslyn.

MR. KRANBUHL: This is Alek Kranbuhl, and I have no conflicts.

DR. ANIGSTEIN: Bob Anigstein, SC&A. I have no conflicts.

DR. ROBERTS: Anybody else for --

UNKNOWN SPEAKER: (Indiscernible.)

DR. ROBERTS: -- for DCAS/ORAU?

MR. SHARFI: I'm Mutty Sharfi (indiscernible).

DR. ROBERTS: Okay. I could barely hear you.

MR. SHARFI: Mutty Sharfi. No con -- with the ORAU Team. No conflicts with Joslyn.

DR. ROBERTS: Anyone else with DCAS/ORAU? Okay. Now let's move on to SC&A.

MR. BARTON: This is Bob Barton. No conflicts.

DR. ANIGSTEIN: Bob Anigstein. I already spoke up. No conflicts.

DR. BUCHANAN: Ron Buchanan. No conflicts for this site.

MS. GOGLIOTTI: Rose Gogliotti. No conflicts.

DR. ROBERTS: Anyone else for SC&A? Okay. Let's move on to who's here for HHS and contractors.

MR. RAFKEY: Michael Rafkey, HHS, no conflicts.

MS. ADAMS: Nancy Adams, NIOSH contractor.

DR. ROBERTS: Anyone here from the departments, DOL, DOE, others?

DR. ROBERTS: Okay. And are there any members of the public who would like to register their attendance?

Okay. Well, thank you, and welcome again. Before we officially move into the meeting, I just want to cover a couple of brief items. In order to keep everything running smoothly and so that everyone speaking can be clearly understood, please be sure to mute your phone unless you need to -- if you are on the phone only, if you don't have a mute button, press star six to mute. Press star six again to take yourself off mute. For those on Zoom, the mute button is typically in the on the lower left-hand side of your screen. Please periodically check your phone and computer to ensure that you're remaining on mute if you're not speaking. Also, if you're on the telephone, please identify yourself before making a comment just so that we know who is speaking. Also, if you're with CDC, please if you're in -- and you're on Zoom, please put your name on your -- on your screen or your card so that we know who you are. As I mentioned before, the agenda for the meeting can be found on the NIOSH/DCAS website. All of the materials were sent to staff prior to this meeting.

So, with that, I -- we can move into the main parts of the agenda now, so I will turn the meeting over to the chair of the working group, Dr. Paul Ziemer. Over to you, Paul.

CHAIR ZIEMER: Okay. Thank you very much, Rashaun, for getting us underway, and thanks to the work group and all the support people who are

with us today. We appreciate all that you do. I -- I want to acknowledge -- I think this work group goes back quite a ways, because the work group is really TBD-6000. And under that -- under that, sort of, heading, we have several sites that we have looked at or are looking at, such as General Steel Industries and Joslyn is another one. And TBD-6000 constitutes a general, sort of, what you would call, a general site profile, and then it has -- it has appendices. And appendix J of TBD-6000 is the one that deals with -- the details on Joslyn.

I don't believe, Andy, that you were with us originally on this work group; is that correct?

MEMBER ANDERSON: That's correct, no, I --

CHAIR ZIEMER: Yeah, so --

MEMBER ANDERSON: -- as -- as people retired and left --

CHAIR ZIEMER: Yeah, I think --

MEMBER ANDERSON: -- needed to have at least three on the committee.

CHAIR ZIEMER: Yeah. And I think that there may be others here who weren't involved early on with Joslyn. It has, actually, been 10 years since this work group officially reported to the Board the status of Joslyn. In fact, it was January 2014, and here we are February 2024 getting ready and will be -- be on the docket to report to the Board in April. So, a decade has passed. We have been awaiting some things, and we understand how the priorities have developed and slowed down due to a variety of factors.

In any event, I'll make a few remarks about Joslyn, and I -- I know that Alek later is going to give us more detail on the work that was done



there, but just quick update. Joslyn is, actually, called Joslyn Manufacturing Company, sometimes, also, called Joslyn Stainless Steel Company. It's located in Fort Wayne, Indiana and had a number of contracts, particularly in the early days. I think, again, Alek will be giving us more detail -- well, both Alek and Bob will -- more detail the actual work that was done there.

The other thing I want to mention is that there is an SEC class for Joslyn that goes from March 1, 1943, through December 31, 1952. Actually, it started out as going only to December 31, 1947, and then it was amended to take it through July 31st of '48, and then finally through December 31st of '52. And all of that was under SEC petition 200.

The other thing I wanted to mention, in that summary to the -- our -- our summary review to the Board in January of 2014, the work group, actually, recommended that the -- the SEC class be extended -- that August to December date that was added later. And the other thing that the -- the Board did at that meeting was discuss the finding -- findings matrix that SC&A had prepared. And at that time, there's -- there may be some conflict in -- in the numbers. We may have to go back and check this -- at that time, we reported that there were 11 findings in the findings matrix, but many of those were probably related to the general things that had to do with the SEC petition. There was later a findings matrix and, I believe -- and I'm looking here my documents and I saw some differences between what Alek showed and what appeared in some other documents -- but Alek is -- and he'll detail (indiscernible) showing seven findings and two observations in the review that was done by Bob Anigstein in May of 2015. And SC&A reported in their summary activities that there were 10 findings

and three in abeyance.

Part of that difference may be that some of the original findings were closed and maybe -- maybe the seven findings that Alek is reporting on were the ones that remained open. I think it would be helpful for the work group at some point to -- for either SC&A or NIOSH to go back and provide us with copies of that findings matrix just so we're all on the same page on -- on that. But in any event we -- we are -- I -- I think we originally thought that the white paper that would come out eventually from -- from NIOSH would cover all of those issues, and -- and I think SC&A thought that -- or expected that too, but based on comments from Bob Barker (sic) that -- I'm not sure Bob if everybody got those or just -- if I just got those, but the -- the scope of what we're covering today is much more narrow than all those seven findings. I believe that there is more work to be done. But nevertheless, we will have a step forward here and then proceed on that basis.

So, again, thank you. very much Let's go ahead with the agenda itself. And, I believe, that Bob Anigstein is going to kick it off for SC&A. So, Bob are you set --

MEMBER BEACH: Paul -- Paul, before you start with Bob, --

CHAIR ZIEMER: Oh, sure.

MEMBER BEACH: -- were you talking about the white paper from SC&A, the March 2013 one that had the --

CHAIR ZIEMER: Well, that -- that was an earlier one, but I think the one we're focusing on is a white -- is the paper that -- well, let me look here. The paper that SC&A reviewed in 2015.

MEMBER BEACH: Okay. I was just gone through to see if -- which ones I had.

CHAIR ZIEMER: The paper in 2015 was called "Review of Site Profiles for Atomic Weapons Employees that Worked at Uranium Metals Appendix J."

MEMBER BEACH: Okay. Yeah, yeah, I got that one. Okay.

CHAIR ZIEMER: Yeah, I think that --

MEMBER BEACH: Yep. July 6, 2015.

CHAIR ZIEMER: Right. And --

MEMBER BEACH: Did you say you didn't have that, Paul?

CHAIR ZIEMER: I probably do.

MEMBER BEACH: Okay.

CHAIR ZIEMER: -- somewhere, but I'm not sure. And probably Andy doesn't have that. I didn't dig out my copy of that, but I -- I did note that --

MEMBER BEACH: All right.

CHAIR ZIEMER: -- that SC&A reported that seven of the 10 findings were open, and I'm wondering if those are the seven filings that -- that Alek was referring to.

MEMBER BEACH: Yeah, and it's in that -- that paper. All of them one -- through seven are open, and then eight, nine, and 10 are in abeyance.

CHAIR ZIEMER: Right. Exactly.

MEMBER BEACH: Yeah. Do you want me to forward that to you guys?

MEMBER ANDERSON: Yeah, if you could, I don't have it.

CHAIR ZIEMER: Yeah.

MEMBER BEACH: Okay. I'll dig it up and send it to you.

CHAIR ZIEMER: Okay. Thank you, Josie.

MEMBER BEACH: Sure.

CHAIR ZIEMER: So, Bob, are you ready to proceed then? I assume Bob is here.

DR. ANIGSTEIN: Yes, yes, I am.

CHAIR ZIEMER: Okay.

DR. ANIGSTEIN: All right. For some reason, they only have an email, my (audio drop) instead of my name here. It's in9 is me.

CHAIR ZIEMER: Oh, I got you. I got you, okay.

**EVALUATION OF URANIUM WORKING DAYS FOR  
JOSLYN MANUFACTURING: SCA-TR-SP2015-0050, REV. 0**

DR. ANIGSTEIN: All right. Well, Paul gave us a nice introduction to this.

I -- I'm going to make another introduction, that is as you already put it, summer of 2015, SC&A responded to the appendix -- to the latest version of appendix J, reviewed it. And that report was never -- it never the subject of a work group meeting. I checked it out. Now, what we did at this point, we had very little time because we were only notified less than a month ago, -- month sounds like a long time, but we have to go through certain steps of clearance and editing and compliance, so there was relatively little time left for preparation. So, this presentation is abstracted from your data review, and it deals only with the -- this is -- as the title goes -- the evaluation of the uranium processing days. The original review also dealt

with the dosimetry of the dose -- dose assessment of the inhalation external exposure.

So, this is the -- this is the presentation that I would have made if I was asked to do this nine years ago. It does not take into account the NIOSH response through the -- through this, but which I will make some mention of. So, let me proceed.

Okay. So, this is a summary of how we -- the material that we used to prepare this, and we have the Appendix J. the dates uranium billets were rolled into fueling rods. There's also machining involved. And then separately listed out are dates the uranium rods were machined, using centralized grinding to reduce the rod's diameter, make -- give them a uniform diameter that was necessary.

So, initially, they were needing separate evaluation of rolling and machining these because machining produces -- since it's stripping off the surface of the rods, there's much more dust produced. So, from your working standpoint, it makes a big difference whether he's involved the rolling, which is simply taking the billets or the ingots, as they're alternately called, and turning them into rods, and there is some -- uranium does produce that way, but nowhere near as much as dust as is produced by stripping away the surface. However, since NIOSH concluded it could not fix estimated internal dose at Joslyn prior to August 1, 1948, there was no need to separate the rolling and machining operations that occurred prior to that date.

I'm listing -- we did an exhaustive search of the SRDB, and I'm just briefing going -- I don't expect this to be completely absorbed -- that I --

the -- the way -- giving a sample of how we went about this. So, going through the literature, there were three rollings -- only 3 ingots were rolled March 13, 1943, then there were more June 29, '43, and then there was another report. This was always memos correspondence. We then -- so, we had to tease out the very -- there's no single diary or journal of when -- when were the rolling, when were the -- when was the machining done.

So, the University of -- so, they had a -- University of Chicago subcontracted. As most of you might know, University of Chicago was a big player in the Manhattan Project. I reconfirmed it was based there.

So, you use the fact that the contracts specifically said \$12 an hour will cover all costs. Therefore, if you take the number of dollars that were -- that were allocated and divide by the -- by this 12 hours per hour, you can get a pretty good as est -- an upper end of the hours spent. They're not likely to have had a crossover run.

So, here's a summary based on this RDB. In some cases, we use the quantity to estimate the workdays, and in other cases, the time -- time span. This slide, by the way -- if you were to look at the slide that was posted on the internet, there was a mistake. The November 29 -- this is the correct date, November 29th through December 15th. Somehow, the September 7 date migrated to December 15. So, you have the observed legend that it was November 29 to September 7. So, this will be corrected. I mean, it's corrected here; it will be posted.

So, there were five agreements. There was additional -- there was an initial University of Chicago contract, and then there were separate agreements, each one incrementally increasing the cost. And so, here there

is a little pecu -- a little anomaly in the analysis. When I was doing the original analysis that was -- that was the subject of the 2015 report, Dave Allen --

who's (indiscernible) retired a year or two ago -- furnish a spreadsheet that he used for his calculations. And in this spreadsheet, he had the workday to be 9.6 hours long. Now, obviously that doesn't make much sense. Where that comes from is there was this -- prior to '51 and normal workweek was six hours (sic). People worked Monday through Saturday.

But if you assume a five-day week, the same number of total hours, you ended up with 9.6 -- 9 point -- so, 6 workdays would be 48 hours and five or at -- at 9.6 hours are also 48 hours.

So, if you're simply doing, like, an inbound assessment, what were the -- what were the intakes, what -- what were the inhaled dose, it doesn't really matter whether you work 9.6 hours for five days or eight hours from six days. The dose is the same. For the purpose of this, it -- it's a little bit confusing. And I'm not sure -- if I had it to do over again, I probably would have done it a little differently. So, then our workdays and NIOSH's workdays don't exactly correspond even -- even if all the other assumptions were the same.

And so, here is the result of the subcontracts and the workdays and -- and again, 9.6 hour workdays -- so, to take -- to get -- to get the eight-hour workday, you have to increase that by the appropriate factor. By the way, please feel free to interrupt me and ask questions. Okay. So, here is -- so, this -- this is how much we are -- the assumption of the workday is based on the contract, and then in addition to the contract, there were other reports -

- there were reports of other rolling and grinding on various dates in 1944 -- 1944 and 19 -- yeah, yeah, this is all 1944. But this gives you a feel -- a summary of how we had arrived at the figures we had arrived at.

And so, these are the document -- this is excluding -- exclusive of the contract where we add specific documentation in DSRDB of -- that we could infer workdays, and we simply said May 8 through 11, inclusive, and four workdays, etc., with the others.

And then going on to 1945, you see, because the just -- I'm going -- and so, it's -- going on 1945, we had -- it was a slight confusion here, uncertainty in documents that there were, like, 220 threaded -- threaded rods and when they were threaded were -- were shipped in 1945. Then, in addition -- and we think it's not in addition. It's also report that 222 rods, which is two rods greater than that number, were supplied to the -- to the NRX Reactor at Chalk River, Ontario. And the order -- the order that's so similar that we're assuming they were one and the same, either sloppy bookkeeping that what it said it was, 220 or perhaps two rods were rejected. I'm not sure. But where -- we're getting -- we're assuming it was all the same order, and it took 63 days, complete.

And then for 1946 the uranium workdays are estimated based on the uranium metal shipments to and from Joslyn. There were 44 -- very precise number, which was a summary case. It's a shipping case. It probably includes some packing materials. But at any rate, it assumed 28.2 tons -- tons -- by tons we mean short tons. And 12 to -- 12 tons of rods were produced in 1945. Estimated required 62 days. So, given -- so, taking that as a rate, we go with -- we jump up to 28 tons and 146 workdays. And this



is the period of time during which the shipment -- the production was made -- took place.

Okay. I'm not going to go into detail with each one of these because there -- the -- the methodology is -- is consistent and continued year to year. We have a huge -- so, there's a separate site for each year. But we had a brief summary of each -- of each year, each operational year. And then, again, the same -- the same philosophy carries on where you have some time -- sometimes we know -- excuse me. Sometimes we know how much material -- how much unformed uranium was shipped to Joslyn, and we have an idea of how long it takes to process. So, we get a process -- we get production days based on that. Other times, we know how many rod -- if you -- threaded fuel rods they could use. And you can use that as a -- as a guide. So, we did either -- we based it either on the rods or on the billets.

And here we know that there was a quote for the National Research -- NRC is the Canadian -- Canadian equivalent of the -- of our Atomic Energy Commission. And so, again, we have the rod -- we -- again, we made an assumption and it's the 25 percent of the billet did not make it into the rods and may have been recovered later because of the grinding involved.

We -- we -- we take either -- here we take the mass of the -- of the rod -- the assumed mass of the rods and estimate how long it took. And we know it was three days because a man named Stroke was contracted by the NRC, the Canadian NRC, and so -- so we know there were two -- there were rollings on at least -- on those two days, like, August 10 and 11 because Stroke said he saw them. And we figured there probably was a third day also. And it all -- it all adds up to 16 days of machining and rolling. Okay.

We're getting close -- close to the finish. Now, we have orientation studies.

I cannot explain what they meant by them, but four rods rolled at Joslyn. So, the four rods would have been in one day. And we just assumed that, even though it's not a full day, we assumed that there was -- because this is all -- but the purpose of all of this, I should have started out saying, is to calculate the external dose, the radiation dose, because by virtue of the SEC, the internal dose is not -- is -- is not being assessed because NIOSH could not calculate the intake with sufficient accuracy.

So, consequently, this will show whether the worker is, actually, standing over the machine, there was -- the rods were -- the rods or the billets (indiscernible) they be, were present and there was a radiation field -- external radiation from the uranium.

And then there was a survey that we only had -- with only two days in 1951.

Then, in 1952, we -- there were -- there were sample -- it was an air sampling done, air dust, of the -- of the atmosphere measuring the uranium dust in the air. So, if it took measurements, that means there was uranium present (indiscernible). So, rods -- rods were shipped to Joslyn, but these were rolled, but not -- but not machined. And then Joslyn did...

And then, there were experiments done on fuel rods of three different sizes. And the operations required the shipments to be back and forward to Joslyn, so we assume three days that it -- that -- that they were present on site on three different days.

All right. So, here's the summary. Now, before going any further, this -- the workdays are total workday -- that the total workday in the year at

this time period. Not necessarily conduct -- concerned with uranium processing. So, these are the machining that -- the day that machining took place, according to SC&A, and -- and machining includes rolling, so it -- it can be slightly confusing. Because up through 1948, there was no need -- there was no need to do any calc -- to do -- mentioned earlier, no need to separate machining and rolling because only external dose was calculated.

And starting with August 1948, machining and rolling were assessed separately because now -- now internal dose was considered. And there is a slight discrepancy, which I caught, in the 2015 paper. It was -- it was mistakenly labeled -- the table like this (indicating) mistakenly label -- entered as five days, but according to the text, it was seven days. So, if you compare this table to the table in the 2015 report, there would be a slight difference.

Now, then the NIOSH data is based entirely on Appendix J. It does not consider the NIOSH response, which (indiscernible) year, presumably, it's not finished because that came later and it did not -- first of all, as a practical matter, we were not able to consider it. And, also, we chose not to because we're giving the -- the work group a report on the 2015 paper. But of course, the -- the NIOSH response paper, which came out last summer was not available then.

And okay. We're open to questions.

### **WORK GROUP DISCUSSION**

MEMBER BEACH: Yeah, hi, Bob. Paul, is it okay if I ask a question?

CHAIR ZIEMER: Yeah, go ahead.

MEMBER BEACH: It seemed like early on in your presentation, you said that you would have done things differently, so I was curious about that, Bob. And, also, it feels like you're not finished. You didn't have enough time. The new report came out. This is, kind of, based on 2015 paper. So, can you kind of fill us in on what you need going forward?

DR. ANIGSTEIN: Well, first of all, I'd like to -- I'd like to quibble over your (indiscernible). This was intended to be a summary of the 2015 paper. It was not intended -- we were not -- SC&A, according to manager, Bob Barton, was not tasked to do a review of the response paper -- the NIOSH response paper. So, if we were to be tasked to compare the NIOSH response paper to our original review, then you will have a different story.

MEMBER BEACH: Okay. Yeah, I kind of wondered about that, with the different reports that was in NIOSH's paper if you'd had a chance to look at those contracts and things that they listed. So, okay.

DR. ANIGSTEIN: No.

MEMBER BEACH: Thanks for that.

DR. ANIGSTEIN: No. To add the --

MEMBER BEACH: Okay.

DR. ANIGSTEIN: The answer is no, we read the -- read the NIOSH response paper but did not look at their references. I -- I just noted bibliographic reference, you know, in each one, like (indiscernible) are 1948, something like that. And I noted that some of them were, also, listed as references in the two thousand -- SC&A 2015 paper, but presumably we used the same information. And others we did not -- we had not reviewed, at least they weren't listed in the (indiscernible). I can't swear that I didn't

look at them 10 years ago, but they were not listed as references. So, if we were to review the NIOSH response paper, we will certainly look at all the references that NIOSH cited and come up with something different. So, there's potentially -- oops, sorry about that. There is the date -- there is potentially another report coming if we're charged -- if we're tasked to do so.

MEMBER BEACH: Okay. Thanks, Bob.

CHAIR ZIEMER: Yeah, thank you, Bob for -- for your report. I -- I want to ask a question that perhaps more directed toward NIOSH. Do -- can you supply the work group -- and I don't know, Tim if this is you or if this is Alek -- can you supply the work group with the number of claims that have been processed for that period. I'm talking about the SEC period, and we're talking about people who don't meet the SEC criteria in our -- for which you are there for determining external dose. Do we have the numbers of claims and not -- I don't necessarily need it right now, but I assume you have that information.

DR. TAULBEE: Yes, Dr. Ziemer. We can provide that information, but we're going to have to work through ORAU in order to get that information out of the NOCTS data system.

CHAIR ZIEMER: Yeah.

DR. TAULBEE: So, it will --

CHAIR ZIEMER: Yeah.

DR. TAULBEE: -- take us a little bit of time to do so.

CHAIR ZIEMER: And the other thing I'm trying to get a feel for, and both -- both Bob and may -- maybe Alek can answer this as it may be

suitable at -- at -- maybe not right this moment, but given the information that we have on the work times and the -- the -- the daily work logs and so on, are we looking at coworker data to estimate these doses or a -- as opposed to in -- in the -- individual information? Presumably there's -- well, let -- let me ask. I just don't remember. Was there external monitoring in the early days that we have on these individuals?

MR. KRANBUHL: Dr. Ziemer, this is -- this is Alek.

CHAIR ZIEMER: Thank you.

MR. KRANBUHL: We don't have anything that I've seen. There's -- there's no external monitoring.

CHAIR ZIEMER: Okay.

MR. KRANBUHL: We have evidence that there was contracts with a local medical practice where employees were receiving urine -- they were take -- doing urine samples, blood samples, chest X-rays out in -- in the -- in town there, but no -- you know, nothing close to a dosimetry program --

CHAIR ZIEMER: Gotcha.

MR. KRANBUHL: -- for the most part.

CHAIR ZIEMER: Thank you. Well, so are we looking at the building a coworker model -- coexposure model of some sort from these work times or -- and -- and not just for that period, but going forward beyond the SEC period? What's -- what's -- what's the usefulness of the data that we have on -- on these work times?

DR. TAULBEE: So, I go into that a little bit of my presentation. I hope --

I don't mean to leave everyone in suspense. I will -- I will do my best

to explain what -- what we're doing with the number of operational days and how we're taking that information and turning that into intakes and external doses.

CHAIR ZIEMER: Well, -- well, and yeah. You -- you go through that a little bit. And Bob, I wondered, as -- as your folks looked at these, the data that you've just presented, have you -- had you given any thought to how it would be used to determine doses for any in -- individual claimants, or are -- have you just simply focused on that immediate issue of what the work times and days were?

MR. BARTON: I don't want to answer for Bob Anigstein. This is Bob Barton.

CHAIR ZIEMER: Hi, Bob.

MR. BARTON: But essentially, what we're talking about is simply exposure time in the --

CHAIR ZIEMER: Oh. Right, right.

MR. BARTON: -- (indiscernible) regulation. So, there's going to be intake rate, and we just -- intake rate and an external dose rate that we just need to have the number of exposed hours settled and then you'd have, essentially, your coexposure matrix.

CHAIR ZIEMER: Yeah.

MR. BARTON: So, it's not --

CHAIR ZIEMER: We're really -- we're really looking at a coexposure modeled then is what -- what it's going to boil down to.

MR. BARTON: Yes. Maybe not in the traditional sense of having bioassay data --

CHAIR ZIEMER: Right.

MR. BARTON: -- and badge dosimetry, but being able to model the doses from typical uranium operations that (indiscernible) different weeks we're doing and then, you know, multiplying that by the number of hours per year --

CHAIR ZIEMER: Yeah.

MR. BARTON: -- based on whichever year it was. So, yes. It would be a coexposure framework, I guess, I'd call it to differentiate it from the more traditional models of where we're creating distributions of bioassay data and modeling the intakes that way.

CHAIR ZIEMER: Right, yeah. Thank you.

Let me ask Andy. Do you have additional questions or -- or?

MEMBER ANDERSON: Yeah. I was going to ask, I mean, rolling times and all, do we know when the billets came in, were they stored somewhere? I mean, what was the -- the -- kind of the footprint of both the billets of uranium coming in to be processed and the billets going out before they left the property? Where were they -- they would roll for a number -- I mean, that's multiple tons of uranium. How close was it? Who -- was it stored indoors? outdoors? Was that a possible source of some of the workforce in the facility? And as the rods came out at a rolling process, where would they be in proximity to everyone else?

MR. KRANBUHL: I -- I can try to answer that a little bit. While the -- so, to start, we definitely don't have information for every single campaign that was done at Joslyn. That doesn't exist. I can tell you from an operation standpoint, you know, Joslyn was a convenient site because it was



located right on a train line, and so they could offload materials, take them to the rolling mill, and, you know, heat materials in the in the furnaces there and then get all the rolling operations done, and put the finished materials straight back out on a train and send it out. Now, I -- I don't want to speak too in detail, because I don't think I've fully got a grasp on all the numbers on this, but I think our assumptions that we're using for contaminated workplaces, the contaminated floors, the dose rate there is going to be very comparable to or even exceed what you would get working in proximity to just the bare uranium metal. So, I -- hopefully, that answers your question a little bit. And I hope that when I give my presentation, that will kind of answer this question in a little more detail.

MEMBER ANDERSON: Okay. And what was the total workforce at the facility?

MR. KRANBUHL: It's hard to really give you -- so, the number of individuals who had physicals was about 75. The rosters that we've seen -- we, actually, have roster breakdowns for -- Joslyn normally work two shifts, so a 7:00 to 3:00 and then a 3:00 to 11:00. Each shift had about 40 men on it doing various tasks in the -- in the rolling mill. So, they had different individuals assigned to the furnaces, drag (indiscernible), move the materials around, different men for each roller, and then performing stamping op -- operations on the final products. So, and as well, as the grinding. So, different individuals at each stage, so.

MEMBER ANDERSON: And when they -- when they weren't working with the uranium, what were they -- what were their usual products, or was this metal only use for this kind of work?

MR. KRANBUHL: No, they --

MEMBER ANDERSON: That seems to be a pretty small workforce for a rolling mill that would converted to rolling steel or iron or whatever.

MR. KRANBUHL: Well, I -- I -- this was sort of a small group within Joslyn.

MEMBER ANDERSON: Okay.

MR. KRANBUHL: So, this was a separate area within the larger mill where they had these designated individuals that were doing this sort of work. Because this, you know, it was kind of a -- as orders came in, they would process them, and then they would have some dead time in between. So, you know, the work varied. It fluctuated throughout the year.

MEMBER ANDERSON: Okay.

CHAIR ZIEMER: I want to ask one related question then. This is Paul Ziemer again. And maybe Alek or maybe Bob or -- Bob or Bob have run across this, but do we know the degree to which Joslyn was able to control access to this part of the plant for -- or is there some likelihood that we're going to -- have had or will have claims from other folks that indicate that while they weren't officially workers in that area, but they had to go there frequently for this or for that? Do we have any information on security of that area?

DR. ANIGSTEIN: Well, if you're referring to security, one of the report specified -- mentioned in my presentation -- that when the uranium was not being processed, it was under armed guard. There wasn't -- there was no casual access to it. It's only one instance, though.

CHAIR ZIEMER: Well, you're probably talking about either the rods or

the ingots, but what about the work area where they did --

DR. ANIGSTEIN: (Indiscernible) --

CHAIR ZIEMER: -- contamination, which goes into dose reconstruction and so on?

DR. ANIGSTEIN: I think I can --

CHAIR ZIEMER: You -- you may recall, Bob, when we did General -- Bob Anigstein, when we did General Steel, because you spent a lot of time on that, but it seemed that many people had access to a lot of different areas of that plant that weren't, actually, assigned that do the actual work.

DR. ANIGSTEIN: Well, we do --

CHAIR ZIEMER: -- materials, you know, including wandering through the -- the radiographic areas where they were using the radium.

DR. ANIGSTEIN: Oh, sorry I interrupted you. I think it -- I think the assumption is that there is an ambient radiation field in the vicinity of the fuel, whether it's uranium or thorium, which of course, is much more -- much higher external radiation field. And any workers that are -- that were working there during that time if the dose is being reconstructed, we assume they got that exposure.

MEMBER BEACH: Yeah. I was just bringing up the evaluation report. It says 100 to 200 workers and anywhere from 25 to 75 working on the fabricating of the uranium rods. And --

CHAIR ZIEMER: That's probably, again, --

MEMBER BEACH: -- that's the (indiscernible) --

CHAIR ZIEMER: -- that -- that's the people who, actually, are assigned to work there. I was asking you about others who work for the

plant and that's their -- it's true that they may have armed guards on -- on the rods and ingots, but access to the work area by others was what I was asking him about, and maybe --

MEMBER BEACH: -- yeah, and that's what I thought this was, consistent of 100 to 200 workers in the manufacturing workforce.

CHAIR ZIEMER: Many more workers, I think, at Joslyn per over -- overall with all --

MEMBER BEACH: Yeah.

CHAIR ZIEMER: -- yeah.

DR. TAULBEE: Dr. Ziemer, I don't know that we distinguished between who is directly working and who is not. We've --

CHAIR ZIEMER: Yeah.

DR. TAULBEE: -- developing an exposure model that, basically, we apply to everyone --

CHAIR ZIEMER: Yeah, yeah.

DR. TAULBEE: -- there -- and -- and so, I'd really like to ask that, you know, Alek present. I think it will help --

CHAIR ZIEMER: Sure.

DR. TAULBEE: -- answer a lot of your questions here --

CHAIR ZIEMER: Right.

DR. TAULBEE: -- and might prompt some more questions.

CHAIR ZIEMER: Yeah. Okay. Yeah. That's fine. Let's go ahead.

Thank you. Any other questions, work group?

MEMBER BEACH: No.

CHAIR ZIEMER: Okay. Let's go ahead. Thank you. Alek. I -- I think,

Alek, you weren't involved 10 years ago, I don't believe, but we're glad to have you aboard now.

MR. KRANBUHL: No sir, I was not here 10 years ago. I was -- I was in the Navy --

CHAIR ZIEMER: You don't have to tell us.

MR. KRANBUHL: Okay. Anyways, is it easiest if I share my screen --

CHAIR ZIEMER: (Indiscernible) --

DR. ANIGSTEIN: -- for me --

### **RESPONSES TO SC&A SCA-TR-SP2015-0050, REV. 0**

MR. KRANBUHL: Okay. Everyone should see my presentation in presentation mode, hopefully.

MEMBER BEACH: Yep, we see it. Can you make it bigger?

MR. KRANBUHL: I think you should be able to do that on --

MEMBER BEACH: Oh, I can -- I can --

MR. KRANBUHL: -- your screen.

MEMBER BEACH: -- do that. Yep. Thank you.

MR. KRANBUHL: All right. So, I'll go ahead and get started. So, I'm Alek Kranbuhl. I've been with NIOSH since July of 2021. I took over the Joslyn site in October of the same year. And here we are, about two and some change years later, and trying to make some progress here. So, I have to give a lot of credit to Mutty Sharfi and John Burn (ph) and the team over at ORAU. They did a great job really putting a lot of this information together.

Matt Smith and his team are doing a lot of the MCNP work to help sort

of move this forward. And, also, Dr. Anigstein, you know, was very helpful in, one, consolidating a lot of this information somewhere so we had a good starting point, and he, also, provided all his MCNP runs and everything so that we could not only reproduce what was done, but kind of come up with the best model that we could for Joslyn moving forward.

So, I'll get started. So, I'll briefly go over the operations at Joslyn, review the open findings. I think there was a little confusion here because there are some findings from a second white paper concerning the thorium and MCNP modeling of some thorium rods that affects Joslyn and -- and probably some other sites as well. And then we'll go into the methods that we used to assess the number of operational and rolling days, and then our -- our plan moving forward to finally close everything out, so.

So, as was mentioned briefly, Joslyn is located in Fort Wayne, Indiana. They had a number of contracts with the Manhattan Engineer District and then AEC throughout their coverage period of March 1, 1943, to December 31, 1952. And they played a really instrumental role in development of procedures for handling natural uranium, including rolling rods and -- and machining techniques. And they produce significant number of rods that were used at Hanford. And the rods were typically produced from billets provided by various locations throughout the, sort of, entire complex, so Mallinckrodt and MIT provided some, so.

All right. So, the SC&A review. So, this was back in October of 2014 that the appendix J of TBD-6000 was initially approved. SC&A was tasked with the review and later that year, May 12th, they issued their review, which detailed seven findings and two observations.

So, to go through those, so the first three findings, finding one, was -- that was really the basis for this white paper. It was a finding of underestimated number of uranium workdays. Initially as Dr. Anigstein mentioned -- excuse me -- Dr. Anigstein mentioned, our focus was initially on recorded documented rolling campaigns, and we didn't look at contracts or billing with the University of Chicago. Finding two, dealing with underestimated inhalation intakes, it stems from the same issue. The inhalation intakes were underestimated due to the same issue of underestimate -- under estimating the number of uranium workdays. Finding three is the same, underestimated post -- photon and electron dose rates from contaminated floors and number of rolling days.

Then finding four, underestimated doses from external exposure to uranium, same issue under -- due to an underestimated number of rolling days or operational days. Finding five deals with the improper combination of personal dose equivalence, which is the dose that we use for exposure to uranium metal. That was combined with exposure rates from contaminated surfaces. So, the -- those units are expressed in milliroentgens and the Hp (10) is in millirem, and those were combined and then converted to organ dose where we have to, actually, evaluate those separately and convert both of those to organ dose.

Finding six also ties into finding one, underestimated doses to the skin from exposure to uranium. And then finding seven, we mention briefly this was part of a separate white paper where there was some incorrect geometry in the MCNP analysis that was done.

So, and then the two -- I -- I generalized them as two observations.

Insufficient information for review that was publicly available, and there was a comment -- there were several comments that a lot of the data that we used was tabulated and maintained within the site research database and other locations that weren't readily accessible. And then the second observation had to do with inconsistencies in the general assumptions that were used in Appendix J and TBD-6000. So, for example, Appendix J uses a -- an assumption that for external dose, that a worker is exposed for eight hours a day to a uranium rod, and the TBD-6000 general assumption is that they're exposed for -- you know, the operational workers exposed for four hours per day. So, there's inconsistencies without any explanation as to why.

So, and, again, if there are any questions as I'm going through this, you can feel free to stop me as I'm going through, and I'll try to answer them, or if you want to save them to the -- to the end, that's fine as well.

So, we'll get into the assessment of rolling days that we had together. So, we issued this white paper back in July to describe our method of how we determined the number of operational days. As Dr. Anigstein mentioned in his presentation, a lot of times we have receipts on one end or the other of a sum campaign. So, we have, you know, billets coming in, rods coming out, or masses of these things coming in and coming out, so it's -- it's -- in order to connect the dots, we had to come up with some general assumptions about average billet and rod weight, the yield from -- you know, going from a billet to a rod, and then the production rates or a rough idea of the production rate of -- of rolling and machining operations.

So, the method that we used to determine the average billet and rod



weight was we looked at specific contracts that Joslyn had with the Manhattan Engineer District. And some of those contracts, we were, actually, able to pull out the number of billets that were coming in and the weight -- the total weight of those billets. So, what we did was we summed the weights the -- the weights of all the billets and divided that by the number of billets that came in to come up with an average weight for a typical billet. And we did the same thing with the rods. So, we had a number of rods going out, a weight of rods going out, and simply divided the weight by the number of rods, and -- and we came up with an average weight per billet and an average weight per rod.

So, the -- the next thing we wanted to do was come up with a billet to rod yield. The reason that this was -- is important is because the yield for taking a billet and rolling it into a rod is going to be much higher than when you start to add other machining and grinding to that same operation. So, we used this letter from the head of the metallurgy and control division. There's, actually, a table that provides the observed rolling and machining yields for all different -- for several different operations. And this gave us kind of a good basis to determine okay, if we have this -- a certain weight of material coming in and we compare it to the weight coming out, if the yield is below 95 percent, we need to probably look at whether -- or assume that other operations also happened. So, Joslyn may have taken in billets and just rolled them to be machined at a different facility. They may have machined the rods there. And, sort of, the best way to determine whether machining also took place was to look at the -- the overall yield of the operation.

And then finally, coming up with, sort of, default production rates for rolling in machining. Here, we -- we sort of did the same thing. We looked at contracts with -- that contained the billet and rod information and job length. One of the first things that we did was exclude any contracts, which either were documented to take place in less than one day or were likely completed in less than one day, because we couldn't determine really the fraction of day that -- that the work was completed in. And, basically, what we found was there's a pretty significant range depending on presumably what else was going on at Joslyn, but a fairly large range of -- of rolling rates between 5.3 tons per day to almost 20 tons a day.

The machining rates are -- we really use two documents. One document, the Simmons document from 1943, they rolled 158 rods in 10 days, so that gives you a output of about 15 -- almost 16 rods per day. And then the second document, Klevin, they -- in that instance, they -- they rolled 12 rods in a day, which was split between two to six hour -- excuse me -- two eight-hour shifts, so that gives you a total of 12 rods per day. So, to be claimant favorable, we went towards the lower end of the production rates for both of those. So, we used a default rate of 5.3 tons a day for rolling and then 12 rods a day for machining

Okay. So, I didn't want to go through year by year and explain, you know, every document that we used to come up with a -- or every document that was used to come up with a rolling period. Similar to Dr. Anigstein, we -- during the SEC period, the rolling and machining days were combined because internal doses are inner -- internal dose reconstruction is infeasible, so there's no real reason to -- to separate those.

And then well, a -- sort of, a big difference was the assumption of six working days per week. So, that gives -- that gave us a total work -- total number of workdays per year. We -- we used 300, so that's -- that's one of the larger differences. So, I think for -- for brevity and just for comparison, to illustrate the difference in the numbers that we came up with -- I'll leave it on the screen for a little bit. If there are any questions -- I'm going to go into a little more detail about 1944 and 1946, why there's pretty large deltas there. But I hope that this is illustrative of -- of, you know, we, actually, found quite a few more rolling days in some years, quite a few less in some years. And it -- and it really just comes down to the -- the procedure that we used.

Are there any questions on this screen before I go on? Dr. Anigstein also mentioned I gave him credit for an extra day down here. I came up with eight when I -- when I reviewed it, but I think he said this was seven, so --

MEMBER BEACH: Yeah, no questions here, Alek. Thanks.

MR. KRANBUHL: Okay. Let me go on then.

So, let's talk about 1944 and 1946. So, in 1944, that difference of 41 days is entirely due to our assumption of Joslyn operating on a two-shift, 16-hour workday; whereas, SC&A -- SC&A assumed that they were working a single 10-hour shift or 9.6 hours per day. And then so, for 1946, that difference is due to, sort of, the throughput rate. SC&A assumed that it would take Joslyn 62 days to roll 12 tons of rods, and our estimate, we use the default rate of 5.3 tons per day. So, that's why those two years have such relatively large differences.

And I -- just for comparison, I -- I sort of put up our method for the University of Chicago contract, why that was different, so. So, in our calculation -- it's, essentially, the same. We're just using more hours in the workday. And there was, also, a minor transcription error in the SC&A report. They used 13388; whereas, the total billed amount that was actually, in the document was 13338. So, it's a difference of \$50, about four hours of work, so not -- not a large amount, but.

So, moving on. And so, really just --

CHAIR ZIEMER: Alex -- Alex --

MR. KRANBUHL: Yes?

CHAIR ZIEMER: Let -- let me -- this is Paul. Let me interrupt quickly. How about 1950? Did you mention that?

MR. KRANBUHL: 1950?

CHAIR ZIEMER: Yeah.

MR. KRANBUHL: Let me go back.

CHAIR ZIEMER: Thirty-one.

MR. KRANBUHL: Where we found the extra 31 days?

CHAIR ZIEMER: Yeah. That -- that seems, like, a little -- I mean, most of your numbers are pretty close. You mentioned two of them that aren't. What -- it seems like the machining for 50, the plus 31 seems a little bit far out, too, one way or the other. What was main issue there?

MR. KRANBUHL: I -- I -- I would like to go back and double-check with the white paper since I have the presentation up on my screen, and I can't check.

CHAIR ZIEMER: Oh. Okay.

MR. KRANBUHL: I believe we actually, found a few more instances of rolling campaigns for 1950, but I -- I will verify that --

CHAIR ZIEMER: Okay.

MR. KRANBUHL: -- once I'm done sharing my screen.

CHAIR ZIEMER: Sure.

MR. KRANBUHL: I'll go back and double-check and --

CHAIR ZIEMER: Yeah.

MR. KRANBUHL: -- and get you an answer.

MR. SHARFI: Alek, do -- do you want me to help you with that one?

MR. KRANBUHL: Please, Mutty, if you have the answer.

MR. SHARFI: I believe the difference is we -- they had ten -- I think we ended up at a lot more machining days, --

CHAIR ZIEMER: Yeah, right.

MR. SHARFI: -- because we ended up 41 machining, and -- and it -- and a lot of that driver, I think, was that -- that assumed -- because we did a very conser -- so, we set up -- of us setting up a set number of a throughput regardless of a time period. We're setting -- presetting up the number of machine days for throughputs, and -- and in that one, I think, SC&A, kind of, used it -- at some point, they were using a production rate and other days, they were using previous year's number. And so, their inconsistency gave them, I think, a little fewer machining days where ours is based on the throughput. Because I don't -- I think all our references are, basically, the same, so I don't know for tonnage changed that much.

CHAIR ZIEMER: Yeah.

MR. KRANBUHL: Yeah, I think -- sorry. I -- I -- I think it did come to

me. So, we used the default rate of 12 rods per day. And that's what two shifts, and the SC&A assumption was 18 rods per shift. And for that period - for this period, they, actually, assumed that Joslyn was working two eight-hour shifts.

CHAIR ZIEMER: Yeah, okay.

MR. KRANBUHL: So, the -- they assumed much higher throughput or, I guess, a higher work rate for the machining than we did.

CHAIR ZIEMER: Okay.

MEMBER ANDERSON: Just -- just a -- this is Andy. Just a quick question. Are -- is your assumption these projects were consecutive, continuous days, or were -- the -- like, machining was that potentially going not all in 41 straight days, but spread out over three months per year or something?

MR. KRANBUHL: Yeah, so what --

MEMBER ANDERSON: Which would mean they were storing both the raw uranium and the rods as part of a group somewhere.

MR. KRANBUHL: Yes, I understand your question. And we looked at it as an amount of work time. So, we didn't consider storage of the material --

MEMBER ANDERSON: Well, their cleanup -- I mean, the cleanup if it was going continuously might have been different than if they did some and then they either shut down or they went to something else, and they would not necessarily have -- I mean, how -- how careful -- careful were they with the uranium, as far as the waste?

MR. KRANBUHL: Well, I think that the waste was very -- I mean, it's very well documented that they did their best to control as much of the

waste as possible, because all the material was -- you know, it was heavily controlled. The waste was collected and -- and reformed in -- into new ingots. So, you know, it -- it -- that wasn't necessarily part of our analysis. But I think that the method that we used, because we use the low-end production values, because we assumed that, you know, the rolling campaign would take -- take place and then once the rolling campaign was over, then all the machining took place, instead of those -- because there's no reason those operations can't happen at the same time. We assume those things happened concurrently. So, I -- I understand that --

MEMBER ANDERSON: Well, you said sequential -- you -- you assume sequential.

MR. KRANBUHL: Yes, exactly.

MEMBER ANDERSON: Okay. (Indiscernible) --

UNIDENTIFIED SPEAKER: (Indiscernible.)

MEMBER ANDERSON: -- kind of my questions When you go days of work, you know, what happened over -- were there blank days in between or before and after?

MR. KRANBUHL: Well, and at -- what we did in -- and I'll, sort of, highlight this a little later, is when we had periods of no operations, we come up with a dose rate based on contaminated workplace. And I hope that --

MEMBER ANDERSON: Okay.

MR. KRANBUHL: -- sort of highlights --

MEMBER ANDERSON: Yeah.

MR. KRANBUHL: -- what -- what we did.

So, yes. Like, like I said, this number, because we use low-end

production values, there's also likely overlap of certain operations with the work that we assumed occurred under the University of Chicago contract that, you know, for the analysis was separated. We consider them two different operations. And then, again, we assumed that the rolling and machining operations happened sequentially, not at the same time.

All right. So -- so moving forward. We, sort of -- we already talked about the outstanding findings. You know, now, that we have this estimate of operational days, that's sort of the first step in closing findings one through four and six that were all related to the underestimated number of working days. Finding five, like we've already talked about, was -- it's just an error due to improperly combining two separate units. So, milliroentgens -- milliroentgens and millirem, and then the MCNP runs, that's ongoing. Those are still being evaluated, because they're going to effect at least one other site, maybe others as well.

So, this is a -- a sample of what the external dose calculation will look like at the end of this. So, we have the external dose is equal to the sum of the doses from each operational day. So, for an operational day, we assume that the worker was exposed at one foot from a uranium rod. So, that's point .703 millirem per hour, and then you just multiply that number by the number of hours in a workday and the number of operational days, and that gives you the operational dose. And then for nonoperational days, we use the procedure from TBD-6000 where you have a contamination level, which is derived from the airborne activity for a given -- for a given operation.

That number is then multiplied by that 1944 meters, which is a -- it's a combination of the settling velocity and the number of seconds in 30 days.



And then that contamination level is then converted into a dose rate through -- by using this those conversion factor for alpha contamination to gamma dose rate, so. So, when you add these quantities together, that will give you the annual external dose rate.

And then on the intake side, it's a similar calculation, but here we are taking the airborne concentration for a given operation times the breathing rate times the number of hours in a workday and operational days in a given period. And then, so this would be the operational intakes.

And then the nonoperational intakes are based on the assumed contamination labor -- level, which we talked about on the previous slide. And then the resuspension factor or the resuspension rate, that comes out of TBD-6000, the respiratory rate, and then the number of hours in a workday, and number of nonoperational days. So, what this does is, basically, average the intake for the number of operational and nonoperational days and then gives you a -- an average daily intake for the year. And then that gets multiplied by the number of days that the employee worked for -- for the given year. So, if you have partial years, that's, -- that's how you would prorate the intake for a year.

Are there any questions about either of these? I don't want to skip ahead. I think we're pretty close to the end as well.

CHAIR ZIEMER: I think you can proceed. Yeah, it looks good.

MR. KRANBUHL: Okay. So, findings three and six both dealt with this Putzier or Putzier (pronouncing) effect. Sort of, going through notes, the issue -- the main issue here was that there was concern that this wasn't accounted for in Appendix J in the Joslyn Appendix or in TBD-6000. What

this is, is it's the basis for the factor of 10 beta dose rate or the ratio, I guess, of a gamma dose to beta dose rate. So, it's a factor of 10 -- the photon dose rate is multiplied by a factor of 10 to account for this effect. And that -- that language is in TBD-6000, Section 3.3.1. It's also in Joslyn Section J 5 that, you know, it briefly mentions it. It doesn't call out the Putzier effect specifically, but it is accounted for. And according to the BRS, this was resolved several years ago.

And with that, that's all I had. If there are any additional questions, I'd be more than happy to answer them. Let me stop sharing as well.

### **WORK GROUP DISCUSSION**

CHAIR ZIEMER: Thank you very much, Alek. Very -- very good presentation. It -- it certainly looks to me like the numbers -- although, there's a few that seem to be substantially different in your comparison table with NIOSH, those -- the other numbers are -- are fairly close. I'm not sure exactly what we would consider close enough, but I think it's going to be worthwhile for SC&A to take a close look at your report and, particularly, take a look at how we might consider resolving those bigger differences. And then, also, you know, just have to look at the calculations because your -- if what I'm seeing is correct, we could be pretty close to resolving all the outstanding issues. That's not going to happen today, but I think it could happen fairly soon. We'd have to have tasking of SC&A to -- to take a look at this final report. I think it goes further than I originally thought it was ready to go. But those are my comments right now. Let's see what Josie and -- and Andy have to say.

MEMBER BEACH: I agree with you Paul. I was going to ask Alek about that Putzier effect, when it was settled, since we don't have -- I do remember that conversation many years ago, but I don't think it was for this site. I think it was for a different site.

MR. KRANBUHL: Yes, I -- I'm sure it's popped up at several different sites that handled freshly cast uranium billets. According to what I have, was January -- January 6 of 2017. It was resolved with the subcommittee for procedure review.

MEMBER BEACH: Yeah, that's what I was remembering. So, okay. And that's something that SC&A will look at when they review this, if they are so tasked. And then, do you feel like, Alex, you have everything, all the contracts you can get a hold of, for -- for that site, for that time period?

MR. KRANBUHL: I would love to be optimistic and say so. I can tell you that I personally have looked at every document that we have for Joslyn in the SRDB, and so if it exists, then we just don't have it.

MEMBER BEACH: Okay.

MEMBER ANDERSON: The only other comment I would have is -- and we'll get that when the number of claims and things that -- we get that information, but would -- would the -- have there been any former worker interviews? I mean, that might help with documents in periods that may be -- be missed, if there are any workers to interview. It may not be necessarily given what -- what you've already done, but I just raise that as something that we may want to think about at some point.

MR. KRANBUHL: I don't know of any worker interviews. I don't recall seeing any. I -- I -- because, again, this was very early on in the --

MEMBER ANDERSON: Yeah, I know. I know.

MR. KRANBUHL: -- and a lot of the individuals had already been working at Joslyn for five to 10 years or so before they even started on this project. And unfortunately, I don't know that we had an opportunity. I don't want to --

MEMBER ANDERSON: Yeah, I don't want to --

MR. KRANBUHL: -- speak incorrectly here --

MEMBER ANDERSON: -- propose that because that can add a lot more time, than may be necessary here. But, again, if we know how many claims have been filed and what -- what has been -- how those were done, that might help. But if there -- if any of those were done, I haven't seen those. So, I would be interested. If there haven't, that isn't to say they need to be done. CHAIR ZIEMER: Well, you know, there's a certain consistency. They have records --

MEMBER ANDERSON: Yeah.

CHAIR ZIEMER: -- that exist for every year here, and it looks like -- you know, during that whole period, there's very careful accounting for uranium, --

MEMBER ANDERSON: Yeah.

CHAIR ZIEMER: -- particularly -- I mean, we're going back to the early days of when -- of the Manhattan Project. So, the fact that we have the record set that exists there and there doesn't seem to be any years missing -- is there, I think -- because I -- I looked at it. We have record for projects for -- or for -- you know, for 3, 4, 5, 6, 7 -- yes. Every year from '43 to '52 we have -- we have records of the campaigns there, so that gives

me some degree of confidence that they have kept pretty careful records.

MEMBER ANDERSON: Haven't missed much or haven't -- unlikely to. Thanks. Yeah.

CHAIR ZIEMER: Yeah.

MEMBER ANDERSON: I -- I -- I'm -- I was impressed at the number of records they were able to dig up.

CHAIR ZIEMER: Are there any further questions for either NIOSH or SC&A at this point?

MEMBER ANDERSON: I don't have any.

CHAIR ZIEMER: I assume --

MEMBER BEACH: I don't.

### **WORK GROUP DISCUSSION OF PATH FORWARD**

CHAIR ZIEMER: I assume from the discussion, the subcommittee or the work group -- it's not a subcommittee -- our subcommittee (sic) would like to have SC&A tasked to take a look at this report in some detail. And as soon as that can be done, I think this work group can meet again. I'd like to resolve all the issues and put this whole thing to bed as soon as we can.

MEMBER ANDERSON: Yeah, reconcile the differences is all we --

CHAIR ZIEMER: Yeah, yeah.

MEMBER ANDERSON: Yeah.

CHAIR ZIEMER: Yeah, yeah.

MEMBER BEACH: I agree with --

MR. BARTON: This is Bob Barton. Just for clarification here, and I -- I agree, because I think -- maybe there were some new -- new references

introduced that we should look at and see what NIOSH did. Again, it's -- it was a decade ago, so, you know, a lot has changed. A lot more things have been captured.

The main question I have is whether it's appropriate at this time to sort of rebase line the issues matrix we had put together way back in -- in 2015 to see what's still outstanding, what maybe has been taken care of by, you know, the -- the Putzier effect discussion in 2017, if that's an appropriate thing for us to take a look at, or if that's premature and NIOSH/ORAU is planning to present more material based on SC&A's review of the appendix, which was, essentially, a TBD review.

CHAIR ZIEMER: Well, as -- certainly, we don't want to leave any -- any dangling issues from -- from previous matrices. So, we'd want to come to closure and anything that's -- that remains open from previous efforts. And I think, to me, that should be included in the tasking, that we make sure that all -- anything that's still open, that we take that into consideration. Many of those things may be covered by what you're -- would do here, but certainly that's --

MEMBER BEACH: We might -- Paul, we might want to look at the ones that are in abeyance, too, since it's been so long since we've looked at those.

CHAIR ZIEMER: Yeah, yeah. Yeah, Bob Bartn, can -- can you -- if this is -- if this gets tasked, can we include that, sort of, wrap up everything that's, sort of, still out there from before?

MR. BARTON: Yes, absolutely. I just wanted to make sure that weren't getting ahead of ourselves --

CHAIR ZIEMER: Yeah, exactly.

MR. BARTON: -- if NIOSH was planning to --

CHAIR ZIEMER: Right, right.

MR. BARTON: -- you know. But yeah, we can certainly take a look at that. Absolutely.

CHAIR ZIEMER: And we don't necessarily need all of that for the report to the Board. We'll just tell them what we're doing and what we have done this time.

MR. BARTON: I think Tim, maybe, wanted to add in.

CHAIR ZIEMER: Yeah, go ahead.

DR. TAULBEE: Yeah, thanks, Bob. I was weighing back and forth do I want to comment or not. Bob, I certainly get, you know, what your point is -- is -- you know, is there any other products coming from NIOSH at this time, and there's not immediately because we're kind of looking for the work group's concurrence with these working days in order to address the other findings, because as Alek pointed out throughout his presentation, that is a critical component to closing out those other findings.

So, you know, we know we haven't addressed those yet, but if that's something that, you know, SC&A and the work group wants to, you know, bring up again, you know, that's fine. But, you know, please keep in mind we are aware that we have not addressed those other findings, because they're all kind of contingent on this first one of the number of workdays. So, I kind of would propose that, you know, you resurrect the old issues matrix to just give a status, but then look heavily at these -- at the workdays and what we've done to see if we can get some concurrence on

that, then we can address the other findings.

CHAIR ZIEMER: Yeah, Tim, that's a good -- good point. And I think the main thing was we want to make sure that we're not overlooking what -- what we have yet to do beyond resolving the workdays issue. So, not -- not necessarily having additional work done on them, but simply identifying what's still out there.

DR. TAULBEE: Correct. And that's where I think looking at a full-issues matrix of all of those things, of summarizing it --

CHAIR ZIEMER: Yeah.

DR. TAULBEE: -- recognizing that we have not responded to --

CHAIR ZIEMER: Right.

DR. TAULBEE: -- some of them.

CHAIR ZIEMER: Yeah, that's -- yeah. Okay. I -- I think -- are we all in concurrence with that, work group?

MEMBER BEACH: Yes. Yes.

MEMBER ANDERSON: Yeah, that's fine.

CHAIR ZIEMER: Let me ask, Rashaun. What -- will you be in a position to go ahead and issue a tasking for this?

DR. ROBERTS: Yes. Yes, the tasking is fine.

CHAIR ZIEMER: Then I think we have concluded what we need to address today unless there's really questions from anyone. If not, thank you very much. Been productive and I appreciate --

DR. ROBERTS: You're on mute.

CHAIR ZIEMER: Yeah, here I'm talking to myself. I was simply saying that I think we're ready to adjourn this meeting. I wanted to thank both



SC&A and NIOSH for the work they've done on this and helping us, kind of -- kind of, get this back on track and point toward what we can do. And we'll proceed on that basis with the issuance of a work group -- with a tasking and -- and proceed from there. So, thank you very much, and if we have no other questions, we will stand adjourned.

(Whereupon, the meeting was adjourned at 2:37 p.m. EST.)