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

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ADVISORY BOARD ON RADIATION AND
WORKER HEALTH

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WORK GROUP ON HANFORD

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FRIDAY
NOVEMBER 30, 2012

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The Work Group convened telephonically at 11:00 a.m. Eastern Standard Time, James M. Melius, Chairman, presiding.

PRESENT:

JAMES M. MELIUS, Chairman
BRADLEY CLAWSON, Member
JOHN W. POSTON, Member
PHILLIP SCHOFIELD, Member
PAUL L. ZIEMER, Member

ALSO PRESENT:

TED KATZ, Designated Federal Official
FRED DUNCAN, ORAU Team
TOM FOULDS
SAM GLOVER, DCAS
STU HINNEFELD, DCAS
TOM LABONE, ORAU Team
JENNY LIN, HHS
JOYCE LIPSZTEIN, SC&A
ARJUN MAKHIJANI, SC&A
JOHN MAURO, SC&A
PHILLIP SCHULTZ, ORAU Team
SCOTT SIEBERT, ORAU Team
JOHN STIVER, SC&A

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(11:00 a.m.)

MR. KATZ: Okay, it's 11:00 a.m. Good morning, everybody. This is the Advisory Board on Radiation and Worker Health, the Hanford Work Group. And let's first get started with roll call, beginning with Board Members. We're speaking about a specific site, so please speak to conflict of interest for all Board Members and agency-related personnel, beginning with the Chair.

(Roll call.)

MR. KATZ: A note for everybody, we have materials related to this call on the NIOSH website, as well as, they should have been distributed to interested parties and certainly to all Board Members and related staff. And the principal material is a presentation from NIOSH, and also the agenda for this meeting. And you can also find them posted on the NIOSH website under the Board

section, under the meeting section, under today's date. So, you can go there and find that if you don't have that already in your hands.

Let me just also make a note, for the benefit particularly of Mr. Foulds. Mr. Foulds provided last night and I provided this morning when I received them several materials for the Board Members and related staff. And I just want to note, particularly for Mr. Foulds' benefit, that the Work Group will not be discussing any individual cases, including a case that might be represented by Mr. Foulds, so those individual materials that are details from someone will not be taken up by the Work Group.

Otherwise, let me just note for everybody, please, if you're not addressing the group, put your phone on mute, because it will improve the audio for everybody, including the court reporter. If you don't

have a mute button, press *6, that will mute your phone. And then to take your phone off of mute, press *6 again. And, also, please, nobody put the call on hold at any point. If you need to leave the call for a piece, hang up and dial back in. Thank you.

CHAIRMAN MELIUS: Okay. Thank you, Ted. At our prior Work Group meeting where we were discussing this petition, 00155 regarding Hanford, we had at that meeting reviewed and discussed the SC&A review of the NIOSH Evaluation Report regarding this petition, and we had talked about a number of the issues related to U.S. Testing. So, at the end of that discussion, we had decided at least one other issue we wanted to discuss as a Work Group, which was to have a little bit better understanding of the dose reconstruction methods that were being used for internal dose for this particular situation. So, we asked for NIOSH to develop a presentation for us on

those dose reconstruction methods.

So I will start the call today; I think Sam will be doing this presentation. We all have the PowerPoint slides that he prepared, and then we'll discuss those. So, Sam, you're ready to go?

DR. GLOVER: Yes, sir.

CHAIRMAN MELIUS: Okay. Before I do that, any Board Members have any questions on procedure or otherwise? If not --

MEMBER ZIEMER: I have none. This is Ziemer.

CHAIRMAN MELIUS: Thanks, yes, Paul.

Go ahead then, Sam.

DR. GLOVER: I want to mention in the folder this material was transferred to you guys, I also provided some of the quality assurance reports in that time period.

MR. FOULDS: I'm sorry, Sam, can you speak up a little bit? You're hard to hear

on this end.

DR. GLOVER: Yes, I'll do the best I can here. I'm having to do this at home since I'm sick. I included several references from the QC program from PNNL in that folder for your guys' easy and convenient access. Also, three, actually four documents from PNNL that kind of summarized -- they were doing a plutonium fecal analysis program because of their concerns about Super S. So, for that it's pretty direct and to the point related to some of the different materials, so those are in there, as well. So, let me just -- some of this front material I'm going to go through fairly quickly, so I'll just -- unfortunately, the slides aren't numbered, but hopefully you can just keep track of them on the tab numbers. As I change slides, I will make sure that I say where we're at.

All right, so Slide 2. All right, so briefly just a very quick overview. I did

focus on the bioassay program, focusing on Super S and the fecal sampling. I want to discuss a little bit about OTIB-49. I didn't know who did part of Rocky Flats and how familiar you are with OTIB-49, which is our Super S dosimetry, how we deal with Super S. And then also how we deal with OTIB-49 at Hanford.

I didn't get into the presentation. I was way late, maybe like yesterday asking ORAU in a conference call. They've done their best to verbally summarize what the changes would be to these, but essentially we'll go through that as well, at the very end. I'll give them an opportunity to discuss what they reviewed in the 11 cases out of probably 8,000 cases that have fecal samples used at Hanford. So, there's not many of these.

So, just to get you all back, we're going to be on Slide 3. This is November

10, 2009. The petitioner requested all personnel who were internally monitored, urine or fecal, who worked at the PFP, the 200 Area at Hanford in a very narrow time frame, January 1, 1987 through December 31st, 1989.

Qualified for evaluation May 3rd, 2010, and it was based on falsification of the records, potential falsification of records. Number 4, please. There were four SEC Classes, just to make sure we're all on the same page. The four SEC Classes previously enacted in Hanford, the very beginning one `43 to `46, `46 to `68, then we subsumed that to be all areas, because those others were very specific, and then this most recent one we've added July 1, 1972 through December 31st, 1983. These all have individual SEC numbers. They were added as -- essentially, they were really part of SEC 55. And that was requested up through -- I'm sorry, 57, page 5, SEC 57 petition requested through 1990, so the

Advisory Board and NIOSH continue to review post-1983.

SEC 155 was encompassed by this previous SEC; however, the data or the request is so specific and focused we deemed it appropriate for separate review, again, based on falsification of data.

And just to refresh everybody's memory, it was based on evidence from the U.S. EPA of purposeful wrongdoing by U.S. Testing, resulted in NIOSH determining that issues regarding the quality of the bioassay data require further investigation. This is page 6, I apologize. The intent of NIOSH is separate evaluation of SEC 155, which will ensure that issues identified with U.S. Testing's non-bioassay program did not also adversely affect the company's bioassay analysis.

Now, that being said, most of the discussions we were talking about really were driven by the bioassay, what was going on with

the fecal analysis program and concerns about the quality control, so we'll focus on that.

So, we were again evaluating this time period from January 1, `87 through December 31st, `89. While the location was specified employees who worked only at the PFP, Plutonium Finishing Plant, the evaluation was focused on the overall program of bioassay which applies to all hands.

Page 8. So, just to refresh your memory on some of the sources of exposure, and I've starred two of them because those are ones that PNNL specifically were concerned about as being related to fresh -- that means has no americium-241 -- freshly produced plutonium that could produce Super S material. So, that would have been the weapons-grade metal production in the remote mechanical line, mechanical C, RMC line. And there also had other areas in the PFP, obviously, major plutonium facility, so they also had the

plutonium reclamation facility and miscellaneous glove box treatment operations, analytical lab operations, development laboratory operations, and also in this time, the Poly Q process, a mixture of polystyrene and plutonium oxide which I believe was used mostly for criticality kind of works.

Also, they discussed doing a limited run on workers, there was an oxide production line at PUREX, so they were also concerned at that facility of being low americium-241 content plutonium that could be Super S.

Slide 9. So, I tried to get up some data to give you a flavor for how many samples. Obviously, U.S. Testing processed many thousands, there's probably, I think, 15,000 samples versus a few hundred fecal samples at Hanford. The urinalysis is the principal bioassay method. And it was also then supplemented by in vivo. Workers deemed

to have a higher risk may have fecal samples, and they have a limited scope program focused on these, and they discuss that in some of the papers.

And americium was typically monitored with in vivo counting, and it was usually an indicator of plutonium intake. So, of course, we'll not discuss in this review, but Hanford maintained an extensive air monitoring program to supplement this.

Slide 10. PNNL was responsible for many of these years for overseeing the quality of data produced by U.S. Testing, and just very briefly they had several hundred C- retrospectively, these numbers don't look that large at 250 blanks and quality controls, `87 to `89 that were blind bioassay. They weren't double-blind, but they were blind, and the annual reports during the time period of interest were reviewed by NIOSH as part of the evaluation. Those are provided for you guys.

If you look retrospectively at these, U.S. Testing had its own internal QC with blanks and quality control samples, so these were separate and above. And then putting this in perspective with the historic programs, you know, the 1990s and `80s is when EML and others really started to implement these kind of programs and provide additional blinds, and give you this extra quality control. So, these aren't the kind of programs that you would see in the early `50s and `60s, so we were actually asking this to be held to a very high standard. Of course, they were accused of falsification of data, so I guess that's not unreasonable.

Slide 11. So, just before this happened, Hanford, I'll call it they modernized the bioassay methods. Now, they used a total alpha measurement technology, they separated the plutonium and then they would measure that. So, they would just get

the number of counts. And in 1983, they updated that to an alpha spectrometry method, and they did that for uranium as well as plutonium.

I know a number of my esteemed colleagues have seen a lot of alpha spec, but some of us may not, so I included some slides from old material that I produced for the U.S. Transuranium and Uranium Registries, so just to give you an idea of what an alpha spec would look like for various radionuclides.

One thing of note is that, in the massive dosimetry files that we have, we talked a little about MDAs. MDAs can vary because U.S. Testing had to respond at Hanford. Hanford at times would say, "I want a result today. We've got a guy with a massive intake. We're going to chelate him. I want a result today."

So, those are not going to have nearly as good MDA as a sample where they can

take their time. And those are listed in the data sets or in the database, so you can see what's listed with those. So, I did want to make brief mention of that. There are many kinds of plutonium samples, not just one.

We did our best on Slide 12. We asked ORAU to do -- I'm not very good with databases, so they extracted this, because it's a massive database. Any time you have a fecal sample for somebody, they found out how many samples on either side of a year for urine or in vivo had been taken. You can see that there were a few that were zero, but those were all people who were part of the internal QC program. In other words, they were the people providing blind samples for the fecal program. So, anywhere from one, in some cases they actually have more than 10, so you can actually get a feel for this. And in `87 they were really just starting this plutonium, they were still on sort of a small pilot

program. `88 you get more samples, `89, `90, and then you see they actually terminated that in 1990, because their concern went away. The fresh americium plutonium -- fresh plutonium with no americium that they couldn't see in the in vivo, so their concern went away. That fresh plutonium wasn't going to be present. And they still used fecal sampling for accidents, so you'll still, of course, see that continue on, but not nearly as many samples.

DR. MAKHIJANI: Sam, could I ask a question about this chart? This is Arjun Makhijani.

DR. GLOVER: Sure.

DR. MAKHIJANI: Each one of those bars represent one worker, or --

DR. GLOVER: No, actually, that would be -- so, let's say 1988, there are 180 workers who have four -- and I apologize, I should have gone through this, so say 1988,

that purple line that goes up to 180. So, that list, that would be four either urine or in vivo counts for that fecal sample there. So, they had 180 instances where workers had four other bioassay samples. And you'll see there's a little blue line that starts it, so there were only a handful that only had one. So, most of these guys would have been on a more aggressive bioassay schedule. Probably just annually, they may have been annually both for plutonium urine and in vivo, which I guess if you look at one year to either side, that sort of makes sense, so we're getting four as being the dominant factor where these guys were in an annual in vivo and urinalysis program. I can certainly provide those to you, Arjun.

DR. MAKHIJANI: Yes. Sam, I got confused because the title says "Bioassay for an Individual," and then the vertical axis has "number of bioassay samples," not number of workers. So, it's a little confusing. I guess

I can talk about it with you off line.

DR. GLOVER: You're right. That would have been a better axis title on that. Really what I'm trying to say is for 180 workers, the number of workers who had, for a given year, how many bioassay samples they would have had per fecal sample. So, they had a fecal measurement, then either a year before or a year after that measurement, how many urine or in vivo samples do they have?

DR. MAKHIJANI: Okay.

DR. GLOVER: And really just trying to show that you had a very -- they weren't just getting fecal measurements. These things are -- this is a very small part of the overall program. And they just want to verify that by actually testing it.

So, on Slide 13 -- go ahead.

MEMBER ZIEMER: Hold on. This is Ziemer. I think I had the same question, so let me understand if I'm interpreting it

correctly. So, in `88 you had 180 workers who had four other samples beside the fecal?

DR. GLOVER: Yes, sir. They would have had --

MEMBER ZIEMER: And then three of 60, 70 or so had three samples plus the fecal and so on. Is that how we're --

DR. GLOVER: Yes, sir, that's exactly correct.

MEMBER ZIEMER: Okay, thank you.

DR. GLOVER: Sorry for the confusion on that chart. It would have been better, I could have explained a little bit better coming into it. Is everybody okay with that one then? I'll move to Slide 13.

MEMBER SCHOFIELD: Ted, this is Phil. I'm on the line.

DR. GLOVER: Oh, good. So, we'll be on Slide 13, Phil.

MEMBER SCHOFIELD: Okay.

DR. GLOVER: Did you catch the

explanation of Slide 12?

MEMBER SCHOFIELD: Yes, I did.

DR. GLOVER: Very good. All right. I just did a simple query to give you a relative feel for how many urine, which is the U of course, the F is fecal, at any particular time. So, they -- roughly, I tried to force the program to be on an annual but it could be a little stubborn, so it's not quite exact. But you can get a real good feel that we're looking mostly anywhere from 1,500 to 3,000 bioassay urine samples, and fecal analysis is a very small part of the overall program.

So, Slide 14. So, it was interesting that, you know, Hanford -- Tom LaBone down at SRS and others were very aggressive about some fecal analysis programs. Tom was the author of OTIB-49; he's on there. He's on the call with us today. And my Hanford principal internal dosimetrist, and also the overall internal for Scott -- they've actually

done a lot of the looking at the cases. Let's talk about some of those programs. I'm not paying nearly enough attention to my dog, she's not very happy that I'm not paying attention to her. Sorry about that.

Hanford represented -- they presented an overview of technology shortfalls for Superclass Y, a.k.a. Super S, a 1988 document which I provided to you in that directory, "Methods to Improve Plutonium Monitoring."

Now, while this document describes ICRP 30 which is -- this is previous to what we use for this program, and ICRP 30 or 26 lung models, still gives you a feel for what was driving their concerns. And they talk about a number of different issues. And, essentially, the amount of plutonium going to be in the urine was too low to be observed using the alpha spectrometry methods, and they had several processes at the time that

produced freshly separated plutonium which would defeat the lung counting program to get a prompt analysis that would provide what these -- to meet their 100 millirem.

All right, Slide 15. Just very quickly on these, so these are just -- I gave you a few actual numbers. So, these are the kind of levels that they wanted to hit, what the intake rates would be, and plutonium-238, -239, and americium. So, this is what would meet their requirements programmatically. Again, this is not necessarily completely applicable because this is a 6 percent plutonium mixture and this would give them the levels that would meet their requirements.

So, Slide 16, just to give you a feel for how is that getting into the urine and clearing the lungs. So, the top slide, Figure A is the excretion and urine from acute intake measurable at one year. So, you see somebody had an acute intake one year before

that, this is the disintegrations per minute per day in that urine sample. So, that kind of gives you a feel for what you can miss.

The lower curve, expected urine excretion that would be available from the target intake, so you see that within six days they weren't going to meet their target intake. It was below their capabilities, and you could see that's even worse by the Super S intakes. They call it Superclass Y at the time, based on the ICRP 26. So, again, technology shortfall, so they were exploring different ways to deal with that.

So, Slide 17. This is, essentially, how many years minimum detectible intakes of Superclass Y in terms -- so you can see they were -- in terms of rem, they were essentially looking at quite a large missed dose, so they were concerned that they could miss a number of rem, not just a few millirem on Super S.

Slide 18. So, they initiated in 1986 a pilot fecal program, approximately 50 workers. And they had a number of problems, and we need to make sure we take those into account. One, they didn't have very good participation. The workers didn't like it, which is common; it's not a urine or a bioassay method which is well-received. Only 58 of 84 scheduled samples were received. Just to give you a feel for that, 1,719 Pu urinalysis samples in 1987, so they definitely got some feedback from the workers that they weren't happy with that.

The pilot program was continued for 100 workers at the PFP. They showed about 40 to 50 percent of the workers had statistically greater than controls. And the reason I've got to emphasize some of this is, it talks about the QCs that were being done, essentially they were using artificial fecal samples and they had a number of non-exposed

personnel provide human fecal samples. And they were testing those against -- just so they could get a statistical analysis against what the workers were getting, and what is the actual blank in the lab, and how does that compare. Do you see a real statistical difference or are they similar? So they've got to do a lot of chemistry. And they found in their paper, this is actually a 1993 Health Physics paper that about 40 to 50 percent of the workers had statistically greater plutonium than the controls. So, they found a low-level plutonium inhalation intake at the facility, and they confirmed that later by high-level large volume air sampling.

So, Slide 19. So, in April of 1989, about 12 months after the pilot program, sampling frequency was changed to annual, with the provision of obtaining about the same number of samples each quarter, you'll see that there were about 2,156 routine urinalysis

plutonium samples in 1989, about 259 routines. There were also specials, and those can be associated with accidents. They call them specials when you look at the bioassay database.

They did implement the program using experiences from the pilot program. It was mandated by the employers, so participation, while probably reluctant, they didn't have a choice.

External spike fecal samples were not provided that I could tell, that the personnel, they were really looking at the blanks versus trying to determine whether the blanks -- do they get a real difference in the measures, so they really didn't have an external QC, but they would still have been using the standard reagent blank with each batch because you do radiochemistry. You still have to spike -- provide a spike sample where you spike it, make sure your tracer was added

correctly. And you also get a blank because of each set.

Slide 20. So, the routine fecal program operated normally until the contract default by U.S. Testing on June 1, 1990. May samples were never analyzed. In September, before the interim contractor could be put in place -- so they were looking at having an interim contract done until they could get a permanent contractor -- Hanford decided to terminate the program. This was done because the facilities were no longer processing material that would be considered freshly separated Superclass Y.

The dose determinations that were made for workers in the program at the start of the year, so chronic exposure, January through September based on fecal results obtained December 1989 through April 1990. There were 759 Pu urinalysis, 56 specials, and you'll see there are only 35, and this is sort

of the tail end of the program.

Slide 21. I mentioned earlier they published a 1993 paper on the routine fecal sampling program of approximately 100 workers. Again, the quality control samples, it was a mix of artificial and known blank, no natural samples included to compare the results of the workers. 391 samples from workers were provided, there were 47 controlled samples consisting of 31 artificial and 16 from unexposed individuals. And in that paper they describe the sampling and radiochemistry methods used to do the chemistry.

So, very briefly, Slide 22, OTIB-49, it's our basis for estimation of doses for plutonium strongly retained in the lungs. The newer ICRP is more insoluble compounds than ICRP 30. Various accidents did show that it was -- there are cases where it has longer retention. And our OTIB was based on nine cases from Rocky Flats and one from Hanford

that had well-defined intakes and exhibited long retention times. We used upper bound cases to establish bounding doses for Super S materials. We fully compared that data to U.S. Transuranium and Uranium Registries cases.

Slide 22. So, just to give you a feel for the effect of Super S. This is one of the Rocky Flats cases. The purple line, you see it falling off to 10,000 days to being a fairly low one-hundredth of what was inhaled; whereas, the reality is that it stayed in the lungs essentially with very little change for that long time frame. So, this is the kind of analysis that we're doing to make sure that we don't underestimate the dose.

Slide 24, please. Essentially, what you have is the lower curve line on Slide 24, that first slide. That's what Type S normally would be expected, but we are finding in some of these cases that upper line, so what we essentially have done is we've -- it's

a factor of 40 between the upper line and the lower line if you get out to 50 years, and actually you see the lung adjustment dose factors per year. Those are the lines that it takes to get that lower line to these 10 cases. And we used the upper lines to determine the adjustment factors for dose. So, you see that our adjustment factors go up to even above 100 after you get past 40 to 50 years.

So, it's fairly straightforward. It is cumbersome to enact because when you actually do this with chronic instead of acute intakes, there's a whole series of tables in order to deal with this, but that's, I think, pretty thoroughly reviewed as part of Rocky Flats.

So, Slide 25. Just very briefly, this doesn't have the fecal sample. I'll talk about that next slide, but we basically have a number of tables that adjust the dose. So, you

would take the lungs or for the different systemic organs. It's really the most important for the lungs and for the lymph nodes. When you get into the systemic organs, the lung counts and the air concentration data doesn't affect it, but the urinalysis, there are some factors that could apply, because it continues to leak out at a flatter rate than what we would expect. Leaking out of the lungs and still being in the system, so it still continues as a long-term component for the systemic organs, being not in the lung but in the rest of the body.

So, Slide 26. So for fecal adjustment, OTIB-49 does specifically address the adjustment of fecal data. Fecal samples collected less than two months after an acute inhalation intake of less than two months after the end of the chronic intakes should be evaluated with a standard Type S model. Once the intake is determined, the dose is

adjusted, taking direct measurements, fecal samples collected after two months should be treated as if they were urine samples and the dose adjusted by a factor of 3.

So, you can see here on Slide 27 the fraction of intake in the urine versus feces, samples as a function of time. And then on Slide 28, you'll see the urine to feces activity ratio. And you see that nominally gets to be about three when you get past 100 days, so it's kind of a little swirly out there, but they chose a factor of 3.

So, during this period, essentially for the application at Hanford, we used standard DCAS procedures. Assumptions include the age of the plutonium, the plutonium oxide makeup, fuel-grade or weapons-grade, solubility class including Super S. That's not applicable for all cases. I mean, in some cases, it's detrimental to the claimant to assume Super S for certain cases.

And you essentially have to evaluate the information available for the case.

Slide 30, the NIOSH TBD currently uses the contractual MDAs, so SC&A has described that method during this time period. The current TBD uses 10-year old plutonium. I don't know if they included that in their discussion, but that is the base. We are using aged plutonium currently. Weapons-grade and fuel-grade plutonium may be evaluated, see which is more claimant-favorable. Rarely is fecal data available. The OTIB-49 is used. I'm going to have Scott or Fred summarize what they saw. Essentially, though, where we have used it, it's oftentimes because it was the only indicator of an intake. If the fecal sample was positive, so the dose reconstructor chose to use a positive sample instead of a sample that was not indicative of an intake, so it was below the -- the fecal sample showed he had an intake but

not the urine sample, so they chose to use that. And sometimes intakes are not favorable assumptions by their methods and, essentially, case-specific data must be reviewed, since the in vivo data may make assumptions not claimant-favorable.

So, that concludes this. Do you want to let Fred Duncan or Scott kind of summarize what they found in the 11 cases that they looked at?

CHAIRMAN MELIUS: Yes, let's sort of finish up the presentation part. That would be helpful, so go ahead.

DR. GLOVER: Scott or Fred?

MR. SIEBERT: This is Scott. I'll go ahead and do that. It seems like the NIOSH team here is falling apart. Sam's sick and I just got back from the dentist, so if I sound a little slurry, I apologize for that.

We did walk through the 11 cases that specifically did use fecal sampling in

the assessment. It includes cases that used the fecal sampling for the assessment, and also a couple where it was just used to validate the values that came out of assessing based on urine or chest counting.

Reviewing all 11 of them, I'm not going to go through specifics on any one case, but generally speaking, the samples, the fecal samples that we used were in response to incidents, as Sam mentioned earlier. And in cases like that, just like the slide that he mentioned and went over before, in most cases, actually in all cases here, we have additional urine sampling and/or chest counting relatively quickly after the incident. So, even if we don't take into account the fecal sampling that we do have, if we base it upon the urine or chest counting that we have, in each of the cases, it was a very minimal impact. And by "minimal," I mean I didn't see anything that would change any

compensabilities. Very, very small doses. Some of them actually urine may have been more limiting just based on the specific scenario involved. So, as I said, we went through the 11 and didn't see anything specific that would cause us alarm if the fecal samples had not been available.

CHAIRMAN MELIUS: Okay, go ahead.

MR. FOULDS: This is Tom Foulds. I'm sorry. I didn't mean to interrupt.

CHAIRMAN MELIUS: Okay, if you could wait a little bit, we'll give you an opportunity to --

MR. FOULDS: Sure, be glad to.

CHAIRMAN MELIUS: -- speak in a little bit. Sam, anything further you want to present?

DR. GLOVER: I think that's it for me.

CHAIRMAN MELIUS: Okay, thank you. So, let me open it up for questions from Board

Members or SC&A.

MEMBER SCHOFIELD: Yes, this is Phil Schofield. I've got a question. Looks like in some of these you're using air sampling as an upper bound. Is that breathing zone sampling or is that like an average for a room?

DR. GLOVER: I think everything we're doing at Hanford right now is based on urinalysis. As the time frame increases, as we get into the 2000 time frame, the Plutonium Finishing Plant right now is relying -- is using breathing zone sampling data. So, we're not into that time frame right now, so this is still based on urinalysis and fecal measurements. The OTIB-49 is generic. It could be based on any site, not just Hanford.

MEMBER SCHOFIELD: Okay.

MEMBER CLAWSON: Sam, this is Brad. I had a question. You were talking about the other samples that you had other than the

fecal samples. Were they just urinalysis or were they chest counts?

DR. GLOVER: Usually, they're going to have both lung and chest counting, and urine samples. It depends on the bioassay frequency, but there's kind of a model --

MEMBER CLAWSON: So, what drove these samples? Were they what we call our birthday samples, were they done on a yearly basis? This is -- they came in, you know, got this all done within about a two-month period? I'm just looking -- I was wondering because I can't see any kind of a date when each one of these were performed or anything. I'm just seeing numbers that say, you know, they had C-

DR. GLOVER: The uranium -- or, I'm sorry, the plutonium urinalysis program would have been spread out to try to make sure that the lab analyzed samples in a reasonable -- so, I don't know what their -- you said it was based on a birth date or, you know, there is

some -- it used to be quarterly. I don't know when, off the top of my head, when they switched to annuals. But there's always been sort of a graded approach. Sometimes people could still be on quarterly, I think, even at that time frame, and if they got urinalysis program and they were -- they would expect to also be part of the in vivo program. I didn't get to include those statistics in this one, but -- so, yes, they'll have -- anytime they have a suspected intake they would have numerous samples that would be related to that. So, those are going to come up whenever intake is suspected. They have to analyze that.

MEMBER CLAWSON: Okay. So, they still have incident-driven ones, but I just refer to them as our birthday samples because that's how we process through there every year. We got a load of all these samples that we put in so they could kind of build a

baseline for us. So, I was just wondering because when you were saying the other samples, I was wondering if it was done on a routine basis, or if it was a check every once in a while, just to check people. I was wondering if they were to that standpoint yet or not. Thank you.

DR. GLOVER: Okay.

CHAIRMAN MELIUS: Any other Board Members, SC&A questions?

DR. MAKHIJANI: This is Arjun.

CHAIRMAN MELIUS: Yes.

DR. MAKHIJANI: Sam, on Slide 26, just to follow up on what Phil was asking. The third bullet you say, "Once intake is determined, dose is adjusted using direct measurement factors, for example, air monitoring." I think he was referring to that. I didn't quite get how that is done.

Hello, am I on mute?

CHAIRMAN MELIUS: No.

DR. MAKHIJANI: Okay.

CHAIRMAN MELIUS: I can hear you, Arjun.

DR. GLOVER: I'm sorry, I was on mute.

DR. MAKHIJANI: Okay.

DR. GLOVER: There's a number of ways, because sometimes they have multiple -- and, actually, Tom, would you mind just addressing that very briefly, the adjustment factors in OTIB-49? I'm pushing my stamina here for the day.

MR. LaBONE: I'm not sure what slide -- the slides aren't numbered, so --

DR. GLOVER: I'm sorry. It's Slide 26. It's fecal adjustment factors. Really what the question is, Tom, is: they were asking because I just said that once the intake is determined, essentially what we have is -- you determine an intake and then you have a series of adjustment factors, depending on the

bioassay method being used. Maybe you could just briefly -- I didn't go into the specifics of what you would do for urine versus fecal or for urine versus air into the specifics. Sometimes you just use one or the other, or you have multiple. I'm not being very clear here.

MR. LaBONE: What does the title of the slide say?

DR. GLOVER: All right. It's near the very end. It's the fourth from the end.

MR. LaBONE: Fourth from the end.

DR. GLOVER: Fecal adjustment factor. The concern is, I said, "Once an intake is determined, the dose is adjusted using direct measurement factors." So, in this case, like for air monitoring, you would use a specific set of adjustment factors if you used air monitoring. For urinalysis, you'd have a separate set of adjustment factors. It just depends on how it's being processed. So, what

we -- it's probably too cumbersome, Tom, to have you answer off the cuff.

Essentially, and you can correct me if I'm wrong, we use the basis, what's soluble. If it's urinalysis, that's what was removed from the compartment, from the lung. We determine an intake, and from that we then adjust that intake, what actually stayed in the lung. So, what you see is we get the correct intake at the original time of intake determined, but then we have to adjust up the dose by that factor of 100 at 50 years.

DR. MAKHIJANI: Oh, okay. I get it. Okay.

DR. GLOVER: But it depends on what -- if it's chronic, if it's more -- then you have to deal with -- you know, it's not a single number, a single year, so we have a number of tables that adjust for this.

DR. MAKHIJANI: Right, right. Thank you. I don't know if Joyce is on the line?

DR. LIPSZTEIN: Yes.

DR. GLOVER: Okay.

DR. LIPSZTEIN: Hello?

CHAIRMAN MELIUS: Yes, we can hear you, Joyce.

DR. LIPSZTEIN: Okay, I just got in.

CHAIRMAN MELIUS: Okay.

DR. LIPSZTEIN: Sorry about that.

CHAIRMAN MELIUS: Out of your control, so --

DR. LIPSZTEIN: No.

CHAIRMAN MELIUS: Anybody else have -- Board Members or others, SC&A, have questions at this point?

DR. MAKHIJANI: Just one more thing. Is there a write-up of those 11 cases that would be available at some time?

DR. GLOVER: No, we didn't write them up yet. I gave them this --

DR. MAKHIJANI: Okay.

DR. GLOVER: If the Board would like us to, we can summarize what the --

DR. MAKHIJANI: Yes, a summary table or something.

DR. GLOVER: Dr. Melius, just let me know if that's something the Board would like us to take up.

CHAIRMAN MELIUS: Okay. Yes, let's -- when we get to the --

DR. GLOVER: Yes.

CHAIRMAN MELIUS: Finish with the questions and try to resolve this. And we can talk about that. Any other questions?

MR. FOULDS: You're still asking for the Board Members, right?

CHAIRMAN MELIUS: I'm still asking Board Members. I'm going to get to you in just a second.

MR. FOULDS: Sure.

CHAIRMAN MELIUS: Okay. And why don't we ask you, Mr. Foulds, then, for any

comments that you might have. We've received your materials actually this morning, but Board Members will have time to -- or Work Group Members will have time to review those. Again, as Ted Katz indicated earlier, we're not really in a position to comment or address issues with specific cases.

MR. FOULDS: Sure. Sure.

CHAIRMAN MELIUS: So, if you have any comments or want to summarize your comments now, that would be fine.

MR. FOULDS: I apologize for the possible disorganization of the materials that were furnished this morning from me, Tom Foulds, on behalf of the petitioner. We were just informed of this conference two and a half days ago, and right in the midst of a number of other things, so it was very -- we did our best job possible yesterday working on this.

And it's obviously not complete,

but, at the risk of being redundant, and maybe Sam has already covered this, but there was, as the Group is aware, there was a oversight examination done by four independent scientists and engineers selected by the Department of Energy who did an analysis of the procedures, "U.S. Testing Company Radiological Procedures," 1990. And they found a number of, in their opinion, of shortcomings.

Incidentally, all of these members of this group that was selected, they're from separate agencies, and they all each have a degree of radiological or engineering expertise in their background. And they found among other things, and excuse me for being redundant, maybe Sam has mentioned this, but as of May 1990, they were furnished a large number of samples. And out of the 3,000 samples that they were given, none were fecal samples. And they felt that the number

overall, and this is all in this material, so I don't want to be redundant, and I'm not trying to review it all. But overall, they found that the procedure for taking samples was inadequate, that they were not obtaining enough samples. Now, this is as of 1990.

I don't know what the procedures were like in 1998 because the difficulties with U.S. Testing had not yet -- I should say 1988, I don't know what the procedures were because U.S. Testing, the disclosure of the EPA had not yet been made public. But in any event, in 1990, May of 1990, they felt that the sampling was inadequate overall, and these are radiological samples. And that specifically, out of the samples that were given to them, that there were no fecal samples to use.

That brings up another point that I raised in the exhibit I presented, part of which was a section out of the last dose

reconstruction done in 2010. In that report on page 13, they provide a list of measurements that were made of plutonium mixtures, number of disintegrations per M -- and I guess per day or per millirem, I'm not really sure -- and they compared measurements done by the technology utilized by U.S. Testing.

But the plutonium measurements, they compared that with the lung count measurements, and they could not find any consistency between the two types of methodologies of measurement either through the lung count or through the -- presumably a gamma spectrometry analysis used to find the 239. So, you've got two different methodologies with the same objective, yet they're not consistent. And it would appear, in my layman's point of view, as a indication of the lack of ability on the part of U.S. Testing to do a credible job of testing for plutonium.

MR. SIEBERT: This is Scott Siebert of the ORAU Team. May I address that question?

CHAIRMAN MELIUS: Why don't we let him finish, and then we can address --

MR. SIEBERT: You got it. Thank you.

CHAIRMAN MELIUS: Thank you, though. Go ahead, Mr. Foulds.

MR. FOULDS: Well, basically that in a nub is the basic concern of my client; that is, that the procedures being utilized by U.S. Testing during the period of time in which the fecal samples were taken from the client at the time of that special incident that everybody concurs he had a special exposure, and then following that there was some samples taken, some of which were beyond the two-month time range specified in the technical bulletin that is utilized to make the evaluation of the measurements.

And the technical bulletin 4.1.4

requires that if there is ample plutonium identified in fecal samples identifying plutonium beyond the two-month limit after the major incident of exposure, then they would take the dose that had been computed as of the time and multiply it by a factor of 3.

Now, that particular technical bulletin on procedure 4.1.4, specifically on how to handle fecal samples, was never addressed in either the 2009 dose reconstruction nor the 2010 dose reconstruction. In fact, it was not just never explained, it was never even mentioned at all, so actually, I and the client are in some bafflement as to why that was not applied, since no explanation for not applying them was ever given. But that, basically, comes back to the concern over the measurements.

Even putting that aside, it would seem that the measurements being made of what was discovered beyond the two-month time

period would still be questionable whether they were at the minimum detection limit, or whether they were below it or above it, that it is the petitioner's position that the UST was not capable of providing a reliable answer. And I think, in effect, that it's impossible to do a reasonably reliable dose reconstruction. And that's basically summarizing the position, and I'll take no more time of the Advisory Board. And if I've been redundant on anything Sam has already covered, I apologize.

CHAIRMAN MELIUS: No, no need to apologize. It's a very complicated, very technically difficult area. But, again, I just will reiterate, you know, our Work Group and the Advisory Board really can't address specific issues with a single dose reconstruction, individual dose reconstruction. What we're looking at has been really evaluating the petition and the

evaluation of that petition by NIOSH as to whether or not the overall methods being used for dose reconstruction are appropriate given how the statute is set up and so forth. So, that's been our focus in the previous review in the Work Group meeting on September 12th, as well as this meeting today.

Sam or anybody from ORAU want to respond?

MR. SIEBERT: Sam, do you want me to go ahead and --

CHAIRMAN MELIUS: Yes.

DR. GLOVER: Yes, just keep it brief.

MR. SIEBERT: Yes. The only thing I was going to point out is when Mr. Foulds brought up the inconsistency between the different measurements, what we are pointing out in any case is that after an intake at a set amount of time, say 100 days, the type of material will make a difference, whether it's

able to be seen in a different type of analysis or not.

If you base an intake on urine, for example, you may project out what you should have seen in a lung count on that same date. And if we have a lung count that does not demonstrate that amount, if we should have seen a very positive amount, and we have a count and it does not demonstrate that, that merely means that that material type is unlikely to have occurred because the measurements are inconsistent, not because there's anything wrong with the measurements, but just because they are not designed to have the same amount of sensitivity at a certain time after intake based on a different material type. I know that's a relatively complicated explanation, and I may have muddied the waters, but it's not a problem with the measurement as much as just: you cannot measure the same thing with different

types of measurements and always get the same value. You're going to get inconsistencies based on material type.

CHAIRMAN MELIUS: Okay. Thank you for that clarification. Any other -- Sam, or any of the Board Members with additional clarifications or questions? Because I think where we are with this petition, in our previous Work Group meeting we had discussed the original NIOSH Evaluation Report, the SC&A review of that, and I think the only issue that we still wanted additional information on out of that Work Group meeting was the issue related -- some more information, more detailed information on the actual dose reconstruction methods that were being used, because it was a little bit confusing in terms of understanding what was going on.

Work Group Members, how do you -- what is the feeling in terms of -- are people satisfied with the amount of information now,

have the methods being used been clarified sufficiently?

MEMBER ZIEMER: This is Ziemer. I'm satisfied, but I would like to hear from SC&A, perhaps Joyce or Arjun in terms of their sort of evaluation of this material that we've just reviewed.

CHAIRMAN MELIUS: Yes. Arjun, do you want to start?

DR. MAKHIJANI: Joyce, do you want to go ahead?

CHAIRMAN MELIUS: Okay.

DR. MAKHIJANI: Joyce and I discussed it briefly.

CHAIRMAN MELIUS: Okay, good.

DR. LIPSZTEIN: Okay. Okay, I was just muting. Hello?

CHAIRMAN MELIUS: Yes, we can hear you.

DR. LIPSZTEIN: Okay. I think it's fine. I agree with everything. I think it's

good. It's based on OTIB-49, which we already revised and approved, and has been used. So, I think it's okay. I don't have any questions. I think it's okay, good material.

DR. MAKHIJANI: My one comment was this -- okay. I hate to bring up this slide. Sorry, I wasn't ready. This thing was done in 1993 that you mentioned, Sam. Was that some kind of -- I guess I'm on Slide 21, 1993 published paper, and the sampling and radiochemical methods you described. That's the last bullet. Did you look at, you know, the consistency of these -- it's indicated here with the standard practice across the DOE complex at the time, and whether those standard practices were being followed, even though we understand there weren't QC samples during the period for fecal. Were there samples afterwards that found the program to be okay, and were the methods being used at that time consistent with what was being used

in `87, `89?

DR. GLOVER: My recollection is that soon after, about early `93, `94 they made a modification to the procedure. So, I don't know if later methods --

DR. MAKHIJANI: Okay.

DR. GLOVER: -- I think they added hydrofluoric acid or maybe a fusion method to deal with these highly insoluble compounds. I think they modified the procedure at that point, so I don't know -- as far as I know, there's no way to go apples to apples backwards and back-compare.

For those who are technically -- or not technically, but inquisitive of what they were doing, it was pretty just they would ash the samples, dry ash them, burn off all the organics, and it was a peroxide. And then you would just do the standard analytical separation. It was fairly routine. I don't know if there's -- and they used those for --

but they didn't get blind samples to cross-validate that. That didn't come in until later, that DOELAP and others would provide blind fecal samples for analysis. This predates that.

DR. MAKHIJANI: But the lab method being used in `87-`89 was consistent with that being used at other sites?

DR. GLOVER: I think -- Tom LaBone, how many sites actually had a fecal program back then? I think Idaho may have had one for uranium. SRS did something. I don't know if Tom is still with me.

Tom LaBone. I may have lost Tom LaBone. Anyway, I know he did -- but I think it's probably not many -- there's probably not many sites that I recall who had a routine fecal sample. We could look into that if the Board would like to.

DR. MAKHIJANI: No. Yes, it was just a question, because it seemed to me that

you had looked into it. That's why I wanted some clarification, but I guess with -- it's more complicated than I thought.

CHAIRMAN MELIUS: Any other comments or questions?

DR. LIPSZTEIN: I saw the paper and the description of what was done, and it's really -- the paper was really done very carefully. And that's the same method we used for fecal samples in our laboratory, so it seems okay to me.

CHAIRMAN MELIUS: Okay. Thank you, Joyce.

MR. LaBONE: Hello, this is Tom. I hung up instead of hitting the unmute button.

CHAIRMAN MELIUS: Okay. Do like I do, I talk for five minutes on mute wondering why nobody's responding, why other people start talking. Go ahead. I don't know if you heard the --

MR. LaBONE: Do you still want me

to respond to Sam's question?

CHAIRMAN MELIUS: Yes, it would be helpful, I think.

MR. LaBONE: Okay. As far as I'm familiar with, the people who did routine -- the sites that did routine fecal monitoring are Argonne and Idaho. At Savannah River, we had a pilot program that ran for about a year, and was kind of similar to the one that they did at Hanford, but routine-wise it was just Argonne -- I guess Argonne East as we call it, and Idaho National Lab, the ones I'm familiar with.

CHAIRMAN MELIUS: Okay.

DR. MAKHIJANI: And, Tom, they used the same analytical methods that were used in the period by U.S. Testing?

MR. LaBONE: I don't know that.

DR. MAKHIJANI: Okay.

MR. LaBONE: I typically just focused on the results. I'm not a chemist, so

-- when we did Savannah River, our study in the 2000 timeframe, we were very concerned about dissolving the samples, so we went through a microwave dissolution and we tested it with some Rocky Flats soil, which is a pretty insoluble material, just to make sure that we getting into solution. I don't know how much people focused on that in the late `80s/early `90s.

DR. MAKHIJANI: I guess Joyce really answered my question.

CHAIRMAN MELIUS: Yes, okay. Any additional questions? If not, I think where we stand is that, you know, we had essentially, I think, again, had dealt with the what we'll the testing fraud issue with our previous discussion, and previous Work Group meeting. And then we had, I think, just clarification on this. And I guess my question to the Work Group Members: are we ready to make a recommendation to the Board for our upcoming

meeting, or is there something additional that needs to be done? And, again, focusing on the SEC aspects of this.

MEMBER ZIEMER: This is Ziemer. I think we're ready to make a recommendation, but I may need a little help in ascertaining the form that it should take. I don't recall what was on the floor prior to this, if we had a motion that was tabled, or what was the status before?

CHAIRMAN MELIUS: As I recall, I don't believe we had a motion. I think we -- it's sort of -- we were talking about what to do and one or two of the Work Group Members thought that some clarification on the testing method would be useful, and need to give NIOSH time to respond to that and prepare something so that we -- so I don't believe there was a motion at the time. So, it's open. It was sort of done by consensus.

MR. FOULDS: Mr. Chairman, can I

make one comment? This is Tom Foulds again.

CHAIRMAN MELIUS: Yes.

MR. FOULDS: Speaking only in regards to the SEC 155, I would submit that the very detailed analysis done by that group that I mentioned before that had been appointed by the DOE, that they were actually reviewing the then ongoing U.S. Testing procedures, and that would seem to me the most viable document to illustrate the conditions that would be involved in SEC 155.

CHAIRMAN MELIUS: Mr. Foulds, we actually discussed all those issues at the last Work Group meeting, and there's a transcript available of our discussions. And I appreciate the comment, but we have, you know, I think addressed those issues and discussed them in terms of -- and had our technical contractor, SC&A review, so I just don't want you to think we're ignoring it, but it is something that's previously been addressed.

So, let's move on with the Work Group. Paul, do you want to --

DR. MAKHIJANI: Dr. Melius, may I say something that might help clarify that particular point?

CHAIRMAN MELIUS: Yes.

DR. MAKHIJANI: Mr. Foulds, if you look at the report that SC&A did, you'll see we extensively reviewed the 1990 report and the 1991 report. And we also interviewed the authors, some of the authors of those reports at length --

MR. FOULDS: Oh, okay.

DR. MAKHIJANI: -- about the usability of the data. So, we did take your comment and petition into account. And I think you might find the interviews which we did with those experts, who were independent outside experts, very useful as regards their opinions about the usability of the data.

MR. FOULDS: Okay, thank you.

CHAIRMAN MELIUS: Paul.

MEMBER ZIEMER: Okay, so what do we need motion-wise at this point?

CHAIRMAN MELIUS: Well, whatever you want to make as a motion. But I think the question is: do we recommend to the Board that --

MEMBER ZIEMER: Well, is the motion to accept the NIOSH analysis in this, or is it the bigger motion to accept the recommendation on the SEC? It wasn't clear to me what you needed.

CHAIRMAN MELIUS: Well, I think it will be a recommendation on the SEC, I think is what --

MEMBER ZIEMER: Okay.

CHAIRMAN MELIUS: I mean --

MEMBER ZIEMER: Yes. Well, to get it on the floor then, I'll move that we accept the NIOSH recommendation regarding this SEC.

CHAIRMAN MELIUS: Do I have a

second for that?

MEMBER CLAWSON: This is Brad. I second it.

CHAIRMAN MELIUS: Okay. Thanks, Brad. Now, discussion. Again, I mean, personally I think we've addressed the issues here in the report, and I think that's the appropriate recommendation to make to the Board. So, I'm obviously in favor of that.

MEMBER SCHOFIELD: I tend to agree with you there.

CHAIRMAN MELIUS: Okay. Thank you, Phil. And, John, Dr. Poston, are you still on?

MEMBER POSTON: As soon as I get on the right side of the --

CHAIRMAN MELIUS: Okay, thanks. I know the feeling, John.

MEMBER POSTON: Yes, I'm still here.

CHAIRMAN MELIUS: Okay. And do you agree with the motion that the Work Group

recommend to the Board that we accept the NIOSH conclusion that dose reconstruction can be done? Essentially, turning down the petition. We're accepting NIOSH's recommendation.

MEMBER POSTON: Yes.

CHAIRMAN MELIUS: Okay. Good, okay. I think we're all set. Any further follow-up needed, or questions?

MEMBER ZIEMER: Was that the -- did we vote, or is that --

CHAIRMAN MELIUS: Well, I think we've got everybody agreeing, so --

MEMBER ZIEMER: Okay.

CHAIRMAN MELIUS: Unless, you know, like --

DR. MAKHIJANI: Dr. Melius, just for the record, since you said dose reconstruction can be done, there is another petition for the same period that's under review. I just wanted to say that for the

record.

CHAIRMAN MELIUS: This is for SEC 155.

DR. MAKHIJANI: Right.

CHAIRMAN MELIUS: Yes, which is what we're focused on. All right. Thanks, Arjun. Then we'll present this at the Board meeting and update them then in a couple of weeks in Knoxville.

Mr. Foulds, thank you for participating, and Sam and everyone at ORAU, and Arjun and Joyce, thank you, also, appreciate your input. And I guess we'll see everybody, or see many of you in Knoxville in a couple of weeks.

MR. KATZ: Okay, thank you.

CHAIRMAN MELIUS: Thank you.

(Whereupon, the proceedings went off the record at 12:19 p.m.)