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 SEC ISSUES

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TUESDAY
MAY 11, 2010

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The Work Group convened in the Zurich Room of the Cincinnati Airport Marriott Hotel, 2395 Progress Drive, Hebron, Kentucky at 10:00 a.m., James M. Melius, Chairman, presiding.

PRESENT:

JAMES M. MELIUS, Chairman
JOSIE BEACH, Member
MARK GRIFFON, Member
GENEVIEVE S. ROESSLER, Member
PAUL L. ZIEMER, Member

ALSO PRESENT:

TED KATZ, Designated Federal Official
NANCY ADAMS, NIOSH Contractor*
ISAF AL-NABULSI, DOE*
LYNN ANSPAUGH, SC&A*
HANS BEHLING, SC&A
SAMUEL GLOVER, DCAS
EMILY HOWELL, HHS
JEFF KOTSCH, DOL*
JENNY LIN, HHS*
ARJUN MAKHIJANI, SC&A
JOHN MAURO, SC&A
DAN McKEEL, Petitioner*
JAMES NETON, DCAS
LaVON RUTHERFORD, DCAS

*Participating via telephone

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

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

10:00 a.m.

MR. KATZ: Welcome, everyone in the room and on the line, to the Advisory Board on Radiation and Worker Health, SEC Issues Work Group, and we'll begin with roll call. We will begin with Board members in the room. Chair?

CHAIRMAN MELIUS: Jim Melius, Chair.

MR. KATZ: And also since we are discussing Dow if anyone has, everyone please state your situation with respect to conflict of interest with Dow.

CHAIRMAN MELIUS: I have no conflict of interest with Dow.

MEMBER BEACH: Josie Beach, no conflict of interest with Dow.

MEMBER ROESSLER: Gen Roessler, Board member, no conflict with Dow.

MEMBER ZIEMER: Paul Ziemer, no conflict with Dow.

MEMBER GRIFFON: And Mark Griffon, no conflict.

MR. KATZ: Okay and are there any Board members on the line?

(No response.)

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

DR. NETON: Jim Neton, no conflict with Dow.

DR. GLOVER: Sam Glover, no conflict with Dow.

MR. RUTHERFORD: LaVon Rutherford, no conflict with Dow.

MR. KATZ: NIOSH-ORAU Team on the line? Okay. SC&A team in the room?

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

DR. MAKHIJANI: Arjun Makhijani, SC&A, no conflict with Dow.

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

DR. ANSPAUGH: Lynn Anspaugh, no conflict with Dow.

MR. KATZ: Welcome, Lynn.

DR. ANSPAUGH: Thank you.

MR. KATZ: Okay and then other HHS or federal employees or contractors for the feds in the room?

MS. HOWELL: Emily Howell, HHS.

MR. KATZ: And on the line?

MS. LIN: Jenny Lin, HHS.

MS. ADAMS: Nancy Adams, NIOSH contractor.

MR. KOTSCH: Jeff Kotsch with Labor.

MR. KATZ: Welcome, Jeff.

DR. AL-NABULSI: Isaf Al-Nabulsi, DOE.

MR. KATZ: Welcome, Isaf. Okay. And then any members of the public. There are none in the room. Any members of the public on the line who want to self identify?

DR. McKEEL: Yes, this is Dan McKeel. I am the co-petitioner on SEC-00079 for Dow.

MR. KATZ: Welcome, Dan.

DR. McKEEL: Thank you.

MR. KATZ: Very well. Then please, folks on the line, mute your phones, *6 if you don't have a mute button, *6 to bring it off of mute. And, Dr. Melius, it is yours.

CHAIRMAN MELIUS: Okay. We have two items on our agenda for today. First sort of a brief update on the Dow Madison SEC, and then we will spend most of the time talking about the SEC evaluation issue, the so-called 250 day issue, which is really the less-than-250 day issue, I guess, would be a better descriptor of it.

On Dow there are, since our last discussion of this, there have been, SC&A has sent out two draft reports on this. I'm not sure where they exactly are in terms of clearance. One was their SEC findings on Appendix C of the TBD-6000. I don't know if that's on the agenda -- your 6000 Work Group

is meeting tomorrow, Paul?

MEMBER ZIEMER: We haven't been doing Appendix C since that's Dow Madison.

CHAIRMAN MELIUS: Okay, okay.

MEMBER ZIEMER: Right.

CHAIRMAN MELIUS: But the overall issue?

MEMBER ZIEMER: Is it a TBD-6000 or is it a Dow Madison issue?

DR. MAURO: Apparently there is an Appendix now that updates some of the information, basically updates the information we had before. So we took a look at the Appendix.

MEMBER ZIEMER: That is Appendix C.

DR. MAURO: Right, but right now the only thing we have is the general 6000 and GSI, not any of the other specific appendices. That was my understanding.

MEMBER ZIEMER: Right, the 6000 and the GSI we will be covering tomorrow, but

not Appendix C.

DR. MAKHIJANI: I think we did Appendix D, Electro Met.

DR. MAURO: Oh, no, we have a number -- yes -- Electro Met is 6001. But we have a number of appendices that we've done that are all being sorted out between 6000 and 6001, but we haven't engaged them yet.

CHAIRMAN MELIUS: And then the second report is entitled Evolution of Dose Reconstruction Approach at Dow Madison and Use of Surrogate Data. I don't know if the entire -- this Work Group got that or it might have just gone to the Surrogate Work Group

DR. MAURO: Probably just the Surrogate.

CHAIRMAN MELIUS: So we'll get it circulated to this Work Group also. I think it makes sense to try and sort of consolidate specific issues on DOW into this Work Group rather than having what would in effect be three Work Groups dealing with it. There's

obviously the need for some consistency on that.

And then we are not going to try to discuss those, but these reports were both done in response. I think Dr. McKeel brought up some issues, and we just need to make sure we had a good inventory of what were the issues related to Dow Madison. There are a lot of different sort of small issues related to both surrogate data as well as to the TBD-6000. So we've got these short reports that address that.

The third issue related to Dow Madison is the possibility of some new data on that, and I don't know if Ted or LaVon, who knows that?

MR. RUTHERFORD: We -- this is LaVon. I can say that we did identify. Actually recently there is an index of sites that have classified documentation that we are working to go look at that. Dow is indicated on that, but it is not specific whether that

is Dow Madison or Dow Bay City or Dow -- what Dow facility it is. We are, as I indicated, we do intend to go look at the documents, and we probably will not be able to look at those documents until some time in early June. We are going out this week to look at some stuff, some documents associated with Chapman Valve but we don't feel we will have time to go through all the documents. There is roughly, I can't remember --

DR. NETON: Forty-five boxes.

MR. RUTHERFORD: Forty-five boxes of documents to look through. Not all associated with one facility. There are roughly 65, I believe, facilities that are involved in those boxes.

CHAIRMAN MELIUS: And so we would have an update at least on the content of the Dow information there roughly mid-June?

MR. RUTHERFORD: Yes.

CHAIRMAN MELIUS: So there may still be classification issues and so forth

with those?

MR. RUTHERFORD: Yes.

CHAIRMAN MELIUS: I think we are going to have to wait and see what's found and have a sense if that's relevant to this particular SEC issue or other issues, I guess, related to Dow Madison. So I think we would do is postpone any sort of action or consideration on Dow. I -- add one other document this morning. I don't know if everybody has seen it, but Dr. McKeel did email this morning a document that raises -- sort of summarizes a number of questions and issues that he and the petitioners have relative to the Dow Madison SEC. I'll admit I am aware of the document. I have not had a chance to read it yet. But I believe it was circulated this morning. Did other people get anything?

MEMBER ZIEMER: I haven't seen it.

CHAIRMAN MELIUS: Okay.

MEMBER ROESSLER: It came through.

CHAIRMAN MELIUS: Okay.

MEMBER ROESSLER: About 9:00 I think.

CHAIRMAN MELIUS: Okay. Those that didn't get it, we'll make sure that -- which it may have been which email it went to also. I don't know. So we will do that, and I think we just wait and see what happens with this new information and the timing and so forth on that. We don't know if it is relevant or not. Paul?

MEMBER ZIEMER: Could you quickly summarize the nature of Dr. McKeel's items, or you don't have them?

CHAIRMAN MELIUS: I was -- I don't have the -- I haven't read -- opened up that part of the email. The part of the email that I opened was just his sort of cover email.

MEMBER ZIEMER: Oh, you haven't seen the document.

CHAIRMAN MELIUS: I didn't have a chance to look at the actual document.

MEMBER BEACH: I have a copy of it here.

MR. KATZ: I can forward it. It went to -- addresses.

MEMBER ZIEMER: No, no.

MR. KATZ: Okay.

MEMBER ZIEMER: Without having to -- I am really asking you if there are some new issues that Dr. McKeel has raised or maybe you would permit him to speak.

CHAIRMAN MELIUS: I was going to permit him and -- right now was permitting the Work Group members to say something first. But, Dr. McKeel, do you have any comments or questions?

DR. McKEEL: Yes, thank you. Good morning to everybody. The email I sent everyone in the Work Group this morning and asked Ted to distribute to the Board. I also sent to SC&A, to John Mauro, and I sent it to Stuart Hinnefeld and to Dr. Neton. And in it what I attempted to do was to take each of the

major technical reports that had been generated by both NIOSH and SC&A on Dow Madison and summarize my comments, including the two White Papers, draft White Papers that SC&A distributed in March of this year, which I have.

I would say I know you all have other business this morning, but basically I have many issues that I think still need to be resolved. I think that the Appendix C review is certainly -- the SC&A review does not include the points that I feel are very important and haven't been addressed. I point out for example that it's been said that there were two campaigns to do experimental gamma phase extrusion at Dow for Mallinckrodt, when in fact there is a document that I've retrieved called MCW 1416 which is an AEC technical report prepared by the folks at Weldon Spring where they detailed nine campaigns that were carried out. And there's a lot more information in there. Some of it

relates specifically to dose reconstruction, the issue about extrusion presses not having vacuum hoods, for example, could affect the amount of dust generated and that accumulated during the residual period and undoubtedly did. That hasn't been taken into consideration.

I show in that report that there are references to non-destructive testing work at Dow and mention an old finding that there was a Kelley-Koett, that's K-E-L-L-Y K-O-E-T-T, betatron at Dow that was, we don't know when it was used. It was probably used during the operational period so it wouldn't affect the residual period.

But anyway there are many issues about the residual period that I think are important. I would simply ask you all to please read and consider that information. I would point out that the -- Dr. Melius' motion to look into an extension of the Dow SEC to cover the residual period took place in May of

2007. And you know, we are now in April of 2010, and there has still not been a recommendation from the Work Group to the full Board about whether or not NIOSH's claim that it can do dose reconstruction is valid or not.

I think that Dr. Mauro circulated from the one about the extent of the use of surrogate data is extremely important. A main piece of data that's being used for the residual period there is based on two weeks worth of film badge data from the Bay City, Michigan Dow plant. And I personally don't think that two weeks of film badge data from another center could possibly be said to be representative for the Dow Madison plant. I remind everybody, again, there's absolutely no direct film badge data for Dow Madison, nor is there even a good indication there was an active film badge program there.

So anyway, that's the comments that I would like to have. I spent quite a bit of time on that document and it does

represent my point of view and I wish and hope that you all will consider it and take that into consideration when you are making a decision about the SEC. I appreciate the opportunity to address you this morning. Thank you.

CHAIRMAN MELIUS: Thank you, Dr. McKeel. I think our plan would be June NIOSH looks at the new box, and hopefully we have information by July. And I think we have to consider do we do a Work Group meeting focusing, try to resolve these issues with Dow Madison -- around July, sometime in July and then try and put it on the agenda for the August Board meeting. Although I think all that will depend on what happens, what is found with the boxes and some of the classification or declassification issues that could arise from that.

We'll also do our best to keep you informed, Dr. McKeel, on what happens with that. On the surrogate data issue, we have a

meeting of the Surrogate Data Work Group on Thursday, a conference call, and a Board meeting next week, yes, next week coming up, and we'll hopefully be finalizing surrogate data criteria with the Board at that meeting next week and, I think, may be able to address the other issue that you raised, Dr. McKeel, also. Let's see, I think this issue with the information in the box, I think, is the one that's making us hesitate a little bit in terms of how to move forward on this until we see what's there.

Any other Work Group members have comments? Okay.

We'll move to the next item on the agenda which is the issue of the less-than-250 day SEC. We've been working on this issue for a long time. I think it started with looking at the Nevada Test Site and Ames, and we've thought about different approaches -- and, boy, that was quick. For the record, LaVon just left -- Mr. Rutherford just left. And we

struggled with it. We tried different approaches. We've been back and forth with NIOSH. And I think at least some members of the Work Group believe that we need to address in some way in order to be fair and equitable for people to program but it's not people making claims who have worked for short periods of time and had high exposures. But it's not an easy issue to address that. I thought to help start our discussions today, I asked Arjun to sort of give some thought and make a brief presentation of where we are and where we might go with this issue at least to get us started, and then we'll go from there. Arjun?

DR. MAKHIJANI: Jim and I had a phone conversation about this two weeks ago and discussed some ideas as to where we were and what might move us forward. What I tried to do was just to capture that idea and see if the Work Group wanted to go in that direction or not and we could prepare a report for you

on that.

So basically, you know, the way the rule is written for incidents is there are four criteria for somebody to qualify that has less than 250 days of employment. Exceptionally high exposures is an example given -- criticality accidents or incidents, similarly high levels of exposure to criticality incidents and a failure of radiation protection controls. And we've discussed these criteria with respect to external dose, and SC&A prepared a study on that including cataloguing all the criticality accidents and the doses that are being estimated associated with that.

And there is also -- there have been several reports, but there was also a report on how this might apply to internal dose, and SC&A prepared a report on blowouts in Ames showing that there were quite high internal exposures, quite high intakes with the dose playing out over a long period of

time, but the intakes happening over a short period of time.

Just to sort of recap some of the discussions, and, people, do please correct me if I'm not representing the discussions properly. They have been complex, but the criticality report turned out to make the discussion more difficult rather than illuminate it because doses during criticalities have ranged from well below one rem into the thousands of rems.

And so there has been quite an extended discussion of what it means to say exceptionally high exposures. And in relation to cancer Jim Neton had said that you can compensate people of less than one rem, but it seems from a technical point of view that less than one rem wouldn't qualify for an exceptionally high exposure. We discussed the annual dose limit, five rem, ten rem, white blood cell changes, you know, thresholds for somatic changes.

We've discussed a number of different levels from below one rem to about ten rem or well above ten rem, I think. And from a technical point of view, I think the general feeling had been if you are a few rem or below it's not exceptionally high exposures the way the health physicist might see it. For internal, and that's where, so far as I recall, we left that discussion the last time we took up the external dose issue.

For internal dose issues, the main issue had been how do you relate doses that were delivered to the person over a very long period of time because they are committed doses even though the intake would have been during an incident or several incidents. And what Jim asked me to do was to see if there were ways to think about this where we could try to make this, whether there were other approaches than thinking of dose thresholds in thinking about this problem, and one thing that I had discussed with Jim was whether the

rule for incidents could somehow be related to the threshold of 250 days of employment.

So I reviewed some of that background, and Jim also asked me to go back to the Advisory Board discussion of the draft rule and see what the Board had said during that time. So I did that, or we did that. SC&A people actually compiled some of that information. And so in reviewing that information, you know, 250 days clearly derives from the law that has the three gaseous diffusion plants and that basically says if you were badged or had a job like people who were badged and had 250 days, you're in, and the way I read the transcripts and the presentation of the rule, that seemed to be the motivation. Ted, you were the one who did it, so correct me if I'm wrong. But so it didn't have a dose threshold. It had a present threshold, and that has a clear correspondence in the incidents rule. If you are present during an incident, and then are

those other criteria, exceptionally high exposures and so on.

But the presence thing didn't seem to be an issue because one thing requires presence for 250 days and the other thing requires -- so since there's no dose criterion for 250 days, it seemed that it might be worthwhile exploring non-dose criteria for incidents. Within the law the most immediate thing that is available of course is the Amchitka SEC.

We've discussed this before briefly during Work Group meetings. I think I went back and looked at that record or at least looked at something in relation to Amchitka. The highest recorded external dose -- I didn't review the source documents, I have to say. I just looked at our previous reports. For Amchitka which required only presence and didn't have a time threshold, presence at one of three tests, Long Shot, Milrow and Cannikin. Is that how it is

pronounced? Cannikin. And the highest reported external dose according to the literature that we've reviewed before is 265 millirems. So quite low in the sub-rem range. Of course these were planned criticalities not criticality incidents.

Some of the discussion around including Amchitka was that some of the legislators felt that the doses were not fully recorded so that doses were higher than those recorded. And so there's a question of uncertainty around doses and whether they could be reconstructed. So as far as I recall that's not in the law itself. There's no dose threshold in the law. It just says if you were there during one of these three tests.

Now, so the -- if there's a non-dose criterion, you could decide that you are going to go in that direction, presence during an incident, and then the question is what is a serious incident and how do you reconcile it with the health physics notion of what is an

exceptionally high exposure? There is clearly a conflict between looking at Amchitka and what the exposures were then and saying, okay they were on the order of one rem or on the order of the kind of dose that might be in the lowest dose case to be a compensable cancer but not be considered exceptionally high dose in the manner that the Working Group has discussed before, 10 rem, 25 rem, and so on. Clearly not an exceptionally high dose in the regard. But still be an event that is of very short duration.

So I looked at DOE guides for incidents to see how else presence at an incident might be considered significant, and there are a number of them. There's a DOE standard on internal dosimetry that has quite an extensive commentary on what is a significant intake including non-dose threshold criteria. Significant intakes usually occur as a result of accidents, and prompt response is needed. So some of the

decisions around what significant are whether prompt response is needed like medical attention. Diuresis if you have tritium intake and so on, so there is a fair amount. I won't detain you in the quite extensive literature there is from -- and there are examples of the kind of incidents that lead to medical response that have radiation associated with them and so on.

There is also a DOE guide regarding what is an incident-related significant exposure for workers, which is, I haven't studied that document. I just got the URL for it from Joe last night, which is 500 millirems. And then there is the EPA protective action guide that John pointed me to for the public which is when do you think about evacuation of the public, and that would be on the order of one rem.

For internal dose, you know, you could use a criterion like were the conditions such as to -- I mean there is no way to avoid

reference to some kind of dose issue because you've got exceptionally high dose in the rule. So there is going to be, within the rule, there is some, there's got to be some point of reference to significance of dose but it could be something like likely or possible the person got more than the annual limit of intake during one or more than one incident. That would make incident comparable in the internal and external.

I looked at the Board discussion in this regard. I don't think, at least I couldn't find any Board discussion that discussed internal compared to external dose. But there is a fairly lengthy interchange between Dr. Melius and Dr. Ziemer actually in one of the discussions where it seemed that presence during the incident and not the -- the duration of the incident and not the duration of the dose seemed to be what you all were discussing. But there is no explicit reference to internal versus external. And I

could not find any explicit language that would kind of help resolve the issue.

So these are some ideas for staying with the previous path that we have had, summarizing the previous path. And maybe another alternative approach might be to try to make presence and exceptionally high doses relate to 250 days and how incidents are handled. And I don't think you can easily reconcile the health physics idea of exceptionally high dose with some of these other ideas as to what might constitute a significant incident. They are not the same kinds of numbers.

DR. MAURO: I want to just add one thing that I found interesting. When the protective action guides were developed by EPA, I remember the number being one to five rem and that's when you evacuate. In other words, if you anticipate a release that could cause one to five rem, you evacuate or take some other action like shelter. But I didn't

remember, but it turns out the one to five rem includes internal. In other words it's the dose you would get from external radiation from a passing plume but also from what you might inhale. There is a place where they considered -- they talked about one to five rem but it is effective whole body dose, and it includes both what you would get from the external from the passing plume plus what you might inhale as the plume passes.

DR. MAKHIJANI: So I have no recommendation or resolution to give you, just a new dilemma.

MEMBER ZIEMER: Well I have a lot of different comments, and I don't have any solutions. But I think if we start getting into population criteria of the type you suggest which are based on integrated dose over population and projections of cancer incidence based on collective dose and have -- I -- in my mind very little application because you look at the population a very

different way to start with as compared to a Working Group. And so to me that's a difficult one. I would think it would be preferable to stay with the sorts of things Arjun is talking about. What happens in other workplace situations?

We've gone round and round on this because one of the issues is to define what those incidents are, those high-dose incidents, you end up bounding it. And if you can do that, then the 250 days doesn't matter. If a person was there for a week and you can show that a blowout occurred some time, even if you don't know if they were in the blowout. For example, if you went to Ames and the person said you know during that half year I worked there, there were probably ten blowouts, we can bound the dose and do a dose reconstruction. That -- the very nature of the thing otherwise is we can't bound the dose and therefore we go to the SEC type situation.

I think we have all agreed in the

past the 250 days really is arbitrary. You get to the argument, well, if 250 days is good, what about 249 days, is that very different, and so on. And it's just a demarcation. So I think it's very difficult to -- because we can adjust for work times like we did in the Pacific island cases. If they are there 24/7, that adjustment can be made. So it's not 250 calendar days. It is 250-workday equivalence. So those things can be handled. I sort of intuitively would like to feel like, at a place like Ames, if the blowouts were occurring and someone's there, you include them. But -- I know you can bound that.

DR. MAKHIJANI: You don't know how many blowouts there are.

MEMBER ZIEMER: Well, you don't but I think that's like other things. You can bound the number of blowouts, probably.

DR. GLOVER: They had six in one day once.

MEMBER ZIEMER: There you go.

DR. GLOVER: But then are you going to assume six every day? I don't think so.

MEMBER ZIEMER: Well, no, but you have enough information -- well I don't know.

CHAIRMAN MELIUS: No, no, Sam. That was, I think, what we ran into with Ames was because we bound with sufficient accuracy given the uncertainties about when and then would that even be a practical Class -- practical for NIOSH to do or, you know, if it was based on the number of blowouts you were present at, could you administer a Class Definition? It's hard.

MEMBER ZIEMER: Well, I agree it's hard. I'm saying, for example, based on whatever records you have and worker testimony, if you could say, well, all right, a reasonable estimate would be one blowout per week or something. If a person worked there for 30 weeks, you would say okay, they could

have been subject to 30 blowouts and so on. But if you do that, you are able to -- we could bound the blowout doses, too, so.

CHAIRMAN MELIUS: I don't think we ever reached the point where we felt we could bound them? Is that correct, Jim?

DR. NETON: That's right.

CHAIRMAN MELIUS: Yes, that was -- we -- at one point that was our approach. We had a Work Group meeting. We talked, and I think SC&A had done some calculations or something.

DR. MAURO: Yes.

CHAIRMAN MELIUS: And then Jim went back and tried to do it, and the conclusion was that it wasn't going to be --

MEMBER ZIEMER: Oh, you couldn't bound them. Is that what --

DR. NETON: It all came down to n, the number of blowouts. I think it was reasonably okay to --

CHAIRMAN MELIUS: To bound one.

DR. NETON: -- bound one to know what the conditions were but then to determine the total --

MEMBER ZIEMER: Well, I'm sort of saying can you arrive at a reasonable estimate, you know, or not. If you can't, all right.

DR. MAURO: I think it's important to set the context of that particular analysis. The whole intent was that whether incidents that occurred at Ames that theoretically could have -- be considered very significant, and therefore perhaps we should grant SEC status to less than 250 days. And our only mandate, SC&A's work was why don't you see what you can do to try to get an idea of what kind of exposures there were. So Hans did an analysis to the extent where he did the best he could to say doses could have been this high and the whole story is told there.

Now we are not saying that that is an accurate characterization, but it is

certainly a plausible characterization of what could have occurred following an event, and he gave his reasons. In some of the cases some of the assumptions could have been considered conservative, perhaps not conservative enough. So I wouldn't want to say that this is a highly reliable estimation of what the dose per blowout is. It probably is a pretty good estimate of what it could be.

Now, and I think even Jim agreed that that probably is a pretty good strategy per blowout and the numbers we ended up coming up with which are pretty high for the lungs, for the bone. And I think we all agree that those doses are high and maybe we can reconstruct doses. But the problem we ran into was, okay, you have a real worker now, and let's say, well, we can construct his dose. Well how many of those are we going to assume he was exposed to? So if you are saying you can't reconstruct it, you have no choice but to say well how many did he get and

get that dose and do his PC. And there's where things sort of broke down.

So I think on two levels, the experiment we had regarding looking at Ames gave us some important information on what the magnitude of exposures could be from a blowout. But I wouldn't say that necessarily it was a number that you really want to hang your hat on as being a reasonable upper bound.

DR. H. BEHLING: John, can I make a comment here?

DR. MAURO: Hans, I'm glad you are here. Go ahead.

DR. H. BEHLING: That actually is more of a real number than you might think because it was really based on an empirical data that involved a blowout at Fernald where I used actual empirical data that involved a blowout at Fernald and quantified that and tailored it to the blowouts at Ames. So the numbers for there are -- have a fairly high level of credibility. And if you look at the

actual numbers that I generated on behalf of several cancers, you could come to the conclusion that a single blowout would more than adequately suffice for compensation if you were to do a PoC.

DR. MAURO: Would people agree that if we have a site, let's just do Ames for a second, just to keep -- we have a site where we know there were blowouts, and we know that any one blowout could have delivered doses to some organs that certainly everyone would agree is very high. But they are internal dose and dose commitments. Would there be agreement here that at Ames we should grant everyone that was there, present at a time when they could have experienced exposures to blowouts, that they should be granted SEC status? It becomes a real simple -- rather than the big question, it becomes a simple question. Just for Ames. Let's just look at Ames. Everyone agrees that these blowouts were nasty, and Hans' calculations show these

doses were high. Hans, if I remember, we are talking on the order of 100 rem?

DR. H. BEHLING: Yes, and in fact if you look at table one on page nine of that write up that goes back to June of 2007, that Table 1 identifies a bone surface doses as well as lung doses, and I graduated by the integrated dose for the first year, five year, ten year, and thirty year, and if you go all the way to a thirty-year integrated dose for bone, a single blowout would generate a dose of 214 rem. For the lung, a thirty year dose would generate a dose of 69.1 rem. So we are talking about substantial doses from a single blowout.

DR. MAURO: I bring this up because all of sudden things become simple now. You have a worker. You know he was at Ames; it was likely he was at Ames at the time of the blowout. But he is being denied because we know he wasn't there for 250 days. All right? And the question becomes, and

this, really you have to ask yourself the question. Do you think this person deserves to be compensated?

MEMBER ZIEMER: But the reason that we're tending to say yes is because we know the magnitude of the dose.

DR. MAKHIJANI: From one blowout.

DR. MAURO: From one blowout.

MEMBER ZIEMER: But if you are saying that all it takes is one, then maybe that's all you need to assign. If that person came back and said, okay, I wasn't there 250 days so, therefore, I want a dose reconstruction. What would NIOSH do? Would you say, well, he could have been exposed to at least one blowout in his time there? Would that be unreasonable? If you don't know when the blowouts occurred, would you assign him one?

DR. MAURO: What do you do with that? I mean you reconstruct.

MEMBER ZIEMER: Is it unreasonable

to say that a person could have been exposed to one blowout some time during his period? Is that unreasonable?

DR. MAURO: No, that's reasonable, but I don't think it means you can reconstruct his dose.

MEMBER GRIFFON: Yes.

MEMBER BEACH: Or if he was present on the day there were six.

DR. MAURO: But you see why do we have to go there?

MEMBER ZIEMER: Well, I don't know I'm just saying under the rule, under the SEC rule we say we can't reconstruct dose, but here we're saying we are going to give an SEC because we know the size of the dose.

DR. MAURO: We know it was at least this high. We know there is a very good chance that this man may have experienced at least this much of a dose commitment. That's all we really could say, and possibly a lot more. We don't know. And that alone is

enough to grant compensation. I mean, I could see that line of thinking. And you never really get quantitative. All we are saying is, everyone agrees it was high because it was in a realm where we all agree it was high. Now if it turned out a blowout ended up being one rem, would you say that is enough? Well, then we have a problem. So you're almost saying on a case by case basis, you have to deal with it. Can you come up with a general rule? I'm having trouble with a general.

CHAIRMAN MELIUS: Well, what if we have like -- what we've talked about. We came up with and we used this term when we were talking about General Electric was sort of probability of being present and therefore exposed, and as a general approach say we have some idea of what the number of -- probability of being -- of a certain time period being exposed to a blowout and therefore would use that as a basis for looking at --

MEMBER ZIEMER: A probability

distribution of blowouts.

CHAIRMAN MELIUS: Yes, blowouts but then also what, coming up with some time frame. If you worked there for 30 days, you had a reasonable -- some probability of being exposed to a blowout.

MEMBER ZIEMER: X number of blowouts.

CHAIRMAN MELIUS: Yes. We have to have something that's workable in terms of defining a Class. Now it could be like Amchitka present at all though it was hard to be present for an hour at Amchitka because once you are there you are stuck on the island, I think.

MEMBER ZIEMER: I'm guessing that would be almost a rulemaking, wouldn't it?

MR. KATZ: Can I throw something on the table just that are -- sort of resonate with what John was saying related to discussions we had way back when, which is the whole idea again with the criticalities was

you know it when you see it. I mean, for the people with extraordinary -- we weren't talking about the people that happened to be at an incident of criticality or what have you but didn't incur terrible doses. We weren't really -- that was not what was in mind. So what John was saying here, I think, is very resonate.

If it's an internal dose of the magnitude where plainly on the face of it, that's an enormous dose, I mean, that is the same idea as what we were wrestling with in terms of external dose. If there were a debate about is that an extraordinary dose then you already know you have a problem, and that's probably not a dose that qualifies. But, you know, anyway that was sort of part of the discussion we were having back then that we're trying to deal with situations where plainly on the face of it, this person incurred -- could have incurred quite an incredible dose. And the other thing that I -

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MEMBER ZIEMER: An incredible dose to certain organs?

MR. KATZ: Yes, it may be, right. That's not an issue.

MEMBER ZIEMER: Well, it is on an SEC because you have a whole lot of organs covered. I mean, Hans is giving us dose figures for particular organs which are the organs of interest for those nuclides. So I think we have to be very careful to say that it's a high dose automatically. There may be some, if you can bound it, see. If you can't bound it, that's a different thing. Then you have to say any of the organs could have high dose.

DR. MAURO: You see, if we can't come to agreement on Ames about what is the right thing to do here, where I consider this to be like a flagship problem, I mean, classic problem. If we can't come to agreement there, we are going to have an even harder time

coming to agreement on many other sites. So it is almost as if -- it is almost like the easy one to solve. And whatever areas we find that we can agree about regarding Ames and perhaps coming to a decision, that becomes a stepping stone to allow us to move on to the next, more difficult one which is not as easy to decide because I know for one, I'll say it out loud. In my mind, Ames is cut and dry.

If you were there at a time when those blowouts occurred, you experienced extraordinary exposures. I realize it's not comparable to a criticality because it's internal. But I've got to tell you, I feel as if a person was there and one of those things occurred, you've got to pay the guy. I'm making life feel simple. And it is easy for me on that one. Now I can't say I could come that quickly to others, things that may have occurred at Nevada Test Site or other facilities. But Ames, if we can't do Ames, I say we can't do any of them.

MEMBER ROESSLER: So how are you basing -- you're clear on your decision about Ames. What is the criteria that you are using to come up with that?

DR. MAURO: When I hear that an extraordinary event that blew a door off released the quantities of airborne uranium to a point where you couldn't even see, people inhaled enough radioactivity where they were delivered a committed dose, lifetime committed dose to the bone, to the lung over 100 rem. Even in the one year, Hans, what are some of the numbers for one year?

DR. H. BEHLING: For the one-year the bone surface according to my calculation, I think they were also verified by Jim Neton so that these numbers are reasonably correct. For the one-year integrated dose for the bone is 12.7 rem. For the one-year lung it is 53.2 rem and that is for the thorium blowout. They are quite different between thorium and uranium. But even a one-year dose would have

a substantial dose. As I said 12.7 for the bone surface and 53 rem to the lung.

DR. MAURO: And that's one blowout, one year.

DR. H. BEHLING: Yes.

DR. MAURO: So, we have to realize that we are health physics scientists and we see the world the way we see the world. When I hear that I say pay the guy. Under my understanding of SEC.

MEMBER ROESSLER: It's a dose-based thing.

DR. MAURO: It is the magnitude of the dose.

MEMBER ROESSLER: Magnitude.

DR. MAURO: The insult. The magnitude of the insult.

MEMBER ROESSLER: So we can't really -- we can't get away from using what is a large dose?

DR. MAURO: Well, that's the -- you know it when you see it. I saw one --

DR. NETON: I'll point this out in very general terms. We've added a number of SECs because we can't bound dose. Ames is one of them. I can guarantee you for any site that handled, that we can't bound dose, things like plutonium, enriched uranium you can come up with doses, maybe not as high as a blowout, but you are going to come up with doses that clearly would show or demonstrate very easily that you have endangered health if you are doing PoC calculation. No doubt. Then that puts you in the very difficult situation of how do you parse that down from 250 to whatever scenario you want to identify as the time period and it would have to go to presence anyways.

MR. KATZ: You can't parse it down on a time period.

DR. NETON: What I'm saying, though, is you have in that 250 day, I can guarantee you that you come up with doses that are, well much less 250 day will give you

doses much higher than what it would take to be over 50 percent on a PoC calculation. So you kind of got this balancing act then.

MS. HOWELL: Can I ask a clarifying question, a non-scientist? Is the reason that you understand what magnitude Ames was because blowouts have an objective magnitude or you just know enough about Ames to know what the magnitude of the blowouts there would be?

MEMBER ZIEMER: Well I think that is site-specific for Ames knowing the source-terms. Was it not? Hans can you clarify?

DR. H. BEHLING: Actually the numbers that are used to derive those dose estimates were actually numbers that involved a specific blowout that occurred at the Fernald facility. However, I tailored it in proportion to the quantities that were used in the actual reduction process. So with a combination of empirical data that involved a single event that was well documented for Fernald but then I tailored that document --

those documented values to quantities of material used for thorium as well as uranium material that were reduced at the Ames facility.

MEMBER ZIEMER: You really complicated it now, sir. Just joking.

DR. MAURO: You see magnitude --

MEMBER ZIEMER: I'm okay with that part of it. I think, in a sense, it is site-specific. I mean a blowout somewhere else would have to be, you wouldn't say blow outs per se --

DR. MAURO: I agree. You see one of the things we are doing to ourselves and maybe it's not fair. When we are looking at Ames we are almost afraid to talk about it because we are afraid of where it may lead us when we go someplace else. So it's not -- to me let's come to agreement on Ames.

You would like to be able to use that as a stepping stone. So listen, if we all agree on Ames, the reason we agree with

it. The question then becomes when we move on to the next one, the same sensibility that we all collectively developed on Ames, if we do have that same sensibility. I'm not sure if we do. How is that going to serve us on the next one? So it almost becomes a case-by-case basis and these general rules that we are looking for will emerge from that process.

CHAIRMAN MELIUS: Or they may not.

DR. MAURO: They may not.

CHAIRMAN MELIUS: If there was an easy general rule I think we would have found it by now. We've struggled with Ames. We've struggled with all, at one point I think with Nevada Test Site we are thinking well maybe it's an individual, until NIOSH does the dose reconstruction and goes to a detailed evaluation of a person, we wouldn't be able to make a determination about an incident that they might have been exposed at which is a very different approach. And then we weren't

sure that was practical and got away from it.

I would also add though, I think it would obviously make a difference to have to change the regulation. The 250 day versus incident is not based on the law per se. It is based on what regulation was written. So it was nothing, I mean, we thought it was 60 days or something else. There is a basis for it but it doesn't mean that couldn't be put in place if that was appropriately justified. It would obviously be cumbersome and not an easy thing to do. But I don't think we should necessarily totally dismiss that sort of thought simply because we are tied to the present regulation.

MEMBER ZIEMER: And I don't think it makes any difference if you change the number. You could change it to 200 days or 100 days. There is always going to be someone below the line. So the problem still emerges.

CHAIRMAN MELIUS: It is the basis for how you make this determination.

MEMBER ZIEMER: And also I think the only reason we are using the 250 days was sort of the precedent on the other sites. And we can't compare them too well. Even Amchitka is 265 millirem. The implication though was that we don't even really think that's a good number. I think the congressional implication was we can't hang our hat on that. In fact if we were reconstructing doses there we wouldn't have ended up using that number because there is missed dose. There is all the other issues anyway.

DR. MAKHIJANI: There was some reference to Dr. Bertell, Rosalie Bertell dose reconstruction. We've discussed that before too.

CHAIRMAN MELIUS: There was an index --

DR. MAKHIJANI: I think maximum estimate of 17 gram -- but this is from memory. So I would have to go back and check it.

CHAIRMAN MELIUS: Can I elaborate? The index case so to speak at Amchitka was a worker with leukemia whose records were withheld. First the claim wasn't monitored and then they were withheld by DOE for security reasons for many years. So it went to the Supreme Court in Alaska over a worker's compensation case and it was clear once even the records were made available that the monitoring, Bertell had done some sort of a study estimate basically saying that whatever that person was exposed to was orders of magnitude higher than what was recorded for them at that site. I think that was some of the basis for the decision and in particular they just weren't --

MEMBER ZIEMER: Yes, I'm just saying I don't think we should assume that low doses of --

CHAIRMAN MELIUS: No, no, that's why I was --

MEMBER ZIEMER: The implication

was the doses were higher than they recorded.

CHAIRMAN MELIUS: Yes.

MEMBER ZIEMER: But, right. I'm in sympathy with what you are saying John. I'm uncomfortable with the idea that we have to in a sense reconstruct dose to get to that point and I would sort of like your idea of a probability distribution, Jim's idea. But I don't know how you would put that into play in terms of practicality. I mean it would make sense if a person was there like 100 days. You would say it's likely that they were exposed to this many blowouts. But therefore you would reconstruct dose based on that I assume. Or do you just go the other way and say you know, anyone working there less than that probably was exposed to one or more blowouts and therefore the doses were probably high enough.

CHAIRMAN MELIUS: A known number of blowouts I think is what makes the uncertainty or the inability to do dose

reconstruction.

MEMBER ZIEMER: If the number of blowouts is great enough, that makes the dose very uncertain then, too.

CHAIRMAN MELIUS: Right.

DR. GLOVER: There is some language there about the discreteness of the incidents, though. If the number of blowouts is like a continual thing.

MEMBER ZIEMER: Well in my mind the blowouts would be sort of if you want to make the analogy like a series of criticality accidents. They are discreet and here's a blowout maybe three weeks later then another one.

CHAIRMAN MELIUS: To my mind those are discrete incidents. They are obviously multiple but they are not routine.

DR. MAKHIJANI: Well I was assuming incident by nature is discrete. I mean until you all discussed it in the Board meeting whether an incident would last an hour or a

day or a few days. And you didn't actually come to any resolution during the Board discussion. I don't know whether there's another document.

MEMBER ZIEMER: Well you know.

DR. MAKHIJANI: I didn't know what it was.

MEMBER ZIEMER: I don't think you can put a time table on that. Just like the oil spill going on is an incident. The incident extends for a while. You know, Three Mile Island was an incident and you know.

DR. MAKHIJANI: Chernobyl lasted for ten days.

MEMBER ZIEMER: Right, an incident.

DR. MAKHIJANI: Well that's exactly what you said five years ago or seven years ago.

MEMBER ZIEMER: I'm glad you remember.

MS. HOWELL: Do you have a date on

that?

DR. MAKHIJANI: Actually I looked at the Board discussion. That's how I know. I do have a date on that.

CHAIRMAN MELIUS: We struggle a lot with this part of the regulation.

DR. MAKHIJANI: May 28, 2003.

DR. NETON: In this situation I think I need to refresh my memory as to what exactly was done by SC&A and their analysis. If I recall correctly the Class was added because we couldn't reconstruct thorium dose. Is that right? I think that's the basis. And therefore I think we had enough uranium dose to reconstruct.

DR. MAURO: Ames?

DR. NETON: Yes, is that right? Thorium? I thought the basis was thorium.

DR. MAURO: We can look it up.

DR. NETON: This is where I'm going is if it was for thorium exposure and we are reconstructing uranium based on urine and

if the blowouts were somewhat equivalent you kind of have a bounding analysis of intake for thorium, for uranium. I don't know, I'm just trying to remember.

DR. MAURO: Trying to find a way to reconstruct it.

DR. NETON: Well I'm just saying, I think it was thorium. Hans did you do urinalysis for thorium intakes?

DR. H. BEHLING: I did it for both. I did both thorium and uranium. I think I gave two sets of tables and I even fragmented the exposure by the first five minutes versus the term of 30 days from residual resuspension. So there's a whole series of data that I created for both thorium, uranium and the exposure that resulted from the initial distribution of material in air following by 30 days of resuspension of residual contamination.

DR. NETON: I'm looking up the Ames letter here.

CHAIRMAN MELIUS: I think I've got it.

DR. NETON: Okay. And the basis was? I think the second one was talking about thorium.

MEMBER GRIFFON: Thorium production.

DR. NETON: Which was the first one?

CHAIRMAN MELIUS: The letter doesn't say the first one.

DR. NETON: Federal Register notice.

DR. MAKHIJANI: I don't think this refers to uranium.

MEMBER GRIFFON: The second one, the sheet metal workers, it says --

DR. NETON: That was thorium.

MEMBER GRIFFON: Yes, thorium.

DR. NETON: The second one was sheet metal workers.

MEMBER GRIFFON: It says potential

internal radiation exposure associated with the maintenance and renovation activities of the thorium production areas.

DR. NETON: This was the 42 Class. There is very little monitoring data available. Okay. Maybe it was. I was thinking of thorium for the second class.

DR. MAKHIJANI: Thorium was at Y-12 for the first one.

DR. NETON: Never mind, I've refreshed my memory sufficiently.

CHAIRMAN MELIUS: What difference would it make?

DR. NETON: Well I was thinking if it was only based on thorium and it was thorium blowouts and we could reconstruct uranium intake based on uranium urinalysis data. If the blowouts were not preferentially occurring thorium versus uranium, you could sort of come to some idea of -- for instance like that -- I won't talk about Fernald.

CHAIRMAN MELIUS: But what I

think that is the -- that was the thought at the time and then I think reconstructing a blowout may have been feasible. What was not feasible was I think estimating the number of blowouts. I thought that was --

DR. NETON: I recall going back at one time and saying, well, we have thorium analysis urinalysis data. And I went back and looked at the thorium urinalysis data and it was just so far removed from the time of the -- you know, they start collecting data, you know, twenty, ten years later. It made some implausibly high intake calculations. That's why I recall looking at the thorium intakes. I thought the uranium intakes were reconstructing doses for --

CHAIRMAN MELIUS: I don't think we are trying to pin anybody down with a specific agreement on a specific site.

DR. NETON: I agree.

CHAIRMAN MELIUS: Let's keep it more --

DR. NETON: I know, but John was making a pretty good argument about it.

CHAIRMAN MELIUS: Yes. And I think we can talk about it hypothetically. Assuming that a single blowout would be sufficient, or what determination would be, given the fact that there were so many, the blowouts were so frequent at that site for such a significant period of time then it should -- say presence at an incident would be enough. So presence working at the site would be, would qualify a person.

DR. NETON: And Mark and I at the same time came across the table, just to clarify. It was based, we said we can reconstruct uranium exposures at Ames. And presumably then we are using the urinalysis data that bounds the blowouts that occurred for the intakes. That's what I thought. I don't know where that goes. I understand what you were saying earlier but the fact that there were a number of uranium blowouts as

well and we are using urinalysis data kind of gives you a handle on the upper magnitude of the exposure the worker received during these blowout conditions.

MR. KATZ: But since, you could take the urinalysis off the table. If you are trying to speak theoretically -- forget and say you don't have the urinalysis to do that and you have the same situation.

DR. NETON: Agreed. That's what I think Dr. Melius was saying. But that was arguing for this specific targeted of Ames and I was pointing out that the unreconstructable dose at Ames is thorium. It brings a different light to it.

DR. MAURO: It does.

MEMBER GRIFFON: You still, though, and I have been reflecting on kind of what John said that the you know, it might be a case by case, because as I am sitting here thinking some of the discussions I had with Arjun off-line was this notion of, if you have

an SEC -- this all assumes you have an SEC in place, obviously. Then if you could have a qualitative metric like a person within their file showed presence at an incident, then the problem is incident is defined different over time, certainly at all these sites.

You really have to know more, I think. Because an incident obviously in the early 90s, the reporting requirements were different, you know. An incident in the 50s at Oak Ridge would be totally different than in the 90s or whatever. So I'm not sure. But on the flipside if we are looking at the Ames example, we are sort of going back to this sort of quantitative thing, you know. You know it when you see it. I'm just trying to think of another metric that would be more qualitative but also it might be a guideline that we say consider reportable incidents. And then it still is a case by case thing but you actually, you would have to then look back and say okay, these are reportable but the

cost is in the 80s and 90s and here is the criteria for reporting. It is a very low threshold. We can't rely on this. I don't know.

CHAIRMAN MELIUS: Yes, Paul?

MEMBER ZIEMER: I wanted to ask Jim Neton, right now for Ames if a person had less than 250 days and came in for dose reconstruction, you would reconstruct uranium and then what? Is that it? You would stop?

DR. NETON: I think external exposure.

MEMBER ZIEMER: And external and medical X-ray.

DR. NETON: But there would be no thorium.

MEMBER ZIEMER: There would be no thorium and the only real difference is that for those more 250 days they're in the SEC and I can't bound thorium. For these guys you still can't bound the thorium but they don't qualify because of the presence issue.

CHAIRMAN MELIUS: Do those -- just sort of procedurally do people that are with a SEC cancer who work -- have a work record for less than 250 days, does DOL send those to you for reconstruction?

MEMBER ZIEMER: Sure.

CHAIRMAN MELIUS: I know they said that non-SEC cancers --

DR. NETON: Anyone who doesn't qualify for the SEC.

MEMBER ZIEMER: Okay, okay.

DR. GLOVER: You can get people who have qualified for the SEC, you may get their prostate cancer, a non-SEC cancer. We may still do a dose range.

CHAIRMAN MELIUS: That was less than 250 days.

DR. NETON: It would be a latency issue for instance with a solid tumor. We will get them in even if they work two years.

MEMBER ZIEMER: So we really have already said we can't bound the blowouts then

as far as thorium is concerned?

DR. NETON: I don't think that was the way we described it. As a matter of fact I think the way it is discussed is that it is one of these, there is no evidence of these exceptionally high, because that standard boilerplate when we talk about the 250 day requirement in our write-up. It says we have evaluated the exposure scenarios and we believed it was sort of a chronic exposure scenario.

MEMBER ZIEMER: No, but someone who qualifies for the SEC and they were presumably exposed with a blowout too. You are still saying we cannot bound -- based on the uranium bioassay we can't bound thorium dose?

DR. NETON: Correct.

MEMBER ZIEMER: So there is not a correlation on uranium and thorium. I'm trying to get a feel for it. I'm much more comfortable if it's an unbounded incident than

one where we say well I know the dose was at least this high. Because once you've bounded it I think you are back to dose reconstruction.

DR. MAURO: I'm not saying you bounded it but we know something occurred where the doses were exceptionally high and we really can't bound it. We can't bound it because of the nature of the individual incident or the number of incidents. And in the case of Ames, it is almost as if that we all have the sensibility that we think something happened here that certainly was in a realm of a dose that was high, exceptionally high and it was an incident and it was uncontrollable. Now I keep thinking back to something that we didn't bring up. That is, they're looking for, okay, we know when it appears. There's an incident, and everybody knows this is pretty bad. It is when it starts to get a little lower and when does it become an incident of concern. Now you have

brought something up, like the last time we talked about this, what's your trigger? And the idea that you came up with, well something would certainly be considered uncontrolled incident if an individual got radiation exposure during an incident which caused him to have more than his allowable occupational exposure. And the number of three rem full body per quarter came up or five rem for the year as being this is a circumstance where clearly it wasn't my intention. It had to have resolved from a breakdown of some kind of controls. And quite frankly I am hearing a number, three rem per quarter, which starts to fall in the area where we generally have been talking. It is not small. We are delivering three rem. So I am struggling right now to say what's the trigger. Okay, we've got an incident report that just came out about 1960s, an incident report. And we know something happened. We have some information regarding what happened. The question we would

ask ourselves is there reason to believe that the exposure this person experienced as a result of an incident could have put him what would be allowed as the occupational limit at that time? Is that a criteria that may trigger? Yes, this person it falls -- it meets all these criteria. I am testing the waters to expand the generalization that we are trying to get to.

MEMBER ZIEMER: Of course Mark pointed out that trigger has changed over time. You know you go back in the Ames period. What were they working on? 50 rem a year maybe?

MEMBER GRIFFON: Yes.

MEMBER ZIEMER: Yes. The thing has come down for a while. It was a running thirteen week rather than a calendar quarter. So, in a thirteen week period the three rem triggered them at the calendar quarter. So March 31, you are okay. You can get three there. And then you get three the next day,

it's all right. These things change. So I don't think you can use that kind of a -- and in current, modern times, what people call an incident may be a few atoms of tritium down in the creek by Savannah River. So I think the concept of incident that we are talking about, if we could agree in more general terms what it is. A breakdown of controls. Sometimes a breakdown of controls is very different than a violation of regulations.

MEMBER GRIFFON: Yes.

MEMBER ZIEMER: I mean, your guys are working and they are wearing a pocket dosimeter and the pocket dosimeters says they are five mR below the thing and they are okay and then they send in their TLD badges and they are 5 mR over and it is the thing of record so it is reportable. The controls haven't broken down but there is a technical difference. So I don't think we want to mess with those.

MEMBER GRIFFON: Okay.

MEMBER ZIEMER: We are talking about what's clearly a breakdown of controls and I don't know how you define that. I think intuitively you sort of know it when you see it. The blowouts are an example. No one is planning for that to occur. It is clearly an accident kind of thing. It's not -- I don't know.

DR. MAKHIJANI: There is some modern DOE guidance about these things. That's what Joe said. I haven't had time to study this. It had things like loss of radioactive material they received hundred times. The quantity specified it, 10 CFR part 835.

MEMBER ZIEMER: But those are microcuries.

DR. MAKHIJANI: Five hundred millirem exposure in a short period of time. No, I'm just saying that there are.

MEMBER ZIEMER: Those are administrative incidents.

CHAIRMAN MELIUS: I think we'd be better off to finding, describing at the upper end, not a threshold. So it is similar to, which is what we are trying to do with criticality. We were naive about criticality, but I think as I recall the discussion x years ago, the rule was we will recognize it. That was, it would be something similar. We didn't have examples then.

DR. MAURO: I'm looking at the protective action guides that the EPA wrote and what you are saying is correct for the public. But the criteria for the one to five rem, I'm going to read them to you, acute effects on health. This would be for an individual now. We are talking about if a person were to experience, acute effects on health, those that would be observable within a short period of time which I have a dose threshold below which such effects are not likely to occur should be avoided. Okay, so acute effects and the other one, the risk of

delayed effects, primarily cancer and genetic effects. And it goes on to explain. So in other words when they pick the one to five rem that's why we are going to evacuate. It was because there were concerned that if you don't evacuate, people could experience two things that we are very concerned with here. So at least they made that judgment. They made that call. And in an accident situation, primarily for nuclear power plants, members of the public who project are going to get exposures, that could have acute effects and result in risks of delayed effects, genetic and cancer that are considered to exceed what is acceptable. You evacuate. So I mean what I'm getting at, we actually have some regulatory precedent here.

MEMBER ZIEMER: You know I would say on non-stochastic effects, if those occur. I mean these are immediate effects. I would call that an incident. I don't have any trouble with that. One to five rem? Yes I

can calculate a probability that cancer will occur in 50 years in somebody and that's not even calculated the way we do. I think that's what they are talking about there.

DR. MAURO: They're doing both. They are saying that, if you get one to five rem, apparently there is some evidence that you do see a subtle drop in white blood cell count in five rem, acute. I remember Casarett, Radiobiology 101. That's the lowest I've ever seen it. But most people talk about 25 rem. We could debate that.

MEMBER ZIEMER: Well, they are talking about stochastic effects.

DR. MAURO: But they also add in one of the second criteria. This is EPA now. The second criteria is also they pick that number because they don't like the risk of cancer at that dose. They are uncomfortable with that.

MEMBER ZIEMER: But John, you know very well the risk of cancer with a

population of calculated risk. What's the number? And if not.

CHAIRMAN MELIUS: We already have a risk assessment so to speak. That's how the dose calculations are done. So I think we've got to be careful about bringing in a different risk assessment, cancer risk assessment as a criteria for this particular part of the program.

DR. GLOVER: I would point out even the missed dose for plutonium could take bioassay can be tens to, you know, many dozens of rem from missed dose from an incident. It is very hard to do plutonium very well so you can very quickly get into these numbers that are just missed dose.

CHAIRMAN MELIUS: I'm trying to come up with like sort of general criteria for this based on our discussion. So, one is what we've been talking about is what is an incident? Can we come up with some general descriptors that would help us identify what

type of incident would qualify? Criticality and so forth, lack of controls, some sense of what the magnitude is. The second general criteria would be that not able to, it is not feasible to bound the dose, do the dose reconstruction -- or not feasible to determine the number of incidents of the person they've been present at.

MEMBER GRIFFON: Well that's bounding the dose.

CHAIRMAN MELIUS: Yes, part of the bounding the dose but I think it, I guess the way I have it written here is not feasible to bound the dose for an incident or the frequency. It is the same. You are right, it is the same.

DR. MAKHIJANI: Just as a supplement to your comment here, I think is the way technically the language of that rule reads to me is you can't avoid an individual, case-by-case approach. It would be very hard to come up with a rule like 250 days that it

is always black and white. You know there is documentation. Did they work for 250 days or not. There is going to be a judgment if the intent was you will know it when you see it. Then you have to see it. Those -- then there has to be documentation about an incident and some judgment about how severe it was. I think part of our problem has been there are not enough examples in the rules and none relating to internal dose about what severe means. So maybe it might be useful to give more examples as to what we need and include internal dose. That was part of the intent of how I heard what John was saying regarding Ames. It is, this seems to be a case of we know it when we see it and somebody was there during an incident or in this case, because incidents were not documented, we might make a judgment about their frequency. If they were there for a few days they're more likely to experience an incident and do it that way. But I don't think the dose reconstructor's

judgment is avoidable in this case. I mean you've got, if you are going to look at that and interpret it in a way that we would be talking about and say exceptionally high exposures and we know it when we see it then the dose reconstructor has to see it.

CHAIRMAN MELIUS: Or we have to see it for a Class. We are trying to define a Class. One way of defining -- that is what came up with NTS, was that we really wouldn't be able to see it until we were at a point of doing individual dose reconstruction. So we are saying we will have to do individual 83.14s or, you know, because it wasn't going to be possible to find an incident, a qualifying incident. It would be until you couldn't do the dose reconstruction.

DR. MAKHIJANI: That is actually a very good example because now we are in a different place now with NTS than we were then.

CHAIRMAN MELIUS: Yes.

DR. MAKHIJANI: How would you look at the main variants where there were so many people involved in being in the club? Would that constitute an incident under what we are talking about? I don't know.

DR. H. BEHLING: This is Hans. Is it possible to bring in the Metallurgical Laboratory at this point because that represents a very, very different scenario where we are not necessarily talking about incidents but the conditions that over a short period of time would have potentially triggered a substantial dose from either external or internal. I think in my White Paper I give various examples of radium sources for individuals who were exposed to dose rates over an r per hour and over a period of even a few days which resulted in a significant external dose from radium. Also we talked, in my report I talked about tolerance doses and they even offered tolerance doses for the maximum concentration

of airborne material that one could inhale in a given day in one of the examples that I showed in one of the exhibit one was that the air exposure for single day would have resulted in a total intake of 280 microcuries of iodine-131. That would have resulted in excess of 300 rems to the thyroid. So those are examples that are not necessarily incidences in a classical definition. But at the same time would have resulted over a very, very short period of exposure in substantial doses from both internal and external doses.

CHAIRMAN MELIUS: I was going to try to do that next after we talk a little bit out NTS. I'm glad you stopped at two examples. Because I think it is another situation. What has changed with NTS? What else? Before we were talking about I think we were mostly talking about the above ground.

DR. MAKHIJANI: Well before the position was that we know enough to reconstruct doses up to 1963. So if you have

internal dose data then presumably and NIOSH already documents a number of these incidents.

CHAIRMAN MELIUS: Right.

DR. MAKHIJANI: And I don't remember how many events there were but between 1963 and 1970 but there are a number of significant ones. And so if you have the data to do that then the question about separating incidents into an SEC doesn't arrive because you already said that you have the data to do that. And the thing that has changed is now the number of radionuclides, the short term to exposure, the fact that exposures were mostly non-routine. I mean that led to a special consideration for Nevada Test Site. So I think the question of people who were present less than 250 days but may have been involved in one of the incidents is quite interesting. It is a new context. At least I think it is.

CHAIRMAN MELIUS: Yes. So I am just trying to think of -- how does that, how

do we think about those incidents in terms of being extraordinary or whatever?

DR. MAKHIJANI: Baneberry was an extraordinary venting. He had millions of curies that were vented but I don't know how we think about it in terms of this rule. I don't have any particular. Jim might have.

DR. NETON: I'll defer to Sam. He took the lead.

DR. GLOVER: I haven't looked at the Baneberry that carefully so fortunately it's -- go ahead.

DR. MAURO: I was going to say. This does represent a very nice stepping stone. What I mean by that is I think we have a sensibility regarding Ames right now, even though we haven't said anything definitive. Now we move on, you leave Ames and you move to NTS. You say okay, how were things different here or the same? Well I would say in many respects they are very similar. That is we have from time to time an event where a

substantial amount of radioactive materials leaves the environment over a relatively short period of time. In the case of Ames we all accept that because of the special calculations that Hans did that well yes we all agree, that's a pretty big dose. Now what's different here? Well, we all agree that both during above-ground and below-ground tests, of course they are all covered now under the SEC, there were incidents whereby there were ventings. Let's talk about Baneberry as being an example. Now, the thing that we haven't talked about, well the Baneberry resulted in enough emission where the doses that people might have experienced, external/internal could have been extraordinarily high, comparable to the kinds of things we saw, we estimated for Ames. Now I would argue that if we say yes to that then we've established Ames as a stepping stone and that would bring that stepping stone over to NTS. Is it possible we would agree? I'm not

saying we should. Is it possible we would agree? Yep. The Baneberry would be something like that where there is an incident, uncontrolled, and from best we can tell, the kinds of exposures that could have occurred were pretty big. I don't have those numbers. Those numbers may exist. But if we find that they are in the tens of rems or even higher delivered effective whole-body dose if you want to use that as a criteria. That could have occurred to some people who were present during that. Well, as far as I'm concerned we have just made another step in the process. Now does that mean that applies to other ventings? There are a lot of ventings that have occurred. Yes, we've got a problem there. I'm not sure. What I'm getting at is it isn't a very nice progression to go. That's why I like the idea that we worked out Ames in my head and if there is agreement on it. In my head, I'm working it out. I'm talking --

(Laughter.)

CHAIRMAN MELIUS: Lobotomy.

DR. MAURO: I don't know if you buy in to how I'm thinking but I lay it out. This is where my thinking is taking me. Whether you want to get on that roller coaster with me, I don't know. But that's how I'm thinking about it right now.

MEMBER ROESSLER: I think the problem is that we each have our own head.

DR. MAURO: Yes.

MEMBER ROESSLER: Each of us maybe have a different line or trigger point for that thing you talk about as significant dose, or big releases. Somehow we are going to, if we are going that route we have to define what we mean by that and then I think we are all going to have a different --

DR. MAURO: Well I got to tell you I threw it on the table. I mean, naked in the world, this is what I think.

CHAIRMAN MELIUS: The problem is

we're used to defining these things quantitatively and we are in a situation where I guess the first step is that you can't quantify it, sufficient for dose reconstruction. So I'm as interested is it like NTS, what would we call an incident? Or some other example but we wouldn't call it an incident.

DR. MAKHIJANI: It might be some --

CHAIRMAN MELIUS: Extraordinary incident.

DR. MAKHIJANI: -- NTS in that regard because Baneberry was the last big venting except I think there was one in 1986 that is regarded as extraordinary.

CHAIRMAN MELIUS: Most of the other vents are usually regarded as small, right? Would we agree on that? And they were also -- most of them or many of them were operational vents that were deliberate because after Baneberry, mostly the tests were pretty well contained. I think it was much less than

Baneberry in terms of total releases.

DR. ANSPAUGH: This is Lynn Anspaugh. I would like to make a couple of comments about that. You know there were some Ploughshare events that took place in 1965 and 1968 and those vents were certainly comparable to Baneberry. There were several significant releases and a lot of insignificant releases but if you wanted to define it an incident, then you would have to define how large the release was.

DR. MAKHIJANI: Yes, Lynn, that's where I was going is what Jim asked is can we say what are not large releases? And that's why I, you know, after 1970 we know there were many large ones because they were in the millions of curies. But after December 1970 there were many what I think mostly we could say were small and I don't know if you would agree with that.

DR. ANSPAUGH: Well I agree with that. You know the 1970 Baneberry event

resulted in a completely new operational mode at the test site where they wanted to make sure that never happened again and it didn't. As far as atmospheric tests are concerned, every time you set off a nuclear weapon, I think that's an incident, isn't it?

MEMBER ZIEMER: Well, I guess you also have to place the workers in some location relative to that. I don't know in Baneberry where they were, were there large groups exposed or would we know in a given claimant if they were actually exposed or not or that was an unknown factor.

DR. ANSPAUGH: Baneberry exposed a lot of people because the cloud went right over a work camp. So there were I would say a few hundred people who were exposed but the doses were in the few rem level as nearly as I remember.

MEMBER ZIEMER: But you're saying we know what their doses were and we know who the people were.

DR. ANSPAUGH: I think it's knowing who the people were and they were all screened. They were particularly concerned about thyroid. They were all screened. Some people were sent for whole body counts and further analysis.

DR. GLOVER: I remember the NTS, one of the issues that it made it an SEC was we have all this bioassay data and because there is a number of different incidents that we couldn't necessarily link it to, the analysis didn't really, wasn't conducive to doing that type of work. If an incident with linked whole body count data it becomes a little more pliable to make some kind of analysis. So there, the overall thing, the 250 days when you have a lot of these all compiled together, to try to look at one.

DR. MAURO: So this short-lived, I know during the decision to grant SEC status to post-63, part of that had to do with this mix of radionuclides, some of which can be

relatively short-lived and therefore any chest counter bioassay data really isn't going to be too helpful. What I am hearing is if you have an incident and you hit the person with a whole body count and do whatever needs to be done shortly thereafter, that probably may be trackable. But if not, one could argue that no, there are still these very short-lived radionuclides that could have gone through and even if it didn't measure the person say for several days, a few days before he got him into to the chest counter or whole body counter, you could miss something important. And then all of a sudden you could miss something important. I'm not sure.

DR. ANSPAUGH: Well you know the Baneberry was a very peculiar situation because the people who were exposed were substantially downwind of the actual vent point. People who got the higher doses I think were the ones who were very close to some vents so that the concentration that they

were exposed to was much higher than the large number of people who were exposed to Baneberry.

MEMBER ZIEMER: But see here we're talking about incidents where we know when they occurred. We even have names for the incidents. But you go to a place like Ames, we don't have, you know, we don't have the dean's blowout or the provost's blowout or you know, name them whatever you want. We don't even know when they occurred at Ames, nor their magnitude, nor who was exposed to them. I think in places like Nevada Test Site where these things have occurred and they were incidents but they are characterized in a much better way. There may indeed be cases where we can't bound the dose but at least we can put people in locations at certain times and do things with them. I'm not as concerned about those kinds of incidents where we can characterize them. I mean even the SL-1, we know when that occurred, we know who the

people were that were exposed there and there's -- and the Oak Ridge impromptu barrel reactor. We know who was there and how long and the dose has been reconstructed. But what we're concerned about are these incidents that we can't characterize.

DR. MAURO: Well Jim --

CHAIRMAN MELIUS: But are we because in some ways there are complementary. The NTS you can't reconstruct the dose. We said that, and yet we have people that worked there for less than 250 days.

MEMBER ZIEMER: Right.

CHAIRMAN MELIUS: And so what do we do about them? In Ames we can characterize an incident but we, presumably can do the dose for an incident, presume that, but we don't know the presence, the number of the incidents and therefore the total dose is impossible to reconstruct. And so you know, do the people from NTS, you know, what's the criteria there? Are there criteria where people should

qualify at less than 250 days? So the people, you know, or those close to the incident, how do we make that determination? Can that determination then be applied based on is it practical in terms of work records or other information.

MEMBER GRIFFON: For example, if they can show less than 250 days but they were present at Baneberry or present at an incident then what do you do?

DR. MAURO: What do you do?

MEMBER GRIFFON: You might say you can bound that.

MEMBER ZIEMER: Well I don't know. I don't know if you can bound it.

MEMBER GRIFFON: If I have enough data.

MEMBER ZIEMER: But I don't know if presence on the site is the criteria or some location.

MEMBER GRIFFON: Or present at the, yes.

MEMBER ZIEMER: That's a detail.

MEMBER GRIFFON: Right.

DR. MAURO: But isn't that what it comes down to? You have a guy, let's say he is covered by the SEC period under NTS, has prostate cancer. Going to do his dose reconstruction and it turns out in his records, is information that he was present or could have been present during Baneberry. Okay? What do we do with that? And reconstruct his doses without including internal because you don't include internal and you come up with a low dose. Meanwhile can you reconstruct his dose from the Baneberry incident. Do you have enough --

DR. NETON: That's exactly like what Dr. Melius just mentioned. When you try to do a dose reconstruction and you can't do it -- and it could be based on presence. But if you have sufficient monitoring data to reconstruct it from the Baneberry you would do it. They have it at SL-1. We reconstructed

doses at SL-1. There was arguing one point that we couldn't but we obtained enough data for that particular accident.

DR. MAKHIJANI: Isn't part of what the drift this discussion the you know it when you see it, the idea that you can only make a determination through a dose reconstruction in an 83.14? Is that the drift of the discussion?

CHAIRMAN MELIUS: No, I don't think so. I think there is some general, will be some general classes and there will be some that may be only when you do an individual dose reconstruction do you have enough information to know that you can't.

DR. NETON: But I think it's essentially what this entire discussion is about is can you identify an incident that would be like an 83.14? Even if Ames were to be added, there has to be an 83.14 because there is no Class based on an incident. Right now there is a Class based on a chronic

exposure scenario. Can you identify 83.14 classes essentially that need to be added?

DR. MAURO: Is that the answer?

DR. NETON: Well that's what we're talking about.

DR. MAURO: I mean in the end bypass. Help me out, maybe I have the wrong line of thought. In other words, every claimant that shows up with a cancer, we can try to reconstruct his dose. If you can't because he was involved, there is information on the record that he might have been involved in an incident that we don't know how to deal with. You grant him, he falls within this Class. This Class called people who develop, you know -- but no, wait a minute. Wait a minute. That's right. Because if he is not covered by the SEC, because he has prostate cancer. You could certainly get an 83.13 petition for instance. I don't know that we --

CHAIRMAN MELIUS: I think we

actually, I thought we had, with Ames we had reserved our review for follow up.

DR. MAKHIJANI: Yes, we did.

CHAIRMAN MELIUS: The statement confused me a little bit earlier. I think we have an active consideration for Ames for less than 250 days.

DR. NETON: You're right. That's correct. You're right. I forgot about that.

CHAIRMAN MELIUS: I was looking at Emily. I wasn't sure if I understood that. And the NTS one would, I think, I'm not sure if we reserved that or what we actually reserved with the above ground one because we were actively considering it and our good friend [identifying information redacted] was reminding us they had concerns about it. It is going back in time. I can't guarantee from my memory but I think it's, but I mean that's why I think go back sort of the criteria had to be that one is, is it a big incident, whatever you call that. Emily put the

regulation you know it when you see it or something? I don't think that will slide through.

MS. HOWELL: No.

CHAIRMAN MELIUS: One or two layers of --

MS. HOWELL: We don't all need to be Potter Stewarts.

CHAIRMAN MELIUS: And secondly is this issue, can you set criteria for the dose reconstruction? Can you reconstruct our base number of incident issue? And so the NTS situation --

DR. MAKHIJANI: You did reserve it.

CHAIRMAN MELIUS: You make -- the first criteria, yes. It could have been a big exposure. Second, we may not know when we can reconstruct it until they actually do. You may not be able to define a Class ahead of time. So it may just be something that would come across in individual dose reconstruction. Maybe that becomes a little bit bigger of a

Class but it may not. It -- maybe it could even be individual. As I recall when we were discussing this, it was the ability among what kinds of exposure monitoring individuals had and the information where they were in incidents.

DR. MAKHIJANI: You did reserve for 51 to 62 but less than 250 days at NTS.

CHAIRMAN MELIUS: Yes, Paul?

MEMBER ZIEMER: I sort of have to think in specifics, though. Let me ask a question this way. Let's take Ames. Suppose we have a claimant who was there less than 250 days but who knew specifically, maybe we have an affidavit that says, I was there during a blowout or two blowouts. And we know that. And you say but we can't reconstruct dose. Suppose that occurs. Then it still reverts back to the 250 day issue under the, if you can't reconstruct dose and they were still there less than 250 days, under the current reg, you could not compensate. The only way

you could would be if you had, if we had said presence at a blowout qualifies.

DR. NETON: I'm not sure of that.

MEMBER ZIEMER: Well that's what I'm asking. If you say I can't reconstruct dose for an individual who was there in that facility less than 250 days.

DR. MAURO: And has a cancer.

MEMBER ZIEMER: And has a cancer.

DR. MAURO: That's not covered, a prostate cancer.

MEMBER ZIEMER: Well a covered cancer.

DR. MAURO: Oh okay.

MEMBER ZIEMER: It's a covered cancer.

MEMBER GRIFFON: Cancer, less than 250 days.

DR. NETON: You'd have to go back and look at the reason that we decided why we couldn't reconstruct dose. And typically it's because there was no monitoring information

for an extended period of time.

MEMBER ZIEMER: Right.

DR. NETON: If someone presented with an affidavit that said I was involved in this, somewhat unique, or maybe not unique, this exposure scenario, I suspect that we would do something.

MEMBER ZIEMER: If you can't reconstruct dose, then what?

DR. NETON: If you can't reconstruct it, then yes there would be no dose assigned for that person. But, that may itself develop another Class. It would be a Class of workers that we haven't previously identified in our 83.13 evaluation. The 83.13 evaluation says there are no evidence in our opinion of the incidents that led to this very high dose. And so then if a claimant presents while we are doing these with evidence of that we would either have to be able to reconstruct it or if you can't and then recommend a Class.

MEMBER ZIEMER: And then you find the Class but does the Class always have the 250 day attached to it? That's what I'm asking.

MR. KATZ: You don't have to reconstruct it. You have to determine that it meets the criteria.

DR. NETON: No, no. If we reconstruct it, we don't even have to make a determination.

MR. KATZ: But even if you reconstruct it -- if you find you can't reconstruct it, it's still -- you still have to make that determination that this is a discreet incident.

DR. NETON: Yes.

CHAIRMAN MELIUS: But I think at Ames with the thorium you couldn't reconstruct then you wouldn't and that's really the basis for most of the exposure during the incident also. You wouldn't, I mean I don't think they need to pry or you wouldn't go very far

because the major dose would be unreconstructable. I mean that would be a determination made ahead of time that they wouldn't even attempt to do the dose reconstruction on the incident I don't believe.

DR. NETON: Well, for the thorium.

CHAIRMAN MELIUS: Lacking any evidence on a person's exposure history they have these blowouts in their file. You are right. We would just not do it. But if there was a situation such as Dr. Ziemer suggested. I have an affidavit. Five people saw me. I was at this incident. We have to address it.

MEMBER ZIEMER: Yes, but if you say then that I cannot reconstruct it. What happens then? That's what I'm asking.

DR. NETON: Then, that's criteria for, he doesn't make a judgment. It is very high.

MEMBER ZIEMER: Under the current rules unless you say that is an incident --

MEMBER GRIFFON: Like a criticality.

MEMBER ZIEMER: -- then the 250 day issue has to be invoked.

CHAIRMAN MELIUS: Right. They can make it independent of 83.14. They could make it independent. I don't think they've ever, they've never done that.

DR. GLOVER: It hasn't been done.

MEMBER ZIEMER: But it could be done.

CHAIRMAN MELIUS: But it could be done, right.

MEMBER ZIEMER: We don't say that blowouts are incidents. They decide, the person -- that takes care of cases where it is unknown. Then you have the issues of well I think I was but I don't know for sure issues. Or I worked there six months and yes.

DR. ANSPAUGH: I think you'd also have a problem with Ames in the Chicago Met Lab that many of these claims are probably

filed by survivors and actual workers have already passed away.

MEMBER ZIEMER: Understood, and that complicates the issue because they don't know whether the worker was present.

DR. MAKHIJANI: Yes, also I think even in the simpler case say at Ames where the worker has an idea that they were in a blowout. It is highly unlikely they would know there was a thorium blowout or uranium blowout, you know, after 60 years. I mean this is not -- one of the things that I kind of try to think through to some extent was thinking it out of the realm of number of thresholds. If you say you can't reconstruct dose, you already passed the stage where you are putting numbers to things for whatever bound you set. So, in the health endangerment area then you are not trying to make a radiation dose determination. You are trying to make a circumstantial determination. In the 250 day case, the circumstantial

determination is, did you work there for a certain amount of time. And in this case I think we keep going back to the dose-threshold issue because it says exceptionally high exposure. So there is no escape from that to a certain extent. But I think if the spirit of the health we can't reconstruct dose is maintained then an SEC has already been granted by the site or certain group of four persons. Then I think it may be more useful to go to the circumstantial basis of present during an incident. And would it be regarded as serious and not by certain criteria that aren't explicitly dose related because you already said you can't reconstruct dose?

MEMBER ROESSLER: I thought it was defined incident if we can't relate it to dose. That's where I think our problem is. We still get that. I can't get away from that.

CHAIRMAN MELIUS: But I think that's why the guidance or whatever we would

have would say one is how to identify the incident. What incident qualifies? Second, we can't reconstruct the dose or the number of incidents the person was exposed to. There are cases where I think you may already have the Class but you may be able to potentially reconstruct the incident. And the third would be some probability of being present at the incident. So either documentation of the incident, or, as in the case of Ames, where a person worked during the time period when there were -- I don't remember enough about Ames to recall.

MEMBER ROESSLER: So we need to define incident.

CHAIRMAN MELIUS: We have to start with criteria for incidents, yes.

MEMBER ROESSLER: Yes.

CHAIRMAN MELIUS: We have to do it non-quantitatively.

MS. HOWELL: Is it at all possible to work backwards to say there are these

quantifiable levels that we consider incidents but what are the characteristics of those aside from the dose exposure and if you could look at it across the test sites. There is always probably going to be exceptions to the rules, but to say these are the things that we see that qualify incidents and we know in a handful of situations that it met this quantifiable number that we were comfortable with.

CHAIRMAN MELIUS: Certainly the criteria we might have for incidents would include a number of parameters to that.

MS. HOWELL: Can you arrive at the parameters by, since everybody is so, having such a hard time getting away from numbers?

CHAIRMAN MELIUS: I think the numbers are going to be implicit. The problem is when we make them explicit, then we get sort of a slippery slope.

MS. HOWELL: But in the, no, because I completely -- I recognize the problem with

that, not having explicit numbers when you get to it, but can you just -- to start the conversation.

CHAIRMAN MELIUS: No, no. That's what we've done.

MS. HOWELL: Because you keep talking about these blowouts, but I get the impression that a blowout is different, at a different site. So, a blowout at Ames seems to -- you all seem to perhaps have an idea that might be an incident but it is unclear to me that a blowout at another site would be. So what is it, was it about Ames that makes that blowout an incident?

DR. H. BEHLING: Perhaps I can just quickly give you an answer. It was based on, as I said the data regarding a blowout at Fernald. But it also was based on the actual quantity of the uranium that was used in the blowout.

DR. MAURO: It was big. Everybody agrees those doses are big.

DR. GLOVER: And there is no bioassay.

DR. MAURO: Yes, so I mean the funny thing about it is when you hear a hundred rems, there is very little dispute. And that's our only problem. We are trying to say, can we come off that some. And I don't think we are going to be able to do that.

CHAIRMAN MELIUS: But we can describe it by examples and that will help to find it and it is going to be a judgment that we would have to make, I think.

DR. ANSPAUGH: I would also like to bring up the issue of equity particularly concerning Amchitka. Now there were no incidents at Amchitka, and I was on the island during the time between or before Cannikin went off. And I can assure you everybody was wearing a dosimeter, and I can almost guarantee you that none of these things that Frank Murkowski was alleged to have happened really did. And I think that dose

reconstruction and Rosalie Bertell did was not a good job. I did read the paper carefully. I don't believe it for a minute, though. Here you have this precedent of granting an SEC without the 250 day requirement to a site actually had nothing, no reason at all to be included, yet there it is. And so I think there is a serious issue of equity here.

MR. KATZ: Lynn, I mean the federal agencies cannot do what the legislature can do. I mean they have, they are not bound the same way as federal agencies are in terms of their -- the basis for which they can take actions like this. So the fact that the legislator did what it did, it had that authority to do that. And we can match in terms of for equity reasons.

DR. ANSPAUGH: That brings me up to the next thing on my mind which is one solution to this is to ask Congress to simply get rid of the 250 day rule.

CHAIRMAN MELIUS: I don't think,

it's not the Board.

MEMBER ZIEMER: That's your job, Lynn, not ours.

DR. ANSPAUGH: Well, you know I've listened to you guys worry about this for four years and I don't think you are any closer to resolution amongst yourselves and with NIOSH than you were when you started. So I think the only reason or solution is congressional action.

CHAIRMAN MELIUS: Well, we'll see. Some of us think we are closer, so we'll see. And on that note, since it's almost noon we'll take a break, call our congressmen. But we can come back at 1:00. What I would like to do at 1:00 is talk about the other example we have which Hans described already but I think we should need some further discussion, which is the Met Lab and then secondly sort of talk about general criteria or can we make some progress on this area. So until 1:00.

(Whereupon, the above-entitled

matter went off the record at 11:57 a.m. and resumed at 1:03 p.m.)

MR. KATZ: Everyone welcome back, this Advisory Board on Radiation and Worker Health, SEC issues, Work Group and we've been talking about 250 days, or less than 250 days matter. And we are just ready to get started again. Do you want me to check on anyone on the phone?

CHAIRMAN MELIUS: Yes, let's identify who is on the phone so we know.

MR. KATZ: So first of all do we have any Board members who've joined us? Okay and do we still have Dr. McKeel with us? Folks from SC&A? Hans do we have you back again?

DR. H. BEHLING: Yes you do.

MR. KATZ: Great. And Lynn Anspaugh?

MR. ANSPAUGH: I'm here.

MR. KATZ: Great. Okay.

CHAIRMAN MELIUS: Okay. It just

helps to recognize those. What we do this afternoon, we failed to solve this problem at lunch but we tried, was to move on and talk a little bit about the Met Lab situation. I think that's our other example that sheds light or darkness on trying to solve this problem. Yes Sam?

DR. GLOVER: Since I've come to this issue sort of late in the game, I was just going to make maybe a suggestion, good or bad. We have an existing rule. Sometimes it is unclear to me where, if we are talking about changing the rule or if it's only reviewing things under the existing rule or if there are things about making suggestions to maybe about how to make it fit better. Is there any thought that you guys have had maybe making like, here's a case study. If we use it on the existing rule and then you are going to propose language, things maybe we think your rule could be done better. There are certain things perhaps we take up that aren't

covered under the existing, this rule, and how that discussion could be done like whether it is internal dose maybe or if it's exceptionally high obviously is very hard to quantify. And whether that needs to be quantified perhaps better. But we thrown out a bunch of case studies, some of them seem like we are trying very hard to make them fit under the existing rule but maybe the rule needs to be clarified. So I just wasn't for sure if -- how your Working Group was going to be.

CHAIRMAN MELIUS: We're not sure either. As I said earlier, I think what we want to take is a broader look to what is, you know appropriate for this program. But it is in the context of what we have for the current health endangerment regulation, the 250 day and for the incident, part of that health endangerment. Whatever conclusions we reach may or may not require a change in the regulation. I think we, we're not trying to

be that precise at this point in time. In fact our discussions before this meeting I think, the last meeting the full Board meeting or what but Emily and I had a conversation of the same. We are not going to try to do something say to turn to Emily and say does this meet the current regulations, if we word it this way, does this meet the current regulations? I don't think this judgment, if you can necessarily opinion she can give us immediately anyway. And secondly I don't think that is the intent of what we're, we are not trying to craft examples that don't fit the rule. Let's try to get a little bit broader than that but at the same time understand that there's a context which is the current regulation and at least in a broader sense it should be consistent with what we've done. We can say throw the whole thing out. This current thing isn't workable but I'm not sure at that point. I don't think anything we've talked about so far is that distant from

what is in the current regulation. We are not trying to fine tune that and I don't think it's fair to ask Emily to give us an opinion because we haven't been precise enough in what we've said to really ask for an opinion and to be able to judge that. That's my sense. Emily is that fair?

MS. HOWELL: It's fair.

CHAIRMAN MELIUS: Okay.

MEMBER ZIEMER: And I agree with that too. I think initially if you go way back there were two things that we were trying to do at the starting point. One was to sort of pin down what an incident was because that's one of the things that says, aside from the 250 days if you have an incident. So we are trying to grapple with that a little bit. The other thing was I don't think initially we recognized that Labor, I think Labor has the ability to adjust the 250 days according to the number of hours in the workweek. I think we were concerned about places where

people were there 24/7. At least early on we thought the 250 days was calendar days. We found that we don't really have to worry about that if they can show that their work weeks were longer. Those adjustments are made, I think automatically by Labor in terms of what they said. So it sort of evolved over a bit of time.

CHAIRMAN MELIUS: Two other comments. One is we said earlier I think we recognized that we can't like say well this is the 30-day SEC, this is a 60-day. That's beyond what I think can be done under current regulation. It is not possible to do under the law I think. But it's not, it is a definition of endangerment but not under the current regulation. I think we all thought or assumed that when we used the analogy or for example criticality incidents with the language there. We thought it was providing a description or something in terms of least doses and I don't think we quite recognized at

the time what a wide range of exposures represented and it really didn't by itself sort of narrow it down to the potential situations that might qualify. Is that helping you?

DR. GLOVER: Within the context just explore the language that's fully in the rule.

CHAIRMAN MELIUS: Yes.

MEMBER ZIEMER: How do we take care of these kind of things like the blowout? I think certainly it arose in that context.

CHAIRMAN MELIUS: Yes and I think there may be some situations that can't be covered by the current rule. I don't know. Just because of some specific language in that or because of what information is available. I think situations are different and the Met Lab is very different and that's why I thought it would be helpful to talk a little bit about that before we talk about more general criteria or how to get it. Arjun do you want

to bring us up to date?

DR. MAKHIJANI: I actually haven't reviewed the Met Lab situation. Maybe Hans can do it.

DR. H. BEHLING: Okay. This was a report that I had submitted for review back in June of 2009 so we're almost coming up to a year when the report was initially issued. And I do believe that it was briefly discussed at a previous meeting. However, at the time when it was issued, I don't believe that NIOSH had a reasonable chance to review it in it's entirety. I remember Jim Neton making some comments and also at the time he said he needed to review in greater detail to perhaps add additional comments regarding the validity of some of the comments I had introduced in the report. But for those who have had a chance to read it, you realize that the Met Lab was in fact the first incidence of AEC, DOE issues that relate to the weapons program. It started in 1942 and of course that

comprised one more thing. That is we were very uninformed about a lot of things involving radiation, especially in large source-terms and quantities and some of our information was extremely limited with regard to what those radiations do to living cells, to living organisms. And one of the things I brought out in the report was the concept of tolerance levels and they established tolerance levels for external exposure for airborne concentrations, for in body concentrations, etc. And now in retrospect we do come to realize that many of these tolerance levels were either orders of magnitude higher than what we would allow for in current day standards and I provided some examples about polonium and other particular radionuclides where tolerance levels in the body were more than, up to fifty thousand times higher than what they would be allowed in today's world. Also there were misconceptions. For instance, one of the

things that stood out was their concern about radium. They considered radium to be ten times more detrimental as an internal radionuclide than plutonium. So given all those things we have to realize that the environment in which workers worked during that time frame were quite different and they were based on understanding that in today's world we would potentially realize we are very much in error. Tolerance doses whether it was external/internal were very, very high. Earlier this morning I identified for instance one tolerance level that was identified in behalf of iodine 131 where in a given day they would allow up to two hundred eighty something microcuries to be inhaled which translates to over three hundred some odd rads to the thyroid. So given that we realize that we were dealing with a time frame when things were quite different from what they are today and the 250 day standard that applies across the Board for all time periods may have to be

looked at in different terms when we go back in time. And of course Met Lab is really ground zero for the time frame of the weapons production. And in my report I identified the number of things in addition to tolerance levels which gives sort of a qualitative assessment as to how things were done during that time. I also provided some additional information regarding certain potential exposures both external and internal in places on page 22 of my report. I took some verbatim statements out of some of the reports that were available for review. And for external exposures that involved sources of radium that were used in a very careless way in handling the radium sources people were exposed to radium at a rate where they would exceed their tolerance level for external radiation exposure in a matter of an hour or two on a daily basis. So one can conclude that on the basis of just a single radium source that was used for calibration and other purposes one

could receive a fairly large dose from external radiation in the matter of days to weeks. In addition I talked about examples about contamination level and of course plutonium was used during those time frames and there were levels of plutonium where workers were monitored both at home as well as at work and one of the examples that I provided was part of Exhibit 4 and 5 that talked about contamination levels of plutonium that involved things such as and I'm looking here at items that were assessed for contamination levels in the individual, in one of the worker's homes from the floor to the table to the couch, kitchen tables, refrigerator food and the quantities of plutonium were found as contamination levels were very, very high in the thousands. And we still haven't quite figured out what the metric was but obviously we speculated that it was metric that would have translated into sizable levels of contamination in a worker's

home. And of course that would imply that the worker was exposed to fairly large quantities of plutonium in an airborne environment in order to be transported from the workplace into the home. In addition to that I also provided some assessments of plutonium samples in fecal samples that were collected for several workers. And again when we talk about a positive fecal sample one can reasonably conclude that exposure was a relatively acute exposure because of the relatively high appearance rate of material that is either inhaled, brought up in the upper respiratory tract and swallowed or potentially transported from a surface that's contaminated by hand to mouth and then introduced into the gastrointestinal tract. So when you have a fairly high fecal sample that suggests the presence of plutonium one can reasonably conclude that those were also acute exposures as opposed to long term low level chronic exposures. And lastly I introduced a number

of documents that involved -- one of the concerns at the time was obviously damage to the hematopoietic tissues, meaning that there was a risk to workers both external and internal that might perhaps reduce the circulating blood, peripheral blood cells and that was one of their concerns and they would test people routinely and in many instances they did find people who had suppressed white blood cell counts and again we suggest relatively high doses in acute exposures. And contrary to and at the expense of sounding a little bit contrary to what John said, the threshold for hematopoietic damage is not as slow as we normally think. John mentioned this morning about five rem or 20 rem. The truth is when you really do hematopoietic tissue damage what you really would like to know is the starting point because you can take a 100 people in any given room and even have them relatively consistent in terms of age and sex and so forth and your baseline in

terms of what your neutral fills and your basal fills and your lymphocytes and et cetera will vary not only among individuals but even for given individuals over time. And so unless you have a baseline for that individual you really have a very limited understanding of what shift may occur as a result of exposure. Now I did in my write up include the Y-12 accident and in that particular Y-12 accident in 1958 they had the benefit of baseline levels for a total of eight workers who were exposed to the criticality accident. Five of those individuals were exposed to very high doses in the hundreds of rad but three were exposed to lesser levels. And in fact some of the earlier documents that I looked at, NIOSH looked at those values as well. But they had exposures among the three people who had lower exposures. Their exposures to photons and neutrons combined were somewhere around at the high end 70 rem whole body exposure external, photon/neutron.

And yet as a result of that high exposure they observed no significant reduction in the hematopoietic or in the cellularity of peripheral blood cells. So that gives you an indication that the sensitivity of the hematopoietic tissue is not as high as we think it is and in this case they clearly had the ability to make that statement because they had in fact the baseline values for those three individuals and of course the dose reconstruction generated a dose to the hematopoietic tissues around 70 rads with no significant reduction. And yet in the case of the Metallurgical Laboratory we have people there who did in fact show significant changes in blood cellularity as a result of radiation exposure. So in collective terms, not to belabor this, we have instances where exposures were potentially very high based on tolerance levels. We have sources of radiation exposure such as radium that would have resulted in significant doses in

relatively short periods of time days to weeks perhaps. And we had fecal exposures and potential contamination exposures of plutonium that would have suggested very, very high exposures as well as hematopoietic changes. So given the variety of source-terms that were available for work exposures and the potential for acute exposures or acute exposures meaning days to weeks.

CHAIRMAN MELIUS: We'll let you and John figure out your threshold issue later.

DR. MAURO: I defer to Hans.

CHAIRMAN MELIUS: I guess the question though, Arjun and I talked about this a little bit which is one reason we couldn't focus on this initially is are these, are these incidents? I think that's what is brought up here. These are working conditions. I think what Hans referred to as a acute but acute over days or weeks of exposure. Are they incidents and are the

incidents and sort of fit the criteria we've talked about this morning on incidents?

DR. H. BEHLING: I would say probably not, because, as I said if these exposures occurred over short periods of time and the doses were large, it was probably more a matter of our level of limited understanding of issues and ignorance more than an accidental event that triggered these exposures. And in the classical sense, if you want to classify an incident as something that was unforeseen, unpredicted or there was no conscious effort to allow this to happen then clearly these cases would not qualify as incident cases.

DR. MAKHIJANI: The difference between say during testing where soldiers went near ground zero because they were doing exercises and somebody getting caught in the Baneberry cloud. I mean exposures might be comparable but one was not intentional and the other one was intentional.

CHAIRMAN MELIUS: There's also an issue of control measures.

DR. MAKHIJANI: Yes.

CHAIRMAN MELIUS: And the other question I would have here is were some of these exposures incidents in the way we've been talking about it? I'm trying to remember back.

MEMBER ZIEMER: The Oak Ridge one was clearly an incident.

CHAIRMAN MELIUS: Yes, the Oak Ridge one, but I'm talking about the Met Lab.

DR. H. BEHLING: Well Dr. Melius you could potentially construe some of them as sort of hybrids. For instance, they were portholes for neutron exposures that people simply walked by and there was a limited solid angle for a fairly high neutron exposures. Again, were the people aware that they were potentially leaving themselves vulnerable to a high neutron exposure by walking past these beams of neutrons or was it again simply

indifference. It is hard to really label these situations as being an incident when you realize these were scientists. They knew they were being exposed to neutrons but didn't really care enough to worry about it.

CHAIRMAN MELIUS: Be careful about the something else.

I also think we have to be careful about how do we try to account for intent or whatever in terms of any exposure. Be hard to put that in a Class Definition. Unintended exposure.

DR. MAKHIJANI: This neutron thing is interesting because there were no radiation controls. I don't know whether you call it failure radiation control but clearly they were in a hurry to do something. And they did not, you know, they knew they were. They had a certain number of neutrons. There was neutron exposure incidental to that and not part of the experimental setup. So, conceivably you could consider that piece of

evidence.

CHAIRMAN MELIUS: The failure of controls what is the knowledge of appropriate controls? Is our knowledge contemporary or is it knowledge at the time? I think --

DR. MAKHIJANI: I think the whole dose reconstruction is done on a contemporary basis.

CHAIRMAN MELIUS: Yes.

DR. MAKHIJANI: I think the radiation controls have to be taken on a contemporary basis. We are kind of looking back saying for a lot of reasons people were exposed back then and we are going to compensate them under certain conditions and the dose reconstruction method using old data but you are using modernized ERPs and you are not using dose reconstruction methodology from the time or the framework in the time or anything like that. So I would say it would fit the rest of the philosophy to say failure of radiation controls would be by today's

standards. How you actually factor that in with exceptionally high exposures is obviously very hard. But the radiation control piece I would say should be by today's standards because it fits.

CHAIRMAN MELIUS: But if and I don't know the details of the work schedule there and operational schedule to know that but certainly a significant number of the -- say we agreed that those were incidents under our best we have. A significant number of the workers during that time period would, you know, would potentially have been exposed. There had been a probability that they would have been exposed to one of those incidents. And I don't know if we could document it or not document it. So I think we would have to make some assumption about that. And so under that construct they could qualify. Some of the longer term exposures, the acute closures over weeks or something I think are harder to think of as an incident, I guess.

DR. MAKHIJANI: Dr. Ziemer did back then.

MEMBER ZIEMER: Did that?

DR. MAKHIJANI: Long things at an incident of potential, longer than one hour, one day, might be something less than 250.

MEMBER ZIEMER: Well we talked about that earlier today too.

DR. MAKHIJANI: Right, that's what I'm saying. And I think we came up with some examples of that.

MEMBER ZIEMER: We are talking about Metallurgical Lab. Those were, that was controlled, those were accidental excursions that was controlled. They were very carefully adding fuel and making measurements and approaching criticality and we all know that the protective things were very crude. They had the axe man. The guy with the rope and what was it, the boron. A jug of boron or something. Anyway, or cadmium rod, I forget which is was. That was the scram system, a

guy with a hatchet and a rope. But the output of that was very well documented. I mean they are going to criticality. They were measuring the multiplication. The neutron fluxes were pretty well known, I guess.

CHAIRMAN MELIUS: But the control of exposure was by today's standards would be considered uncontrolled.

MEMBER ZIEMER: Well Hans talked about the tolerance level and people thought in those days there was a value below which there were no effects. So, I think the dose limits are very high. Those can be reconstructed though, can't they? Where did we end up in the Met Lab?

DR. NETON: Well I was just looking at the ER right now and neither are internal nor external is considered to be reconstructable.

MEMBER ZIEMER: Why was the external not?

DR. NETON: We only had one result

for one person, one external badge. We had no dosimeter data, except for that one person and he was not monitored for neutrons.

CHAIRMAN MELIUS: An inadequate source of information.

DR. MAKHIJANI: I think the control system probably calculating, had to been calculating neutron flux.

MEMBER ZIEMER: Basically it was a criticality experiment where you keep adding fuel and measuring the multiplication of the neutrons.

MEMBER ROESSLER: Well I keep thinking of what John Morrow said about situations where we know it when we see it and that's not the worst approach. When I look at these time periods that we are dealing with on anything and I think of 1942 to 1940 whatever there was consideration of the job that needs to be done, the lack of technology for making these measurements and the lack of knowledge about what the effects were. To me I start to

factor that time period is one in which the rules might be different for some other time. Maybe the effects are not different but I think time period we need to think about.

MEMBER BEACH: I have a question. Jim, back in December 2008 when we started talking about Met Lab we had four cases that had less than 250. Do you know, probably not offhand, if there has been any other cases that have come in?

DR. NETON: I don't know.

DR. MAURO: Hans, didn't you have an attachment to that report which listed a number of workers that were there and how long they were there?

DR. H. BEHLING: Yes I do. In fact I think that was stricken because of the Privacy Act issue but in one of the documents I identified a citation of sixty some-odd workers who by definition for being on that list had been there for less than one year. And one can obviously conclude that it

provides a termination date and you already know when the starting date was so yes, there were a substantial number of people who had been employed for less than the year's time, yes.

MEMBER BEACH: Thank you.

DR. GLOVER: Some of these facilities because of the claimants.

DR. NETON: Those are not claimants that Hans was referring to.

DR. GLOVER: A lot of college professors, like the Los Alamos and there may during the war effort time but people don't hit the 250 days because of those.

MEMBER ZIEMER: Well, and in this particular case once they showed that they could produce the chain reaction then people scattered. They built other piles at Argonne and Oak Ridge, Hanford and a lot of those people left for other sites anyway.

DR. H. BEHLING: Excuse me. I have to correct myself. I said 67. Actually

paging to the portion of the report where I identified and I'll read to you on page six and seven of the report and it's called the Metallurgical Project Personnel Report. They identified 169 individuals who were classified as resigned or cut off. And on the basis of the termination dates and the start of the lab they were all obviously people who were less than 250 days at the facility. So 169 is the number.

CHAIRMAN MELIUS: So there's some probability where we can, could consider this concluded. I agree with what Gen said, it does seem something, I don't know if it's the time period or what. To me it's the concept of -- by modern standards of radiation control it is uncontrolled and in a situation where there would be exceptional exposure that occurred and obviously not able to reconstruct it all.

MEMBER ROESSLER: If you could think of another word for uncontrolled.

DR. MAURO: How much leeway, I mean understand sort of the dilemma we have. We have the information that has been communicated to us regarding these various sites and they are different. And we also have the constraints imposed upon us by the law, by the statutes and the regulations. And clearly there is a certain amount of leeway I presume we have within the definition of the terms and the way in which the language is structured. Could we actually reach a point where we feel that for example, this business of loss of control or breakdown or an incident. These are terminologies that we are sort of saddled with because the way in which the regulations are written. But we just heard a very interesting example of one where really, everything was being done the way it was suppose to be done, we just didn't have the knowledge. So to what degree do we make our judgments. Do we make our judgments -- let's say we are talking about this site.

Okay? We have 168 people that worked there for less than a year. I'll just take a guess, if it is the way it is now one out of four probably developed cancer at some time in their life. Throwing a number out. That's what happens. In theory there may be some fraction of that 40 people or whatever it comes to. But and so common sense dictates that here we have a significant population of people that clearly probably were exposed to substantial exposures while they were working there based on the story that Hans just told. Now are we at a place where but we can't grant that SEC status because of the way that the language in the law is written because it just cuts us off. Could that happen here. Can we just say listen, the language is the language but we are not going to stop ourselves and when we see a situation that has to be fixed. I'm not, I've got to tell you I'm not that worried about the language of the law. I didn't mean it to sound the way it

sounded. I'm saying as a scientific body, as a scientific body, we are deliberating over what's the right way to deal with the problem. Then once we discuss it and we come to place where we feel that the way I have just done. Certain people should be compensated. However, we've got a problem. The law is a little ambiguous here. Or the law is not ambiguous and draws a line. You know, what do we do in a situation like that and that is all I'm saying. I think we might be there.

CHAIRMAN MELIUS: The regulations.

DR. MAURO: The regulations, the laws.

CHAIRMAN MELIUS: The regulations provide some guidelines for what has to be met. I think do these situations we've talked about all three of them, do they, with people we think have exceptionally high exposures, could they be addressed through the current regulation? I don't know for sure because I think they've got to get more specific about

how we think they should be addressed and how the Class is defined. But I think in a general sense maybe they could be and they probably could be. I don't think we would do it quite the way you said John. Just hell with the law.

MEMBER ZIEMER: I have an additional thought. Let me approach it this way. I'll ask Hans this question. Hans, the old tolerance doses came out of what we would now call the NCRP and they were related to X-ray and radium things. They didn't have legal force. Here we have a situation which eventually led to the Atomic Energy Commission but do you recall whether I know the Manhattan Project eventually developed some dose limits. But I'm not sure they even existed at the time of the start of the Metallurgical Lab.

DR. H. BEHLING: No they did not. I think they probably were recommendations and I believe most of the recommendations were geared towards external exposure and the use

of radium because those were the only areas prior to --

MEMBER ZIEMER: Well I know the tolerance dose was the NCRP concept that certainly had no legal force.

DR. H. BEHLING: No.

MEMBER ZIEMER: What I'm sort of getting to is I'm wondering if for the time period that preceded legal dose limits. We didn't have legal dose limits, I don't think, at the time of the Manhattan Project. I suppose one could argue that in the absence of any legal dose limits, one might make the case that exposures were not being controlled. That is just a thought.

MS. HOWELL: The regulation doesn't -- it talks about failure of radiation controls. It doesn't speak to the absence. Like we had --

MEMBER ZIEMER: Okay. I'm sort of asking that question, yes.

MS. HOWELL: That's an issue. I

mean there are probably about five or six phrases in the current regulation right now that are undefined terms.

MEMBER ZIEMER: Failure of controls not absence.

MS. HOWELL: Right, creating a loophole.

MEMBER ZIEMER: Yes, yes, okay.

CHAIRMAN MELIUS: So is it failure of controls that were placed or like what you were saying current standards.

MR. KATZ: Current standards.

CHAIRMAN MELIUS: Current standards or is it -- there were guidelines though.

DR. MAKHIJANI: There was a plutonium guideline and --

MEMBER ZIEMER: Wait a minute. At the time of the Manhattan Project there was a plutonium guideline?

DR. H. BEHLING: There were just basically tolerance levels and those are sort of reference levels but again one would

certainly not assign the horsepower to those tolerance levels as we do to current regulatory limits defined by the DOE or the NRC. So one has to make a distinction between what is a tolerance level and what is a regulatory limit.

DR. MAKHIJANI: I agree with that. I was just saying in terms of trying to make the situation more comparable to failure of radiation control, a guideline is obviously not a regulation enforceable in that sense but I think in 1941 actually went back to the radium dial painters situation and tried to assess what the limit.

MEMBER ZIEMER: Yes the old Robley Evans radium thing and everything else was kind of related to that.

DR. MAKHIJANI: And I think they did set a guideline for plutonium on that basis in `41.

DR. H. BEHLING: Except it was considered one tenth as toxic as radium. So

the guideline was obviously a goofy one because it obviously didn't make or account for the higher level of radiotoxicity for plutonium.

MEMBER ZIEMER: Of course plutonium available at that time was like nothing, micrograms or something.

DR. MAKHIJANI: The only thing that I would suggest that maybe a stretch of the definition of failure to impose certain or failure to enforce some kind of radiologic controls is to expand the definition saying the failure to have a dose limits to begin with would not constitute in a broader sense the failure of radiation controls when you have no dose limits to speak of. You would think it would be an extension of the definition.

DR. GLOVER: I would toss out though that stretching the thing versus rewriting it I think the Agency is much more comfortable with you making something that is

consistent with the feeling of the Board versus stretching the rule into areas where it is not meant to have gone. We have circumstances now that you have found that it didn't perhaps cover. But I'm afraid if we stretch it, Emily is going to say that we do have a law we have to follow.

MS. HOWELL: Right.

CHAIRMAN MELIUS: But I do think it's also -- the problem with that approach, Hans, is I mean it still begs the question of well is it an exceptional incident? Is it not reconstructable and so forth? So it's not just you know whether or not there were regulatory limits in place. What were the actual exposures at the time and can we or can we not reconstruct them. We have to be careful that we don't put forth the stretch criteria in a way that then allows everything in and this becomes where we end up having to screen every potential acute exposure up there. I think at some point we, what's going

to be key here is how do we know it when we see it? How do we describe that in a way that there's a, that it, I can't say threshold, but it's a limited universe that we really can all agree on would qualify. Because I think the other criteria would follow from that. Then could there be situations that don't meet the regulatory definitions of incident and so forth that ought to be compensated in some way with short term exposure. There may be. I'm not sure we -- I don't think we've ruled them out but at least the three we've talked about I think there's some reasonable possibility that they could be dealt with in terms of the rule. I think we have some work to do to get there. So I don't want to jump ahead too far on that.

DR. NETON: I just was thinking while you were talking that it seems in this instance -- I remember reviewing the original Hans' report and one of the compelling arguments I think that meets one criteria

possibly which is exceptionally high because of the lymphocyte blood cell depression that occurred in these workers. I think that's actually one of the examples offered up in the regulation as evidence of exceptionally high exposure. So it seems like it meets, could be exceptionally high criteria. I'm not sure it meets discreet incident or failure of radiological control. Maybe one of those three seems to be there.

CHAIRMAN MELIUS: Maybe in the Met Lab we are not going to be able to tell if that is a -- it could have occurred from acute exposures, these porthole incidents. Those may be incidents. I'm not sure but we may not be able to tell for the individual worker there, and we may have to say well but there's a probability that they could have been exposed there. It's a complicated situation, we have limited individual information.

MEMBER ZIEMER: Do we know in the Met Lab if once they achieve criticality did

they do further criticality experiments? I got the impression that once they achieved that they started work on the reactors, the real reactors and the Met Lab stuff with the other stuff.

DR. NETON: I don't know, but my impression was that these large external exposures were not necessarily the result of the criticality but these radium sources that Hans was talking about where they could have received, I forget what his calculations was, a thousand R in a day or something like that.

MEMBER ZIEMER: And I think probably Arjun is correct that although they may not have formal dose limits, they did have the guidelines. There was a reason that they were up on the balcony away from and they had some idea and actually didn't stay at criticality very long once they achieved it. I mean, they were there and then they shut down and they drank their wine and went home. That's how the story goes pretty much. So I

guess in my mind I'm certainly comfortable with using non-stochastic effects as evidence of a high dose and saying that would be a criteria without anything else and you wouldn't be able to reconstruct it but it's got to be "high" if it is causing, certainly -- and certainly in those time frames. It is not like today where you can find a couple of chromosome breaks. I mean, if they could see blood changes in the 40s they must, they've got to be over 50, maybe in the 100s.

MEMBER ROESSLER: Because as Hans talked about the changes in response with individuals too, you have a to put a big range on that.

MEMBER ZIEMER: Yes.

DR. H. BEHLING: And it's important to note that really their focus and concern during those periods of time early on was really not towards cancer or other stochastic effects. They were really looking only at the potential avoidance of acute

radiation exposure issues.

MEMBER ZIEMER: Right.

CHAIRMAN MELIUS: So we've solved that.

(Laughter.)

MEMBER ZIEMER: We don't currently have a criteria for the less than 250, the presence of or do we? The presence of non-stochastic effects as a criteria for eligibility?

CHAIRMAN MELIUS: Yes, that's one of them.

DR. NETON: Well one of the examples offered in the regulation was like a criticality and I forget the exact findings. Maybe someone could pull it out. It talked about blood cells.

MEMBER ZIEMER: So that's already in place.

CHAIRMAN MELIUS: But it's tied to the incident issue. So that's the, I think, maybe more of a hurdle.

MEMBER ZIEMER: Oh, but evidence of an incident --

DR. NETON: I'm not actually sure it's actually in the regulation or the preamble.

MS. HOWELL: It's in the preamble

CHAIRMAN MELIUS: The preamble.

DR. NETON: It's in the preamble.

DR. MAKHIJANI: I don't believe it's in the regulation.

CHAIRMAN MELIUS: It's in the preamble.

MR. KATZ: That's in the preamble.

CHAIRMAN MELIUS: That's right.

MEMBER ZIEMER: What does it say?

MR. KATZ: The regulation itself doesn't go to that.

CHAIRMAN MELIUS: It's in the preamble

MEMBER ZIEMER: But the preamble expresses intent.

DR. NETON: Yes.

DR. MAKHIJANI: The thing with the white blood cell changes and measurable somatic effect lost your internal -- I mean it's a step from the external.

MEMBER ZIEMER: It's one indicator.

DR. MAKHIJANI: Right.

MEMBER ZIEMER: It's not the only one necessarily.

DR. MAKHIJANI: Right.

MEMBER ROESSLER: So that helps us with the Met Lab, but it doesn't help us with this. Jim wanted for us to come up with some general.

MEMBER ZIEMER: But that's a fairly general one.

CHAIRMAN MELIUS: Yes, it's one.

MEMBER ZIEMER: Is it already included by being in the preamble or not? Does it have to be explicit?

MR. KATZ: Well it's already considered in effect that's already under consideration at DCAS because that's in the

preamble. It might even be addressed in their guidelines too.

DR. GLOVER: If it's a point that we are still discussing it here, then it may not hurt to have it, that's your magnitude of large, right? It is one of the things that says what do we mean by big, we agree that seems to make --

CHAIRMAN MELIUS: The description of the -- you know it when you see it. That's one of the things you see.

MS. HOWELL: The failure of controls is the actual language at the reg.

DR. NETON: 83.10 actually includes white blood cell depression. Section I, medical evidence that one or more members of Class may have incurred a high level of radiation dose from the incident such as depressed white blood cell count, associated with radiation exposure for the application of chelation therapy.

DR. MAKHIJANI: So that is internal

dose.

DR. MAURO: That's the internal.

MEMBER ZIEMER: Which means they've taken steps to do something, so it indicates an incident.

DR. MAKHIJANI: This goes along the line of what I was saying earlier in the morning. There are specific guidelines that call for medical intervention, and chelation is one of them. So if you want to go away from a quantitative dose idea because you can't reconstruct the incident and you know it happened, you've got to establish presence someway, an affidavit, somebody said they were there or a record or special incident index. I mean you have to have something like that, otherwise you can't get there. But I think --

MEMBER ZIEMER: Or these medical records.

DR. MAKHIJANI: Or medical records.

CHAIRMAN MELIUS: But I think there are members of the Class. You don't have to

document it for every Class member.

DR. MAKHIJANI: I think chelation, internal dose could be gotten at.

DR. MAURO: I've got to tell you that's very important because, you know, we have had some strong arguments regarding external, whether that's captured by the definition. I have to say this is the first time I have heard some language bringing internal into the picture.

MEMBER GRIFFON: We forgot that was in there.

MEMBER BEACH: So when did chelation come into play though? This was in `42 to `46.

DR. NETON: John's right. It clearly, I don't think the intent of the regulation was to discount internal. I think the way it was defined as a discrete incident sort of precludes these expended internal exposures that give you very high doses. That is sort of the disconnect in my opinion.

DR. MAURO: So you would agree then -- see one of the things that is a little disturbing right now. I went through three examples, and I sort of stuck my neck out. That sounds like the first one, Ames, you got to pay those guys. You know the second one, Baneberry my goodness. That was pretty bad. I don't know how high the doses were, but they sounded like they were pretty serious. Now we hear this story. Now in each one of these cases, I'm not afraid to -- you got to pay those guys. They came down with cancer and they were there for less than 250 days, and the guy has one of the list of cancers. So in my mind I just heard three examples that scream to me it is the right thing to do.

Now, quite frankly I haven't heard anybody around the table say the same thing. Do you agree? In light of what we know, we know a lot about the subject do you think that the right thing to do here is at least in those three cases notwithstanding what the

regulations say. Granted, I know we are trying to get to the big picture. But I'm staying to the small picture. We just went through three cases. I know how I come out on the three cases. I don't know where everybody else comes out on the three cases. I know, it seems obvious to me. Now, what that tells us about the generalities is other matters, but if some folks don't believe every one of those cases warrant granting a SEC for those people, then we are still at, like, square one to me. I know what that tells me.

MEMBER ZIEMER: Well, I think on the first one the difficulty was establishing presence in those logs, right?

DR. MAURO: Well, that's the mechanics of it. If it can be established that a person were present when one or more blowout occurred, even though he was there for less than 250 days and we know that. But we also know that he got one of the listed cancers, as far as I'm concerned, we're done.

That is the right thing to do.

MEMBER BEACH: Well we can establish the dates of the blowouts or the dates in between when those blowouts occurred fairly well, can't we?

DR. H. BEHLING: Not really, no.

MEMBER BEACH: No, not really?

DR. H. BEHLING: No. We just know that they occurred at a fairly consistent frequency and from the records with Dr. Spedding who was the head of that department there at Ames he in his own personal accounts and memoirs talks about the frequency and he cites the one day when they had six explosions in a single day. And there is persistent reference to the frequency of these blowouts. So one could reasonably assume that in any given, let's say 30 day period there was at least perhaps one blowout, so establishing a person's presence at the site for 30 days would almost reasonably guarantee you that he was there doing at least one blowout.

MEMBER ZIEMER: Well, that's right back where we were talking about before. That's Dr. Melius', you know, what's the probability you got exposed to one blowout? If you were there 30 days it is one and 60 is two and so on. Okay.

MEMBER GRIFFON: I was just going to answer John's question. For me, I think Ames fits it, I'm convinced anyway. But for Nevada Test Site, I'm not sure. I mean there's some subtleties on these other ones I think. What I heard on Nevada Test Site is that if you are involved in an incident, if I understand it right, the Class was defined because of this -- having several sort of acutes and the difficulty in reconstructing. But if you could show presence from what I'm hearing from folks on the phone as well as in the room is that if you were at one of the incidents, they did do a fair amount of follow up immediately on some of these, so there may, may be records to reconstruct.

DR. MAKHIJANI: I think in Baneberry did.

MEMBER GRIFFON: Yes. I'm not sure it's true.

DR. MAKHIJANI: I'm not sure that there was an intercept between the people and events in the same way.

MEMBER GRIFFON: So I don't know if you were just out there for one event and you worked there 20 days or whatever and were involved in one of the events and but they did follow up immediately and your records have enough to reconstruct. So yes I can't answer that so easily for Nevada Test Site is what I am saying. And then the last one, I guess my trouble with the last one in Met Lab is the same question Jim is raising is that sure you had the medical effects there, which is a strong argument for it but then it doesn't seem like there's any discreet incident that caused it necessarily so you had a longer term exposure maybe.

DR. H. BEHLING: Mark, except that when you have a suppression of lymphocytes and neutrophils it's usually a strong indication of a short term exposure, and I'm going back to criticality accidents but also the Marshall Island experience that I studied intensely and you probably would not get a significant suppression of blood cells if you were chronically exposed even to substantial doses. They would appear to be short term duration exposures that would significantly suppress neutrophils of lymphocytes.

CHAIRMAN MELIUS: That's a good point.

MEMBER GRIFFON: I mean how did they decide to take those measurements anyway? It obviously wasn't just a regular physical, was it?

DR. H. BEHLING: No, no. They would routinely get people down there and assess their peripheral blood much like you do when you take an annual physical exam.

MEMBER GRIFFON: But it is routine?

DR. H. BEHLING: Peripheral blood sample and put it on a slide and count the number of cells and determine what the number of cells are per unit volume, per milliliter, and determine whether or not this differs from a baseline value which they had and then come to some conclusion that radiation might have been or likely have been the cause of that suppression.

MEMBER GRIFFON: No I'm just saying they didn't do it in response to a known excursion or whatever?

DR. MAKHIJANI: In Baneberry, they did.

MEMBER GRIFFON: I'm talking about the Met Lab.

DR. H. BEHLING: Well, I think in Met Lab it may have been something that was done more or less routine that says, okay we're concerned about the avoidance of non-stochastic effect and so rather than let's say

have a bioassay every -- pretty much I think you have to look at the serological tests at the Met Lab much like you do a bioassay. You schedule people every 30 days to see what their excretion rate is for a certain isotope in urine or something else and I think this is basically how they assess people in those days for peripheral blood disorders. It would be used as a bioassay test.

MEMBER ROESSLER: They had animal studies that they probably were basing it on?

DR. H. BEHLING: Yes, absolutely.

MEMBER ZIEMER: Well and keep in mind they didn't -- there was no lifetime exposure records kept. Everybody thought it was like a weekly limit and as long as you controlled that and didn't have any stochastic or non-stochastic effects in a week you were okay. There were no lifetime limits. People didn't keep them, and I might add, I entered the field in the 50s, we were still taking baseline blood counts on every rad worker.

You had that in the files in case you suspected it.

DR. MAURO: So you had baseline?

MEMBER ZIEMER: Yes.

CHAIRMAN MELIUS: So what do we do next?

DR. MAKHIJANI: Do you want some exploration, some kind of guided exploration of these three things?

CHAIRMAN MELIUS: No, I have an answer.

DR. GLOVER: Rhetorical.

MEMBER ZIEMER: We have to guess the answer.

CHAIRMAN MELIUS: Paul will stay after class and complete his napkin. It's got many sides. This isn't -- I'm not going to say who should do this and talk about how to do this, one of the things I think we need to document, let's call it a guidance document that tries to capture what we've talked about in a general sense. How high is high enough?

And some of the other sort of baseline criteria and I think we need to probably include in that some thought -- Emily alluded to the five key words or whatever they are in the current regulation and sort of flesh that out, at least take those into account in writing up this guidance document. The second thing I think we need to do is refresh ourselves on the three examples based on what we've discussed today, the three sites. And are they -- have we in our discussions have we characterized -- we all agree on the characterization of them in terms of that they would fit this loose construct that we have of how we would approach this issue. Some of that, well can we really not count the number of incidents at Ames. Were they that high? And things like that just to make sure we are factually in agreement on what we know and don't know about all three. I think the Nevada Test Site is going to be the harder one because it's just bigger and more complicated.

Maybe that will be harder to do that. Then I think we need to bring the two together with another meeting. I would like to put the goal of trying to have something to present to the Board, including potentially if we agree on it, that we would be able to make SEC recommendations on these sites by the August meeting. I do think we need to bring this to the Board for discussion. We've spent a long time on it. It is difficult but I think at least for the people at Ames and Met Lab and NTS at least to have a path forward on those and relatively soon. I'm not quite as sure that we would be ready for Nevada Test Site by August, but we could be. The facts are less clear.

DR. MAKHIJANI: I think the documentation on Baneberry is there and, Lynn, are you still there? Lynn, are you familiar with all the documentation from Baneberry that we could kind of guide us?

MR. ANSPAUGH: I'm fairly familiar

with the documentation on Baneberry but I certainly have it within my files.

DR. MAKHIJANI: Okay. Maybe we could put it together for you. We can try.

CHAIRMAN MELIUS: Yes.

MEMBER ZIEMER: What are we looking for there? Is that the only one we were looking at?

DR. MAKHIJANI: Well all three in fact, right?

CHAIRMAN MELIUS: All three. Let's back up a little bit. I think on Ames, I don't think, I think we have enough documentation. I think we need to refresh our memories and sort of re-look at that and make sure that what we, the way we've talked about it is accurate. It has been a long time since we talked about it. The same on Met Lab. It is a little bit more recent but I think I certainly need to refresh on that and how this could fit into this issue. And then the third one I think is the Nevada Test Site. I think

that, I don't think we've ever documented that, at least taking into account some of the recent findings in terms of SEC and so forth with that. That's what has changed with the Nevada Test Site. As a result of the work on the SECs there, I think there may be more other documentation out there that we didn't have before when we considered, which was over two years ago, maybe even longer with that. So that may require an updated document from SC&A on that.

MEMBER GRIFFON: And do you have in mind too that that first part, I agree with that, drafting of a guidance.

CHAIRMAN MELIUS: Yes.

MEMBER GRIFFON: A straw man, sort of, but are you going to task that?

CHAIRMAN MELIUS: I was going to do that.

MEMBER GRIFFON: Okay.

CHAIRMAN MELIUS: We would do that as a group.

MEMBER GRIFFON: It might be useful to have a written thing to start from.

CHAIRMAN MELIUS: Yes and I'll do a first draft and then work off of that, certainly primary author, to get moving forward. I think it is important that we sort of be collaborative from the Work Group but also with NIOSH on that so that when we get to the point of having to agree to this at a Board meeting that it is something that we have generally agreed on. We can disagree about at some point about the application, criteria and so forth but it's something that we agree and certainly on the initial examples that is something that everybody is comfortable moving ahead with. Or if there are differences, then we can focus on those differences and try to figure out how to resolve them because it may be is this an incident, it's not incident, things like that.

DR. MAKHIJANI: I'm just trying to be clear. The way I read what you are saying

is we're trying to do two things. One is get clear enough on -- for now -- NTS aside. Get clear enough on Ames and Met Lab so you can take the less-than-250 day recommendation to the Board that there were significant incidents here. One way or the other, you should recommend it since those things were left pending and the second thing is like considering those two, do some guidelines emerge for the bigger picture? Is that the purpose of this?

CHAIRMAN MELIUS: No, well the purpose, you are correct, but I think the timing is wrong. I think they need to be done in parallel so that when we get to a Board meeting in August, we can present our Work Group's consensus to the extent we have a consensus on the guidelines. And NIOSH, we have consensus with NIOSH on that also, in a general sense. And that we have a recommendation that the lawyers feel is legitimate under the regulations.

MEMBER GRIFFON: So for the --

CHAIRMAN MELIUS: But I think the criteria are important because if we are presenting examples, I think we need to be able to say this is the universe where they are going to fit and you know, maybe it is, you know, we will know it when we see it but we'll narrow it down so we don't have to --

MEMBER ROESSLER: So somebody else can know it when they see it.

CHAIRMAN MELIUS: Right. There may be examples but we don't want to have to re-screen every --

MS. HOWELL: But the answer -- I'm sorry. The answer could then be, we figured out what we know when we see it but it doesn't fit within the regs so here are our recommendations to change.

CHAIRMAN MELIUS: Yes, or this part of it does, this part of it doesn't.

DR. MAURO: A little help on the NTS side. Now, what I heard is that we have

at least one event, Baneberry, where we all suspect that there were considerable quantity releases. There is some evidence that there was some follow-up to dose reconstruction. That is, the people that they thought might have experienced fairly large releases and they may very well be feasible for certain people who were involved in that event to have the doses reconstructed. Now, but of course they have also at the same time fall within the scope of the SEC. So we have this person say we feel we can reconstruct his dose from Baneberry but at the same time he's going to be granted SEC.

MEMBER GRIFFON: Not if he was only there for 30 days.

DR. MAURO: Okay but if it was less than, okay. So where -- let me play this out in my head. So here we have this person at Baneberry. We reconstruct his dose. We know we can reconstruct his dose and he is there for less than 250 days. He is either

compensated or not. Everything is pretty straightforward. Now, but there are the other people that might have been involved in Baneberry that say they were. Let's say they say they were but may have been. But they didn't get this treatment, a good follow-up, a reconstruction of doses. What happens to them? And I would say the same thing goes for other incidents beside Baneberry.

MEMBER GRIFFON: Well I don't know that they can't bound their doses. I don't know.

DR. MAURO: So you would say --

MEMBER ZIEMER: I would think you could bound them in that case of Baneberry only, right?

DR. NETON: We'd have to look at it. If you recall that the reason we added the SEC Class is because the monitoring programs appear to be incident-driven. We couldn't reconstruct chronic exposure models based on that. So we, we have a lot of

bioassay data that is collected in response to known incidents. So, I am not sure where that goes.

CHAIRMAN MELIUS: It may come down to what was collected on a particular individual. Some individuals may have been, had adequate data and some may not.

DR. NETON: I think it's open. We haven't really looked at it.

CHAIRMAN MELIUS: Yes, I mean that is sort of that is one of the things that I thought we had talked about a couple of years ago. That may have been where we --

DR. GLOVER: On the Ames discussion that we've had, whether they fit in or not, there was a lot of conjecture back and forth. Well let's forget about them having bioassay and imagine if it was these things. We do need to make sure we very carefully review the records because there is bioassay for these people. We do have groups of uranium bioassay and so we will start composing that. There is

a lot of hypothetical discussions and so we need to make sure we are very careful about the record.

DR. NETON: At Ames, we clearly indicated that we could reconstruct uranium exposure with incidents or not. I did go back and look at the document and it appears, I recall now that the uranium monitoring program, as Arjun suggested, ended very early on. The uranium production program, 1943 time frame, and it was primarily thorium after that, through 1955. So there is the disconnect. So we may have a lot of uranium bioassay but only for the very early periods. How that is relevant to the thorium-production period, I don't know, but as Dr. Melius suggested I think everyone needs to go back and look.

CHAIRMAN MELIUS: I think we can go back and clarify maybe, there's lots of possibilities. Maybe it is just a certain time period, I don't know.

MEMBER GRIFFON: Are you asking for all parties to go back to these documents that have been written already or are you asking for, I mean, I thought what might be useful is an executive summary of the relevant facts for each one at Ames -- especially Ames and Met Lab. Nevada might be a broader thing that SC&A has to look at.

MEMBER BEACH: Well SC&A put together a report in October 2007 that showed various different claims and different incidents based on what you are talking about now, that I was just looking up.

DR. MAKHIJANI: For the Nevada Test Site?

MEMBER BEACH: Yes.

DR. NETON: That was criticality-based though.

DR. MAKHIJANI: No, no. no. We actually had a separate report, the one that Josie is referring to on Nevada Test Site where I believe we compiled all the incidents

at Nevada Test Site. So there is a special report we did on Nevada Test Site. It may not cover all the bases that you want covered, but there is one to start from.

CHAIRMAN MELIUS: Let me ask the Work Group. Would it be useful to have a, given all the documentation there is on, actually on all three of these sites -- Nevada, I definitely thought there was a need for a further document focused on this. Would it be helpful for Ames and Met Lab to have something that at least summarizes what's there?

MEMBER GRIFFON: I thought it would be useful and I think you can juxtapose the cases. This one had this kind of a situation. You know you had the blowouts at Ames. You had the -- they are very different situations that we considered in considering our less-than-250 day policy. So it might be reasonable to summarize. When I say relevant, as they apply to our decision on this 250 day

criteria. We don't need all the detail. We can refer back to the big reports for that.

CHAIRMAN MELIUS: One of the problems we've had with the 250 day issue is that we go from site to site and, by the time SC&A does a report, NIOSH responds and we have a discussion, somebody goes off and does further work. Then we jump to another site. And then we lose track of the earlier site. So maybe a three-part report from SC&A that would deal with Nevada Test Site, Met Lab and the Ames from the perspective -- see how quickly we forget about these things? From the perspective we've been talking about.

MEMBER GRIFFON: And you'll start an initial draft of the overall guidance.

CHAIRMAN MELIUS: And I'll start an initial draft, like I said, like an outline at first for that.

MEMBER GRIFFON: And can I ask before I forget to ask this question of Emily. The five key words or phrases. I think I've

got three.

MS. HOWELL: Yes, I'm just pasting this off of 83.13(c)(3)(I): presence, health endangerment stuff. So discrete incidents, exceptionally high-level exposures, similarly high-level exposures.

MEMBER ZIEMER: What is that?

MS. HOWELL: It says, the full phrase is such as nuclear criticality incidents or other events involving similarly high-level exposures. So the issue with that is, it's more how do similarly high levels of exposure compared to exceptionally high levels of exposure. Are they the same? Are they different and et cetera? Then failure of radiation protection controls versus, in the next sentence, unprotected exposure. Again are they the same or are they different? And presence.

MEMBER ZIEMER: What was the fourth one? After failure?

MS. HOWELL: Failure of radiation

protection control and then there is no absence. Absence is not in there. And unprotected exposure.

MEMBER BEACH: If you look at the conference call notes from January 4. That full paragraph is in there if anybody has that.

DR. MAURO: Say that again.

MEMBER BEACH: It was a conference call to prepare for this meeting to bring Sam up to date on January 4. And that's the pending, notes conference call on 250 day SEC, January 4, 2010 final. And that whole paragraph is in there.

MS. HOWELL: So the fourth was failure of radiation protection controls. The next one was unprotected exposure. And then the last one, which is six actually is presence. And with presence I think you need to verify that is, you know, instantaneous presence of like one second, to think about it practically speaking, not just technically

what scientifically makes sense. But then how do you apply these practically, because that's where some of this stuff you guys have mentioned today, that's where like the rubber meets the road. Some of what you are talking about may make sense from a scientific perspective but in terms of practical application it is a little unclear.

MEMBER ZIEMER: What was the very first one on your list?

MS. HOWELL: Discrete incidents.

MEMBER ZIEMER: Oh, discrete.

MR. KATZ: Can I point out these terms that you've listed, they are not independent criteria. A bunch of this is an example, all laid out as an example. If I could just read. For Classes of employees that may have been exposed to radiation during discreet incidents likely to have involved exceptionally high-level exposures such as nuclear critical incidents or other events involving similarly high levels of exposures

resulting from the failure of radiation protection controls. Such as is always is an example of that initial.

MS. HOWELL: Right but when we, I'm saying this because we've actually gone through hypotheticals and tried to apply these hypotheticals that DCAS has provided for us and so I'm just saying like we need to think about, those are the individual phrases that are strung together in this example, but we need to think about the individual phrases too because we were just having, that's where I'm talking about practical application being difficult. I know that they are all modified with likely to, such as, and that's a whole other kettle of fish.

DR. MAKHIJANI: In making these summaries it might be helpful if we made a table, a side by side table to feature these cases so you can look at them. I mean, not every element in the table might be filled because there may be question marks in some of

them. If we had a side by side, you know, in relation to some of these terms, we could maybe --

DR. MAURO: I agree with that but that can't happen until you have your narrative.

CHAIRMAN MELIUS: Let's do the narrative first then, and then go back and also be a little careful about doing legal interpretations.

DR. MAKHIJANI: No I wasn't talking about legal interpretations. I was talking about putting the characteristics of the incidents side by side so you could see in one table.

CHAIRMAN MELIUS: The ghost of counsel past to haunt you.

MEMBER ZIEMER: I think tying these together though as you suggested is an important factor because I continue to see assertions, for example from petitioners, that failure of rad controls are grounds for an SEC

and that would be for example, failure to take a leak test within six months and it was a week over. And therefore, so it's got to be tied to something that has a particular outcome.

CHAIRMAN MELIUS: It's also why I hesitate to tie it to an operational or regulatory guidance document. It really follows different legal bases. Is everybody -- were you trying to get this done by making significant progress by August?

MEMBER ZIEMER: Yes.

DR. MAKHIJANI: August. So you would want a report for that?

CHAIRMAN MELIUS: Yes.

DR. MAKHIJANI: And the Working Group meeting before the August?

CHAIRMAN MELIUS: Yes.

DR. MAURO: Is this an SC&A report?

CHAIRMAN MELIUS: The summary is an SC&A report. The guidance summary, the summary is an SC&A report. The guidance

document is not. That is a Work Group -- that is a NIOSH collaboration.

DR. MAKHIJANI: And Jim, when you say summary, the Baneberry piece, were you looking for more of an elaboration on that as a separate document than the summary of everything we've got?

CHAIRMAN MELIUS: No, the summary would include -- you decide whether to use part one or part two. I think we need some more -- I don't think we have as good detailed documentation for Nevada Test Site in the context of this 250 day issue as we do for Met Lab and --

DR. MAURO: So it's factual information. I just want to make sure I got this right. Factual information, for example, of the list of events that are identified, obviously, and the degree to which -- how much information do we have regarding those events that represent a resource to make a judgment whether or not it is adequate. We wouldn't

make this judgment, whether or not this, we have this situation where there is adequate information to reconstruct a person's dose and place a bound on the event. So what we are really summarizing is factual information that is available on the record. We are compiling it in a way that is crosscutting to all the matters that we are concerned with as it applies to 250 workdays. So it is almost like a repackaging of the information in a different way.

MEMBER ZIEMER: I think we have the information we just need to get it.

DR. MAURO: Repackaged, so in a --

DR. MAKHIJANI: It's just a summary of what we know and what we don't know from the reports we've already done.

DR. MAURO: Within the context of the 250 workdays.

MEMBER GRIFFON: As it is relevant in making the 250 day decision, yes.

DR. MAURO: Okay.

MEMBER GRIFFON: I think for the Nevada Test Site, you keep talking about Baneberry but there are other events before that. And then what might be relevant is each one of these incidents we know a) there is a good log of all personnel that were in the area and b) we know that they all got in vivo rate, you know. But that not might be true for all the incidents.

CHAIRMAN MELIUS: The population was closed.

MEMBER GRIFFON: Right, right.

CHAIRMAN MELIUS: We will have to address that we are thinking about this.

MEMBER GRIFFON: Right.

DR. MAKHIJANI: We've certainly done enough work on these three sites that this should be able to give you the ability to pull it all together for a summary.

CHAIRMAN MELIUS: Right.

DR. MAURO: It is re-crafting it out there in a way that is more useful to

folks.

MR. KATZ: I'm just wondering, Jim, whether it might be helpful when they get to addressing the issue of what information is available for reconstructability of these doses for example, with Bainbridge and so on, if we want them to be in some sort of communication with DCAS since there is not going to be -- you don't have a lot of time for iterative process, but if DCAS folks view things differently in terms of whether all those records are there to reconstruct, for example Bainbridge, if they view that differently than SC&A you don't want to have an iterative process of getting to the end of that question, right?

CHAIRMAN MELIUS: Right, yes.

MR. KATZ: So do you want some consultative process from SC&A?

DR. MAURO: We don't there to be any disagreements on the factual information. It is essential that, when we bring that from

there --

CHAIRMAN MELIUS: Some of the factual may be so detailed or so you just can't get to it right now. I think -- so we shouldn't spend a lot of time.

MEMBER GRIFFON: Right.

CHAIRMAN MELIUS: Are we going to be able to reconstruct from this -- I mean have some technical consultation start and then if we get stuck we are going to have to, we deal with it with the Work Group and it may be that with Nevada Test Site we are not going to -- I'm not sure August is feasible. It may be or may not be. Like these other two sites, I don't think there is any more factual development needed at these other two sites.

DR. MAKHIJANI: No.

CHAIRMAN MELIUS: It's not a question -- except Jim may need to refresh on the particularly on both of them.

DR. MAKHIJANI: I need a little guidance. We are doing these summaries of

existing reports. Some of these reports haven't gotten out for DOE review and so on. Now we are going to summarize them. Can we put them on the O: drive? Do we need to send them for DOE review? How can we have a technical call and NIOSH can't see it?

MS. HOWELL: Why would NIOSH not be able to see it?

DR. NETON: I think we should be able to see it.

MS. HOWELL: Because it is at DOE?

DR. NETON: No, no. We are all government employees.

MS. HOWELL: Yes.

DR. MAKHIJANI: Just a process point, if something is at DOE review can NIOSH see it while it is at DOE review or do we wait?

MS. HOWELL: That's a question --

DR. NETON: It just can't be circulated external to the Working Group that's all.

MEMBER GRIFFON: You can share it on the O: drive or whatever.

DR. MAKHIJANI: Something that's in DOE review can still be shared with the Working Group?

MS. HOWELL: DOE not PA.

DR. MAKHIJANI: Yes, not PA.

DR. NETON: We routinely send these reports to the Board while DOE review is being conducted as long as it is held internally. That's not a problem.

DR. MAURO: When we think, when we have compiled, I've been working real close with Joe on this. When we assembled from whatever sources there are, whether it is interviews, data capture and we write a report where we have collective, disparate sources, factual information put into one place, it has to go to DOE before it goes to NIOSH or anybody else. It has to go to DOE for clearance. However, if we prepare a report from material that's already been cleared and

published and on the website --

DR. NETON: That's not what I was talking about.

DR. MAURO: Okay, good. And I would say right now my instincts tell me whatever we prepare is going to result from materials already cleared and already in the public domain, it is just re-crafting it. So there is no DOE --

DR. MAKHIJANI: I just wanted us to be clear on that.

DR. NETON: For the record, that's what I was talking about.

DR. MAURO: I'm sorry.

DR. MAKHIJANI: If there are several steps then the time table is less feasible and then we can just stick it on the O: drive and then Jim and Sam, and everybody can see it.

MEMBER ROESSLER: Jim, are you thinking of a teleconference Work Group meeting before August? Then should we pick a date?

CHAIRMAN MELIUS: No, we will pick date next week in Buffalo. Plus, my calendar is out in my car.

MEMBER ROESSLER: Okay.

CHAIRMAN MELIUS: Good. Anything else? If not, we can adjourn.

DR. MAKHIJANI: Broadly, you'll schedule for July, right?

CHAIRMAN MELIUS: There may be, there's a possibility we may try to do something -- a short conference call in June of the Work Group to talk about the guidance document. But in terms of the SC&A report and the application, that's July. So no vacations this summer.

MS. HOWELL: So the meeting regarding Dow in July would also be teleconference or are we having two separate meetings or one meeting?

CHAIRMAN MELIUS: I don't know yet. Most likely it will be a teleconference. I'm not sure what they are going to find when they

open that box.

MS. HOWELL: That's fine.

CHAIRMAN MELIUS: I'm skeptical that they'll share it. If there is information that may be useful there that they can get through declassified and that process will take some time, in which case I'm not sure we will be able to do it in July. If they determine there's nothing there, then it maybe. Okay.

MR. KATZ: Thank you, everybody.

CHAIRMAN MELIUS: Thank you everybody.

(Whereupon, the above-entitled matter went off the record at 2:33 p.m.)

1